Bringing the neighbors in:
A choice experiment on the willingness to accept agri-environmental schemes across Europe

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Abstract

This paper aims to shed light on the challenges and opportunities of promoting farmers' participation in agri-environmental programs in intensively used agricultural landscapes. On the one hand, the study assesses the costs of coordinating farmers for the implementation of such programs, as a complement or alternative to increasing the amount of land set aside for said programs. On the other hand, the paper responds to recent calls about the need to identify incentives other than monetary payments to promote farmers participation. Methodologically, the study consists of a choice experiment exploring the willingness of farmers in Germany, Switzerland, and Spain to participate in a tree planting measure. According to our findings, the resistance of farmers to participate in coordinated programs is not insurmountable and is influenced by transaction costs as well as beliefs about other farmers' behavior. Similarly, having conservation programs recommended by farmers can encourage other farmers to participate. Finally, different conservation framings can affect the resistance of farmers to participate depending on the emphasis made on the environmental benefits that farmers obtain from the programs. Overall, the findings illustrate the interest of further integrating farmers in the design of agri-environmental schemes, and further testing the feasibility of coordinated schemes in light of the influence of both monetary and social incentives.

1. Introduction

Adjusting intensive agriculture to natural resource conservation goals has become a major concern and challenge in Europe. Although farm activities have been the driver of much of the biodiversity loss in European landscapes, agriculture itself has also been understood as part of the solution (Batáry et al., 2015; Queiroz et al., 2014). This partially owes to the long history of farming activities and the cultural association of farmland with natural landscapes on the continent (Stoate et al., 2009).

Agri-environmental schemes (AES) are, with protected areas and compulsory regulations, one of the main governmental tools for conservation in EU countries, Switzerland and Norway (Kleijn and Sutherland, 2003). Like some compulsory regulations, AES target agricultural landscapes and promote the provision of ecosystem services via extensive agricultural management practices. Contrary to other tools, AES are voluntary and include economic compensation to farmers. Funds devoted to AES are substantial; they currently account for about 7% (i.e. nearly 20 billion EUR) of total EU funding for the Common Agricultural Policy programming period 2014-2020, which is approximately 20% of the expenditure for rural development and twice the cost of managing Natura 2000 protected areas (Früh-Müller et al. 2018) .

The impact of AES, however, has been only modest. About half of the schemes aiming to enhance biodiversity, for example, lack positive effects (Batáry et al., 2015; Kleijn and Sutherland, 2003). This has raised questions about the cost-effectiveness of the schemes, as well as concerns about the existence of a trade-off between the ecological effectiveness of conservation schemes and the opportunity costs of participating in the schemes for farmers (Henle et al., 2008; Sabatier et al., 2014).

A European response to the trade-off between ecological effectiveness and opportunity costs has been the promotion of spatial coordination among farmers in the implementation of AES. Farmer coordination can help to overcome participation thresholds, facilitate agglomeration effects and targeting, and contribute to learning, economies of scale, innovation and sense of belonging among farmers (Carmona-Torres et al., 2011; Franks, 2011; Mills et al., 2008; Prager, 2013, 2015; Uetake, 2013). However, coordination also entails costs and risks such as transaction costs, constraints on individual decision making, and compliance issues, all of which discourage farmers from committing and hinder the efficiency of the collaborative ventures (Amblard, 2012; Ayer, 1997; Enengel et al., 2011; Ferranto et al., 2013; Stallman, 2011; Villanueva et al., 2015b). This paper focuses on assessing those costs as well as exploring the potentially countervailing influence of so called “neighbor effects”.

A response to the limitations of economic reasoning to explain farmer behavior has been the focus on “neighbor effects”, or the exposure of farmers to what is socially appropriate and what others think about them and their decisions (Beedell and Rehman 2000; Burton 2004; Chen et al. 2009; Jaeck and Lifran 2009; Sheeder and Lynne 2011; Kuhfuss et al. 2016; Chabé-Ferret et al. 2018; Le Coent et al. 2018). Our study analyses whether these neighbor effects can reduce trade-offs between ecological effectiveness and opportunity costs in the design of AES, and explores the relative weight of said effects compared to economic factors. With some notable exceptions, little empirical experimental research has been done in that direction (Chen et al. 2009, Jaeck and Lifran 2009, Banerjee and Hanley 2015, Kuhfuss et al. 2015, 2016, Chabé-Ferret et al. 2018).

An alternative to increase the ecological impact of AES without increasing the number of farmers involved is increasing the amount of land enrolled. The greening reform of the Common Agricultural Policy (CAP) was an important step forward in this direction. Farmers are now obliged to set aside 5% of their farms as Ecological Focus Areas if they want to benefit from agricultural subsidies. The measure, however, has fallen short of expectations due to a number of exceptions to the rule. These exceptions were motivated by the strong resistance of farmers to bear the opportunity costs of the measure, and reflect an ongoing debate about whether the 5% commitment is both economically feasible and ecologically effective (Rutz et al., 2014). Additionally, increasing the land enrolled also involves more spending. This paper explores the response of farmers to changes in the amount of land required for conservation as a test of the importance of opportunity costs in farmer's decisions, as well as a reference to assess the impact of neighbor effects and coordination.

After an overview of the theory motivating the study, and the methods, we present the results of a choice experiment (CE) conducted in Switzerland, Spain and Germany, and discuss main findings with regard to the amelioration of the trade-off between ecological effectiveness of conservation measures and the opportunity costs for farmers.

2. Theoretical background

2.1 AES uptake theory

Explanations about AES uptake abound. However, there are few if any universal variables that regularly explain the adoption of conservation agriculture across past analyses (Knowler and Bradshaw, 2007). Variables can be classified into groups based on different criteria (de Graaff et al., 2008; Prager et al., 2012). This paper builds on the distinction between economic explanations on the one hand, and explanations that rely on cognitive aspects and social norms on the other (Christensen et al., 2011).

Well-understood economic factors of farmer´s willingness to participate in AES include the income loss or opportunity costs of implementing the measures (Knowler and Bradshaw, 2007; Sattler and Nagel, 2010), the level of monetary compensation that farmers receive (Defrancesco et al., 2008; Lahmar, 2010; Santos et al., 2015), transaction costs (Falconer, 2000), the duration and flexibility of contracts (Christensen et al., 2011), short and long-term dependence on agricultural income, land tenure, farm size and location, and the availability of off-farm labor (Lastra-Bravo et al., 2015; Prager and Posthumus, 2010). Related to economic factors are farmers' characteristics such as age and education (Hynes and Garvey 2009, Uthes and Matzdorf 2013, Grammatikopoulou et al. 2016). Explanations why these make a difference have to do with the lower risk aversion of younger farmers and the higher human capital and environmental awareness that tend to come with education (Defrancesco et al. 2008).

Equally important are "cognitive" factors. These have been understood as affecting an individual's economic rationality in favor of conservation behavior, and include environmental attitudes and values, information about the conservation programs, and perceptions about costs and environmental threats (Kabii and Horwitz, 2006; Knowler and Bradshaw, 2007; Prokopy et al., 2008; Schneider et al., 2010; Wauters et al., 2010).

Finally, explanations based on social norms build on the premise that farmers care not only about the economic implications of their decisions but also about their reputation within their community and about what is considered “appropriate” (Beedell and Rehman, 2000; Burton, 2004; Chen et al., 2009; Christensen et al., 2011; Jaeck and Lifran, 2009; Sheeder and Lynne, 2011). With some notable exceptions, little experimental research has been done with regard to the assessment of “social appropriateness” factors alone and in combination with factors based on economic reasoning (Chen et al. 2009; Jaeck and Lifran 2009). A prominent social psychology theory that integrates the “neighborhood effect” and has also been used to understand farmer’s conservation behavior is the Theory of Planned Behavior (TPB) (Beedell and Rehman, 2000; Burton, 2004). This theory is an improvement of the Theory of Reasoned Action (TRA), which posits that a person's behavior is explained in terms of his or her beliefs. These are in turn based on the person’s positive or negative evaluation of a course of action (attitude) and her perception of the opinion of others about such action (subjective norm). The TPB adds to this model the consideration of the person’s perceived ease or difficulty of performing a behavior (behavioral control).

2.2 Collaboration theory

Collaboration theory in the context of payments for ecosystem services is growing steadily. Studies interested in the factors contributing to successful “collaboratives”, e.g., environmental cooperatives, land-care groups, or collective stewardship programs, abound (Prager, 2015). More interesting for this study is the theory on the costs and benefits of coordination.

Coordination can contribute to the implementation and ecological effectiveness of AES through different paths. First, coordination can increase farmers’ participation (Franks and Emery, 2013): farmers’ sense of effectiveness and/or obligation can increase if they participate jointly with others and that may in turn increase their willingness to participate (Kuhfuss et al. 2014, Banerjee and Hanley 2015). Second, coordination can promote agglomeration effects of individual conservation efforts on biodiversity, i.e., via the spatial coordination of such efforts (Bamière et al., 2013; Gabriel et al., 2010; Parkhurst et al., 2002; Schmidtner et al., 2012; Warziniack et al., 2007). Third, farmer coordination can pave the way to harmonize the different ecological functions of natural resources in heterogeneous landscapes (Davies et al., 2004; Goldman et al., 2007; Ohl et al., 2008) and to tailor conservation measures to local ecological needs (Uetake, 2013). Additionally, coordination has social benefits to farmers. Collective decision making can (i) reduce conflicts of interests between farmers as well as between conservation and development goals (Rocamora-Montiel et al., 2014); (ii) reduce monitoring costs and increase compliance (Amblard, 2012; Prager, 2015); (iii) allow for more flexible, equitable payment contracts and bargaining power with governments (Carmona-Torres et al., 2011; Franks and Emery, 2013; McKenzie et al., 2013; Mills et al., 2011); (iv) increase information availability, environmental awareness and learning (Davies et al., 2004; Mills et al., 2008; Prager, 2015; Uetake, 2013); and (v) reinforce a sense of group belonging (Enengel et al., 2011; Prager, 2015).

Additionally, coordination can help overcome potential social dilemmas. Biodiversity conservation and many ecosystem services have public good characteristics. Thus, farmers may resist participating in conservation programs if it is not guaranteed that other farmers also participate or if their conservation efforts just benefit others (Goldman et al., 2007; Stallman, 2011). In the worst case scenario, there may be externalities arising from non-conservators that jeopardize the efforts of conservators (Davies et al., 2004; Kuhfuss et al., 2014; Stallman and James Jr, 2015).

However, coordination also entails challenges. First, coordination constitutes itself a (second-order) social dilemma. In collective conservation ventures, the misbehavior or lack of performance of one individual can ruin the effectiveness of the whole project. Risk aversion to such behavioral uncertainties goes against the willingness to engage in collaboration (Christensen et al., 2011). Additionally, coordination may imply the standardization of farm practices, which can entail unequal opportunity costs across farmers (Ohl et al., 2008). Further, transaction costs occur. Farmers need to communicate, make collective decisions and potentially also supervise the proper implementation of those decisions, all of which require time and resources (Goldman et al., 2007). These costs can be notably high and may sum up to more than 30% of the opportunity costs (Villanueva et al., 2015a).

3. Material and Methods

To assess the impact of coordination requirements and other attributes on farmer's participation, we used a CE survey. The CE method builds on Lancaster's theory of consumer choice (Lancaster, 1966), according to which individuals' choices depend on the attributes of certain goods and their interest in maximizing the utility gained from those attributes. The statistical analysis of the data collected through CEs is based on random utility theory (RUT) (McFadden, 1973). According to RUT, individuals make choices with the goal of maximizing the total utility they gain from those choices. Individuals are assumed to have a utility function of the form:

$$U_{ni} = V_{ni}(S_i, Z_n) + e_{ni} \qquad \text{Eq. (1)}$$

where for any individual *n*, a given level of utility U will be associated with any alternative *i*. Utility derived from any of the alternatives depends on the attributes (*S*) of alternatives and the social and economic characteristics (*Z*) of the individual. The random utility approach is the theoretical basis for integrating behavior with economic valuation in the CE. In this approach, the utility of a choice is comprised of a deterministic component (*V*) and an error term (*e*), which is independent of the deterministic part and follows a predetermined distribution. This error term captures all effects that are not observed by the researcher and implies that predictions cannot be made with certainty.

Assuming that utility increases linearly with improvements in attributes, the conditional indirect utility function is:

$$V_{ni} = \beta_0 ASC_i + \boldsymbol{\beta S_{ni}} + \boldsymbol{\delta}(\boldsymbol{Z_n} * \boldsymbol{S_{ni}}) \qquad \text{Eq. (2)}$$

where ASC_i is an alternative specific constant that captures unobserved effects associated with (the label of) alternative i on utility. The vectors of coefficients $\boldsymbol{\beta}$ and $\boldsymbol{\delta}$ are attached to the vector of attributes and the vector of interaction terms between attributes and social and economic characteristics that influence utility, respectively.

Statistical analyses of the choices can then be used to disentangle the marginal values of each of the attributes and to analyze trade-offs when comparing the attributes.

Assuming that the error terms are identically and independently distributed with an Extreme Value Type I (Gumbel) distribution, the probability of any particular alternative *j* being chosen from the set of I alternatives, P_{nj}, leads to the conditional logit model (McFadden, 1973), which takes the general form:

$$P_{nj} = \frac{\exp(V_{nj})}{\sum_{i=1}^{I} \exp(V_{ni})} \qquad \text{Eq. (3)}$$

The utility parameters β and γ of this model can be estimated with the maximum likelihood method.

CEs have been extensively used to assess willingness to pay for different environmental goods. Only recently, researchers started using CEs to elicit farmers' willingness to participate in agri-environmental programs (Christensen et al., 2011Chi; Villanueva et al., 2017). CEs allow to calculate the marginal rate of substitution between an AES and its attributes, and the compensation payment. This rate is interpreted as the *willingness to accept* (WTA) an AES and calculated as $WTA_s = -\frac{\partial V/\partial s}{\partial V/\partial c}$, with s being the ASC or the attribute of interest and c the cost attribute. For linear utility functions with centered interaction terms, WTA boils down to $WTA_s = -\beta_s/\beta_c$

In our survey, farmers were confronted with a series of choice cards with two alternative AES. Each AES option was the result of combining different levels of the attributes under study (Table 2). The task was to choose one program (or none) per choice card.

3.1 CE concept, attributes and levels

In our study farmers were invited to (hypothetically) implement a "tree planting measure" (Table 1). The measure fulfilled a series of requirements, including: applicability in different contexts, familiarity for farmers, potential for soil, water and biodiversity conservation, possibility to be used for agricultural production if desired by the farmer, and possibility for coordination across farms/farmers.

Table 1. Requirements of tree planting measure

1	Plant 20 trees per hectare of arable land dedicated to the program
2	Maintain the trees for 8 years
3	Plant the trees by the border with another farm.
4	Plant the trees at 10 meters from each other in groups.
5	No maintenance required but trees need to survive
6	After 8 years of the program contract can be renovated or cancelled

The tree planting measure was labeled in three ways: (i) as part of a soil conservation program with the goal of reducing soil erosion; (ii) as part of a water conservation program with the goal of reducing harmful water emissions; and (iii) as part of a biodiversity conservation program with the goal of reducing the loss of soil biodiversity. Labels in CEs are useful when there are signs that subjects perceive some attributes as an overarching characteristic of a choice scenario, namely as a "type" of scenario, rather than a specific feature of it (Olschewski, 2013). As pointed out by Hensher et al. (2005), choices in many occasions are the result of "perceptual beliefs" rather than of rational assessment of facts. In this case one may aim to capture those perceptions through a label. Labelled CEs, however, have also issues. To the extent that labels may be relatively abstract, individuals may use labels to infer missing (omitted) information. This information may, in turn, be correlated with the random component of the utility function, thus potentially affecting model estimates and interpretation of results (Louviere et al., 2000). This omitted variable bias can be minimized by collecting enough information ex ante to make the choice problem as closely related to individuals´ choice motivations, experiences and reasoning as possible (Louviere et al., 2000).

The labels in this study aimed to capture the perceived value given by farmers to different environmental conservation programs. As mentioned before, many ecosystem services have properties of public goods. This does not mean, however, that every user of ecosystems benefits equally from the services. As pointed out by Stallman (2011, p.xx), "it is likely that ecosystem services with a high potential to supply direct private benefits to the provider are more likely to supply a net benefit than those with a low potential". Agriculture, and farmers in particular, benefit from specific ecosystem services, such as soil fertility, pollination and pest control (Dale and Polasky, 2007; Stallman, 2011). The private benefits can be economic such as increased crop yields, or socio-cultural, such as self-realization or increased wildlife viewing (Stallman, 2011). Thus, farmers may value these services more than others. In contrast, other ecosystem services, such as groundwater purification may be of less private value to farmers.

The selection of the attributes included in the choice scenarios (Table 2) was based on a combination of the reviewed theory, a literature review of empirical studies on that topic, and information from focus-group discussions with farmers at the German and Spanish study sites. The discussions were oriented to get a sense of the relevance of different attributes and to explore different designs of the CE.

Table 2. Attributes of the choice experiment

Attributes	Description	Levels
Location of trees	Location of trees along the border of the farm of a neighboring participant	1. Coordinated 2. Not coordinated
Share of farm	Percentage of farm dedicated to the measure	1. 1% 2. 5% 3. 10%
Recommendation	Whether the program has been selected over others by a reference group	1. Recommended by farmers 2. Recommended by scientists 3. No particular recommendation
Payment for action	Annual individual payment in € per hectare, in addition to the reimbursement of planting costs and other governmental subsidies.	1. 50 2. 100 3. 150 4. 200

The “location of trees” attribute confronted farmers with the possibility of coordinating or not with their neighbors for the implementation of the tree planting measure (see Table 1, and Figure A1). Coordination in this case does not involve free rider problems but still generates transaction costs associated with communication and collective decision making, as well as with long-term uncertainties related to unforeseen environmental or behavioral change. Also, some farmers may face higher opportunity costs than others. Our interest was to assess the extent to which the theoretical reluctance of farmers to avoid coordination is fulfilled and the degree to which it could be offset via monetary payments or other theory- and policy-relevant attributes.

A policy-relevant attribute is the “share of farm” dedicated to the AES. The reluctance of the European farm lobby to dedicate more than 5% (or even 2%) of farmland to an “ecological function” (i.e., Ecological Focus Areas) during the last European Common Agricultural Policy showed the need to better understand the opportunity costs of increasing biodiversity services via the promotion of land-use change (Schulz et al., 2014). It is unclear a priori whether agri-environmental measures represent a cost under all conditions. Devote land to environmental conservation can be seen by some as an attractive alternative, particularly in case of (i) ecologically sensitive areas, (ii) less productive land or (iii) among farmers who are concerned about the environment (Beedell and Rehman, 2000; Kuhfuss et al., 2015; Schulz et al., 2014). Everything else being equal, however, we expect opportunity costs to be positive and to increase with the share of the agricultural land affected (Espinosa-Goded et al., 2010; Schulz et al., 2014; Villanueva et al., 2015b). How those costs compare to the costs of coordination is an open question. We set the levels of the “share of farm” attribute around 5%, which is the Ecological Focus Area (EFA) threshold established in the last CAP reform in Europe. Due to the exceptions and weighting system used, the real impact of the EFA does not exceed 1-2%. By 2018, depending on reviews, the plan is to raise the threshold from 5 to 7% (Hart, 2015).

A second, more theory-relevant attribute we wanted to explore is “recommendation”. This attribute aims to capture the role of social pressure, i.e., information about choices made by groups that can potentially influence farmers’ decisions. As pointed out by the Theory of Planned Behavior, social influence on individual choices should not be taken for granted. The question for us was, how such pressure compares to the costs associated with coordination and the opportunity costs of land-use change.

Finally, there is the “annual payment” attribute which served in this study as a financial indicator of WTA (Louviere et al., 2000), and as a means to calculate potential monetary trade-offs among attributes. The levels of the “payment” attribute were set as close as possible to payments of similar governmental programs. The task was difficult given disparities concerning country-specific programs and purchasing power. In the region of Aragon, for example, the government had offered 22 €/ha for maintaining 5 non-productive trees per hectare in 2007-2013 (Gobierno de Aragon, 2014), 428 €/ha to create hedge rows of 2-3 meters wide and 175 meters long, and 332 €/ha to maintain extensive vineyards in terraces (Gobierno de Aragon, 2015); while in Germany, a program currently pays 6.5 €/tree for around 40 to 100 trees/ha in extensive fruit orchards (Land, 2015). In Switzerland, the planting of ecologically valuable and well-managed forested hedge rows is subsidized with up to 2800 Swiss Francs (approx. 2500 €/ha) (OFAG 2018). Also, pilot interviews revealed that famers were rather concerned about the opportunity costs of reducing agricultural area and more secondarily about the costs of guaranteeing the survival of the trees. The costs of planting trees (i.e., investment costs) were not signaled as an issue. Also, while farmers would tend do the maintenance themselves, most of them were likely to contract someone to do the planting, i.e. at different market costs depending on the country and the number of trees planted (our "area" attribute). Based on this, and also given our interest to disentangle the opportunity costs of the measure we included the full reimbursement of the planting costs in the experimental scenario. Accordingly, we did not provide information about the costs of planting trees to the farmers during the experiment.

Decision 5 of 12: ***Please choose one of the 3 alternatives here below***

5 / 12	**Biodiversity program**	**Soil program**	**None**
Share of farm	10 %	1 %	I choose none of the programs
Location of trees	Not coordinated	Coordinated	
Recommendation	Recommended by farmers	No recommendation in particular	
Annual payment per hectare	150 €	100 €	
My choice: → (mark with an X)	☐	☐	☐

Figure 1: Example of a choice card

3.2 Case study selection

Case selection followed a "most different-case" strategy (Mill, 1872, cited in Sekhon, 2004). This strategy fitted our goals of maximizing the generalizability of results and capturing the diverse reality of farming practices across Europe. Cases were selected in three countries, Switzerland, Germany and Spain (see Figure A2 in Appendix). In Spain, like in Germany and the other EU member states, farmers have to devote 5% of their farms to an "Ecological Focus Area" since 2014. In Spain, EFAs can comprise fallow land, agro-forestry, afforested areas and N-fixing crops. In Germany, EFAs can additionally include terraces, landscape features such as trees and hedge rows, buffer strips, forest edges and catch crops (Hart, 2015). Additionally, farmers can apply for a variety of AES for biodiversity conservation, climate change mitigation, water conservation and organic farming development. In Switzerland, direct payments to farmers are also conditioned on the implementation of "Ecological Compensation Areas" (ECA). Contrary to the European EFA regulations, the Swiss regulations require that farmers devote at least 7% of their farm to ECAs and the full direct payment is conditioned on that (in the EU, only 30% of the direct payments depend on compliance with the EFA requirement). ECAs may consist of a variety of biotopes such as extensive grasslands, traditional orchards, hedges, field margin strips, conservation headlands, ditches, stone walls or unpaved roads. Most frequent biotopes included under ECA are low-intensity meadows (49% of ECA area) and extensively used meadows (41%).

3.3 Data gathering and experimental design

Like in other studies of similar geographical scope (see Figure A2 in Appendix), the surveys were delivered through different means, depending on feasibility (Arnaud et al., 2006). At the Spanish site, contacts were obtained from the records of the local agricultural and irrigation cooperatives and the survey was delivered via ordinary mail to 130 farmers. At the German and Swiss sites, contacts were obtained from public authorities and the surveys were delivered via a letter that included a link to an online platform. We sent out 350 letters at the German site and 1,500 at the Swiss site. We also carried out surveys in person at the Spanish and German sites. Previous studies have shown that switching survey mode in follow-up surveys can notably increase response rate (Dillman et al. 2009). We opted for this strategy as a backup in case response rates were too low for statistical analysis, given the relatively small sample size at these sites (particularly the Spanish site). We also delivered surveys in person at the German site. The instructions of the survey included descriptions of the water, soil and biodiversity programs' goals and a detailed overview of the tree planting measure and attributes. Special emphasis was put (i) on the possibility to cut the trees down if desired after the end of the program and to reconvert land to the former uses, and (ii) on the complementary nature of the payments, i.e. in addition to any other governmental payments they would receive. Whenever the survey was delivered in person, the instructions were read out loud and questions were solved. The instructions also included an illustration of the tree location attribute.

The total number of possible combinations of the attribute levels was $3 * 2 * 3 * 3 * 4 = 216$ leading to 216^2 =46656 possible choice cards. To reduce the number of combinations while minimizing the information loss, the CE applied an efficient fractional factorial design, minimizing the d-error for a multinomial logit model (ChoiceMetrics, 2012). The design was created with all attributes entering the utility function linearly, except for the labels (i.e. the different program ASCs) and the recommendation attribute, which were dummy coded. The priors of the coefficients used to minimize the d-error were estimated based on a pre-test with 50 individuals. Given uncertainty concerning the correct prior values, we chose a Bayesian efficient design, assuming priors to be random variables. The resulting CE consisted of 12 choice cards with three options (two labelled programs plus an opt-out option) and four attributes. We mailed the CE along with a questionnaire (heretofore post-experiment survey) aiming to capture socio-economic, farm, and attitudinal characteristics.

The mail survey response rates varied significantly across countries. The rate was 30% in Spain (n=37, Monegros and Sastago counties) and about 10% in Germany (n=34, Uckermark district) and Switzerland (n=163, Cantons Aargau and Zurich). Setting appointments with farmers at the Spanish and German sites was more difficult than expected and the in-person surveys did not notably increase sample size. Given the satisfactory response rates obtained via mail we decided to use only mail surveys. The willingness of farmers to respond to our survey could be related to different attitudes towards participating in agri-environmental schemes. In that case, the differences in the response rates across sites would question the comparability of the results; however, we did not find strong differences in the percentage of farmers who systematically (i.e., in all 12 choice cards) chose the opt-out option (32%, 21% and 42% at the Spanish, German and Swiss sites, respectively). Also, there may be a bias in the Spanish sample since only farmers who are members of the local agricultural and irrigation cooperatives were included; however, as indicated by our informants, more than 90% of all the farmers in the area are members of a cooperative.

3.4 Model specification

In this study we adopted the conditional logit model both with and without interactions as a start of the analysis[1]. We coded the attributes into five variables: “share of farm”, “coordinated location of trees”, “farmer recommendation”, “scientist recommendation” and “payment”. We also included an alternative specific constant (ASC_i) for each program (“water program”, “soil program”, and “biodiversity program”). The ASC_i) takes the value 1 if the hypothetical program associated with alternative i is present and 0 otherwise. Thus, positive coefficients of the ASC variables suggest the existence of some systematic but unobserved utility in choosing one of the programs compared to the opt-out alternative (Meyerhoff and Liebe, 2009). In contrast, negative coefficients indicate that, given the alternative programs, opting out is preferred. “Share of farm” and “payment” were modeled as numeric variables. We effects-coded the rest of variables (“Coordinated location of trees”, “Farmer recommendation” and “Scientist recommendation”) to better interpret the interactions and the alternative-specific constant of the opt-out option (Bech & Gyrd-Hansen 2005; Daly et al. 2016).

Case-specific variables included “age” (numeric; see Table A1-1 in Appendix), “education” (ordinal), “farm size” (numeric), “income” (numeric), and the percentage of “rented” land from other landowners (numeric). We centered all case-specific attributes at the country (i.e., site) level. Also, we expected preferences about coordination to be contingent on whether the program had been recommended by farmers (i.e., potentially neighbors) or scientists and we included the corresponding interactions. Overall, the generic utility function from Eq. 2 will be estimated with the following specification:

$$V_{ni} = \beta_{i0} ASC_i + \beta_1 Share\ of\ Farm + \beta_2 Coordinated\ location\ of\ trees + \beta_3 Farmer\ recommendation + \beta_4 Scientist\ recommendation + \beta_5\ Payment + \delta_{1i} ASC_i * age + \delta_{2i} ASC_i * education + \delta_{3i} ASC_i * farm\ size + \delta_{4i} ASC_i * income +$$

[1] The conditional logit model has two main restrictions. First, it holds the Independence of Irrelevant Alternatives (IIA) assumption. Second, it does not incorporate unobserved preference heterogeneity. Extensions of the conditional logit model such as the random parameters logit model or the latent class logit model relax these assumptions and are therefore frequently used in empirical analyses of CE data. However, we opted for the conditional logit model for three reasons. First, the IIA test (Hausman and McFadden, 1984) indicated for all but one of the 12 combinations of full and country samples and alternatives that IIA is not violated (See Table A1 in Appendix for details). Second, the small sample sizes lead to very low degrees of freedom in more advanced models, threatening the validity of parameter estimates and overfitting (Babyak, 2004). Third, the results of a random parameters logit model are similar to those from the conditional logit model. The direction and significance of almost all estimated parameters did not vary and the few that varied did not affect our main findings (Table 3). In Model 1 (ES), the “farmer recommendation” variable changed sign to negative but was still not significant. In Model 3 (CH), the negative effect of the “coordinated location of trees” variable turned out significant. In Model 4 (SP+DE+CH) the “scientist recommendation” turned out significant. The results of these models are available upon request.

$$\delta_{5i}ASC_i * rented + \delta_6 Share\ of\ Farm * age \ldots + \delta_{30}Payment * rented\ +$$
$$\delta_{31}Coordinated\ location\ of\ trees * farmer\ recommendation\ +$$
$$\delta_{32}Coordinated\ location\ of\ trees * scientist\ recommendation \qquad \text{Eq. (4)}$$

4. Results

The mail survey response rates varied significantly across countries. The rate was 30% in Spain (n=37, Monegros and Sastago counties) and about 10% in Germany (n=34, Uckermark district) and Switzerland (n=163, Cantons Aargau and Zurich). Setting appointments with farmers at the Spanish and German sites was more difficult than expected and the in-person survey did not notably increase sample size. Given the satisfactory response rates obtained via mail we decided to use only mail surveys. The willingness of farmers to respond to our survey could be related to different attitudes towards participating in agri-environmental schemes. In that case, the differences in the response rates across sites would question the comparability of the results; however, we did not find strong differences in the percentage of farmers who systematically (i.e., in all 12 choice cards) chose the opt-out option (32%, 21% and 42% at the Spanish, German and Swiss sites, respectively). Also, there may be a bias in the Spanish sample since only farmers who are members of the local agricultural and irrigation cooperatives were included; however, as indicated by our informants, more than 90% of all the farmers in the area are members of a cooperative.

The analysis of the data by country revealed some general patterns (Table 3). First, there was a negative and significant impact of “share of farm”. This is, together with the impact of the payment attribute, the most consistent result across all the countries. The post-experiment survey was also revealing in this regard: When asked about their preference in locating the trees, 63%, 60% and 74%, of participants at the Spanish, German and Swiss sites replied that they would rather concentrate them in one plot than to spread them out in different plots. Informal conversations with some of the farmers at the Spanish and German sites revealed an interest in devoting the least productive and least easily accessible plots to the measure. Overall, the results support current knowledge about the opportunity costs of devoting agricultural resources (i.e., land) to conservation in landscapes with intensified agricultural production and the eagerness of farmers to avoid or minimize those costs.

Second, the “coordinated location of trees” variable also showed a significant negative impact at the Spanish and German sites, and a negative but not significant impact at the Swiss site (Table 3). The post-experiment survey results provided additional information: At the German and Swiss sites, about 60% of the participants disagreed with the statement that “in case me and my neighbors participated in the tree planting measure, coordinating to choose where to plant the trees along the border would be easy”. This supports transaction cost theory and our conjecture about the added difficulties and uncertainties of collective action. That said, 60% is not an overwhelming rate, and the rate dropped to 22% at the Spanish site. Thus, it is unclear whether the resistance to conservation programs that require coordination is driven just by concerns about transaction costs. A complementary explanation may have to do with the belief that other farmers would be reluctant to participate in the conservation program or to facilitate that their neighbors participate. Around 68%, 91% and 93% of the participants at the Spanish, German and Swiss sites disagreed with the statement that “most of the farmers in this county would be interested in the tree planting measure”;

and 73%, 84% and 78% disagreed with the statement that "obtaining the consent of my neighbors so I could plant trees in the border of our farms would be easy".

Table 3. Conditional logit models of willingness to participate in tree planting AES

VARIABLES	(1) SP	(2) DE	(3) CH	(4) SP+DE+CH
Water program	-1.548**	-1.630**	-1.900***	-1.679***
	(0.630)	(0.789)	(0.416)	(0.250)
Soil program	-0.821	-1.054	-1.641***	-1.357***
	(0.628)	(0.810)	(0.416)	(0.251)
Biodiversity program	-0.979	-0.477	-1.819***	-1.341***
	(0.891)	(1.060)	(0.567)	(0.345)
Share of farm	-0.105**	-0.242***	-0.112***	-0.114***
	(0.0526)	(0.0608)	(0.0336)	(0.0204)
Coordinated location of trees	-0.444**	-0.445*	-0.128	-0.217***
	(0.220)	(0.256)	(0.133)	(0.0832)
Farmer recommendation	0.158	0.345	0.267**	0.300***
	(0.214)	(0.232)	(0.127)	(0.0786)
Scientist recommendation	-0.0577	0.0847	-0.180	-0.161
	(0.265)	(0.286)	(0.162)	(0.100)
Payment	0.00854***	0.0111***	0.006***	0.00721***
	(0.00301)	(0.00372)	(0.002)	(0.00118)
Pseudo-R2	0.25	0.24	0.25	0.19
LL	-299.724	-269.953	-1269.487	-1978.704
AIC	699.449	639.907	2638.973	4057.409
BIC	948.406	883.875	2960.75	4397.558
Observations	1,074	972	4,608	6,654
Participants*	31	27	136	195

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Note: Very few interactions were significant (two interactions in Models 1, 2 and 4; and one interaction in Model 3). Those included: [coordinated location of trees]*[percentage of rented land] (1.73, p<0.05), and [water program]*[percentage of rented land] in Model 1 (-3,53, p<0.1); [farmer recommendation]*[income] (0.012, p<0.1), [scientist recommendation]*[income] (-0.017, p<0.05) in Model 2; [soil program]*[age] (0.062, p<0.1) in Model 3; and [water program]*[percentage of rented land] (-1.68, p<0.05), and [coordinated location of trees]*[scientists recommendation] (-0.105, p<0.1) in Model 4. The full models are available upon request. The Swiss sample is considerably larger than the Spanish and German samples as it is the result of aggregating samples from two counties (Cantons Zurich and Aargau). Table A2 in the Appendix displays the model results for the two Swiss counties separately. Results are for the most part consistent with those displayed in this table.

*Sample size for SP, DE and CH was 37, 34, and 163, respectively. The sample size of the models is lower due to missing data in the survey variables mentioned in Note 1 (age, education, farm size, income)

Third, the "recommendation" attribute revealed substantial differences depending on the "advisor" and partially also on the study site. In Switzerland, the "farmer recommendation" variable had a significant positive impact as compared to the absence of any recommendation in particular (the impact was also positive not significant at the German and Spanish sites). In contrast, the "scientist recommendation" variable had no significant impact at any of the sampling sites. The post-experiment survey results are insightful and also puzzling. Approximately 60% and 80% of the participants at the Spanish and German sites considered the opinion of other farmers about agricultural practices to be quite or very important for them, although "just" around 50% did so at the Swiss sites. Despite this slight inconsistency between the choice experiment and survey data (see also discussion section), the results tend to support our conjecture about the importance of knowing about the opinion and preferences of other potentially relevant groups, at least as far as farmers' recommendations at the Swiss study site are concerned.

Fourth, at all sites, conservation programs tend to have a negative impact on utility, as compared to the "opt-out" option. Although the negative impact was not significant in all countries, the findings illustrate the general resistance of farmers to participate in conservation programs by default. More importantly, the water-conservation label had a stronger negative impact on utility than the soil conservation and biodiversity labels and was indeed the only one among the three that was significant in all countries (Table 3). A Wald test for equality of the corresponding pairs of coefficients was rejected, meaning that the utility differences between the programs are statistically significant. Results from the post-experiment survey confirm these findings, too (see Figure A3 in Appendix). Around 68%, 41%, and 59% of participants at the Spanish, German and Swiss sites indicated that soil erosion control is the most important conservation goal when compared to water and biodiversity conservation. Overall, the results align with our conjecture about the preference of farmers for ecosystem services with a higher share of private to public benefits. Soil conservation, and to some extent also biodiversity, are expected to contribute more to farm productivity and farmer's benefits than water conservation, which should mostly benefit downstream users.

Fifth, the "payment" attribute had, as expected, a positive and significant impact on utility across all countries.

It is important to note that around 37% of all farmers systematically chose the opt-out option. Although this is consistent with results from similar studies, it is important to explore whether this affected the main findings (Meyerhoff and Liebe, 2009). To do so, we re-run the models in Table 3 without the participants who systematically opted out (see Table A3 in Appendix). Although the statistical significance of some of the coefficients changed, the direction of most of them did not. The direction of the effect of the water and soil conservation labels changed in the Spanish and German samples (from negative to positive, not statistically significant); however, the relative preference of farmers for the soil label compared to the water label remained the same. Also, we run a model including only one ASC for the opt out option instead of the conservation labels, and a number of interactions between the ASC and farm characteristic and attitudinal variables. As shown in Table A4 in the Appendix, the model aligned with the results from Table 3. The main difference was the coefficient of the coordination variable for the German sample, which changed from negative to positive (although not significant). Also, according to the model, farmers who already have trees not for production in their farms opted out more frequently (all samples); farmers who believe that "trees that are not cultivated intensively increase the risk of plagues and weeds in farms" also opted out more frequently than otherwise (in the German and Swiss samples); and farmers with higher income (Spanish and Swiss samples) and with lower education (German and Swiss samples) also opted out more frequently than otherwise.

Finally, the conversion of the model coefficients into monetary values facilitates the assessment of trade-offs (see Table 4). Moving from a water conservation framing to a soil or biodiversity conservation framing would allow to reduce the payment by 45€/ha and 47€/ha, or could allow to pay an increase in the area enrolled by 3 points, approximately. Also, the cost of adding the coordination requirement in a program (60€/ha) would be approximately equal to the cost of increasing the area devoted to the program by 4 percentage points. Finally, having the program recommended by farmers could totally offset the costs of coordination or the costs of increasing the requirement of enrolled land from 5 to 10%.

Table 4. Payment estimations of conservation programs

	Most expensive program	**Least expensive program**
Conservation Label	*Water* (233 €/ha)	*Biodiversity* (186 €/ha)
Area	*10%* (16 €/ha)	*1%* (16 €/ha)
Coordination	*Coordinated* (60 €/ha)	*Not Coordinated*
Recommendation	*Not recommended by any group*	*Recommended by farmers* (-82 €/ha)
Payment €/ha	309 €/ha	120 €/ha
TOTAL Payment*	4,635 €	180 €

*: Estimated for the average farm size across the sites (~150 ha). This would correspond in the most expensive program to ~15 ha enrolled, and 300 trees planted; and in the least expensive program to ~1.5 ha and 30 trees planted. For site-specific estimates please refer to Table A6.
Note: Importantly, as pointed in the instructions of the choice experiment, it is expected that the trees planted only occupy 1/5 of each ha devoted to the program. In the most expensive program that would correspond to 3.8 ha, and in the least expensive to 0.38 ha.

5. Discussion

Our results inspire several discussion points. First, the negative impact of the "share of farm" attribute is consistent with previous findings about the reluctance of farmers to give up agricultural production for conservation, and illustrates well-known tensions between agricultural intensification and conservation (Espinosa-Goded et al., 2010; Schulz et al., 2014; Villanueva et al., 2015b). This is particularly relevant given recent recommendations to increase the agricultural land set aside for biodiversity conservation in Europe (i.e., Ecological Focus Areas within the within the European CAP) (Pe'er et al., 2014; Zinngrebe et al., 2017). That said, it is important to note that the conditions of agricultural intensification are not the same across the sites and thus pathways to conservation may need to vary too (see Tables A5 in Appendix). At the Spanish site, intensification is driven by the expansion of irrigation and rental in a context of relatively high land-property fragmentation (close to 60% of the farmers in the sample enjoy irrigation in at least 25% of their farm; average farm size = 156 ha; average plot size = 8 ha; rented land = 57%). Here, conservation requirements should bear in mind the clear dichotomy between dry and rather unproductive land on the one hand, and irrigated and intensively-used land on the other, and build on the likely low resistance of farmers to implement more stringent conservation measures in the former than in the latter. At the German site, intensification is rather characterized by large-scale production and the concentration of cultivation is in the hands of a few large firms (average farm size = 680 ha; average plot size = 18 ha; 30% of the farmers cultivate 80% of the land). Here, conservation efforts shall benefit from targeting the largest firms and negotiating tailored agreements. Finally, the Swiss sample is mostly featured by small farms that produce high value crops/fruits in rather heterogeneous landscapes (average farm size = 38 ha; average plot size = 3 ha; average income = 1335 €/hectare). Here, the success of conservation shall benefit the most from the coordinated implementation of measures.

Second, and more importantly for this study, coordination of tree location tends to weight negatively on the willingness to participate in AES (significantly in the Spanish and German samples). In our CE such negative effect had less to do with concerns about the transaction costs of coordination (Goldman et al., 2007; Villanueva et al., 2015a), than with certain skepticism about the willingness of other farmers to participate in the program or to facilitate that their neighbors participate. This means that, given the appropriate conditions (i.e., low actual or expected transaction costs among farmers), overcoming the resistance of farmers to participate in an AES may be enough to implement coordinated measures. This is congruent with previous studies showing the benefits of agglomeration effects on participation (Drechsler et al., 2010; Parkhurst and Shogren, 2007). Also, as pointed in the theory section, natural resource conservation decisions are usually embedded in social dilemmas at different levels (Muradian and Gómez-Baggethun, 2013). In the AES context, the decision to participate and the decision to coordinate theoretically reflect two social dilemmas; however, as illustrated here, distinguishing one from the other may be trivial if the transaction costs of solving one or the other are minor. Appropriate diagnoses of how transaction costs distribute across the two social dilemmas in different situations seem thus important in order to better design coordinated payment schemes.

Interpreting the negative but non-significant effect of coordination in the Swiss sample is difficult. The Swiss farmers were neither less concerned than the German farmers about coordination costs, nor more optimistic than the Spanish or German farmers about their neighbors' behavior; still Swiss farmers were less resisting to coordinate. The interaction terms between coordination and case-specific variables included in the regression did not provide further insights (none were significant). One explanation may relate to the higher propensity of Swiss farmers to concentrate the trees in one or a few plots than to spread them out across their farms (see Appendix A7-2). As shown in Appendix A7-1, the average size of farm plots is considerably smaller in the Swiss sample (3 ha) than in the Spanish and German samples (8 and 18 ha, respectively). Also, knowledge gained through field visits revealed a much higher concentration of plots in Swiss farms than in Spanish farms. Thus, devoting an entire plot (e.g., of 3 ha in a farm of 30has) to the tree planting was likely a more realistic option for the Swiss farmers (i.e., vis a vis coordinating with neighbors) than for the German and Spanish farmers. This would justify that, although similarly concerned about transaction costs than German farmers, Swiss farmers still expected some leverage to minimize them (i.e., by concentrating the trees in one plot).

Third, the positive impact of farmers' recommendation on WTA is revealing. It supports previous findings about the influence of social norms (Beedell and Rehman, 2000) and information about others' preferences or expectations (Chen et al., 2009; Kuhfuss et al., 2015) in farmers' conservation behavior, and encourages further tests of the Theory of Planned Behavior in this context. Moreover, the findings are revealing in the prevalence of farmers' recommendations over scientific recommendations. A number of reasons may explain this pattern, including credibility of traditional and crowd knowledge vs. scientific knowledge, as well as the influence of previous experiences, trust and legitimacy, bureaucracy and social distance (Anderson and Feder, 2003, 2004; Curry and Winter, 2000; Purcell and Anderson, 1997). European governments have recently rediscovered the importance of steering production and dissemination of knowledge in the agricultural sector via the organization of farm advisory systems (FAS). The dismantlement of national extension services in many countries across Europe in the 1990s left an advisory gap that was filled by a myriad of private actors in a rather uncoordinated way (Garforth et al., 2003). These actors, which range from commercial companies and consulting firms, to cooperatives and farmer unions, constitute the core new pluralistic advisory systems which are still far from performing satisfactorily (Knuth and Knierim, 2013; Labarthe and Laurent, 2013; Winter, 2000), particularly in their potential promotion of agri-environmental policy (Klerkx et al., 2006; Sutherland et al., 2013). The findings from this study highlight the potential of integrating farmers' knowledge and normative considerations in the new FAS.

Also importantly, in our CE the willingness of farmers to participate in conservation programs varied depending on the goal of conservation. Farmers in the CE were invited to participate in programs with different conservation goals; however, the conservation measure (tree planting) and thus the opportunity costs were the same in all programs. As shown, conservation goals that involve comparatively low ratios of private to public benefits (i.e., water conservation as compared to soil conservation in our experiment) tend to face more resistance from farmers than otherwise. In other words, farmers make conservation decisions not only based on opportunity costs, but also on the benefits of the conservation measure and their distribution (Stallman, 2011).

The influence of conservation goals in participation also illustrates the importance of policy framing. The "conservation goal" labels in our experiment targeted different ecosystem services as if the tree planting measure could contribute to one or the other; however, in-field trees contribute simultaneously to soil, water and biodiversity services, and also other production and cultural services. In multifunctional landscapes, policy framing can be particularly important. As pointed out by other authors, public goods and services that are produced jointly with agricultural commodities are expected to generate lower transaction costs, if the policy is applied to the commodities instead of exclusively to the public goods (Rørstad et al., 2007; Vatn, 2002). A similar logic applies to our findings. Given multifunctional conservation measures like the tree planting, framings that emphasize the private benefits of the measures (e.g., soil conservation) can trigger participation more effectively than otherwise. Alternatively, the findings could be explained by the possibility that farmers are more likely to join programs that yield such results (Burton and Schwarz 2013). It is unclear, however, why farmers across our CE would tend to see trees as being less effective in contributing to water conservation goals than to biodiversity or soil conservation.

6. Conclusion

This paper sheds light on the challenges and opportunities of overcoming the trade-off between the ecological effectiveness of AES?? in Europe and the opportunity costs for farmers to participate in those programs (Batáry et al., 2015; Kleijn and Sutherland, 2003). On the one hand, the study assesses the cost of coordinating farmers for the implementation of the measures, as a complement or alternative to increasing the amount of land set aside for said conservation. On the other hand, the paper responds to recent calls about the need to find incentives other than monetary payments to promote farmers' participation and keep agricultural policy budgets under control (Christensen et al., 2011; Espinosa-Goded et al., 2010; Kuhfuss et al., 2015).

Our findings point to the challenge of increasing the amount of land set aside for conservation purposes in highly intensified agricultural landscapes. The findings also indicate the resistance of farmers (see Spanish and German farmers in particular) to participate in coordinated measures, even if transaction costs of doing so are low. As shown in the data, participation in coordinated measures could benefit from encouraging beliefs about the willingness of other farmers to participate and/or facilitate their neighbors' participation. Additionally, the study reveals the positive influence of a "farmer recommendation" effect on AES participation, on which future policies could capitalize, i.e. via consultation processes and knowledge sharing mechanisms. As far as our data show, such neighborhood effect would be particularly effective among Swiss farmers. Finally, the findings reveal the potential of framing as a no-cost strategy to encourage farmers' participation. According to our results, framing tree planting as a water conservation measure would be less appealing for farmers than if framed as a biodiversity or soil conservation measure. Future research shall further disentangle reasons behind the resistance of farmers to coordinate and their sensitiveness to some conservation goals over others.

Limitations of this study include the lack of consistency in the data collection process due to feasibility issues. This problem is difficult to solve (Arnaud et al., 2006), but nevertheless should be addressed in future studies. Also, there is the potential hypothetical bias as the choices made are not real choices. We tried to minimize this bias by emphasizing in the survey the importance of the study as a means to "inform the design of future agricultural programs". Additionally, we followed previous works in selecting an agri-environmental measure that farmers were familiar with, and collecting additional survey and qualitative data to triangulate the results (Christensen et al., 2011). Finally, the potential presence of attribute non-attendance (ANA) could have influenced our results (Campbell et al. 2011, Kragt, 2013). A number of studies have shown that participants in CEs may systematically ignore some attributes (Gramig and Widmar, 2017, Rodríguez et al., 2018). Addressing potential estimation biases from ANA would have required collecting self-reported data on attendance to attributes or running an equality constraint latent class model with as many classes as possible combinations of ANA to our 4+3 choice attributes and labels (Hensher et al. 2012). Running a latent class model with a large number of classes was unfeasible given the small sample size and low response rate at our study sites. Also, given survey space constraints we gave priority to collecting farm and farmer characteristics and attitudes over attendance to attributes. Although ANA is a topic of increasing concern, the literature is still inconclusive about the impacts of non-attendance on welfare estimates (Kragt, 2013; Rodríguez et al., 2018) as it can reflect both heuristics or preferences (Heidenreich et al., 2018).

As a final reflection, this study provides support for the validity of both economic and sociological logics to explain farmers' decision-making processes. In this regard, the Theory of Planned Behavior offers a promising platform to further explore synergies and trade-offs between these logics.

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Appendix

Table A1. Results from IIA test*

	SP	DE	CH	SP+DE+CH
No Alternative 1	0.000	0.928	0.655	0.390
No Alternative 2	0.861	0.876	0.747	0.642
No Alternative 3	0.886	0.995	1	0.990

*Hausman and McFadden (1984). P-value in cells
Note: The Hausman test for the Spanish (SP) subsample turned out not significant (p=0.997) when run with all the interactions included in the Table 3 Models.

Table A2. Conditional logit estimates and standard errors for the Swiss subsamples

	(3.1)	(3.2)
VARIABLES	Aargau	Zurich
Water program	-1.690***	-3.473***
	(0.538)	(0.941)
Soil program	-1.358**	-3.277***
	(0.529)	(0.989)
Biodiversity program	-1.553**	-3.221**
	(0.732)	(1.300)
Share of farm	-0.104**	-0.106
	(0.0440)	(0.0709)
Coordinated location of trees	-0.179	-0.182
	(0.177)	(0.299)
Farmer recommendation	0.325*	0.181
	(0.168)	(0.270)
Scientist recommendation	-0.303	0.178
	(0.218)	(0.326)
Payment	0.00464*	0.0116***
	(0.00251)	(0.00424)
Pseudo-R2	0.27	0.28
Observations	1,728	2,880
LL	-461.0302	-762.2368
AIC	1022.06	1624.474
BIC	1294.796	1922.751
Participants	66	97

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.
Note: All models include the same interaction terms as the models in Table 3. All case-specific variables were standardized at the country level.

Table A3. Conditional logit estimates and standard errors (systematic drop out participants excluded)

	(1)	(2)	(3)	(4)

VARIABLES	SP	DE	CH	SP+DE+CH
Water progr.	0.351	0.490	-0.852*	-0.708**
	(1.155)	(1.185)	(0.463)	(0.287)
Soil progr.	1.336	1.314	-0.542	-0.332
	(1.188)	(1.270)	(0.473)	(0.296)
Biodiv. progr.	1.152	2.679	-0.773	-0.357
	(1.738)	(1.738)	(0.653)	(0.412)
Area	-0.159	-0.377***	-0.125***	-0.121***
	(0.101)	(0.0965)	(0.0396)	(0.0250)
Coordination	-0.621	-0.953**	-0.154	-0.229**
	(0.404)	(0.390)	(0.155)	(0.100)
Farmer recom.	0.0314	0.0303	0.329**	0.345***
	(0.364)	(0.313)	(0.143)	(0.0909)
Scientist recom.	0.0726	0.735	-0.245	-0.225*
	(0.547)	(0.479)	(0.193)	(0.125)
Payment	0.0124**	0.00568	0.00688***	0.00778***
	(0.00585)	(0.00542)	(0.00218)	(0.00139)
Pseudo-R2	0.47	0.30	0.14	0.13
LL	-138.2741	-211.4078	-823.5968	-1335.174
AIC	376.5482	522.8157	1747.194	2770.347
BIC	605.0924	758.7663	2040.893	3087.131
Observations	714	828	2,628	4,170
Participants	21	23	78	122

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Note: All models include the same interaction terms as the models in Table 3. All case-specific variables were standardized at the country level.

Table A4. Conditional logit estimates and standard errors including opt out ASC and interactions

	(1)	(2)	(3)	(4)
VARIABLES	SP	DE	CH	SP+DE+CH

Optout (ASC_i)	-0.561	-0.0609	1.359***	1.062***
	(0.655)	(0.651)	(0.273)	(0.217)
Share of farm	-0.0668**	-0.113***	-0.0904***	-0.0897***
	(0.0324)	(0.0328)	(0.0167)	(0.0132)
Coordinated location of trees	-0.446***	0.0694	-0.125*	-0.143***
	(0.130)	(0.133)	(0.0652)	(0.0518)
Farmer recommendation	0.0862	0.453***	0.343***	0.313***
	(0.151)	(0.147)	(0.0753)	(0.0600)
Scientist recommendation	-0.0237	-0.353**	-0.284***	-0.236***
	(0.171)	(0.178)	(0.0888)	(0.0699)
Payment	0.00684***	0.0113***	0.00679***	0.00738***
	(0.00197)	(0.00216)	(0.00104)	(0.000826)
Optout*Age	-0.00503	-0.00744	-0.0163***	-0.00195
	(0.0170)	(0.0150)	(0.00615)	(0.00484)
Optout*Education	-0.0451	-0.466**	-0.265**	-0.166**
	(0.129)	(0.205)	(0.130)	(0.0736)
Optout*Farm size	-0.00327**	0.000217	0.0158***	0.000125
	(0.00157)	(0.000251)	(0.00435)	(0.000185)
Optout*Rent	0.485	-0.326	-0.246	0.216
	(0.463)	(0.406)	(0.209)	(0.149)
Optout*Income	0.0155***	0.00689	0.00318*	0.00460***
	(0.00598)	(0.00440)	(0.00187)	(0.00145)
Optout*Trees bad	-0.200	1.039***	0.253***	0.328***
	(0.145)	(0.172)	(0.0669)	(0.0525)
Optout*Have trees	0.550***	0.824***	0.287***	0.244***
	(0.190)	(0.232)	(0.0774)	(0.0593)
Pseudo-R2	0.16	0.26	0.24	0.187
LL	-276.3558	-264.7905	-1273.17	-1918.794
AIC	578.7116	555.5811	2572.341	3863.588
BIC	641.0993	619.0127	2655.901	3951.604
Observations	897	972	4,572	6,441
Participants	31	27	136	195

Table A5. Point estimates and 95% confidence intervals[1] of WTA values (Euros)

VARIABLES	(1) SP	(2) DE	(3) CH	(4) SP+DE+CH
Water program	**181.2**	**146.4**	**308.9**	**232.9**
	[109.1 , 269.5]	**[69.1 , 204.0]**	**[247.9 , 453.2]**	**[204.5 , 272.0]**
Soil program	96.0	94.7	**266.9**	**188.3**
	[-483 , 165.6]	[-44.3 , 162.0]	**[208.6 , 381.5]**	**[159.5 , 223.7]**
Biodiversity program	114.6	42.8	**295.9**	**186.0**
	[-97.6 , 205.8]	[-212.3 , 136.8]	**[222.2 , 392.8]**	**[138.7 , 225.3]**
Share of farm	**12.3**	**21.7**	**18.2**	**15.9**
	[1.6 , 46.7]	**[9.5 , 60.2]**	**[6.7 , 50.3]**	**[9.4 , 27.4]**
Coordinated location of trees	**104.0**	**79.8**	41.6	**60.2**
	[13.2 , 386.4]	**[3.6 , 292.4]**	[-21.6 , 209.0]	**[19.0 , 126.2]**
Farmer recommendation	-37.0	-62.2	**-86.6**	**-83.2**
	[-99.4 , 73.8]	[-112.2 , 1.3]	**[-146.0 ,-27.0]**	**[-108.0 ,-57.2]**
Scientist recommendation	13.6	-15.2	87.9	44.3
	[-193.2 , 85.2]	[-200.8 , 52.2]	[-46.2 , 120.4]	[-3.0 , 77.4]

[1] WTA measures are of the type -b_k/b_c, where b_c is the cost coefficient and b_k is the coefficient for attribute x_k. The confidence intervals were calculated through the Krinsky-Robb method (Hole 2007). We also calculated them through Delta method and Fieller's methods. The advantage of the Krinsky-Robb method relative to the Delta is that it does not assume that WTP is symmetrically distributed. The advantage of the Kinsky-Robb method relative to the Fieller method is that it produces confidence intervals which are defined in all samples (Hole 2007).

Note: significant variables in bold (i.e., as per the 90% confidence levels indicated). Euros are not adjusted for purchase power parity.

Table A6. Site specific payment estimations for conservation programs

SPAIN	**Most expensive program**	**Least expensive program**
Conservation Label	*Water* (181 €/ha)	*Soil* (96 €/ha)
Area	*10%* (12 €/ha)	*1%* (12 €/ha)
Coordination	*Coordinated* (104 €/ha)	*Not Coordinated*
Recommendation	*Not recommended by any group*	*Recommended by farmers* (-37 €/ha)
Payment €/ha	297 €/ha	12 €/ha (71 €/ha)
TOTAL Payment*	4,455 €	18 € (270 €)
GERMANY	**Most expensive program**	**Least expensive program**
Conservation Label	*Water* (146 €/ha)	*Biodiversity* (43 €/ha)
Area	*10%* (22 €/ha)	*1%* (22 €/ha)
Coordination	*Coordinated* (80 €/ha)	*Not Coordinated*
Recommendation	*Not recommended by any group*	*Recommended by farmers* (-62 €/ha)
Payment €/ha	248 €/ha	22€/ha (3 €/ha)
TOTAL Payment*	3,720 €	33 € (5 €)
SWITZERLAND	**Most expensive program**	**Least expensive program**
Conservation Label	*Water* (309 €/ha)	*Soil* (267 €/ha)
Area	*10%* (18 €/ha)	*1%* (18 €/ha)
Coordination	*Coordinated* (42 €/ha)	*Not Coordinated*
Recommendation	*Not recommended by any group*	*Recommended by farmers* (-86 €/ha)
Payment €/ha	327 €/ha (369 €/ha)	199 €/ha
TOTAL Payment*	4,905 € (5,535 €)	299 €

*: Estimated for the average farm size across the sites (~150 ha). This would correspond in the most expensive program to ~15 ha enrolled with and 300 trees planted; and in the least expensive program to ~1.5 ha with 30 trees planted. Note that these are exemplified calculations assuming statistically significant attribute coefficients (compare Table A5 and results section). The non-significant attributes are in grey in the tables for transparency purposes. In the TOTAL payment rows, we have included in grey also the theoretical overall payment were all the attributes significant.

Table A7-1. Descriptive statistics of demographic and socio-economic data

	SP	DE	CH
Total number of participants*	31	27	136
Average age	52	46	48
Average education	2.1	3.5	3
Farm revenue (Euros/year)	40,260	65,254	34,142
% of farm revenue of income	77%	61%	60%
Total number of hectares in sample	5,000	19,701	5,454
Average farm size	156	678	38
Average number of plots per farm	22	25	16
Average plot size (hectares)	8	18	3
% of land rented from other landowners	57%	44%	42%
Farm revenue/hectare (Euros/year)	480	470	1,335

Notes: "Farm revenue" and "farm revenue/hectare" are adjusted for purchase power in each country based on OCDE data (http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP). Education values: 1=primary; 2=secondary; 3=agricultural school; 4=University

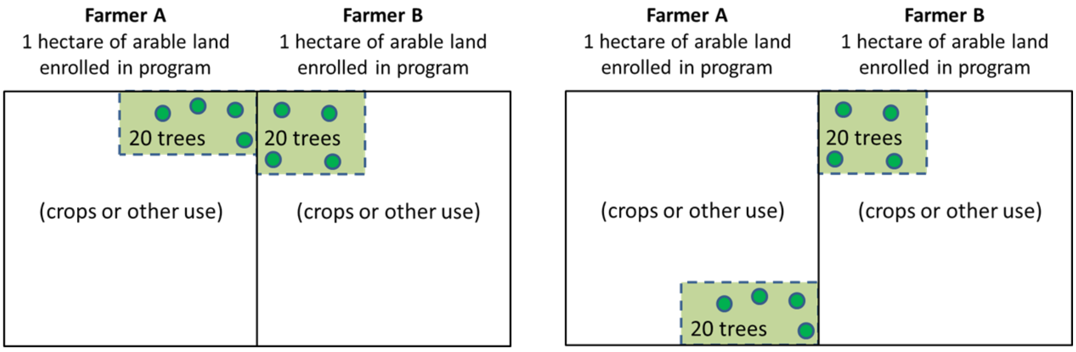
* Sample size for SP, DE and CH was 37, 34, and 163, respectively. The sample sizes in this table are lower due to missing survey data (the table variables were obtained through the post-experiment survey. The numbers indicated in this table correspond to the minimum denominator of participants that provided data for all the variables.

Table A7-2. Descriptive statistics of attitudinal data

		SP	DE	CH
In case of participating in the measure, how would you distribute the trees?	Concentrated in few parcels	63%	60%	74%
	Distributed across my parcels	13%	13%	3%
What is the most important goal among these for you?	Soil erosion control	68%	41%	59%
	Polluting water run-offs	5%	25%	27%
	Biodiversity loss	27%	34%	14%
What is the least important goal among these for you?	Soil erosion control	22%	28%	12%
	Polluting water run-offs	46%	19%	16%
	Biodiversity loss	32%	53%	72%

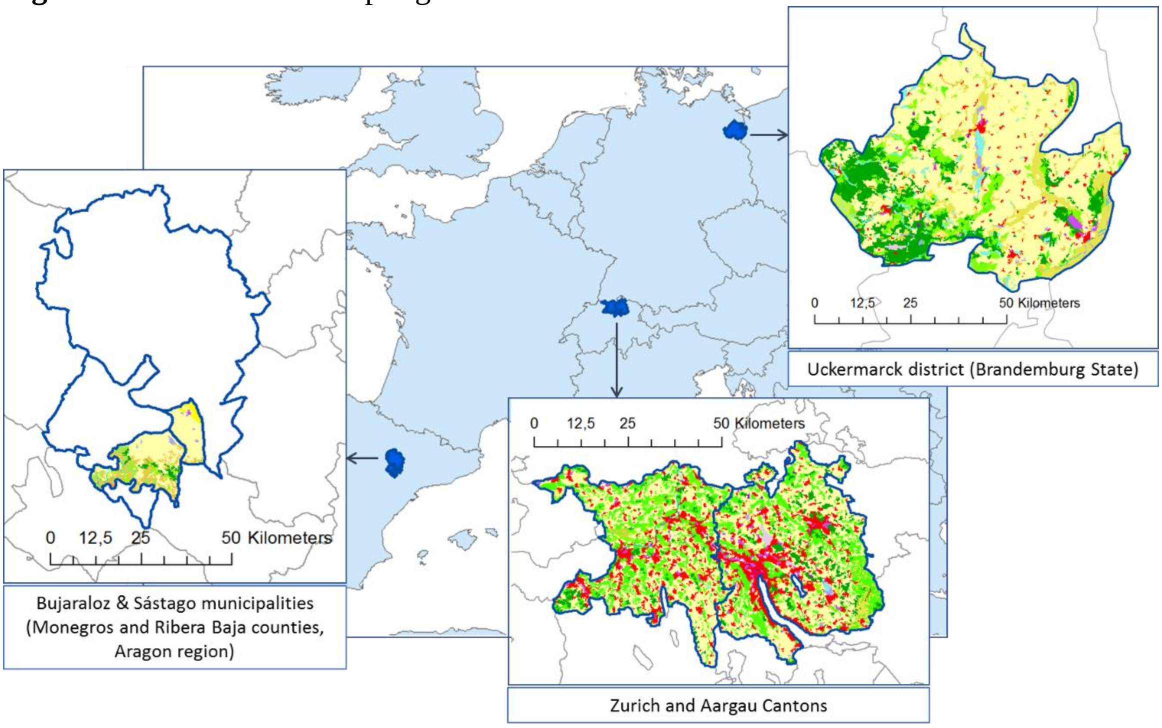
$N_{Spanish}$= aprox. 30; N_{German}= aprox. 32; N_{Swiss}= aprox. 145

Figure A1. Coordinated (left) vs. non-coordinated (right) versions of the conservation measure



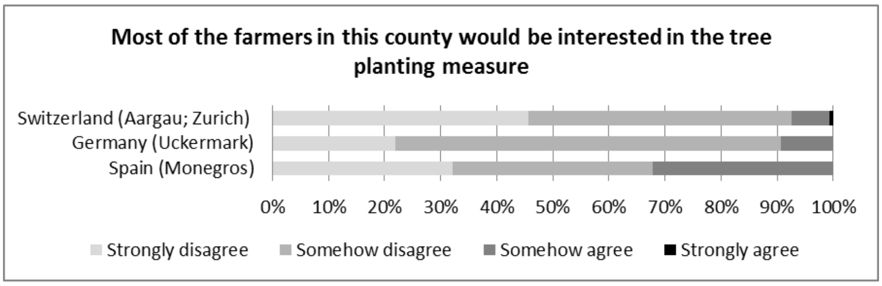
Note: Illustration included in the choice experiment

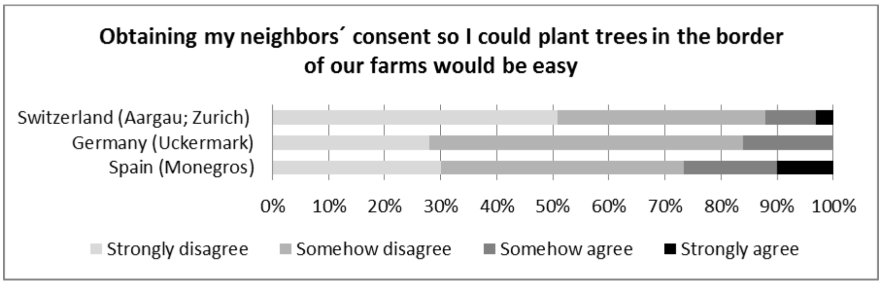
Figure A2. Location of sampling sites

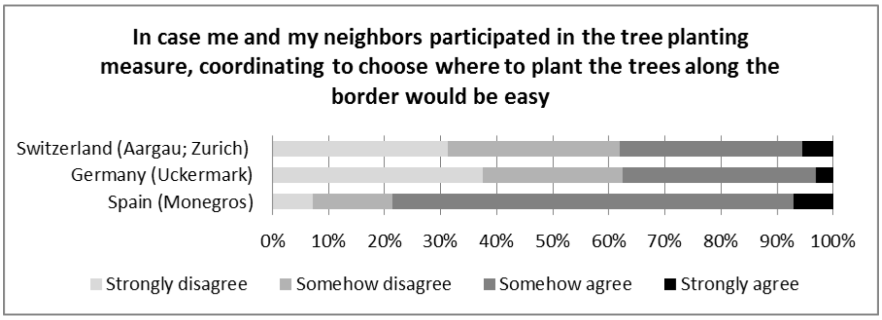


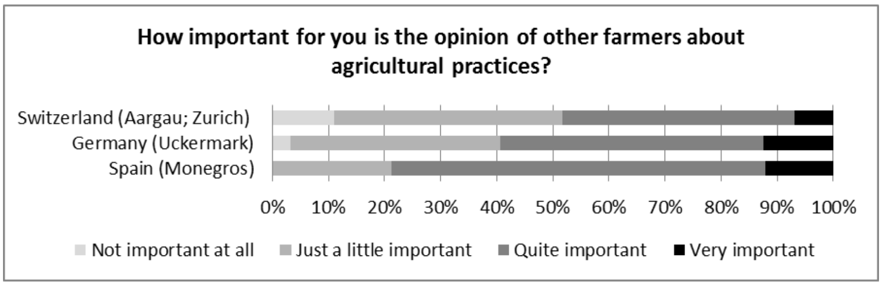
Source: European Environmental Agency (https://www.eea.europa.eu/data-and-maps/data/clc-2012-raster) inventory, Eurostat (http://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units).
Note: Colors represent different land uses, adapted from Corine Land cover dataset: [red] constructed, [dark green] forest, [light green] grassland, [light yellow] arable land

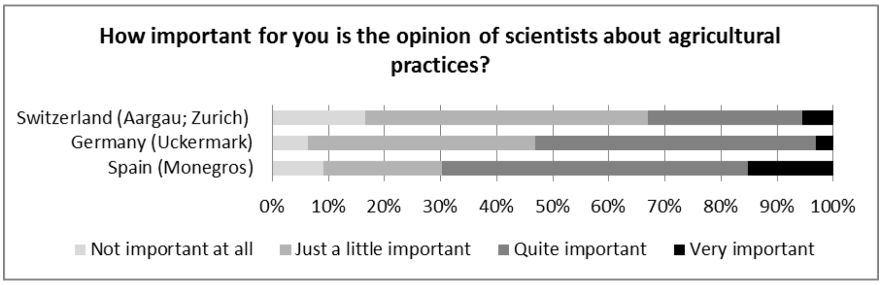
Figure A2. Figures of attitudinal data






In case me and my neighbors participated in the tree planting measure, coordinating to choose where to plant the trees along the border would be easy
Switzerland (Aargau; Zurich)
Germany (Uckermark)
Spain (Monegros)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Strongly disagree
Somehow disagree
Somehow agree
Strongly agree


How important for you is the opinion of other farmers about agricultural practices?
Switzerland (Aargau; Zurich)
Germany (Uckermark)
Spain (Monegros)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Not important at all
Just a little important
Quite important
Very important


How important for you is the opinion of scientists about agricultural practices?
Switzerland (Aargau; Zurich)
Germany (Uckermark)
Spain (Monegros)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Not important at all
Just a little important
Quite important
Very important