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Practical design principles for high performing agri-environmental schemes: From actions to outcomes. Part 2. Multi-country choice experiments with farmers

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Note by the Secretariat

This document is part of work mandated under the COAG PWB 2019-20 Output 3.2.3.1.1 *Monitoring progress in the alignment of policies towards sustainability*: "Practical design principles for high performing agri-environmental schemes: from actions to outcomes". It presents the findings of Part 2 of the project, which includes the choice experiments component. The literature review, policy spectrum and policy simulations are presented in a separate document [COM/TAD/CA/ENV/EPOC(2021)1/FINAL].

The support and active participation of OECD member and partner countries and invited experts was paramount for conducting and concluding the choice experiment component of the project. The Secretariat is grateful to Santiago Guerrero (World Bank, USA), Laure Kuhfuss (The James Hutton Institute, Scotland) and Jared Gars (University of Bocconi, Italy) for their contributions to both choice experiment and this paper.

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Non-technical Summary

Policy makers have expressed interest in exploring the potential for performance-based or results-based payments to improve the cost-effectiveness of agri-environmental schemes (AES). Since AES rely on the voluntary participation of farmers, it is important to understand how and why farmers choose to participate. Understanding farmers' preferences for specific payment designs can help promote the greater participation of farmers in AES and the scheme's effectiveness.

This study focuses on three different models of AES payments: practice-based schemes, where payments are based on adoption of specific practices; results-based payments, which link payments to measurable results; and hybrid payments, under which payment depends on both implementing specific practices and achieving specific results. The study draws on choice experiments undertaken in 2021 with farmers across three OECD countries (Finland, the Netherlands, and Sweden) to advance evidence on the role of contract design and farmer characteristics on participation in different AES. The choice experiment aims to determine how farmer and farm characteristics (e.g. gender, age, farm size) and behavioural aspects (e.g. risk aversion and attitudes towards the environment) impact the choice of AES contract and farmers' willingness to accept a given contract.

While different design features can be tested in policy simulations (as undertaken in the first component of this project), this approach cannot account for certain "real-world" aspects that influence the effectiveness of AES, particularly the behavioural characteristics of farmers. This experiment therefore provides valuable evidence which, together with the simulations, provides richer insights into effective design of AES payments.

In contrast to the cost-effectiveness analysis performed on the basis of policy simulations, results of the choice experiment with farmers (arable and mixed livestock/arable farmers) in Finland, the Netherlands and Sweden show that farmers tend to prefer hybrid contracts when these include low levels of environmental objectives (i.e. biodiversity improvement only) over equivalent purely practice-based schemes, but would prefer practice-based schemes over hybrid schemes with higher results requirements (i.e. biodiversity improvement plus water quality improvement and/or climate change mitigation objectives). Overall, farmers are least interested in results-based contracts. These relative preferences are stable across farm types (arable and mixed) and farmer behavioural characteristics (risk aversion and attitudes towards the environment).

The experiment assesses the payment level needed to attract farmer participation in different AES designs. The average willingness to accept contracts with a low level of environmental requirements for practice-based schemes (i.e. adopting two practices) is EUR 182/ha/year. The average willingness to accept for adopting a hybrid scheme with the lowest level of environmental requirements (adopting two practices and achieving biodiversity objectives) varies from EUR 147/ha/year if 10% of the payment in conditioned upon results being achieved up to EUR 179/ha/year if 90% of the payment is conditioned upon results. In the case of results-based schemes, the average amount farmers would require to adopt a contract with the lowest level of environmental requirements (i.e. biodiversity objectives only) is EUR 246/ha/year.

Under the practice-based and hybrid schemes, the average willingness to accept increases with the level of pro-environmental practices requirements: the payment level needs to increase by EUR 31/ha on average for contracts requiring the adoption of four practices, and by EUR 52/ha for contracts requiring the adoption of six practices.

Similarly, in the case of hybrid or results-based payments, a requirement to reduce nutrient runoff by 25% would require an additional payment of EUR 45/ha/year to be attractive,

and for a 50% reduction, of EUR 55/ha/year on average would be needed in order for farmers to participate. The additional payment needed to convince farmers to sign up to contracts that require a 25% reduction in farm net GHG emissions is EUR 41/ha/year, reaching EUR 48/ha/year for a commitment to reduce net GHG emissions by 50%.

For hybrid contracts, the higher the share of the payment conditional upon achieving results, the higher the payment required by farmers. Farmers require an additional payment of EUR 0.4/ha/year for each percentage point increase in the payment share based on achieving results (e.g., EUR 4/ha/year for 10% of the payment conditioned on results, EUR 8/ha/year for 20%, EUR 12/ha/year for 30% and up to EUR 36/ha/year if 90% of the payment is conditioned on results).

Arable farmers tend to require higher payments to participate in agri-environmental scheme (AES) contracts, regardless of the contract type (hybrid, results- or practice-based) compared to mixed livestock-arable farmers. The relative ranking of preferences for the three scheme designs remain the same across farm specialisations.

Choice experiments can help reveal the role that individual and farm characteristics play in explaining farmers' willingness to participate in AES contracts. Interestingly the main factors explaining differences in willingness to participate identified in this choice experiment are behavioural factors, while farm characteristics, current agri-environmental practices and farmers' socio-demographic characteristics are not major drivers of heterogeneity in preferences. In particular, we find that farmers that are more risk averse, who express a lower interest in environmental change, are less aware of the impact of farming on the environment and who have lower levels of ascription of responsibility towards environmental issues tend to have higher "willingness to accept" threshold, meaning that payments need to be twice as large on average in order for these farmers to participate in AES contracts compared to other farmers.

1. Eliciting farmers' preferences on agri-environmental payment schemes to increase their participation

1. Tackling the environmental challenges associated with agriculture requires improvements in the current set of instruments available to policy makers. One such instrument, agri-environmental payment schemes, are voluntary programmes that pay farmers for the adoption of environmental practices. Despite their popularity, there is mounting evidence that many these schemes underperform against their environmental objectives.

2. Voluntary agri-environmental contracts that offer fixed payment rates suffer from two major problems. First, farmers who face the lowest costs of compliance with environmental requirements are more likely to enter the programme; in cases where the programme pays some farmers for doing nothing differently from what they would have done in the absence of payment, adverse selection may induce large windfall effects (Chabé-Ferret and Subervie (2013[1]). Second, those farmers with the highest costs of compliance are less likely to enter the programme, although they may be precisely those whose engagement would make the greatest contribution to the programme's effectiveness (Kuhfuss et al., 2015[2]). Despite these well-known shortcomings, there is limited evidence on how payment design features could be changed to improve the targeting of beneficiaries and including the best mix of practices or results upon which payments should be conditioned.

3. Since agri-environmental payment mechanisms rely on the voluntary participation of farmers to achieve their environmental outcomes, it is important to understand how and why farmers choose to participate in these mechanisms. This is particularly the case when considering the introduction of new agri-environmental policy mechanisms. As noted in Part 1 of this report, policy makers have expressed an interest in exploring the potential of performance-based or results-based payment schemes to improve the cost-effectiveness of agri-environmental payment schemes. Gauging the preference of farmers for specific payment designs can help anticipate their possible adoption and effects.

4. The purpose of this part of the report is to offer such evidence, and explore how different types of farmers in selected countries respond to specific agri-environmental payment designs: practice-based schemes, where payments are based on adoption of specific practices; results-based payments[1], which link payments to measurable results; and hybrid payments, under which payment depends on both implementing specific practices and achieving specific results. The report is based on a choice experiment conducted with farmers, using a survey instrument that can be adapted to other country and policy contexts.

5. Choice experiments belong to the set of *ex ante* methods and have been applied to numerous issues in a variety of research fields (Holmes, Adamowicz and Carlsson, 2017[3]).[2] They are stated preferences methods (surveys) that aim to reveal information

[1] In this report, results-based payments are based on modelled rather than measured environmental results for nutrient runoff and GHG emissions, given the fact that these are non-point source pollution, hence extremely difficult and costly to measure at field parcel level directly. In contrast, payments related to the biodiversity objective is based on measurable results

[2] Other commonly-used methods include contingent valuations and best-worst scaling. According to Holmes, Adamowicz and Carlsson (2017, p. 134[3]), choice experiments (CEs) offer a number of advantages over other methods, and after consideration of other possible methods, the overall objectives of this project, and the available resources, the choice experiment method was selected.

about individuals' (in this case, farmers') choices and preferences, and are grounded in consumer and microeconomic theory (Hanley, Mourato and Wright, 2001[4]). Essentially, choice experiments consist of presenting individuals with a range of choices, and asking the individuals to trade-off different levels of attributes of interest.[3]

6. This method has been increasingly used in research. A review of the literature found 55 choice experiment studies focusing on agriculture (Annex F). Most of the studies tested farmers' willingness to accept contracts that pay for implementing specific practices. The literature is scant on analysis of willingness to accept contracts that pay for achieving results. The literature reviewed for this report found only one pure results-based contract and a few hybrid schemes that usually had no straightforward linkages between payment levels and the performance attribute.

7. The choice experiment presented in this part of the report studies policy design elements for multiple environmental objectives. While different design features can be tested in policy simulations (as undertaken in the first part of the report), this approach cannot account for certain real-world aspects, including behavioural characteristics of farmers, which are generally difficult to model. The experiment provides valuable evidence which, together with the simulations, yields richer insights into practical design considerations for agri-environmental payment schemes. The proposed choice experiment aimed to determine how farmer and farm characteristics (e.g. gender, age, farm size) and behavioural aspects (e.g. risk aversion, attitudes towards the environment) impacted the choice of different agri-environmental contracts and determine farmer's willingness to accept a given contract.

8. The choice experiment was implemented in three volunteer countries: Finland, the Netherlands and Sweden, but the survey instrument developed for this project could be adapted and applied to other countries interested in the design of practice-based, hybrid and results-based agri-environmental payments.

9. In April 2020, Argentina and Finland conducted focus groups to obtain feedback from experts and farmers on the first version of the survey. The Netherlands conducted focus groups in June 2020. In light of this feedback and interactions with country experts, the Secretariat drafted a pilot version of the survey. The survey was originally drafted in English and was translated by participating countries into Dutch, Finnish, Spanish and Swedish and coded in LimeSurvey by a contracted expert.

10. In January 2021, the pilot survey was completed in Argentina, Canada, Finland and Sweden. Based on the responses from the pilot survey, the survey was adjusted and implemented in March 2021 in the Netherlands, Sweden and Finland. Each country drew on a representative sample of farmers and used incentives to increase participation in the survey. Canada and Argentina were ultimately unable to participate in the final survey due to logistical complications.

11. The following section describes the survey and its components, Section 3 presents the results from the survey and Section 4 draws some conclusions.

[3] In the context of this project, "attribute" refers to a specific policy design element: examples include environmental policy objectives, contract length, contract flexibility, payment basis, payment level, beneficiary eligibility conditions, monitoring and compliance design (e.g. monitoring frequency and type, penalties/sanctions, etc.), services provided (e.g. technical assistance). Level refers to the value(s) of the attribute that are tested in the experiment. For example, levels for the attribute of contract length could be 5, 10 and 20 years.

2. Choice experiment survey[4]

12. Following standard choice experiment design, the survey has four sections, i) introduction, ii) contextual questions, iii) choice exercise, and iv) behavioural questions. There are two main versions of the survey, one for arable farming (general field cropping of cereals, oilseed and protein crops) and one for mixed farming (grazing bovines or sheep and crop production) to represent the two categories of farmers that would be targeted by the potential agri-environmental schemes.

2.1. Introduction to the survey

13. The introduction explains the purpose of the survey, presents general instructions on how to respond to the survey, and the use of data collected, and also includes a point of contact to clarify questions about the survey and a consent form. The introduction highlights that the answers to the survey will directly contribute to informing the design of agri-environmental payment schemes in the future.

2.2. Contextual questions

14. This section contains questions about the participant, farm characteristics and experience with agri-environmental schemes. Data gained from these questions are primarily used i) to assess the representativeness of the sample, ii) to select the survey type (arable or mixed), and iii) to serve as explanatory variables for explaining variation seen in the choice exercise.

2.3. Choice exercise

15. This section is the core of the survey. It starts with a description of the hypothetical agri-environmental policy schemes, includes instructions on how to complete the choice exercise and contains the choice exercise itself (more detail below). Since the main objective of the choice exercise is to elicit farmers' preferences for practice-based, results-based and hybrid agri-environmental contracts for achieving water quality, climate change mitigation and biodiversity objectives, the hypothetical agri-environmental policy schemes sub-section explains how the different hypothetical contracts work, including how they would be monitored and enforced.

16. **Schemes based on the adoption of specific practices** offer an annual payment for five years and pay for the adoption of some or all of the following:

Both arable and mixed

1. A reduction of nitrogen fertiliser application (including mineral and manure sources) by 20% on all cultivated fields – compared to average use over the three years preceding enrolment.
2. The establishment of 3-meter-wide buffer strips along all main ditches and water courses in all cultivated fields.
3. The establishment of cover (or catch) crops on 10% of cultivated fields.
4. The reduction in pesticide use by 20% in all cultivated fields – compared to average use over three years preceding enrolment.

[4] Additional details on the methods are shown in Annex F.

Only arable

5. The establishment of green fallow on 10% of arable farm acreage.
6. The establishment and management of enlarged (2-meter-wide) field edges (e.g. margins, stone walls or hedged) on at least 30% of cultivated fields.

Only mixed

7. The application of all manure by injection instead of broadcasting (whole farm).
8. The management of permanent grassland to favour biodiversity, by imposing a stocking rate between xxx (to be defined by countries) and yyy (to be defined by countries) livestock units per hectare and ensuring the removal of all brushwood.

17. **Environmental results-based schemes** offer an annual payment for five years if the following results are achieved:

1. **Climate change mitigation**. Reduction (no requirement, 25% or 50%) of greenhouse gases net emissions relative to the estimated net emissions before the start of the contract, estimated from the use of nitrogen fertilisers (mineral and manure) and fuel, and cultivation practices (ploughing, cover crops, etc.) that impact the amount of carbon stored in soils.
2. **Biodiversity**. Increase in the number of flowering and vascular plant species (no requirement, 5 flowering plants species, 10 flowering plants species) present on 10% of arable land (*for arable version*) / on permanent grasslands (*for mixed version*).
3. **Water quality**. Reduction (no requirement, 25% or 50%) of the run-off of nutrients, pesticides and sediments at the edge of field, estimated based on the slope, soil type, and recorded cultivation practices (cover crops, buffer strips, fertiliser use, etc.), relative to the estimated runoff before the start of the contract.

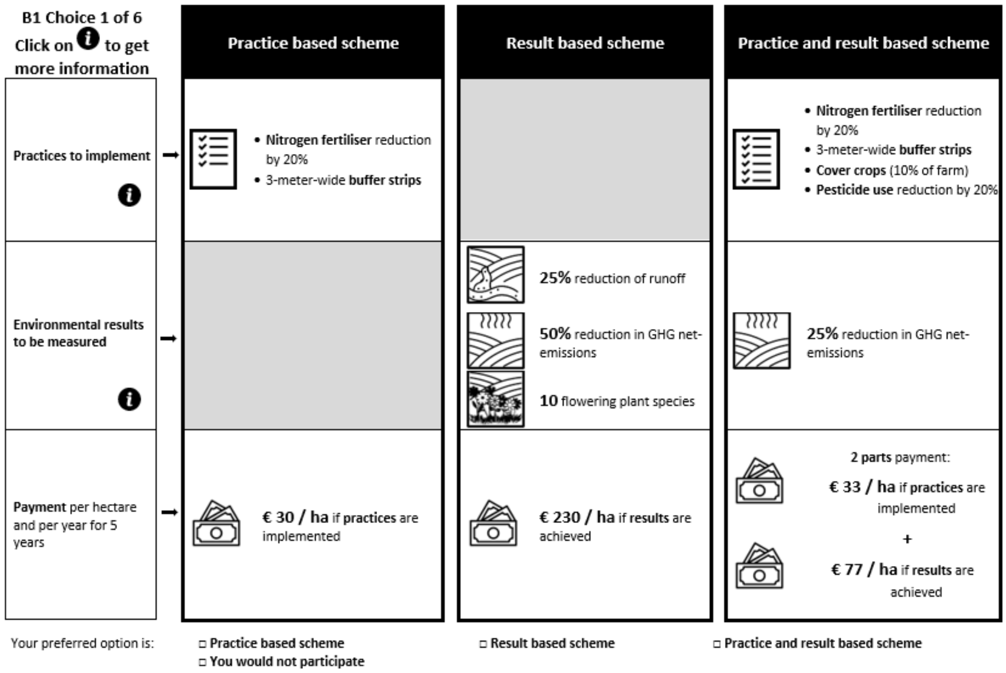
18. The survey states that under environmental results-based schemes, farmers are free to adopt any practices that they consider most suitable to achieve those results. Note that the biodiversity objective is purely based on measured results, while the water quality and climate change mitigation objectives are based on modelled/simulated results.

19. **Hybrid schemes** offer two annual payments for five years; one for the adoption of specific practices and an additional payment contingent on the achievement of environmental results. In this scheme, the menu of environmental results comes from only results-based schemes and the menu of practices comes from only practice-based schemes.

20. The survey also notes that, under all schemes, participants would be asked to report on the adoption of practices and/or achievement of environmental results at the end of each year; that all reports would be reviewed each year; and that 5% of farms would be selected for field controls.

21. Figure 2.1 shows an example of the choice cards included in the survey; for each choice card, responding farmers have to choose one option among three, considering a range of requirements and the resulting payment. A total of 36 choice cards were generated as the minimum number needed to generate efficient (low variance) parameter estimates. The cards were organised in six blocks (six blocks each containing six choice cards) and each farmer was presented with only one block (six choice cards).

Figure 2.1. Example of choice card



2.4. Attitudinal or behavioural questions

22. This section includes questions about participant attitudes or behaviours that are relevant to the choice exercise, such as their views on the importance of improving agricultural sustainability, attitudes towards participating in policy measures, and beliefs about the value or likelihood of co-ordinated actions, etc. As shown in the literature review, behavioural aspects such as dispositional factors (personality, risk tolerance and environmental concerns), social factors (social norms and expectations) and cognitive factors (ability to understand costs and benefits of their actions and the way programmes work) are important for farmers' willingness to enrol in agri-environmental schemes. These questions typically appear *after* the choice exercise, so that responses to the choice exercise are not affected by these questions. The final survey includes twelve behavioural questions.

23. The related behavioural factors identified in the literature review that are relevant for understanding farmers' motivations to enrol and participate into agri-environmental schemes include:

- Questions to identify *unreliable responses / protest answers* (Cognitive)
- *Value belief norm model*. This model is used for predicting behaviour and can be broken down into sub-factors that affect intentions: social norms, attitudes, values, ecological worldview, awareness of consequences and ascription of responsibility (Dispositional and Social)
- *Perceived efficacy*. Perceptions of the environmental efficacy of adopting best management practices (Cognitive)
- *Theory of planned behaviour*. Theory used for predicting behavioural intentions; it can be broken down into three factors: social norms, attitudes, and perceived behavioural control (Dispositional and Social)
- *Risk attitudes and risk perception* (Dispositional)
- *Time preferences* (Dispositional and Social)

- *Shifting baseline theory*. Perceptions of environmental change, perceived need for action (Dispositional and Social)
- *Trust and uncertainty* (Dispositional and Social).

3. Results

3.1. Sample and farmer characteristics

24. The sample consisted of 731 complete submitted answers to the questionnaire (Table 3.1), including 270 responses for the mixed farming version of the questionnaire and 461 for the arable version of the questionnaire. In terms of participation per country, 357 farmers completed the questionnaire in Finland, 230 in Sweden and 144 in the Netherlands.

Table 3.1. Respondents

Specialisation	Finland	Sweden	The Netherlands	Total
Mixed farming	90	158	22	270
Specialised in crop production	267	72	122	461
Total	357	230	144	731

3.1.1. Respondents' socio-demographic and farm characteristics

25. The average farm size within the sample was 160 hectares, including 70.8 hectares of arable land. On average, farmers owned 75 hectares of land; 74.4% of respondents had another source of income than the farm revenue for their household, and the farm income for those who had another source of income represented 36.7% of household income on average.

26. The sample was largely composed of males (89.7%) over 55 years old (49.9%). Most respondents had specialised education in agriculture, from a high school diploma (14.9%) to a university degree in agriculture (12.7%), as well as vocational training in agriculture (24.1%). 58.2% were full time farmers, while 36.7% were part-time farmers (see Table A D.2, Table A D.3, Table A D.4 in Annex D for more details on farmer characteristics).

3.1.2. Respondents' behavioural characteristics

27. Farmers in the sample varied in their tolerance for risk (from risk averse to farmers who were more willing to take risks), but the majority tended to make choices now to influence outcomes farther into the future. Generally, farmers' responses regarding their willingness to adopt new farming practices and willingness to take risks were evenly distributed, from strongly disagree to strongly agree. In contrast, only a minority of farmers displayed preferences for the present, while most tended to be more long-term oriented in their decision making. Roughly 70% of farmers stated that they made farming decisions to achieve outcomes that may not result for many years (Figure A C.1 in Annex C presents these results in more detail).

28. With regards to farmers' attitudes towards the environment, most farmers in the sample were satisfied with the environment around their farms and acknowledged the threat of global warming, but disagreed about the degree to which they felt responsible for either local or global environmental issues such as global warming. While most respondents believed that farmers in their area were willing to adopt (or had already adopted) farming

practices to improve environmental outcomes, as an indicator of the social norm, about 30% were agnostic about whether other farmers would be willing to adopt such practices. (Figure A C.2 in Annex C presents details on attitudes towards environmental issues).

29. Finally, about half of the respondents had low levels of confidence in the ability to monitor the environmental improvements that would be achieved through the schemes proposed. There were large variations in respondents' perceptions of their ability to adopt the proposed practices and their ability to achieve the environmental results, as well as the potential effects of these on farm profitability. Most farmers would not adopt the proposed practices or work to achieve the environmental objectives presented in the questionnaire in the absence of any payment, and most were in favour of more government spending and agri-environmental payments. A majority of farmers found the survey complex and mentioned having to ignore some of the options' characteristics in order to be able to make choices on the cards.[5] Figure A C.3 in the Annex provides more detail on farmers' perception of the choice experiment.

3.1.3. Contract characteristics

30. As explained in Section 2, respondents were presented six choice cards with three contract options: practice-based, results-based and hybrid. In each of these choice cards they had to choose between one contract and the option of not participating in any of the offered schemes. The contracts varied by the nature of the attributes and levels of the particular attributes (Table 3.2).

31. In the following analysis, farmers' choices are explained first by the scheme characteristics, and then by individuals' characteristics, including behavioural factors.

Table 3.2. Attributes and their levels presented on choice cards

Attributes and constants	Levels and associated variables
Alternative specific constants (ASC) : constants capturing the baseline preference for alternative scheme designs	ASC No participation: constant for the alternative not to participate (reference) ASC Practice-based: constant for practice-based alternatives ASC Hybrid: constant for hybrid alternatives ASC Results-based: constant for results-based alternatives
A : **Practice-based requirements** from list below	Level 1 : first 2 practices to be implemented (reference level) Level 2 : first 4 practices to be implemented Level 3 : all 3 practices to be implemented
B: **Water quality objectives**: reduction of nutrient, pesticide and sediment runoff (measured at the edge of field)	Level 0 : Payment will not depend on water quality results (reference level) Level 1: 25% reduction of runoff Level 2: 50% reduction of runoff
C: **Climate Change (CC) mitigation**: reduction of GHG net-emissions from farm (GHG emissions minus soils carbon sequestration)	Level 0 : Payment will not depend on climate change mitigation results (reference level) Level 1: 25% reduction of GHG net-emissions Level 2: 50% reduction of GHG net-emissions
D: **Biodiversity objectives**: number of specified flowering plant species present on 10% of the farm acreage	Level 0 : Payment will not depend on biodiversity results (reference level) Level 1: 5 flowering plant species Level 2: 10 flowering plant species

[5] Note that the results presented in this report hold when dropping individuals who answered that they strongly agreed with statements: (i) the survey was too complex or (ii) they had to ignore some of the attributes. However, the willingness to accept for the alternative specific constants (ASC practice-based, ASC hybrid and ASC results-based) are lower when dropping the individuals who thought the choices were too complex or stated they ignored some attributes, meaning that the overall willingness to accept of farmers for the different schemes are lower in this case. Importantly, the relative preferences between scheme designs and between attributes remain stable.

Attributes and constants	Levels and associated variables
E: **Share of payment conditioned upon results**	0 % (in practice-based alternatives only) 10, 20, 30, 50, 70, 90 % (in hybrid alternatives only) 100 % (in results-based alternatives only)
F: **Payment** in euros per hectare and per year	0 : in the option "I would not participate" 30, 80, 130, 180, 230, 280

3.2. Farmers' preferences for AES designs

3.2.1. Overall preferences

32. Roughly one-third of farmers preferred not to participate in any of the schemes based on the characteristics presented. Farmers selected practice-based schemes more often than hybrid and results-based schemes (Table 3.3).

Table 3.3. Share of choices for each alternative scheme design on the choice cards, overall, per farm specialisation and per country, percent

%	All	Arable Farmers	Mixed Farmers	Finland	Sweden	The Netherlands
Practice- based	26.93	26.68	27.35	30.63	25.36	20.25
Hybrid	20.59	19.67	22.16	22.88	21.45	13.54
Results-based	16.39	15.4	18.09	16.15	18.91	12.96
Would not participate	36.09	38.25	32.41	30.35	34.28	53.24

33. A conditional logit model was conducted to understand which attributes of the schemes had the most weight in these choices.[6] The model estimates provide information on the importance of the attributes, and their levels, in farmers' decision making. Table 3.4 presents the marginal Willingness-to-accept (WTA) of farmers or the monetary amount that farmers would need to receive in order to accept the corresponding attribute, for each of the contract characteristics. Higher values of WTA indicate that farmers have a stronger aversion to that attribute.

Table 3.4. Overall farmer preferences for AES designs: results from the conditional logit model and associated estimates of farmers' willingness to accept

Conditional Logit Model				**WTA estimates**		
	Estimate		**Robust Standard Errors[1]**	**Estimate (€)**		**Robust Standard Errors**
ASC practice-based	-1.097	***	0.095	182.2	***	14.4
ASC hybrid	-0.861	***	0.129	142.9	***	21.7
ASC results-based	-1.483	***	0.113	246.2	***	19.1
Practices level 2 (ref 1)	-0.187	***	0.064	31.1	***	10.4
Practices level 3 (ref 1)	-0.313	***	0.067	52.0	***	10.9
Water level 1 (ref 0)	-0.271	***	0.084	45.0	***	13.4
Water level 2 (ref 0)	-0.333	***	0.058	55.4	***	9.2
CC level 1 (ref 0)	-0.247	***	0.063	41.0	***	10.2

[6] All models were estimated using the Apollo software on R (Hess and Palma, 2019[12]) (see also Hess, S. and Palma, D. Apollo version 0.01, www.ApolloChoiceModelling.com.). A mixed logit model was also used, yielding similar results (Table A D.1 in Annex D)

Conditional Logit Model				WTA estimates		
	Estimate		Robust Standard Errors[1]	Estimate (€)		Robust Standard Errors
CC level 2 (ref 0)	-0.286	***	0.070	47.6	***	11.4
Biodiversity 1 (ref 0)	-0.029		0.064	4.9		10.7
Biodiversity 2 (ref 0)	-0.053		0.070	8.8		11.5
Share conditioned on result (%)	-0.003	**	0.001	0.4	**	0.2
Payment level (€/ha/year)	0.006	***	0.000			
Number of respondents	731					
Number of observations	4386					
AIC	11 326.35					
BIC	11 409.37					
LL	-5 650.18					

1. Robust Standard Errors computed using the sandwich estimator (R, Apollo package)
*: robust p-value < 0.10; **: robust p-value < 0.05, ***: robust p-value <0.01

34. The three model constants, ASC practice-based, ASC hybrid and ASC results-based capture respectively farmers' preferences for joining a practice-based scheme with a requirement to adopt the first 2 practices of the menu of options, for joining a hypothetical hybrid scheme including only a requirement to adopt the first two practices of the menu of options but without accounting for the result requirements, and for joining a results-based scheme, without accounting for the result requirements. The negative signs of the constants reflect the cost of joining such schemes, which are not associated with the other attributes included in the model. These costs also include all costs associated with unobserved preferences of farmers for the 3 scheme designs. Note that these constants are not directly comparable. For comparison of farmers' relative preferences for alternative scheme designs, see Table 3.5, Table 3.6 and Table 3.7 which include all dimensions of scheme designs.

35. Farmers preferred to be asked to implement fewer practices with lower levels of environmental results. For example, in practice-based contracts, requirement for farmers to adopt the first four practices was significantly less likely to be chosen than those requiring adoption of only two practices. Similarly, a contract with a requirement to adopt all six practices was even less likely to be chosen. The additional payment associated with having to adopt the first four practices instead of the first two practices in practice-based and hybrid schemes is estimated at EUR 31/ha to keep participation rates constant, while farmers would require an additional EUR 52/ha to adopt all six practices instead of only the first two.

36. Participation rates were responsive to increased water quality measures and GHG emissions reductions, but not to biodiversity outcomes. Increasing stringency for reaching water quality outcomes resulted in significantly fewer farmers choosing a results-based or hybrid scheme for a given payment level. A 50% reduction in nutrient runoff had a stronger negative effect on choosing a results-based contract than a requirement for a reduction of 25% in nutrient runoff. Similarly, farmers had negative preferences for stronger climate change (CC) objectives in results-based and hybrid schemes. Together, these two attributes are associated with higher WTA values: that is, for farmers to accept to join an AES (hybrid or results-based) requiring them to reduce their runoff by 25%, rather than a similar contract without water quality related objectives, farmers would require an additional payment of about EUR 45/ha, rising to EUR 55.4 for a 50% reduction. For farmers to commit to a 25% reduction in GHG net-emissions from the farm, relative to a similar contract with no

objective related to GHG net-emissions, would require an additional payment of EUR 41/ha, rising to EUR 47.6 for a commitment to reduce emissions by 50%.[7] In contrast, objectives related to biodiversity do not appear to be a deterrent to farmers' participation and choice of an option. That is, farmers' choice of an AES did not seem to be impacted by the presence of biodiversity results-based objectives.

37. Finally, the share of the payment based on results had a negative effect on their choice of a hybrid AES: the higher the share dependent upon the achievement of specific results, the less likely farmers were to choose this option. Farmers would require an additional EUR 0.40/ha for a one percentage point increase in the share (e.g. EUR 4/ha for 10% of the payment conditioned on results, EUR 8/ha for 20%, EUR 12/ha for 30% and up to EUR 36 per hectare if 90% if the payment was conditioned on results).[8]

38. The total payment for alternative schemes are presented in Table 3.5 for practice-based AES, Table 3.6 for results-based AES and Table 3.7 for hybrid schemes. The red line in Table 3.7 indicates the threshold from which practices-based schemes are preferred over hybrid schemes.

Table 3.5. Farmers' estimated Willingness to Accept for practice-based AES

Level of requirements	Mean WTA (€/ha/year)
Level 1: first 2 practices	182.2
Level 2: first 4 practices	213.3
Level 3: all 6 practices	234.2

[7] It is interesting to note that the increase in farmers' marginal willingness to accept for both water quality improvement and climate change mitigation requirements is not linear, with a relatively lower payment requirements to go from a 25% emissions reduction to a 50% reduction than what is required on average for the first 25% of reduction.

[8] Note that, in hybrid schemes, the share of payments conditioned on results on the choice cards presented to farmers only took values between 10% and 90%, so that the results are to be interpreted only within this range in hybrid schemes.

Table 3.6. Farmers' estimated Willingness to Accept for results-based AES

Level of requirements	Mean WTA (€/ha/year)
Schemes with only 1 environmental objective	
Biodiversity only	246.2
Water 1 only	291.2
CC1 only	287.2
Water 2 only	301.6
CC2 only	293.8
Schemes with 2 environmental objectives	
Biodiversity and CC1	291.2
Biodiversity and Water 1	287.2
Biodiversity and CC2	301.6
Biodiversity and Water 2	293.8
Schemes with 3 environmental objectives	
Biodiversity, Water 1 and CC1	332.2
Biodiversity, Water 1 and CC2	338.8
Biodiversity, Water 2 and CC1	342.6
Biodiversity, Water 2 and CC2	349.2

Table 3.7. Farmers' estimated Willingness to Accept for Hybrid AES

	Mean WTA (€/ha/year)					
	Share of payment conditioned on results					
Level of requirement	10%	20%	30%	50%	70%	90%
First 2 practices						
First 2 practices, Biodiversity	146.9	150.9	154.9	162.9	170.9	178.9
First 2 practices, Biodiversity, Water 1	191.9	195.9	199.9	207.9	215.9	223.9
First 2 practices, Biodiversity, Water 2	202.3	206.3	210.3	218.3	226.3	234.3
First 2 practices, Biodiversity, CC 1	187.9	191.9	195.9	203.9	211.9	219.9
First 2 practices, Biodiversity, CC 2	194.5	198.5	202.5	210.5	218.5	226.5
First 2 practices, Biodiversity, Water 1, CC 1	232.9	236.9	240.9	248.9	256.9	264.9
First 2 practices, Biodiversity, Water 1, CC 2	239.5	243.5	247.5	255.5	263.5	271.5
First 2 practices, Biodiversity, Water 2, CC 1	243.3	247.3	251.3	259.3	267.3	275.3
First 2 practices, Biodiversity, Water 2, CC 2	249.9	253.9	257.9	265.9	273.9	281.9
First 4 practices						
First 2 practices, Biodiversity	178	182	186	194	202	210
First 2 practices, Biodiversity, Water 1	223	227	231	239	247	255
First 2 practices, Biodiversity, Water 2	233.4	237.4	241.4	249.4	257.4	265.4
First 2 practices, Biodiversity, CC 1	219	223	227	235	243	251
First 2 practices, Biodiversity, CC 2	225.6	229.6	233.6	241.6	249.6	257.6
First 4 practices, Biodiversity, Water 1, CC1	264	268	272	280	288	296
First 4 practices, Biodiversity, Water 1, CC 2	270.6	274.6	278.6	286.6	294.6	302.6
First 4 practices, Biodiversity, Water 2, CC 1	274.4	278.4	282.4	290.4	298.4	306.4
First 4 practices, Biodiversity, Water 2, CC2	281	285	289	297	305	313
All 6 practices						
All 6 practices, Biodiversity	198.9	202.9	206.9	214.9	222.9	230.9
All 6 practices, Biodiversity, Water 1	243.9	247.9	251.9	259.9	267.9	275.9
All 6 practices, Biodiversity, Water 2	254.3	258.3	262.3	270.3	278.3	286.3
All 6 practices, Biodiversity, CC 1	239.9	243.9	247.9	255.9	263.9	271.9

	Mean WTA (€/ha/year)					
	Share of payment conditioned on results					
Level of requirement	10%	20%	30%	50%	70%	90%
All 6 practices, Biodiversity, CC 2	246.5	250.5	254.5	262.5	270.5	278.5
All 6 practices, Biodiversity, Water 1, CC1	284.9	288.9	292.9	300.9	308.9	316.9
All 6 practices, Biodiversity, Water 1, CC 2	291.5	295.5	299.5	307.5	315.5	323.5
All 6 practices, Biodiversity, Water 2, CC 1	295.3	299.3	303.3	311.3	319.3	327.3
All 6 practices, Biodiversity, Water 2, CC2	301.9	305.9	309.9	317.9	325.9	333.9

Note: The red line in Table 3.7 indicates the threshold from which practices-based schemes are preferred over hybrid schemes.

39. Results show that hybrid schemes are always preferred to practice-based schemes with the same level of requirement when only biodiversity objectives are included in the hybrid schemes (first rows of the three level of requirement blocks in Table 3.7). This result holds despite the fact that such hybrid payment schemes include practice-based requirements based on biodiversity objectives and a share of payment conditioned on results. However, as soon as water quality protection and climate change mitigation objectives are added to the hybrid scheme requirements, pure practice-based schemes are preferred to hybrid schemes with the same requirements in terms of practices to be implemented.

40. We also note that hybrid schemes are always preferred to results-based schemes with the same environmental objectives.

3.2.2. Heterogeneity by country and farm specialisation

41. In terms of cross-country and cross-specialisation comparisons, the relatively small sample size means that the results should be interpreted with caution. Nevertheless, the relative preferences of farmers for AES designs were similar between the countries studied, and consistent with the overall analysis presented above (Table A D.3 and Table A D.4 in Annex D). While farmers in the Netherlands, and in Sweden to a lesser extent, displayed higher WTA values than Finnish farmers, the sample sizes in the Netherlands and Sweden were small.

42. The share of payments conditioned on results mattered for mixed farmers, while arable farmers did not appear to be significantly deterred by the share of results-based payment in their choice of AES. Similarly, having to adopt four practices of the list of practices, instead of only the first two, did not appear to have a significant effect on arable farmers' choices, whereas it did have a significant negative effect for mixed farmers. For example, arable farmers were not deterred by having to establish cover (or catch) crops on 10% of their arable land and having to reduce their pesticide use by 20% while mixed farmers were.

43. The results (Table 3.8), also show that arable farmers tended to require higher payment levels than mixed farmers to participate in equivalent AES, but the additional payments associated with higher levels of requirements were higher for mixed farmers than for arable farmers (with the exception of the second level of water quality objectives).

Table 3.8. Willingness to accept estimates per farm specialisation

WTA estimates (Delta Method)	Pooled			Arable			Mixed farming		
Based on Conditional Logit	Estimate (€)		Robust Standard Errors	Estimate (€)		Robust Standard Errors	Estimate (€)		Robust Standard Errors
ASC practice-based	182.2	***	14.4	200.6	***	18.24	149.9	***	23.17
ASC hybrid	142.9	***	21.7	166.6	***	27.79	99.4	***	34.73
ASC results-based	246.2	***	19.1	258.3	***	24.75	221.4	***	29.9
Practices 2 (ref 1)	31.1	***	10.4	18.9		13.36	50.2	***	16.33
Practices 3 (ref 1)	52.0	***	10.9	43.6	***	13.4	65.5	***	18.66
Water 1 (ref 0)	45.0	***	13.4	36.8	**	16.79	59.3	***	22.37
Water 2 (ref 0)	55.4	***	9.2	74.2	***	11.9	30.9	**	14.56
CC 1 (ref 0)	41.0	***	10.2	52.7	***	12.84	25.4		17.09
CC2 (ref 0)	47.6	***	11.4	59.4	***	14.63	28.8		18.31
Biodiversity 1 (ref 0)	4.9		10.7	9.1		13.78	0.6		17.23
Biodiversity 2 (ref 0)	8.8		11.5	-4.4		13.87	29.9		19.94
Share conditioned on result	0.4	**	0.2	0.2		0.2248	0.7	**	0.2739

Note: *: p-value < 0.10; **: p-value < 0.05, ***: p-value <0.01

3.2.3. The role of behavioural factors in explaining farmers' preferences

44. A latent class analysis was conducted to determine which farmer characteristics explained preferences for contract attributes. First, clusters of farmers were generated to reduce the number of socioeconomic and behavioural characteristics as explanatory variables to class membership. All clusters were independent from each other, meaning that a respondent could belong to cluster 1 in terms of their farm characteristics, while they may belong to cluster 2 or 3 based on their own individual characteristics. The details of the process are explained in Annex E.

45. The latent class analysis shows that preferences for AES design were strongly associated with behavioural characteristics and environmental preferences, but not with farm and farmers' characteristics. Based on the clusters, two classes of farmers based on behavioural characteristics explain most of the differences between farmers' WTA:

- *Class 1*. Includes a majority of respondents (63.35%) who displayed a more positive attitude towards AESs, as shown by the positive sign of the constants for the three designs of AESs. Farmers belonging to class 1 displayed the expected preferences for all scheme characteristics: the higher the requirements in terms of practices and results, the less likely they were to join, and the higher the share of payment conditioned upon results, the less likely they were to choose hybrid AES. These farmers tended to give relatively more value to the longer-term consequences of their actions; to perceive a need for environmental change; and to be more aware of the effects of farming on the environment, while also feeling more responsible for environmental issues than farmers belonging to class 2. This result aligns well with the Theory of Planned Behaviour and the Value-Belief-Norm models, in which awareness of consequences, ascription of responsibility and perceived behavioural control are described as key factors shaping intentions of behavioural change. Finnish farmers were more likely than farmers from the Netherlands to belong to this class. Farmers who reported more positive feedback to the survey were also more likely to belong to class 1. They were also on average more confident in their ability to adopt the practices or achieve the results required by the proposed schemes.

- *Class 2.* Farmers that were more risk averse (behavioural cluster 1) were more likely to belong to class 2, and therefore to prefer not to join AES. These farmers tended to express a lower perceived need for environmental change; less awareness of the consequences of farming on the environment; and lower levels of ascription of responsibility and behavioural control over environmental quality. This can explain the relatively stronger negative effect of all AES requirements on their choices to join an AES and their overall negative perception of AES, whatever their design. Farmers who found the survey too complex, found that the payments were too low, gave lower levels of credibility to the survey and provided less consistent answers were more likely to belong to this class. These farmers also stated being less confident in their ability to adopt the practices or to achieve the objectives set in the proposed AESs, while fearing that these would put their farm profitability at risk. Finally, they also tended to have lower levels of trust in the monitoring of the proposed AESs. Class 2 of farmers comprised 36.7% of the sample. They were likely to increase the average WTA in the mixed logit analysis.

46. Table 3.9 presents WTA estimates for these two classes of farmers, based on their individual characteristics (age, education, status), behavioural characteristics (risk, time, and environmental attitudes), and their responses to follow-up questions.[9]

47. Farmers belonging to class 2 showed strong negative preferences towards all three AES designs, while farmers belonging to class 1 preferred to adopt any AES rather than not participating, as demonstrated by the significant and positive values of the three Alternative Specific Constants (ASC). The relative preferences between the three designs, practice-based, results-based or hybrid schemes, everything else constant, remained the same however, with both classes preferring hybrid schemes over practice-based schemes and over results-based schemes.

[9] A first latent class model was estimated using all clusters to explain class membership. This leads to a loss of 1044 observations (174 respondents) due to missing values in the respondents' characteristics. Farm characteristics and current AE practices were not significantly explaining class membership, so we removed these variables from the latent class model to increase the number of observations. The results are similar whether the clusters of farm characteristics and AE practices are included or not, so we only present the results of the model excluding them from the analysis (Table A E.7), reducing the loss of observations to 426 observations (71 respondents) not included in the latent class analysis.

Table 3.9. WTA estimates for farmers' behavioural classes

WTA estimates (Delta Method)	Class 1			Class 2		
Based on Conditional Logit	Estimate (€)		Robust Standard Errors	Estimate (€)		Robust Standard Errors
ASC practice-based	-130.3	***	34.69	383.2	***	43.79
ASC hybrid	-174.8	***	37.2	343	***	72.49
ASC results-based	-60.1		32.0	377.7	***	53.02
Practices 2 (ref 1)	35.6	***	11.0	113.9	***	33.34
Practices 3 (ref 1)	53.7	***	11.6	185.9	***	39.7
Water 1 (ref 0)	45.5	***	13.8	69.17		72.53
Water 2 (ref 0)	41.4	***	9.4	98.05	***	28.35
CC 1 (ref 0)	29.3	**	10.4	98.04	***	29.75
CC2 (ref 0)	41.0	***	11.7	98.51	***	30.85
Biodiversity 1 (ref 0)	12.6		10.7	-4.421		28.34
Biodiversity 2 (ref 0)	17.4		13.2	23.59		31.69
Share conditioned on result	0.4	**	0.2	1.084		1.161

Note: *: p-value < 0.10; **: p-value < 0.05, ***: p-value <0.01

4. Discussion and Conclusions

48. In contrast to the cost-effectiveness analysis performed based on policy simulations in Part 1 of this project, the choice experiment shows that farmers always tended to prefer hybrid contracts (payment depends on both implementing practices and achieving results), or practice-based schemes over results-based contracts. The references between practice-based and hybrid schemes depended on the level of results-based requirement included in the hybrid schemes. For low levels of results-based objectives (biodiversity only), hybrid schemes were preferred over practice-based schemes including the same practice-based requirements. When introducing requirements to reduce nutrient runoff to improve water quality and/or requirement to reduce net GHG emissions to mitigate climate change in hybrid schemes, practices-based schemes were always preferred over hybrid schemes including the same practice-based requirements. These preferences were stable across farm type (arable and mixed) and farmer behavioural characteristics.

49. The results from the conditional logit estimation reveal several notable findings. First, farmers preferred less complicated to more complicated contracts. The average willingness to accept contracts with a low level of environmental requirements for practice-based schemes (i.e. adopting two practices) is EUR 182/ha/year. The average willingness to accept for adopting a hybrid scheme with the lowest level of environmental requirements (adopting two practices and achieving biodiversity objectives) varies from EUR 147/ha/year if 10% of the payment in conditioned upon results being achieved up to EUR 179/ha/year if 90% of the payment is conditioned upon results. In the case of results-based schemes, the average amount farmers would require to adopt a contract with the lowest level of environmental requirements (i.e. biodiversity objectives only) is EUR 246/ha/year. Those estimates increased with the level of environmental requirements. For example, in the case of practice-based schemes, relative to the option with two practices, the payment level would need to increase by 17% for contracts requiring the adoption of four practices and by 28% for practice-based contracts requiring the adoption of six practices.

50. Second, as expected, stricter environmental requirements would require higher payments to incentivise farmers to join the scheme. For example, in the case of hybrid payments and relative to "First 2 practices, Biodiversity and 10% share of payment

conditioned on the results", a requirement to reduce nutrient runoff by 25% or 50% would require an increase in payment by EUR 45/ha (31%) or an increase in payment by EUR 55.4/ha (38%), respectively. The additional payment needed to convince farmers to sign up into contracts that required farmers to reduce net GHG emissions by 25% or 50% are EUR 41/ha and EUR 48/ha, respectively.

51. Third, for hybrid contracts, which combine elements of both the results-based and practice-based schemes, the greater the share of the payment conditioned on achieving results, the higher the payment required by farmers. Farmers require an additional payment of EUR 0.4/ha for each percentage increase in the payment share based on achieving results (e.g. EUR 4/ha for 10% of the payment conditioned on results, EUR 8/ha for 20%, EUR 12/ha for 30% and up to EUR 36/ha if 90% of the payment is conditioned on results).

52. Fourth, arable farmers tended to show greater willingness to accept levels in order to participate in AES contracts, regardless of contract type (hybrid, results-based or practice-based). For hybrid contracts, the offered payment (EUR 167/ha) needed to be 68% higher for arable farms than the payment needed for mixed farmers to participate (EUR 99/ha).

53. Finally, one advantage of choice experiments is that they can identify the role that behavioural factors play in farmers' willingness to accept AES contracts. Using a latent class model estimation, we show that farmers that were more risk averse, who expressed a lower need for environmental change, and were less aware of the consequences of farming on the environment tended to have higher WTA. Strikingly, payments needed to be twice as large as the average payment for those farmers to participate in AES contracts. This premium is consistent with previous work that argues that results-based schemes expose farmers to a higher uncertainty of the amount of payment and therefore necessitate a risk premium (Schwarz et. al. (2008[5]); Andeltová (2018[6]), Zabel and Roe (2009[7])), and that concern for the environmental is likely to positively affect enrolment in agri-environmental schemes (Toma and Mathijs (2007[8]); Best (2010[9]); Läpple and Van Rensburg (2011[10])).

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Annex A. Summary of focus groups and pilot survey

Focus groups

54. Focus groups are meetings organised by a chair, usually someone co-ordinating the survey, to obtain feedback on the survey from participants from the pool of potential survey respondents. They are particularly helpful to gain information on how to improve surveys along a number of dimensions. One is to improve the consequentiality of the survey (i.e. the survey conveys that respondents' answers have real consequences influencing policy design). Focus groups help to determine the best language to be used to convey to respondents that their answers have real consequence. The second is to improve the comprehension of the experiment by participants (i.e. do supported activities make sense? Are choices credible and achievable? Are payments too high or low?). Clearly explaining the process of the experiment itself is an essential component for farmers to understand how to make choices about their preferred options. Finally, the third is to improve the information provided about the potential agri-environmental schemes so that farmers make informed choices about the potential options.

55. Ideally, focus groups should be held physically to facilitate the interaction among participants. Due to the effects of the COVID-19 pandemic, in Argentina, Finland and the Netherlands, the focus groups were organised online and were successful at delivering feedback.

56. In Finland, five farmers specialised in different crops and with different farm sizes, participated in the focus group. In Argentina there were six farmers, some of which were tenants and others were landowners and also with different specialisations. In the Netherlands, five farmers that specialised in mixed farming (both crops and livestock) participated in the focus groups.

57. The focus groups provided essential feedback about the comprehension of the survey, the information provided about the practices and the design of the choice cards. Notably, farmers were particularly concerned with how some of the instructions and measurement of the practices were communicated. As a result, the description of the choice experiment and of the individual practices were revised to take into account the concerns which significantly improved comprehension. Further, the way that the schemes and certain practices were described was changed significantly as farmers perceived that the questionnaire was too normative and in favour of results-based schemes.

Pilot survey

58. A pilot survey based on the current design of the questionnaire and choice cards was launched in the beginning of September 2020 and completed in January 2021. Argentina, Canada, Finland, and Sweden participated in the pilot survey. The pilot survey served both to test the overall questionnaire design and to calibrate the payments and parameters for the choice card experiment.

59. In general, conducting pilots is instrumental in the efficient design of choice experiments which provide more precise model estimates (even with relatively small sample sizes). To generate an efficient design, prior values are needed for the model parameters (the weights of each attribute in respondents' choices). Pilots are the best instruments for obtaining reliable prior values. The pilot also permits to the test the full questionnaire with farmers.

60. In collaboration with the partnering institution in each participating country, a translated version of the survey was input into LimeSurvey in which they sent out the link to the survey along with an explanation about the process, an explanation of anonymity, the goals of the survey and a suggested time in which to complete it. In each country, the survey was sent to over 100 farmers with the goal to have at least 20 completed responses of the survey in each country. To have representation of both crop cultivation farmers and those with a mix between crops and livestock, each country except for Argentina that focused on crop farms, sent the survey to an equal number of farmers in each group. All responses were anonymous, and the surveys were stored on a secured OECD server.

61. The data collection began in November 2020 and continued through January 2021. The data collection took longer than expected due to the relatively low response rate of the survey. While this delayed data collection, it was clear that monetary incentives would be needed to both increase the response rate and the speed of the data collection. As a result, monetary incentives will be included in the launch of the final survey in March 2021.

62. Overall, the survey was accessed by 1 212 individuals from Sweden, Finland, Argentina, and Canada. Over 76% (n=932) of the respondents did not pass the landing page of the survey, so did not start answering it. To address this issue, the length of the introduction on the first page was reduced and checks were in place to ensure that there are no errors in moving forward past the first page. Of the remaining 280 participants, 88 were screened out through the screening question, showing that the screening is working well, and only mixed farmers and arable farmers were kept in the survey. There was further dropout throughout the survey.

63. Due to the complexity of the choice cards and the payment schemes, the survey includes comprehension questions. This was another point in which farmers dropped out of the survey (~14 individuals). It is reassuring that a large share of respondents (80%) provided the correct answer to these quiz questions, showing that the explanations provided were clear. Results from the initial analysis suggested that the questions to ensure that farmers understand the structure of payments under the different alternatives are expanded. These will be included in the final survey.

Data collection

64. Data collection for the choice experiment survey was conducted in partnership with the respective partner organisations in Finland, the Netherlands, and Sweden. The finalised survey instrument was adapted to each country context and was implemented on LimeSurvey. In each country, the survey invitation was sent by email to a large sample of representative farmers. The email informed farmers about the purpose of the survey and the role it may play in policy making. Monetary incentives were used to increase response rates, and they varied by country in the value and type. In Finland and Sweden, farmers were informed that they would be entered into a lottery to win a prize (roughly 50 euros) if they completed the survey. In the Netherlands, farmers each received a small amount for their participation.

65. Data collection occurred during May and June 2021. We obtained a total of 731 submitted answers to the questionnaire, including 270 responses for the mixed farming version of the questionnaire and 461 for the arable version of the questionnaire. In terms of participation per country, 357 farmers completed the questionnaire in Finland, 230 from Sweden and 144 from the Netherlands.

Annex B. Methodological framework

General methodological framework for the analysis of discrete choice data

The Conditional Logit Model

66. Respondents were asked to choose their preferred contract alternative on a series of six choice cards in the survey. We analyse this choice data using first a Multinomial Logit (McFadden, 1974[11]), which is based on the Random Utility Theory. Under this framework, the utility provided by an alternative contract i to individual n, $U_{i,n}$, can be decomposed in a deterministic and observable element $V_{i,n}$, and a random term, $\varepsilon_{i,n}$, as follows:

$$U_{i,n} = V_{i,n} + \varepsilon_{i,n}$$

67. The observable part is a linear function of the characteristics of the contract (its attributes). On each choice card, farmers were presented with 3 different alternative contracts, each having different characteristics. We call X_i the vector of K attributes k of a contract i presented to farmers on a choice card. The observable part of the utility function is therefore defined as:

$$V(X_i) = \sum_{k=1}^{K} \beta_{ik}\, x_{ik}$$

68. With β_{ik} the weight of alternative i's attribute k on utility. These betas are the parameters of interest that we aim to estimate.

69. In the context of the current choice experiment with labelled alternatives, V_i is a function of different attributes depending on the alternative that is being considered:

70. In a practices-based alternative, the observed part of the utility is a function of the practices to be implemented ($X_{practices}$), the level of payment ($X_{payment}$) and a constant reflecting the general preferences for practices-based schemes that not reflected in the attributes presented on the choice card ($\delta_{practices}$, called the Alternative Specific Constant ASC). Therefore, the utility associated with a practice-based alternative is defined as:

$$V_{practices} = \delta_{practices} + \beta_{practices}X_{practices} + \beta_{payment}X_{payment}$$

71. In a results-based alternative, the observed part of the utility is a function of the results to be achieved in terms of water quality (X_{water}), climate change mitigation (X_{cc}) and biodiversity ($X_{biodiversity}$), and the level of payment ($X_{payment}$) and a constant reflecting the general preferences for results-based schemes that not reflected in the attributes presented on the choice card (δ_{result})results-based[10]:

$$V_{result} = \delta_{result} + \beta_{water}X_{water} + \beta_{cc}X_{cc} + \beta_{biodiversity}X_{biodiversity} + \beta_{payment}X_{payment}$$

72. In a hybrid scheme alternative, the observed part of the utility is a function of both the practices to be implemented ($X_{practices}$), and the results to be achieved in terms of water quality (X_{water}), climate change mitigation (X_{cc}) and biodiversity ($X_{biodiversity}$),

[10] Note: an alternative specification for the utility functions of the 3 scheme designs were used to check the robustness of results. The results are presented in Annex D and show that the results hold.

the share of payment conditioned upon results (X_{share}), the level of payment ($X_{payment}$) and a constant reflecting the general preferences for results-based schemes that not reflected in the attributes presented on the choice card (δ_{hybrid}):

$$V_{hybrid} = \delta_{hybrid} + \beta_{practices}X_{practices} + \beta_{water}X_{water} + \beta_{cc}X_{cc} + \beta_{biodiversity}X_{biodiversity} + \beta_{share}X_{share} + \beta_{payment}X_{payment}$$

73. We work under the assumption that, on a choice card, a farmer n will choose the alternative *i* that would provide them with the highest level of utility, so that the probability that an individual *n* chooses alternative *i*, over alternative *j* on choice card C_t is:

$$P_{in} = P\left[V_{in} + \varepsilon_{in} > V_{jn} + \varepsilon_{jn}, \forall j \in C_t, j \neq i\right]$$

74. Assuming that the random term ε_{in} is Identically and Independently Distributed (IID) following a Gumble distribution, we obtain the conditional logit model (McFadden, 1974[11]), with the probability of individual n choosing alternative *i* over *J* other alternatives on a choice card defined as:

$$P_{in} = \frac{exp(\beta_i^{'}X_i)}{\sum_{j=1}^{J} exp\left(\beta_j^{'}X_j\right)}$$

The beta parameters of the model are estimated using maximum likelihood.

The Mixed Logit Model

75. Introducing a continuous distribution of betas over the population, and therefore accounting for heterogeneity in preferences, we obtain the mixed logit model in which the parameters β_{kn} are specific to each individual and randomly distributed across the population, with a density function $f(\beta_k)$. The probability that farmer n chooses alternative i in choice card Ct, noted as alternative Aint, is:

$$P(A_{int}|\beta_n) = \frac{exp(X_{int}'\beta_n)}{\sum_{j\in C_t} X_{jnt}'\beta_n}$$

And the probability of observing the sequence of T choices by individual n is:

$$P(A_{in1}, \dots, A_{inT}) = \int \prod_{t=1}^{T} \left(\frac{exp(X_{int}'\beta)}{\sum_{j\in C_t} X_{jnt}'\beta}\right) f(\beta) d\beta$$

where $f(\beta)$ can be specified to be normal or lognormal: $\beta \sim N(b, \mu)$ or $\ln \beta \sim N(b, \mu)$. The parameters b and μ are respectively the mean and the standard deviation of these distributions and are to be estimated by simulation (Train, 2009).

76. When introducing a discrete distribution of betas in the population we obtain the latent class model, which identifies classes of respondents that share the same preferences (same betas). Conditioned on belonging to class s, the probability of individual n choosing alternative *i* is defined as in the conditional logit model by:

$$P_{in|s} = \frac{exp(\beta_{s\,i}^{'}X_i)}{\sum_{j\in C} exp(\beta_{s\,j}^{'}X_j)}$$

The unconditional probability of choice over T choices is therefore defined as:

$$P_{in} = \sum_{s=1}^{S} M_{n,s} \prod_{t=1}^{T} \frac{exp(\beta_s x_{it})}{\sum_{j=1}^{J} exp\left(\beta_s x_{jt}\right)}$$

With Mn,s the probability that individual n belongs to class s.

$$M_{n,s} = \alpha_s Z_n + \mu_{ns}$$

This probability itself is estimated using a Multinomial logit model and depends on individuals' characteristics (vector Zn) as follows:

$$M_{n,s} = \frac{exp(\alpha_s' Z_n)}{\sum_{s=1}^{S} exp(\alpha_s' Z_n)}$$

77. With αs the vector parameters representing the weights of individual characteristics Zn in the probability of class membership.

78. In the next section we present how these three modelling approaches (conditional logit, mixed logit and latent class models) were successively implemented in the analysis of the choice experiment data.

Overview of the analysis and model specifications:

79. Data validation: before proceeding to the analysis, the range of responses for each variable was checked and compared to expected values and the coherence of responses was verified for the values entered for the farm acreage and repartition between arable land, grassland and other type of land. We identified one respondent with responses outside the range of expected values to all questions and a systematic choice of "I would not participate" on the choice cards. This respondent was therefore considered as a protest respondent and their responses considered as unreliable and was dropped for the analysis. All other respondents were kept in the dataset. Responses to the current usage of fertilisers were also inconsistent between respondents and were not included in the analysis.

80. The first analysis of farmers' choices and preferences for alternative AES designs was performed using a conditional logit model on the overall data, and then per country and per farm specialisation. All these models share the same specifications and account for the panel structure of the data (each respondent making a series of 6 choices, the 6 choices of a single respondent are not independent): robust standard errors, t-ratios and associated p-values are computed using the 'sandwich' estimator, which corrects standard errors accordingly. The Apollo software in R (Hess and Palma, 2019[12]) was used for the choice modelling. Farmers' Willingness to Accept (WTA) were estimated based on the conditional logit models results, as the ratio of the parameter associated over the attribute of interest and the price parameter, through the Delta method using the same package on R. For a full description of the Delta method and how it can be used to estimate WTA, please refer to (Daly, Hess and de Jong, 2012[13])

81. The Mixed logit model was used to investigate the heterogeneity in farmers' preferences on the pooled dataset only as it contains too few observations for a mixed logit estimation on sub-samples (per country or per farm specialisation). The same Apollo software in R (Hess and Palma, 2019[12]) was used. We used Sobol draws as recommended in (Czajkowski and Budzinski, 2019[14]) with Owen and Faure-Tezuka scrambling. We used 1 000 draws for each model. We introduced in the mixed logit model correlation parameters between practices attributes and results attributes to account for likely correlation between practices levels and results to be achieved in a hybrid AES design. All parameters are assumed to be normally distributed, but the parameter associated with the price attribute is assumed to be log-normally distributed as we assume that all farmers have positive preferences for higher payment levels. The WTA estimated following the Mixed Logit method are obtained through random draws in the estimated distribution of the attributes' parameters and the payment parameter. We use 10^6 random draws and take the

negative of the ratio of each attribute parameter and the payment attribute parameter. The mean, median and Standard Deviation of the ratio over the 10^6 draws is reported as the estimated mean, median and SD of the marginal WTA for the corresponding attribute.

82. We then proceeded to a clustering of all respondents based on their socio demographic, farm and behavioural characteristics as well as their baseline agri-environmental characteristics on Stata. We used a K-means partitioning, based on the Dice similarity coefficient for clusters based on binary variables, and the Gower coefficient for clusters relying on a mix of continuous and binary variables. The number of clusters for each clustering exercise was determined using a combination of the following criteria: the within sum of squares for different numbers of clusters (2 to 20) (Makles, 2012[15]) and the ability to generate clusters of reasonable size with distinct and significant different characteristics that are coherent, while keeping the number of clusters reasonably low as these need to be usable in the latent class analysis.

83. Using the cluster membership as explanatory variables for the different classes of respondents, we performed a latent class analysis with the Apollo software in R (Hess and Palma, 2019[12]) in order to identification of groups of farmers with homogeneous characteristics and preferences.

Annex C. Descriptive statistics and variable definitions

Table A C.1. Descriptive statistics - farm characteristics

Descriptives for Farm Characteristics

Variable	Nb of observations	Mean (SD)	Min	Max
Total Farm Land (ha)	723	160.1 (266.3)	1.0	3 500.0
Including:				
Arable Land (ha)	705	70.8 (106.7)	0.0	1 760.0
Permanent Grassland (ha)	671	10.3 (26.8)	0.0	350.0
Average Field Size (ha)	721	6.8 (16.2)	0.0	200.0
Livestock (for mixed farming systems):				
Dairy cattle (livestock units)	92	53.1 (65)	0.0	425.0
Beef cattle (livestock units)	137	44.9 (71.5)	0.0	550 137.0
Sheep (livestock units)	94	56.8 (100.7)	0.0	500.0
Other livestock (nb)	98	1825.4 (16174.6)	0.0	160 000.0
Distance closest grazing field (km)	258	0.2 (0.8)	0.0	10.0
Distance most distant grazing field (km)	258	5.4 (10)	0.0	70.0
Distance most of grazing fields (km)	251	3.3 (18.8)	0.0	216.0
Land Tenure: owned (ha)	698	74.9 (206.2)	0.0	4 550.0
Land Tenure: leased (ha)	640	33.2 (62.2)	0.0	850.0
Land Tenure: commons (ha)	487	15.1 (50.2)	0.0	500.0
Workforce on farm:				
Full-time workforce	572	1.4 (1.6)	0.0	18.0
Part-time workforce	547	1.4 (1.7)	0.0	20.0
Share farm income in household income (%)	528	36.7 (27.6)	0.0	100.0

Table A C.2. Descriptive statistics - farm characteristics (continued)

Further Descriptives for Farm Characteristics

	Frequency	Percent	Cumulative
Other Source of Income			
No	184	25.6	25.6
Yes	534	74.4	100
Organic Farming			
No	611	83.6	83.6
Yes	120	16.4	100

Table A C.3. Descriptive statistics - socio- demographic characteristics

Descriptives for Sociodemographic Characteristics

Variable	Frequency	Percent	Cumulative
Gender			
Female	62.0	8.6	8.6
Male	650.0	89.7	98.3
Prefer not to say	10.0	1.4	99.7
Other	3.0	0.4	100.0
Age			
18 - 34	39.0	5.4	5.4
35 - 44	116.0	16.0	21.4
45 - 54	193.0	26.7	48.1
55 - 64	219.0	30.3	78.3
> 65	142.0	19.6	97.9
Prefer not to say	15.0	2.1	100.0
Education			
None	2.0	0.3	0.3
Minimum compulsory	27.0	3.7	4.0
High school diploma in agriculture	108.0	14.9	18.9
High school diploma not in agriculture	78.0	10.8	29.7
Vocational training in agriculture	174.0	24.1	53.8
Vocational training not in agriculture	98.0	13.6	67.4
University degree in agriculture	92.0	12.7	80.1
University degree not in agriculture	100.0	13.8	93.9
Other	44.0	6.1	100.0
Farmer Status			
Full-time farmer	419.0	58.2	58.2
Part-time farmer	264.0	36.7	95.5
Farm employee	4.0	0.6	96.1
Other	33.0	4.6	100.0

Figure A C.1. Risk and time attitudes

Statements used to elicit attitudes to risk and time preferences are presented in Table A C.4

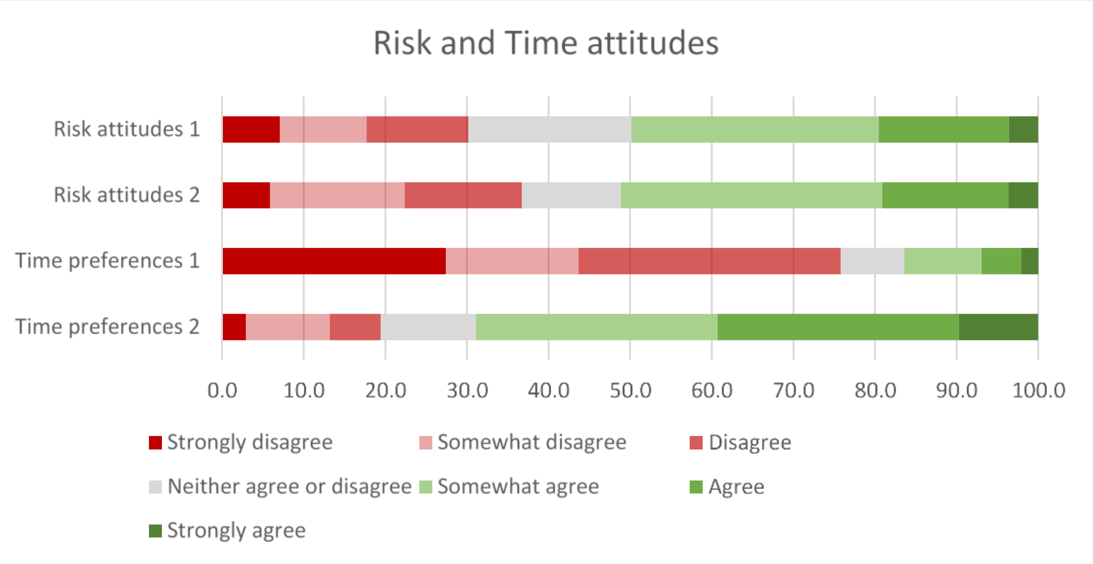


Table A C.4. Statements used to elicit risk attitudes and time preferences

Risk attitudes 1	I am willing to adopt new farming practices that may or may not pay off in the future
Risk attitudes 2	I am generally willing to take risks when managing my farm
Time preferences 1	My farm management decisions are only influenced by the consequences of my actions within the current farming season and not beyond
Time preferences 2	Often, I manage my farm in order to achieve outcomes that may not result for many years

Figure A C.2. Awareness of ascription of responsibility for environmental issues

Statements used for elicitation are presented in Table A C.5

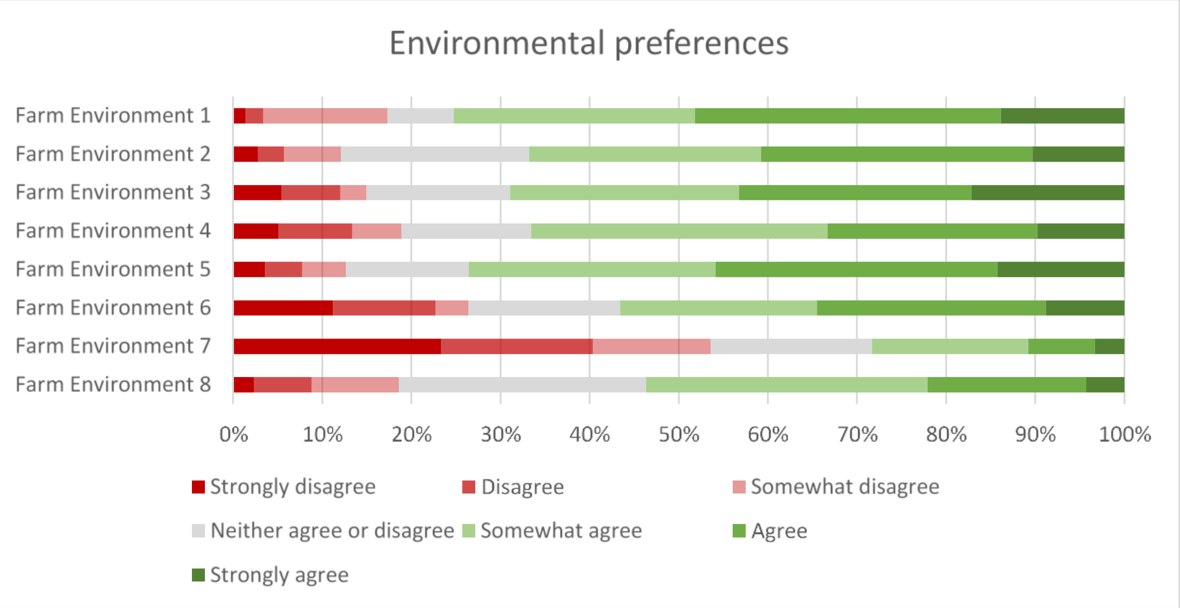
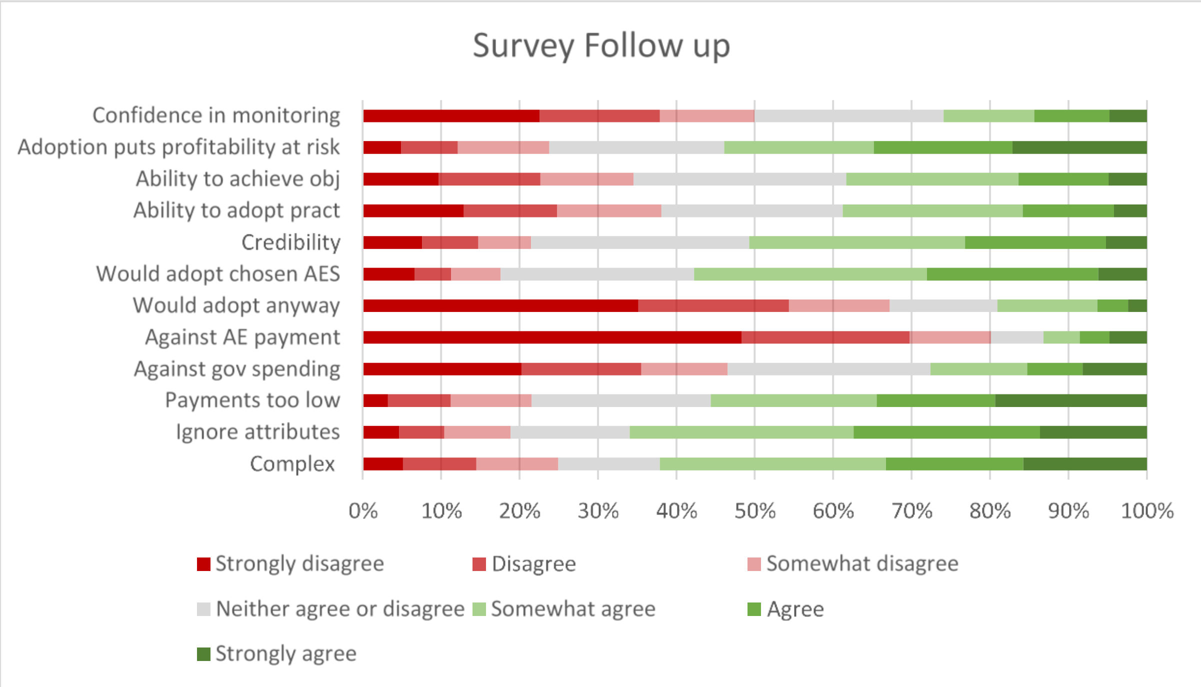


Table A C.5. Statements used to elicit attitudes towards the environment

Farm environment 1	The environment around me is doing okay (Shifting baseline theory – perception of environmental change)
Farm environment 2	The environment around me has gotten better over the past five years (Shifting baseline theory – perception of environmental change)
Farm environment 3	Global warming is a serious threat (Perception on environmental issues)
Farm environment 4	Farming practices directly impact the health of the environment (Awareness of consequences)
Farm environment 5	Farming using environmentally friendly practices can improve the health of the environment (Awareness of consequences)
Farm environment 6	I feel responsible for local environmental issues (Ascription of responsibility)
Farm environment 7	I feel responsible for international or global environmental issues (e.g. global warming) (Ascription of responsibility)
Farm environment 8	The farmers in my area are willing to adopt (or have already adopted) farming practices to improve environmental outcomes (Social Norms)

Figure A C.3. Responses to survey follow-up questions



Annex D. Model extensions and detailed tables

84. The mixed logit model allows for heterogeneity in respondents preferences for the different schemes and their attributes, and relaxes the assumption of Independence of Irrelevant Alternatives. This means that we allow for farmers in the sample to have different levels of preferences for a same level on an attribute, e.g. some may be less negatively impacted by higher requirements of reduced runoff than others, leading to a relatively less negative beta coefficient for this attribute's levels. This also means that the preferences measured are dependent on the alternatives presented in the questionnaire. This model allows the identification of scheme characteristics (attributes) for which farmers' have similar preferences versus those characteristics that have different effects on farmers' choices between farmers.

85. Farmers' preferences for the different attributes, excepted for the payment attribute, are assumed to be normally distributed in the model below, with the mean of the normal distribution reported in the upper part of the table (Table A D.1), and the standard deviation reported in the second part of the table. The payment attribute is assumed to follow a log-normal distribution, with the mean of the lognormal distribution reported in the upper part of the table and its standard deviation in the second part. A significant parameter for the mean shows that the attribute does have a significant effect on choices on average, while a significant parameter for the standard deviation associated with an attribute shows that there is a significant level of heterogeneity in respondents' preferences for this attribute (otherwise we cannot say that preferences for this attribute are different between respondents). The sign of the parameter for the standard deviation is irrelevant. The bottom part of the table controls for the correlation in preferences for the practices and result attributes in hybrid schemes.

Table A D.1. Investigating the presence of heterogeneity in farmers' preferences for AES designs: results from the mixed logit model and associated estimates of farmers' willingness to accept

	Mixed Logit Model			Willingness to accept estimates (€)		
	Estimate		Robust Standard Errors			
Mean				Mean	Median	SD
ASC practice-based	-2.378	***	0.274	422.6	131.5	1532.8
ASC hybrid	-2.204	***	0.429	392.1	112.3	1875.5
ASC results-based	-3.854	***	0.393	685.5	236.2	1944.7
Practices 2 (ref 1)	-0.819	***	0.174	145.7	58.3	325.9
Practices 3 (ref 1)	-1.184	***	0.203	210.8	66.2	743.6
Water 1 (ref 0)	-1.477	***	0.476	263.0	96.6	667.3
Water 2 (ref 0)	-1.067	***	0.229	189.9	65.0	545.4
CC 1 (ref 0)	-0.661	***	0.230	117.7	55.5	221.2
CC2 (ref 0)	-1.451	***	0.412	258.2	81.9	889.7
Biodiversity 1 (ref 0)	-0.338		0.220	60.2	21.9	154.8
Biodiversity 2 (ref 0)	-0.572	**	0.247	101.8	35.5	280.1

	Mixed Logit Model			Willingness to accept estimates (€)		
	Estimate		Robust Standard Errors			
Share conditioned on result (%)	-0.018	***	0.004	3.28	0.99	12.1
Payment level	-4.430	***	0.101			
Standard Deviation						
ASC practice-based	-3.487	***	0.228			
ASC hybrid	4.539	***	0.741			
ASC results-based	-3.892	***	0.361			
Practices 2 (ref 1)	0.478		0.423			
Practices 3 (ref 1)	-1.672	***	0.312			
Water 1 (ref 0)	1.183		0.957			
Water 2 (ref 0)	1.104	*	0.790			
CC 1 (ref 0)	0.020		0.691			
CC 2 (ref 0)	1.966	***	0.579			
Biodiversity 1 (ref 0)	0.281		0.558			
Biodiversity 2 (ref 0)	0.551		0.393			
Share conditioned on result	-0.028		0.406			
Payment level	1.226	**	0.312			
Correlations						
Water 1 * Practices 2	-0.005		0.790			
Water 1 * Practices 3	-1.886	**	0.691			
Water 2 * Practices 2	1.104	***	0.579			
Water 2 * Practices 3	-0.113		0.558			
CC 1 * Practices 2	-0.810	***	0.393			
CC 1 * Practices 3	0.020		0.406			
CC 2 * Practices 2	1.295	***	0.312			
CC 2 * Practices 3	-1.191	***	0.275			
Biodiversity 1 * Practices 2	1.966		0.624			
Biodiversity 1 * Practices 3	1.091	***	1.753			
Biodiversity 2 * Practices 2	-1.255		0.829			
Biodiversity 2 * Practices 3	0.281		1.133			
Number of respondents			*731*			
Number of observations			*4386*			
AIC			*7812.44*			
BIC			*8055.12*			
LL			*-3868.22*			

Note: the random parameter for the payment attribute follows a log-normal distribution. The sign of the standard deviation parameters is irrelevant

86. Table A D.1 confirms the results of the conditional logit model in terms of relative preferences for the 3 AES designs and the average effect of attribute levels on farmers' choices. The mixed logit model captures a small negative effect of the second level of the

biodiversity attribute (10 flowering plant species present on 10% of farm acreage), but with an associated robust p-value between the 0.05 and 0.10 thresholds.

87. Looking at the second part of Table A D.1, we see that preferences for some of the attributes do not vary significantly between farmers, i.e. farmers' preferences are rather homogeneous for these characteristics of AES. These are: level 2 of the practices attribute, both levels of the water quality requirements, the first level of the biodiversity requirements, and the share of payment conditioned on results. The mean parameters being negative for all these attributes (with the exception of the biodiversity requirement), this means that all farmers within the sample dislike in a similar way having to adopt the first 4 practices of the list instead of 2, having to reduce their nutrient, pesticide and sediment runoff and higher shares of the payment being conditioned upon result in hybrid schemes. In contrast, farmers display heterogeneous preferences for all remaining scheme characteristics, including the level of payment (i.e. heterogenous marginal utility of income).

88. While the mean WTA values estimated based on the mixed logit model are overall much larger, they show the same relative preferences for the different attributes. Interestingly, the median values of the WTA are much closer to the ones estimated based on the conditional logit model estimates, showing that the distribution of WTA for the scheme characteristics within the sample is skewed and the high average WTA is being driven by a few farmers with very high WTA values.

89. The latent class analysis presented below will aim at identifying classes of farmers with similar preferences and at characterising the farmers that are associated with each class. Before that, we analyse separately the choices made by farmers from each participating country and for each farm specialisation (mixed farmers or arable farmers).

Table A D.2. Cross country comparison of farmers' preferences for AES designs: results from conditional logit models

Conditional Logit Model	Finland			Sweden			The Netherlands		
	Estimate		Robust Standard Errors	Estimate		Robust Standard Errors	Estimate		Robust Standard Errors
ASC practice-based	-1.011	***	0.139	-0.967	***	0.166	-1.447	***	0.220
ASC hybrid	-0.624	***	0.181	-0.872	***	0.232	-1.383	***	0.321
ASC results-based	-1.413	***	0.162	-1.398	***	0.207	-1.644	***	0.244
Practices 2 (ref 1)	-0.147		0.090	-0.324	***	0.114	-0.022		0.159
Practices 3 (ref 1)	-0.291	***	0.092	-0.279	**	0.125	-0.461	***	0.166
Water 1 (ref 0)	-0.400	***	0.117	-0.259	*	0.155	0.125		0.194
Water 2 (ref 0)	-0.416	***	0.085	-0.207	**	0.099	-0.334	**	0.135
CC 1 (ref 0)	-0.352	***	0.094	-0.112		0.103	-0.207		0.145
CC 2 (ref 0)	-0.318	***	0.097	-0.245	**	0.125	-0.337	*	0.189
Biodiversity 1 (ref 0)	-0.177	*	0.091	0.217	**	0.109	-0.190		0.169
Biodiversity 2 (ref 0)	-0.093		0.098	0.062		0.128	-0.218		0.164
Share conditioned on result	-0.003	**	0.001	-0.002		0.002	-0.002		0.003
Payment level	0.007	***	0.001	0.005	***	0.001	0.004	***	0.001
Number of respondents			357			230			144
Number of observations			2142			1380			864
AIC			5481.22			5481.22			2043.05
BIC			5554.93			5554.93			2104.95
LL			-2727.611			-1814.703			-1008.523

*: robust p-value < 0.10; **: robust p-value < 0.05, ***: robust p-value <0.01

Note that a Likelihood Ratio Test shows that the difference between the coefficents associated with 2 levels of the CC attribute (CC1 and CC2) in Finland is not significantly different from 0 (p-value = 0.729), similarly a LR test shows that the difference between Practices 2 and Practices 3 in Sweden is not significantly different from 0 (p-value = 0.671), neither are Water 1 and Water 2 in Sweden (p-value =0.729).

Table A D.3. Estimated willingness to accept per country

WTA estimates (Delta Method)	Finland			Sweden			The Netherlands		
Based on Conditional Logit	Estimate (€)		Robust Standard Errors	Estimate (€)		Robust Standard Errors	Estimate (€)		Robust Standard Errors
ASC practice-based	137.2	***	16.9	181.3	***	29.0	368.4	***	67.7
ASC hybrid	84.7	***	24.7	163.8	***	44.0	352.0	***	102.2
ASC results-based	191.7	***	22.2	262.2	***	38.0	418.3	***	85.3
Practices 2 (ref 1)	19.9		12.1	60.9	***	19.9	5.5		40.2
Practices 3 (ref 1)	39.5	***	12.2	52.3	**	22.9	117.3	***	42.2
Water 1 (ref 0)	54.3	***	15.1	48.6	*	28.3	-31.9		52.7
Water 2 (ref 0)	56.5	***	11.0	38.9	**	18.5	85.0	***	30.3
CC 1 (ref 0)	47.8	***	12.7	21.0		19.0	52.6		35.5
CC2 (ref 0)	43.2	***	12.9	46.1	**	23.0	85.9	*	46.6
Biodiversity 1 (ref 0)	24.1	*	12.5	-40.8	**	20.6	48.5		43.5
Biodiversity 2 (ref 0)	12.6		13.2	-11.6		24.2	55.4		40.9
Share conditioned on result	0.5	**	0.2	0.4		0.4	0.5		0.7

Note: *: p-value < 0.10; **: p-value < 0.05, ***: p-value <0.01

Table A D.4. Comparison of farmers' preferences for AES designs by farm specialisation: results from conditional logit models

Conditional Logit Model	Pooled			Arable			Mixed farming		
	Estimate		Robust Standard Errors	Estimate		Robust Standard Errors	Estimate		Robust Standard Errors
ASC practice-based	-1.097	***	0.095	-1.212	***	0.122	-0.904	***	0.152
ASC hybrid	-0.861	***	0.129	-1.007	***	0.164	-0.600	***	0.208
ASC results-based	-1.483	***	0.113	-1.560	***	0.147	-1.336	***	0.178
Practices 2 (ref 1)	-0.187	***	0.064	-0.114		0.081	-0.303	***	0.105
Practices 3 (ref 1)	-0.313	***	0.067	-0.264	***	0.082	-0.395	***	0.116
Water 1 (ref 0)	-0.271	***	0.084	-0.222	**	0.106	-0.358	**	0.141
Water 2 (ref 0)	-0.333	***	0.058	-0.448	***	0.075	-0.186	**	0.090
CC 1 (ref 0)	-0.247	***	0.063	-0.319	***	0.077	-0.153		0.106
CC2 (ref 0)	-0.286	***	0.070	-0.359	***	0.089	-0.174		0.113
Biodiversity 1 (ref 0)	-0.029		0.064	-0.055		0.083	-0.003		0.104
Biodiversity 2 (ref 0)	-0.053		0.070	0.027		0.084	-0.180		0.122
Share conditioned on result	-0.003	**	0.001	-0.001		0.001	-0.004	**	0.002
Payment level	0.006	***	0.000	0.006	***	0.000	0.006	***	0.001
Number of respondents			731			461			270
Number of observations			4386			2766			2766
AIC			11326.35			7053.31			4266.18
BIC			11409.37			7130.34			4336.26
LL			-5650.176			-3513.654			-2120.092

Note: *: robust p-value < 0.10; **: robust p-value < 0.05, ***: robust p-value <0.01

90. In order to confirm the robustness of the results obtained under alternative specifications of the utility functions, the models were ran using a single ASC constant capture farmers' preferences for joining a scheme that are not captured by the attributes included on the choice cards. The share attribute was coded as continuous in the hybrid alternative and the share attribute in the other two design options is considered as 2 additional independent variables: either 0% (practice-based) or 100% (results-based), to avoid a discontinuous jump in WTA for the share attribute at approximatively 0 and approximatively 100. Therefore, the variable `share' as a continuous variable in the utility function associated with hybrid schemes would only apply for a range from 10% to 90 % (which was the range used within the hybrid schemes). The observable parts of the utility functions are now defined as:

$$V_{practices} = \delta_{asc} + \beta_{share0}X_{share0} + \beta_{practices}X_{practices} + \beta_{payment}X_{payment}$$

$$V_{result} = \delta_{asc} + \beta_{share100}X_{share100} + \beta_{water}X_{water} + \beta_{cc}X_{cc} + \beta_{biodiversity}X_{biodiversity} + \beta_{payment}X_{payment}$$

$$V_{hybrid} = \delta_{asc} + \beta_{share}X_{share} + \beta_{practices}X_{practices} + \beta_{water}X_{water} + \beta_{cc}X_{cc} + \beta_{biodiversity}X_{biodiversity} + \beta_{payment}X_{payment}$$

The results obtained using this specification are presented in Table A D.5.

Table A D.5. Results of the MNL model under a specification with 1 single ACS and the share attribute is specific to each scheme design

30/03/2022		n	731	LL	-5649.8
MNL US2		obs	4386	Adjust. R2	0.0685
				AIC	11327.6
				BIC	11417.01

Conditional Logit Model

	Estimate		Rob.std.err.	Rob.t-ratio(0)	Rob.p-val(0)
ASC	-0.909	***	0.142	-6.394	0.000
Practices 1	0.063		0.074	0.861	0.389
Practices 2	-0.166	**	0.070	-2.392	0.017
Practices 3	-0.294	***	0.068	-4.310	0.000
Water 1 (ref 0)	-0.264	***	0.085	-3.113	0.002
Water 2 (ref 0)	-0.326	***	0.060	-5.390	0.000
CC 1 (ref 0)	-0.239	***	0.064	-3.752	0.000
CC2 (ref 0)	-0.276	***	0.073	-3.802	0.000
Biodiversity 1 (ref 0)	-0.022		0.063	-0.343	0.732
Biodiversity 2 (ref 0)	-0.042		0.070	-0.603	0.547
All payments based on practice	-0.214	*	0.121	-1.770	0.077
Share conditioned on result [10 to 90%]	-0.002	**	0.001	-2.297	0.022
All payments based on results	-0.582	***	0.124	-4.682	0.000
Payment level	0.006	***	0.000	16.510	0.000

91. Which yields the following values of WTA in Table A D.6.

Table A D.6. WTA estimates derived from Table A D.5.

WTA estimates (Delta Method)	Estimate (€)		Rob.std.err.	Rob.t-ratio(0)	Rob.p-val(0)
ASC	152.30	***	25.47	5.98	0.000
Practices 1	Not significantly different from 0				
Practices 2	27.85	**	11.27	2.471	0.014
Practices 3	49.29	***	11.03	4.469	0.000
Water 1 (ref 0)	44.16	***	13.55	3.26	0.001
Water 2 (ref 0)	54.53	***	9.578	5.694	0.000
CC 1 (ref 0)	40.01	***	10.38	3.854	0.000
CC2 (ref 0)	46.31	***	11.79	3.927	0.000
Biodiversity 1 (ref 0)	3.60		10.52	0.3423	0.732
Biodiversity 2 (ref 0)	7.07		11.66	0.6065	0.544
All payments based on practice	35.89	*	19.79	1.814	0.070
Share conditioned on result [10 to 90%]	0.41	**	0.1756	2.339	0.020
All payments based on results	97.55	***	19.96	4.888	0.000

92. The WTA for alternative scheme designs are then computed, accounting for all their characteristics, to compare the results with our initial findings. These WTA values are obtained by summing up the marginal WTA values for each of the attributes and the ASC reported in Table A D.5.

Practice-based schemes:

Level of requirements	Initial analysis Mean WTA (€/ha/year)	Analysis using specification MNL US2 Mean WTA (€/ha/year)
Level 1: first 2 practices	181.7	188.19
Level 2: first 4 practices	212.8	216.04
Level 3: all 6 practices	233.7	237.48

Results-based schemes:

Level of requirements	Initial analysis Mean WTA (€4/ha/year)	Analysis using specification MNL US2 Mean WTA (€/ha/year)
Biodiversity only	245.8	249.85
Water 1 and CC1	331.7	334.02
Water 2 and CC2	348.7	350.69

Hybrid schemes:

Level of requirement	Mean WTA (€4/ha/year)					
	20% of payment conditioned on results		50% of payment conditioned on results		80% of payment conditioned on result	
	Initial spec.	US2 spec	Initial spec.	US2 spec	Initial spec.	US2 spec
First 2 practices + Biodiversity 1	151.3	160.5	163.8	172.8	176.3	185.1
First 4 practices + Water 1 and CC1	268.2	272.5	280.8	284.9	293.3	297.2
First 4 practices + Water 2 and CC2	285.2	289.2	297.7	301.5	310.3	313.8
All 6 practices + Water 1 and CC1	289.2	294.0	301.7	306.3	314.2	318.6
All 6 practices + Water 2 and CC2	306.1	310.6	318.7	323.0	331.2	335.3

93. The results show that the WTA results under this new specification are very close to the initial specification and, most importantly, all the report's interpretation based on relative preferences hold.

Annex E. Heterogeneity in Farmer Preferences (Clusters)

Clustering farmers according to their characteristics

94. As a first step before the latent class analysis, with the objective to reduce the number of variables to be included as explanatory variables to the class membership, we generate several clustering of respondents: described below. Note that all clustering are independent from each other, meaning that a respondent could belong to cluster 1 in terms of their farm characteristics, while they may belong to cluster 2 or 3 based on their own individual characteristics.

95. The first clustering separates farmers according to their farm's characteristics: farmers are separated in 3 clusters, which characteristics are presented in Table A E.1. Note that farm specialisation (mixed farming or arable farming) is not a determinant of cluster membership despite being included for the clustering.

Table A E.1. Description of 3 clusters of farm characteristics

Clusters of Farm Characteristics	Mean (SD)			Bartlett's test
Variables	Cluster 1 N=162	Cluster 2 N=243	Cluster 3 N=263	
Total land (ha)	198.4 (381.1)	175.6 (185.6)	133.6 (264.7)	***
Arable land (ha)	89.7 (149.4)	91.8 (92.0)	41.8 (84.1)	***
Specialisation (% in mixed farming)	33.3 (47.3)	42.4 (49.5)	37.3 (48.4)	
Share of land owned (%)	54.0 (48.5)	75.7 (309.6)	57.0 (44.1)	***
Other income (%)	100.0 (0.0)	30.9 (46.3)	100.0 (0)	***
Share farm income in household (%)	52.1 (9.5)	95.1 (8.4)	14.5 (10.7)	***

Note: *: p-value < 0.10; **: p-value < 0.05, ***: p-value <0.01

- Cluster 1 (Farm 1, n=162): Largest farms (198 hectares en average, including 89.7 ha of arable land), about half of the farmland in ownership, with all farms having another source of income available for the household, and the income from the farm representing about half of the household income (52.1% in average)
- Cluster 2 (Farm 2, n=243): Medium farms (175.6 hectares on average, including 91.8 ha of arable land), with in average about 3 quarters of the farmland in ownership, with only a third of farms having another source of income available for the household than the farm revenues, therefore the income from the farm representing the largest share of the household income (95.1% in average)
- Cluster 3 (Farm 3, n=263): Smallest farms (133.6 hectares on average, including 41.8 ha of arable land), with in average slightly more than half of the farmland in ownership, with most of the household income coming from other sources of income (only 14.5% of the household income being generated by the farm activity on average).

96. The second clustering separates farmers according to their socio-demographic characteristics: farmers are separated in 3 clusters (Table A E.2).

Table A E.2. Description of 3 clusters of farmers characteristics

Clusters of Farmers' Characteristics Variables (%)	Mean (SD) Cluster 1 N=219	Cluster 2 N=229	Cluster 3 N=270	Bartlett's test
Gender				
Female	11.0 (31.3)	6.1 (24.0)	8.9 (28.5)	***
Age				
18 - 34	10.0 (30.1)	0.0 (0.0)	6.30 (24.3)	***
35 - 44	30.6 (46.2)	0.0 (0.0)	17.8 (38.3)	***
45 - 54	55.3 (49.8)	0.0 (0.0)	26.7 (44.3)	*
55 - 64	0.0 (0.0)	67.2 (47.0)	24.1 (42.8)	
> 64	0.0 (0.0)	32.8 (47.0)	23.3 (42.4)	
Education				
None	0.4 (6.8)	0.0 (0.0)	0.4 (6.1)	
Minimum compulsory	2.7 (16.4)	4.8 (21.4)	3.7 (18.9)	***
High school diploma in agriculture	18.7 (39.1)	21.4 (41.1)	6.7 (25.0)	***
High school diploma not in agriculture	8.7 (28.2)	12.7 (33.3)	11.1 (31.5)	**
Vocational training in agriculture	27.4 (44.7)	29.3 (45.6)	16.7 (37.3)	***
Vocational training not in agriculture	10.5 (30.7)	10.5 (30.7)	17.8 (38.3)	***
University degree in agriculture	19.2 (39.5)	10.0 (30.1)	10.0 (30.1)	***
University degree not in agriculture	7.76 (26.8)	5.2 (22.3)	26.3 (44.1)	***
Other	4.6 (20.9)	6.1 (24.0)	7.4 (26.2)	***
Farmer Status				
Full-time farmer	95.4 (20.9)	90.8 (28.9)	0.0 (0.0)	***
Part-time farmer	0.0 (0.0)	0.0 (0.0)	97.8 (14.8)	***
Farm employee	1.3 (11.7)	0.4 (6.6)	0.0 (0.0)	***
Other	3.2 (17.6)	8.7 (28.3)	2.2 (14.8)	***

Note: *: p-value < 0.10; **: p-value < 0.05, ***: p-value <0.01

- Cluster 1 (Farmer 1, n=219): relatively more female farmers (11%), younger farmers, with a larger share having a university degree in agriculture, mostly full time farmers
- Cluster 2 (Farmer 2, n=229): relatively fewer female farmers (6%), older farmers, with a larger share having the minimum compulsory education, a high school diploma or a vocational training in agriculture, mostly full time farmers
- Cluster 3 (Farmer 3, n=270): average share of female farmers (8.6%), average age similar to the overall sample, with a larger share with a university degree not in agriculture or a vocational training not in agriculture, part-time farmers

97. The third clustering separates farmers according to their current agri-environmental practices: farmers are separated in 3 clusters (Table A E.3).

Table A E.3. Description of 3 clusters of current agri-environmental practices

Clusters of Current AE Practices Variables	Mean (SD) Cluster 1 N=166	Cluster 2 N=340	Cluster 3 N=148	Bartlett's test
Field size (ha)	8.7 (19.8)	5.5 (14.3)	7.9 (17.6)	***
Manure injection (ref: does not use manure injection)	42.8 (49.6)	20.9 (40.7)	30.4 (46.2)	***
Cover crops	1.9 (0.8)	0.1 (0.3)	1.1 (0.9)	***
Green fallow	14.3 (22.3)	5.39 (12.4)	5.5 (14.4)	***
Landscape	0.4 (0.8)	0.6 (0.9)	2.1 (0.9)	
Buffer	0.5 (0.8)	0.8 (1.0)	2.3 (0.9)	**
Currently engaged in an AES (%)	65.7 (47.6)	80.9 (39.4)	81.8 (38.8)	***
Never participated in an AES (%)	27.1 (44.6)	7.4 (26.1)	10.1 (30.3)	***
Organic farming	16.9 (37.6)	12.9 (33.6)	26.4 (44.2)	***

Note: *: p-value < 0.10; **: p-value < 0.05, ***: p-value <0.01

- Cluster 1 (AEpract 1, n=166): large fields, larger share injecting manure (43%), more use of cover crops, larger share of arable land in green fallow (14%), but scarcer presence of buffer strips next to water courses, relatively fewer currently engaged in an AES (66%), and larger share who have never participated in an AES (27%),
- Cluster 2 (AEpract 2, n= 340): small fields, smaller share injecting manure (21%), lowest use of cover crops, small share of arable land in green fallow (5%), medium presence of buffer strips next to water courses, most engaged in an AES (81%), few organic farmers (12%)
- Cluster 3 (AEpract 3, n=148): medium fields, medium share injecting manure (30%), medium use of cover crops, small share of arable land in green fallow (5.5%), but largest presence of buffer strip next to water courses (majority or all fields), most engaged in an AES (82%), largest share of organic farmers (26%).

98. The fourth clustering separated farmers according to their behavioural (time and risk) and environmental preferences: farmers are separated in 2 clusters (Table A E.4).

Table A E.4. Description of 2 clusters of behavioural characteristics of farmers

Clusters of Behavioural Characteristics	Mean (SD)		Bartlett's Test	T-test
Variables	Cluster 1 N= 254	Cluster 2 N=448		
Time				
Time preferences 1	-0.9 (1.6)	-1.6 (1.5)		***
Time preferences 2	0.4 (1.5)	1.1 (1.4)		***
Risk				
Risk attitudes 1	-0.5 (1.5)	0.6 (1.5)		***
Risk attitudes 2	-0.4 (1.6)	0.4 (1.5)		***
Environment				
Farm environment 1	1.7 (1.2)	1.2 (1.3)		***
Farm environment 2	1.0 (1.4)	1.0 (1.3)		
Farm environment 3	-0.3 (1.6)	1.5 (1.3)	***	***
Farm environment 4	-0.4 (1.5)	1.1 (1.3)	***	***
Farm environment 5	0.1 (1.5)	1.5 (1.2)	***	***
Farm environment 6	-1.3 (1.5)	1.2 (1.3)	**	***
Farm environment 7	-2.2 (1.0)	0.1 (1.5)	***	***
Farm environment 8	0.1 (1.4)	0.8 (1.2)	*	***

Note: *: p-value < 0.10; **: p-value < 0.05, ***: p-value <0.01

- Cluster 1 (Behaviour 1, n= 254): strongest preferences for present (/ present biais), more risk averse, lower perceived need for environmental action, less awareness of consequences and perceived control, lower sense of responsibility over local and global environmental issues
- Cluster 2 (Behaviour 2, n= 448): longer term thinking, less risk averse, perceive more need for environmental action, show more awareness of consequences of farming on the environment, more awareness of consequences (Farming using environmentally friendly practices can improve the health of the environment), and sense of responsibility for local and global environmental issues

99. And finally, the fifth clustering separates farmers according to their answers to the follow up questions, measuring their attitudes towards the questionnaire itself: farmers are allocated to one of 2 clusters.

Table A E.5. Testing for cluster differences

Clusters of Follow Up Questions Variables	Mean (SD) Cluster 1 N=298	Cluster 2 N=386	Bartlett's test	t-test
Complex	1.0 (1.8)	0.4 (1.6)	**	***
Ignore attributes	1.1 (1.7)	0.6 (1.5)	**	***
Payments too low	1.5 (1.5)	0.1 (1.5)		***
Against government spending	-0.3 (2.0)	-0.7 (1.7)	***	***
Against AE payment	-1.9 (1.7)	-1.6 (1.8)		**
Would adopt anyway	-2.1 (1.4)	-0.7 (1.7)	**	***
Would adopt chosen AES	-0.3 (1.6)	1.2 (1.0)	***	***
Credibility	-0.5 (1.6)	1.0 (1.1)	***	***
Ability to adopt practice	-1.5 (1.4)	0.8 (1.1)	***	***
Ability to achieve objective	-1.1 (1.5)	0.8 (1.1)	***	***
Adoption puts profitability at risk	1.6 (1.5)	-0.1 (1.4)		***
Confidence in monitoring	-1.5 (1.7)	-0.02 (1.6)		***

Note: *: p-value < 0.10; **: p-value < 0.05, ***: p-value <0.01

- Cluster 1 (Followup 1, n= 298): Find the survey more complex, are more likely to have ignores attributes in their choices, slightly more to be against more government spending, less likely to adopt the proposed measures without payment, provide less genuine answers (i.e. state they would adopt the chosen AES), gave less credibility to the survey, feel less able to adopt the practices or to achieve the results presented on the choice cards → protesters
- Cluster 2 (Followup 2, n=386): the symmetric of cluster 1.

100. Each farmer is allocated to one of the clusters for each category of variables and we use the cluster allocation to describe the class membership in the latent class model below.

Table A E.6. Results of the latent class model, with 2 distinct classes of farmers in terms of AES preferences

Latent Class model	Class 1 (63.35%)					Class 2 (36.65%)				
2 classes	Estimate		Rob.std.err.	Rob.t-ratio(0)	Rob.p-val(0)	Estimate		Rob.std.err.	Rob.t-ratio(0)	Rob.p-val(0)
Preferences										
ASC practice-based	0.925	***	0.195	4.732	0.000	-3.456	***	0.283	-12.209	0.000
ASC hybrid	1.240	***	0.214	5.802	0.000	-3.094	***	0.545	-5.672	0.000
ASC results-based	0.427	**	0.208	2.049	0.040	-3.406	***	0.400	-8.526	0.000
Practices 2 (ref 1)	-0.253	***	0.084	-3.013	0.003	-1.027	***	0.270	-3.807	0.000
Practices 3 (ref 1)	-0.381	***	0.090	-4.243	0.000	-1.677	***	0.321	-5.226	0.000
Water 1 (ref 0)	-0.323	***	0.106	-3.037	0.002	-0.624		0.673	-0.927	0.354
Water 2 (ref 0)	-0.293	***	0.069	-4.228	0.000	-0.884	***	0.264	-3.347	0.001
CC 1 (ref 0)	-0.208	***	0.077	-2.708	0.007	-0.884	***	0.256	-3.458	0.001
CC2 (ref 0)	-0.291	***	0.086	-3.383	0.001	-0.888	***	0.279	-3.187	0.001
Biodiversity 1 (ref 0)	-0.089		0.077	-1.161	0.246	0.040		0.255	0.156	0.876
Biodiversity 2 (ref 0)	-0.123		0.097	-1.266	0.206	-0.213		0.285	-0.748	0.455
Share conditioned on result	-0.003	**	0.001	-2.417	0.016	-0.010		0.010	-0.935	0.350
Payment level	0.007	***	0.001	12.293	0.000	0.009	***	0.001	8.166	0.000
Class membership										
Constant	-		-	-	-	-1.396	***	0.277	-5.041	0.000
Farmer cluster 2 (ref cluster 1)	-		-	-	-	-0.207		0.255	-0.812	0.417
Farmer cluster 3 (ref cluster 1)	-		-	-	-	0.385		0.256	1.503	0.133
Behaviour cluster 2 (ref cluster 1)	-		-	-	-	0.625	***	0.221	2.834	0.005
Follow up cluster 2 (ref cluster 1)	-		-	-	-	2.020	***	0.209	9.644	0.000
Finland (ref The Netherlands)	-		-	-	-	0.812	***	0.266	3.056	0.002
Sweden (ref The Netherlands)	-		-	-	-	0.388		0.283	1.370	0.171

Note: *: robust p-value < 0.10; **: robust p-value < 0.05, ***: robust p-value <0.01. Number of observations=3960; Log-likelihood=-3967.93; AIC=8002; BIC=8209.

Table A E.7. Summary statistics describing the 2 classes of the latent class model

	Class 1		Class 2	
	mean	sd	mean	sd
Total land area (ha)	166.71	319.91	146.83	147.78
Arable land area (ha)	66.24	108.47	81.47	106.92
Mixed farmers (ref: arable) (0/1)	.39	0.49	.34	0.47
Share of land owned (1=100%)	.68	2.43	.57	0.51
Other income available for household (0/1)	.80	0.40	.64	0.48
Share of farm income in household income (%)	47.28	35.31	63.82	35.91
Female (ref: male) (0/1)	.10	0.29	.06	0.24
age1: 18-34	.05	0.22	.06	0.24
age2: 35-44	.19	0.39	.13	0.34
age3: 45-54	.27	0.45	.27	0.45
age4: 55-64	.32	0.47	.28	0.45
age5: >65	.15	0.36	.22	0.41
Status: Farm employee (0/1)	.01	0.08	0	0.06
Status: Full-time farmer (0/1)	.5	0.50	.7	0.46
Status: Other (0/1)	.05	0.22	.05	0.21
Status: Part-time farmer (0/1)	.44	0.50	.25	0.44
Field size - average (ha)	5.56	12.46	8.78	20.10
Use of manure injection (0/1)	.23	0.42	.38	0.49
Use of cover crops**	.79	0.95	.82	0.97
Area in green fallow (ha)	8.45	17.03	6.71	14.90
Landscape**	.9	1.08	.79	1.04
Buffer**	1.16	1.15	.93	1.14
Currently in AES (0/1)	.86	0.35	.64	0.48
Never been in AES (0/1)	.06	0.25	.22	0.42
Organic (0/1)	.22	0.42	.08	0.28
Time preferences 1*	**-1.39**	**1.56**	**-1.37**	**1.64**
Time preferences 2*	**.95**	**1.41**	**.71**	**1.59**
Risk attitudes 1*	**.43**	**1.46**	**-.32**	**1.64**
Risk attitudes 2*	**.16**	**1.58**	**-.02**	**1.59**
Farm environment 1*	**1.19**	**1.36**	**1.72**	**1.17**
Farm environment 2*	**.92**	**1.38**	**1.1**	**1.42**
Farm environment 3*	**1.05**	**1.57**	**.44**	**1.73**
Farm environment 4*	**.81**	**1.50**	**.17**	**1.60**
Farm environment 5*	**1.33**	**1.31**	**.36**	**1.60**
Farm environment 6*	**.54**	**1.73**	**-.11**	**1.88**
Farm environment 7*	**-.53**	**1.73**	**-1.15**	**1.73**
Farm environment 8*	**.62**	**1.30**	**.34**	**1.32**
Survey too complex*	**.45**	**1.54**	**.95**	**1.92**
Ignored attributes*	**.8**	**1.44**	**.84**	**1.81**
Payments were too low*	**.29**	**1.49**	**1.51**	**1.62**
Against gov. spending*	**-.75**	**1.73**	**-.15**	**1.98**
Against AE payments*	**-1.72**	**1.75**	**-1.74**	**1.68**
Would adopt anyways*	**-1.14**	**1.63**	**-1.61**	**1.75**
Would adopt chosen AES*	**1.03**	**1.14**	**-.2**	**1.73**
Credibility *	**.81**	**1.28**	**-.44**	**1.68**
Ability to adopt practices*	**.39**	**1.48**	**-1.12**	**1.61**
Ability to achieve objectives*	**.39**	**1.46**	**-.84**	**1.64**
Adoption puts profitability at risk*	**.23**	**1.56**	**1.42**	**1.65**
Confidence in monitoring*	**-.28**	**1.70**	**-1.34**	**1.75**

Notes:
For statements “Farm environment” 1 to 8 see Table A C.5 for definitions.

For “Risk” and “Time” statements see Table A C.4 for definitions.

* Likert scale from -2 “Strongly disagree” to +2 “Strongly agree”

** Scale: 0: "None of the cultivated fields (less than 10% of arable land)",
1: "A minority of cultivated fields (between 10% and 49% of arable land)", 2: "A majority of cultivated fields (between 50 and 90% of arable land)",
3: “All cultivated fields (more than 90% of arable land)".
In bold: variables included in clusters that significantly explain class membership

Annex F. Economic experiment component: summary of findings from choice experiment literature review

Table A F.1. Choice experiment design features: selected results from the literature

Source	Country and Region	Time period	Choice variables	Sample size	No. choice sets	Survey delivery method	Payments for	Estimation method
Adams et al (2014[16]), Adams et al (2012[17])	AUS	May to September 2009	3 labelled attributes [Conservation covenant; Conservation management agreement; Sell] - Payment (as a % of stewardship costs): (0%; 50%: 100%: 150% for 2 attributes, Market value for Sell attribute) - Configuration: (From no land set aside to one small patch; From no land set aside to several patches; From no land set aside to one continuous area; From one small patch set aside to several patches; From several patches set aside to one continuous area)	92	80: 8 blocks of 10 choice sets (no opt-out)	Face-to-face and mail	Stewardship Program	Conditional mixed-effects logit
Alló et al (2015[18])	SPA	summer 2012	- Payment (EUR, per ha): (30; 60; 90; 120) - Flexibility (how much of the total area enrolled in the contract can be excluded without penalty each year): (0%; 40%) - Fine in addition to the return of the payment (EUR, per ha): (0; 200) - Cover crop area: (0%; 20%) - Restriction on land use: (No restrictions; April 1–August 1)	359	8: 2 blocks of 4 choice sets	face-to-face	AES for bird protection	Ordered logit model
Bastian et al (2017[19])	US	?	- Easement length: (Perpetuity; 20-25 years) - Public access: (Y/N) - Inclusion of wildlife habitat: (Y/N) - Restricted managerial control: (Y/N) - Financial benefit (% of the average land market value): Income and estate tax benefit plus (0; 25; 50; 45; 100)% of average market value of land	Landowner 2101 / Land trust 291	24: (Landowners: 12 blocks of 2 choice sets), (Land trusts: 6 blocks of 4 choice sets)	Mail	conservation easements	RPLM
Beharry-Borg et al (2013[20])	GBR	January and June 2009	- Inorganic fertiliser application per acre: (current level; 25% less; 50 % less) - Farmyard manure application per acre: (current level; 25% less; 50 % less) - Blocking of drainage 'grips': (All; Block 50% of existing grips; Block 100% of existing grips) - Contract length (years): (3; 5; 10) - Compensation payment (GBP per ha per year): (2; 4; 10; 16; 22; 28)	97 (6 protest respondents are included)	18: 3 blocks of 6 choice sets	face-to-face	water quality protection	CLM and LCM

Source	Country and Region	Time period	Choice variables	Sample size	No. choice sets	Survey delivery method	Payments for	Estimation method
Bennett et al. (2018[21])	CHN	2012	- Contract length (year): (1; 5; 10) - Release option: (Cannot leave the programme; Can leave the programme without a penalty) - Land area enrolled (% of household land area): (20; 50; 100) - Annual pesticide use reduction (% in comparison to 2011): (5; 10; 20; 30) - Annual cash subsidy (CNY, per mu=1/15ha): (10; 50; 80; 120)	288	72: 9 blocks of 8 choice sets	face-to-face (Not mentioned clearly)	Coastal Wetlands Protection	CLM
Breustedt et al. (2013[22]) (in German)	GER	Summer 2010	3 labelled attributes [Grassland area enrolled (minimum %): (5; 10; 20)] - Fertilization: (Allowed organic and mineral fertilizers; Allowed organic fertilizer; No fertilizer allowed) - First mowing not before ...: (June 1st; June 22nd) - Maximum number of grazing animals (1 animal = 1 cow or 3 sheep, per ha): (2; 3; 4) - Duration of the contract (year): (1; 5; 10) - Annual compensation (EUR/ha): (250; 350; 450)	68	63: 8 blocks of 8 choice sets (- 1 for a dominant choice)	face-to-face	AES for grassland	CLM
Broch et al. (2013[23]) and Broch and Vedel (2011)	DEN	Jan-Feb 2009	- purpose of afforestation (groundwater; recreation; biodiversity) - option of cancelling the contract (within 5 years; within 10 years; binding) - monitoring (visit) by authorities (0%, 1%, 10%, 25%OTSC) - compensation level (one-time compensation per hectare: EUR0; EUR3600-5600 in EUR400 steps)	842	36: 6 blocks of 6	Web-survey	afforestation	RPLM - Error Component Specification
Brouwer et al (2015[24])	GER	May-September 2012	- Area size (% of the farmer's total area of cultivated land): (10; 25; 50) - Forest type: (Commercial production forest; Non-commercial natural forest) - Availability of technical advice: (Y/N) - Public recreational access: (Y/N) - Return to farmland end of the contract: (Y/N) - Contract duration (years): (10; 25; 50) - Compensation (EUR/ha/year): (250; 500; 750; 1000; 1500; 2000)	Netherlands: 273, Germany: 206	120: 20 blocks of 6 choice sets	face-to-face	Afforestation agreement	RPLM and Latent class (LC) models

Source	Country and Region	Time period	Choice variables	Sample size	No. choice sets	Survey delivery method	Payments for	Estimation method
Chen et al. (2009[25])	CHN	May-August 2006	- Conservation payment (100 to 300 yuan/mu with an intermediate value of 200) ***after the first quarter of the survey, the high payment level was adjusted to 250 yuan/mu*** - Programme duration (3; 6; 10 years) - Neighbours' behaviours (25%, 50%, or 75% of households in the same group would reconvert part or all of their enrolled land plots)	304	9: 3 blocks of 3 choice sets	Face-to-face	maintaining forest on their (GTGP) land plots (although experiment related to maintaining forest after programme ends)	PM
Chèze, David & Martinet (2017[26])	FRA	June 2016 to February 2017	- Profit variation: variation in average annual gross margin per hectare (-EUR50; 0; +EUR50; +EUR100) - Harvest risk: variation in no. years with poor harvest out of ten (0; +1 year; +2 years) - Additional commitments compared to SQ: (none; join AES; joining a Charter (flexible commitment); green certification) - Reduction in health / environmental exposure cf SQ: (0%; -20%; -50%; -80%)	83	16, blocked into 2 groups = 8 choice sets per respondent	Face-to-face and web-survey	Reduced use of pesticides	CLMand RPLM
Christensen et al. (2011[27])	DEN	December 2009-January 2010	- management flexibility: buffer zone width (6m; 6-24m) - management flexibility: use of artificial fertiliser and pesticides in buffer zone (fertiliser can be used; no pesticides or artificial fertiliser) - assistance with contract application (free assistance from extension service, common application form) - contract length (1 year; 5 years) - option to be released from a contract before it expires (no; released without costs once per year) - compensation level (per ha per year: EUR134; EUR 228; EUR 336, EUR510)	444	8	Web-survey	pesticide-free buffer zones	RPLM
Costedoat et al. (2016[28])	MEX	November through December 2014	- Forest parcels: (Individual decision; Negotiated by the community assembly; All forests of the ejido) - Technical intermediary: (External service provider; Community technician; CONAFOR) - Payment (MXN, per ha per year): (250; 500; 1000; 2000) - Use of payment: (100% cash; 50% cash + 50% collective agricultural productive project (tractors); 50% cash + 50% social project (community public good))	82	18: 3 blocks of 6 choice sets	face-to-face	PES for biodiversity-related ecosystem services	CLM and Latent class (LC) models

Source	Country and Region	Time period	Choice variables	Sample size	No. choice sets	Survey delivery method	Payments for	Estimation method
Danne and Musshoff (2017[29])	GER	January to March 2016	- Programme Financing: (Dairy company scheme; Governmental scheme; Food industry scheme) - Annual grazing period (days per year): (120; 150; 180) - Daily grazing period (hours per day): (6; 8; 16) - Feeding standards: (Staple feed consisting only of green fodder; Concentrated feed reduced by 20%; Amount of maize silage reduced by 30%) - Price Premium (eurocents per kg raw milk): (1; 3; 5)	293	12	Web-survey	Pasture grazing programmes	RPLM
Dhingra et al. (2015[30])	US	spring, summer and fall of 2014	- Maximum payment (% of NRCS local county rental rates: 80%; 100%; 120%) - Terms of contract payment (fixed at start; re-adjusted every 5 years) - Contract length (10 years; 15 years) - Establishment cost sharing (50%; 100% government cost share) - Land use restrictions (Idle; graze/hay every other year)	76	23	Face-to-face	Participation in US Conservation Reserve Programme (land retirement)	Exploded logit model with no ties in ranking
El Mokaddem et al. (2016[31]) (in French)	Morocco	?	- Collective development of land for anti-erosion (ha): (0; 1000; 3000; 5000) - Area with a specific pasture for sheep grazing (in proportion to the collective pasture area): (0; 1/4; 1/3; 1/2) - Planting fruit trees (in total number of trees planted): (10; 20; 50; 100) - Payment (MAD (1EUR=11,047MAD), per household per year): (200; 400; 500; 600) - Technical assistance (7 days/year): (None, Plant Production, Animal Production, Mixed)	144	16: 2 blocks of 8 choice sets	face-to-face	Common-pool pastures conservation	CLM
Espinosa-Goded and Barreiro-Hurlé (2010[32]) (in Spanish)	SPA	?	- Flexibility on the area under AES: (Free; 50% eligible area) - Flexibility over grazing/harvesting (Free; Prohibited between August and September) - Presence of a mandatory and free technical assistance service: (Y/N) - Fixed payment of EUR1,000 per contract regardless of the area (to cover adoption costs of AES): (Y/N) - Premium level (EUR, per year per ha): (60; 80; 100; 120)	200	96: 16 blocks of 6 choice sets	face-to-face	AES for Nitrogen Fixing Crops in rain-fed areas	RPLM - Error Component Specification
Espinosa-Goded, Barreiro-Hurlé and Ruto, (2010[33])	SPA	June–August 2008	- a compulsory enrolment of 50% of eligible area (free; 50% of eligible surface) - flexibility over grazing in the land under the AES (Free; limited, taking into account RDP specifications for specific regions) - fixed one-off payment of EUR1000 as part of the contract (yes; no) - availability of a compulsory and free of charge technical training and advisory service (yes; no) - per ha premium level (per year) (EU/ha: 60; 80; 100; 120)	300	96: 16 blocks of six choice sets	Face-to-face	introduction of nitrogen fixing crops in dry land areas	RPLM - Error Component Specification

Source	Country and Region	Time period	Choice variables	Sample size	No. choice sets	Survey delivery method	Payments for	Estimation method
Franzén et al. (2016[34])	SWE	?	- Annual subsidy (SEK, per ha): (Arable land 3000 (Other land use 1500); Arable land 4000 (Other land use 2250)) - Time frame for subsidy and commitment (year): (Min commitment 5 (Max extension 20); Min commitment 10 (Max extension 30)) - Practical support: (No practical assistance for projecting and design of wetland; A collaboration forum, and practical assistance with projecting and designing a wetland) - Economic compensation for construction (% of cost within ceiling): (50–90; 100) - Cost ceiling for compensation (SEK): (100,000; 200,000)	29	8: 2 blocks of 4 choice sets	Mail	Wetland creation	generalized linear mixed model
Greiner (2015[35]) and Greiner et al. (2014[36])	AUS	April–July 2013	- Conservation requirement (short spelling; long spelling; total exclusion) - Compensation level (per ha per year: AUD1; 2; 4; 8; 16; 32) - Contract length (5 years; 10 years; 20 years; 40 years) - Flexibility (yes, no) - Monitoring (self-monitoring w 25% random spot checks; external monitoring)	104	24: 4 blocks of 6 choice sets	Face-to-face and mail	Conservation of (extensive) cattle grazing lands	RPLM and Latent class (LC) models
Hope et al. (2008[37])	India	?	- Land commitment to organic farming (acres): (25%; 50%; 75%; 100%) - Organic crop price increase (per 100 Rupees): (5; 7; 9; 11; 13; 15) - Cost of certification (Rupees, per acre): (1,000 as a group; 3,000 as a group; 3,000 as an individual) - Compost price (Rupees,per trolley): (600; 900; 1,200; 1,500) - Labour days to compost one trolley: (4; 8; 12; 16)	640	64: 8 blocks of 8 choice sets	face-to-face	Wetland conservation	CLM and LCM
Hoyos et al. (2012[38]), Etxano et al. (2015[39])	FRA / SPA (Basque Country)	? WTP is based on 2008 value	- Native forest (% of land converted by cork oak woodland): (2 (status quo); 10; 20; 30) - Biodiversity (Number of endangered species of flora and fauna): (25 (status quo); 15; 10; 5) - Recreation (Conservation status of walking pathways): (Low (status quo); Medium; High; Very high) - Exotic tree plantations (% of land area covered by pine forest): (40 (status quo); 30; 25; 15) - Vineyard (% of land covered by vineyards): (40 (status quo); 30; 20; 10) - Cost (EUR, per year): (0 (status quo); 5; 10; 30; 50; 100)	221	120: 20 blocks of 6 choice sets	face-to-face	Land use	CLM and RPLM

Source	Country and Region	Time period	Choice variables	Sample size	No. choice sets	Survey delivery method	Payments for	Estimation method
Hudson and Lusk (2004[40])	US	?	- Expected Income USD (135000; 150000; 165000) - Price Risk Shifted (None; Semi-Fixed; Fixed) - Autonomy (None; Some; Same) - Asset Specificity (10%; 30%; 50%) - Provision of Inputs (0%; 50%; 100%) - Length of Contract (1; 3; 5)	49	73: 4 blocks of 16 choice sets and 1 block of 9	Face-to-face	Undefined generic kind of contract	CLM and RPLM
Jaeck et al. (2014[41])	FRA	?	- Weed control technology: (Intensive chemical weeding (3 applications or more); Chemical weeding with 1 or 2 applications; Mechanical weeding; Manual weed removal) - Varietal choice: (Short cycle (140–150 days); Medium cycle (150–160 days); Long cycle (>160 days)) - Crop rotation: (Long rotation (1 year of rice every 5 years); 'Cereal' rotation (2 years of rice every 5 years); 'Intensive cereal' rotation (2 or 3 consecutive years of rice)) - Yield (tons, per ha): (yield< 2; 2<yield< 5; 5<yield<7; Yield<7) - Risk (Year): (0; 1; 3) - Single payment scheme (EUR, per ha): (0; 400; 700; 1000)	104	22: 2 blocks of 11 choice sets	face-to-face	CAP for rice cropping technologies	RPLM and LCM
Kaczan et al. (2013[42])	Tanzania	September and November, 2010	- Individual payment for maintenance of agroforest (Approximate USD, per acre per year): (0; 21; 50; 176) - Collective payment provided to a dedicated village development fund (Approximate USD, per acre per year): (0; 21; 50; 176) - Upfront fertilizer payment (Approximate USD, per acre, one-time): (0; 140 (binary variable)) - Conditionality low (No inspections—farmers are required to keep a log book documenting farm activities which may be audited): (Y/N) - Conditionality moderate (Inspecting farmers' farms once per year): (Y/N) - Conditionality high (Inspecting farmers' farms twice per year. Also will ensuring trees are indigenous species.): (Y/N)	220	32: 4 blocks of 8 choice sets	face-to-face	PES for avoiding deforestation	CLM and LCM

Source	Country and Region	Time period	Choice variables	Sample size	No. choice sets	Survey delivery method	Payments for	Estimation method
Kreye et al. (2017[43])	US	2014	- Incentive type (USD, per acre): (Annual payments; Reduction in the estate tax; Annual depredation payment; Safe harbor agreement) - Technical assistance: (Advice about stewardship practices; Advice about securing water resources; Advice about improving game populations; Help identifying other incentive programmes) - Acres enrolled: (25% of eligible acres; 50% of eligible acres; 75% of eligible acres; 100% of eligible acres) - Contract duration (year): (5 years; 10 years; 20 yearsl; 30 years) - Monitoring agency: (U.S. Fish and Wildlife Service; Florida Fish and Wildlife Conservation Commission; U.S. Department of Agriculture; Independent environmental consultant)	187	16: 2 blocks of 8 choice sets	Mail	Panther conservation	RPLM
Kreye et al. (2018[44])	US	December 2015 and February 2016	Management choices - BMP1: Implement 100% of applicable silvicultural BMPs. - BMP2: Implement at least 85% of applicable silvicultural BMPs. - WLD1: Locate concentrated heavy equipment away from active burrows or nests. - WLD2 Heavy equipment use must be minimized around nests during hatching season. - ADD1: Manage stands to have two age classes. - ADD2: Prescribed fire is applied every 3–5 years in stands over 10 years in age. Landowner empowering policy tools - TA1: Technical assistance is provided to help meet programme requirements. - TA2: NO technical assistance. - FA1: 50% cost-share is provided to help meet programme requirements. - FA2: NO cost-share assistance. - EXP1: Participating landowner is exempted from permitting for the incidental take of State Imperilled Species on their forestland. - EXP2: Participating landowner is NOT exempted from permitting for the incidental take of State Imperilled Species on their forestland.	200	12	Mail and web-survey	Wildlife Best Management Practices	RPLM

Source	Country and Region	Time period	Choice variables	Sample size	No. choice sets	Survey delivery method	Payments for	Estimation method
Kuhfuss et al. (2016[45]) and Kuhfuss, Préget and Thoyer (2014)	FRA	Summer 2012	- reduction of herbicide (-30%; -60%; -100%) - localised use of herbicide (yes, no) - final collective bonus of EUR 150/ha (yes, no) - free administrative and technical assistance (yes, no) - compensation level/ha (EUR 90; 170; 250; 330; 410; 500) Two-step experiment: - choice of contract - choice of acreage	290	18: 3 blocks of 6 choice sets	Web-survey	innovative herbicide-reduction contracts	Kuhfuss et al (2016): CLM and RPLM, FE and 2-stage Heckman model); Kuhfuss, Préget and Thoyer (2014): LCM
Latacz-Lohmann and Breustedt (2019[46])	GER	?	- Fertilisation (organic and mineral allowed; organic permitted; no fertilisation allowed) - First mowing not before (1 June; 22 June) - Maximum grazing with (2; 3; 4) animals per ha (1 animal = 1 cattle or 3 sheep) - Contract period (1; 5; 10 years) - Annual compensation EUR per ha (250; 350; 450)	68	63: 8 blocks of 8 choice sets (- 1 for a dominant choice)	Face-to-face	Protection for breeding birds on permanent pasture	CLM (For enrolled land area, OLS and multinomial Heckman model)
Layton & Siikamäki (2009[47])	FIN	?	Two-steps: - choice of contract - choice of acreage - Payment (ERU): (ranged between about 85 and 11,770) - Contract length: (ranged between 10 and 50 years, in 5-year increments)	1129	3 choice sets	Mail	habitat preservation on private lands	Beta-binomial model and multivariate censored regression
Leinhoop & Brouwer (2015[48])	GER	May and September 2012	- Forest size (%) (5; 10; 25; 50) - Forest type (commercial; non-commercial) - Technical advice (yes, no) - Recreational access (yes, no) - Return to agriculture at end of contract (yes, no) - Contract length (10 years, 25 years, 50 years) - Compensation level (EUR per ha per year: 500; 750; 1000; 1500; 2000; 3000)	208	120: 20 blocks of 6 choice sets	Face-to-face	Afforestation	RPLM
Lizin, van Passel & Schreurs (2015[49])	BEL	December 2012–February 2013	- Lot size (ha): (0.5; 1.5; 2.5; 3.5) - Soil productivity: (Low; Rather low; Rather high; High) - Driving time to home (min): (5; 10; 15; 20) - Distance to other land (km): (0; 0.750; 1.500; 2.250) - Land use restrictions: (None; Crop restriction; Fertilizer restriction; Usage restriction) - Price (EUR per ha): (15,000; 25,000; 35,000; 45,000)	188	16: 2 blocks of 8 choice sets	face-to-face	Land use restrictions	RPLM and error component logit

Source	Country and Region	Time period	Choice variables	Sample size	No. choice sets	Survey delivery method	Payments for	Estimation method
Ma et al. (2012[50])	US	2008	Two-steps: - choice of contract - choice of acreage - annual payment for a period of 5 years (USD per acre, A specific range for each of 4 cropping systems): (A: 4-17; B: 10-36; C: 15-55; D: 20-75) - payment provider: (federal government; non-governmental organisation) - sequence of cropping practices (increasing or decreasing in complexity and expected environmental benefits)	1,688	16	Mail	PES in agriculture	Double hurdle model (comprised of a Probit for willingness to consider and a Tobit for acreage enrolment)
Pan et al. (2016[51])	CHN	between July and August 2014	- Technical support: (No technical support (baseline); Medium technical support; High technical support) - Pollution fees (Yuan, per head per month): (0 (baseline); 2.8; 5; 10) - Technical standards: (Y/N (baseline)) - Biogas subsidies (Yuan, per household): (0 (baseline); 1000; 1500; 2000) - Manure market (Yuan, ton): (0 (baseline); 100; 150) - Manure handling rate: (Increase 0% (baseline); Decrease 5%; Increase 15%)	754	12: 3 blocks of 4 choice sets	face-to-face	livestock pollution control policy	RPLM
Peterson et al (2007[52]); (2012[53]); (2014[54])	US	August 2006-January 2007	- Application time (hours): (4; 16; 24; 40) - Monitoring: (Annual verification; spot check) - Penalty USD/acre enrolled: (50; 100; 250; 500) - Trading revenue USD/acre enrolled: (3; 7; 15; 25) - Type of practice required: (Filter strip; No-till) - Haying/grazing allowed on filter strip (Yes/No) - Rotational no-till allowed (Yes/No)	135	32: 2 blocks of 16	Face-to-face	Water quality trading	RPLM

Source	Country and Region	Time period	Choice variables	Sample size	No. choice sets	Survey delivery method	Payments for	Estimation method
Pröbstl-Haider et al. (2016[55])	AUT	January and September 2012	- Type of management: (Cash crop cultivation; Short-rotation cultivation; Grassland cultivation) - Gross margin (EUR, per ha per year): (Cash crop cultivation: 300; 450; 750; 1200; 1650, Short-rotation cultivation: 150; 375; 550; 725, Grassland cultivation: 75; 150; 250) - Environmental premium (EUR, per ha per year): (Cash crop cultivation: None; Greening premium 50; Greening premium 150, Short-rotation cultivation: None; Climate premium 50; Climate premium 100; Climate premium 150, Grassland cultivation: Austrian AES-funding 300; Austrian AES-funding 600; Austrian AES-funding 900; Austrian AES-funding 1200) - Duration (year): (Cash crop cultivation [rotation period]: 1, Short-rotation cultivation [rotation period]: 15; 20; 25, Grassland cultivation [contract period]: 7) - Potential price fluctuations: (Cash crop cultivation: Low; Medium; High; Very high, Short-rotation cultivation: Low; Medium; High, Grassland cultivation: Low) - Likelihood of complete crop failure: (Cash crop cultivation: Every 2 years; Every 3 years, Short-rotation cultivation: Every 10 years; Every 25 years, Grassland cultivation: Every 5 years; Every 10 years; Every 15 years)	148	48	face-to-face	Land use under climate change (cash crop cultivation, short-rotation forestry, grassland cultivation)	CLM
Rabotyagov and Lin (2013[56])	US	February 2009.	- Payment (USD, per acre per year): (25; 50; 100; 200) - Contract length (years): (10; 30; 50; In perpetuity) - Extent of participation (share of forest stand): (More than 0, but less than 1/3; More than 1/3, but less than 2/3; More than 2/3, but less than entire stand; Entire stand) - "Biodiversity pathway" management: (Y/N)	678	32: 4 blocks of 8 choice sets	Mail	working forest conservation contracts (WFCC)	RPLM - Error Component Specification
Rocchi et al. (2017[57])	ITA	?	- Nature: (No surface; 1/3 surface; 1/2 surface) - Biodiversity: (Do not make it; Creation of hedges) - Landscape: (Do not make it; Creation of fences) - Seeds: (No surface; 1/2 surface; All the surface) - Lisciviation: (No surface; 1/2 surface; All the surface) - Money (EUR/ha per year): (50; 100; 150; 200)	244	16: 4 blocks of 4 choice sets	face-to-face	AES in buffer areas	LCM

Source	Country and Region	Time period	Choice variables	Sample size	No. choice sets	Survey delivery method	Payments for	Estimation method
Rossi et al. (2011[58])	US	?	- Replant with SPB resistant Pine: (Required; Not required) - Pre-commercial Thinning: (Required; Not required) - Commercial Thinning: (Required; Not required) - Prescribed Burning: Required (1 time; 2 times;3 times; Not required) - Local Landowner Participation Rate: (5%; 50%) - Incentive Payment (USD per acre): (30; 80; 120; 160; 200; 250)	173	48: 4 blocks of 6 choice sets (24 profiles as the basic foundation, shifting to an additional 24 profiles)	Mail	forest management practices (Southern Pine Beetle Risk Reduction Cost-Share Program)	Heteroskedastic Extreme Value (HEV) models
Ruto and Garrod (2009[59]), Arnaud et al. (2007[60])	Various [a]	May-December 2005	- Contract length (5, 10, and 20 years) - flexibility in terms of what areas of the farm are entered into the scheme (yes, no) - flexibility in undertaking some of the measures required under the scheme (yes, no) - average time spent on paperwork/administration (less than 2 h/week, 2–5 h/week, or more than 5 h/week). - compensation level (per ha: 5%; 10%; 20%)	2262	24: 6 blocks of 4 choice sets	Face-to-face	EU CAP AES (various)	RPLM and Latent class (LC) models
Saïd and Thoyer (2007[61])	FRA	August 2006.	- Level of financial needs - Level of compliance costs with AES - Level of environmental benefits - Level of compensation payment	32	9: 3 blocks of 3 choice sets	Face-to-face	Contracting for the grass premium	BLM
Santos et al. (2015[62])	POR	October and December 2013	- Area size (% of eligible farm land area): (25; 50; 75) - Cattle density (Livestock units per ha of forage area): (0.2; 0.5; 0.7) - Tree density (Number of trees per ha): (20; 30; 40) - Contract duration (Years): (5; 10; 20) - Compensation (EUR/ha/year): (100; 250; 450)	111	64: 8 blocks of 8 choice sets	face-to-face	AES for agro-forestry ecosystem	RPLM

Source	Country and Region	Time period	Choice variables	Sample size	No. choice sets	Survey delivery method	Payments for	Estimation method
Schulz et al. (2014[63])	GER	Summer of 2012	- Ecological Focus Area (EFA): (5%; 7%; 10% of a farm's arable land) - Arable crop diversity: At least 3 crops (in excess of EFA), each covering no less than (5%; 15%; 25%) of arable land - Land creditable against EFA: (None; Land enrolled in AES; Landscape features (hedges, ponds, stone walls, etc.); Land in AES and landscape features) - Permissible use of EFA: (Leguminous crops; Leguminous crops, but they must be grown on twice the EFA; No productive use (EFA must be set aside)) - Choice of EFA location: (Location of EFA can be freely chosen each year; EFA location fixed for 3 years) - Reduction of single payment in case of opt-out (EUR per ha per year): (35; 70; 105; 140; 175)	128	25: 8 choice sets	Web-survey	"greening" of the CAP	BLM and LCM
Sorice et al. (2013[64])	US	?	- Conservation easement type: (no easement; permanent donated easement; permanent sold easement) - Contract length (years): (10; 40; 70; 100) - Credit profit margin (USD per credit): (100; 200; 400; 600; 1600) - Payment structure: (25% year 1, 75% year 5; 50% year 1, 50% year 5; 75% year 1, 25% year 5; 100% year 1) - Decision-making: (programme staff make all land management decisions; landowner and staff share decision-making; landowner makes all decisions) - Obligation once conservation agreement ends (if gopher listed as endangered species): (none; baseline; full) - Result (effectiveness, increase in no. gopher tortoises in country as a result of landowners opting in): (0%; 5%; 10%; 15%)	251	48: 8 blocks of 6 choice sets	Mail	Maintaining and managing habitat for an at - risk species, the gopher tortoise (Gopherus polyphemus)	RPLM
Star et al. (2019[65])	AUS	February to April 2018	- Days of paid work: (0; 5; 10; 25) - Payment (AUD, per day): (0;100; 200; 500;1000) - Extra unpaid days will be required (50:50 risk): (0; 5; 10; 25) - Risk that the project will not fix the problem: (0; 10; 25; 50)	75	32: 8 blocks of 4 choice sets	face-to-face	projects to reduce gully erosion and subsequent sediment run-off	RPLM

Source	Country and Region	Time period	Choice variables	Sample size	No. choice sets	Survey delivery method	Payments for	Estimation method
Tesfaye and Brouwer (2012[66])	Ethiopia	July 2009.	- Principal (contract provider): (Regional Agricultural Bureau; Local Peasant Association) - Contract length (year): (1; 2; 3; 5; 10) - Payment (Birrr (USD 1=12.56 Birr in 2009), per month): (50; 100; 150; 200; 250; 300) - Land use certificate guarantee: (Y/N) - Soil conservation measure: (Stone bund; Soil bund; Fanya juu) - Number of times for additional extension service including monitoring (year): (1; 2; 4; 6)	750	162: 18 blocks of 9 choice sets	face-to-face	soil conservation	RPLM - Error Component Specification
Vaissière et al. (2018[67])	FRA	May-June 2016	- Management plan: (4 levels of increasingly restrictive (more environmentally friendly) management; opt-out) - Contract length: (9; 18; 25; 40 years; opt-out) - Conditional bonus EUR200/ha/year for additional ecological conditions in management plan (yes; no; opt-out) - Compensation level (base)/ha/year: (EUR800, EUR1100, EUR1500, EUR2000; opt-out)	144	16: 0 block of 8 choice sets	Web-survey	biodiversity offsets	RPLM
Vedel et al. (2015[68])	DEN	January and February 2009	- Purpose of afforestation: (Biodiversity; Ground water protection; Recreation) - Option of cancelling the contract: (Option of cancelling within 10 years; within 5 years; Binding contract) - Monitoring: (1%; 10%; 25%) will be monitored - Compensation (USD, one-time per ha): (3620–5525 in steps of EUR 400)	853	36: 6 blocks of 6 choice sets	Web-survey	afforestation	CLM and Latent class (LC) models
Villamayor-Tomas et al. (2019[69])	GER, SWITZ, SPA	?	- Location of trees: (Coordinated; Not Coordinated) - Share of farm: (1%;5%;10%) - Recommendation (endorsement of the programme): (by farmers; by scientists; no particular recommendation) - Payment for action (ERU, per year per ha): (50;100;150;200)	195	12 choice sets	Mail, Web-survey, face-to-face	a tree planting measure	CLM
Villanueva et al. (2015[70])		October 2013 to January 2014	- Cover crops area: (25%; 50%) - Cover crops management: (Free; restrictive management) - Ecological focus areas (EFA): (0%; 2%) - Collective participation: (Individual; collective participation) - Monitoring each year: (5%; 20%) - Payment (USD, per year per ha for a 5-year AES contract): (100; 200; 300; 400)	295	192: 24 blocks of 8 choice sets	face-to-face	AES permanent cropping	LCM

Source	Country and Region	Time period	Choice variables	Sample size	No. choice sets	Survey delivery method	Payments for	Estimation method
Villanueva et al. (2017[71])) (in Spanish)	La Sierra and Los Pedroches (Córdoba), and Sierra Norte (Sevilla), Spain	October-December 2016	- Plant cover surface: (10% (reference level); 30%; 50%; 100%) - Plant cover management: (Free (reference level); Limited; Brushcutter and/or Shredder blade disc; No practice) - Insecticide treatment: (Free (reference level); Limited; Ecological; No treatment) - Premium for results (EUR/ha): (Non-inclusion of the premium (reference level); Inclusion of a premium for results of EUR 400/ha to be received in the 5th year of the programme) - Annual payment (EUR/ha/year, during the 5 years of AEP): (50; 150; 250; 350)	254	24: 4 blocks of 6 choice sets	face-to-face	AES for mountain olive groves	RPLM - Error Component Specification
Vorlaufer et al. (2017[72])	Zambia	May and September 2015	- Payment vehicle: (Annual cash payment; Monthly cash payments; Voucher payments; Input payments) - Payment levels (ZMW, per year per acre): (60 (8.2USD); 120 (16.4USD); 240 (32.9USD); 480 (65.8USD)) - Contract duration (year); (10; 20) - Implementing organization: (Government of Zambia; NGO) - Forest co-benefits: (No extraction; Firewood extraction; Subsistence extraction; Commercial extraction)	320	16: 4 blocks of 4 choice sets	face-to-face	PES for deforestation	CLM and LCM
Wachenheim et al. (2019[73])	US	2017	- Rental payment (% of local land rental rates reported by NASS): (70; 85; 100; 110%) - Mid-contract adjustment: (payment fixed at the start of the contract; readjusted up or down at mid-contract to reflect changes in local rental rates) - Length of contract (year): (5; 10; 15) - Managed burning: (allowed; not allowed) - Conservation practice: (required; not required)	672	30: 2 blocks of 15 choice sets	Mail	working wetlands conservation programme	Mixed rank ordered logit
Ward et al. (2016[74])	Malawi	Jun-14	- Intercropping required: (Y/N) - Zero tillage required: (Y/N) - Percentage of crop residues mulched: (0; 25; 50; 75; 100) - Programme implementer: (DLRC; NASFAM; TLC; World Vision) - Subsidy level (USD, per acre per year): (0;10; 20;30; 40)	1791	20: 2 blocks of 10 choice sets	face-to-face	Conservation Agriculture for soil quality and crop diversification	RPLM
Yeboah et al. (2015[75])	US	Summer 2016	- Contract length: (10-20 years) - Signing bonus (USD): (0-200) - % of cost share assistance for practice installation: (0-140%) - annual soil rental payment (USD/acre enrolled): (50-275)	1106	108: 36 blocks of 3 choice sets	Mail and web-survey	Filter strip programme for watershed protection	CLM

Source	Country and Region	Time period	Choice variables	Sample size	No. choice sets	Survey delivery method	Payments for	Estimation method
Yu & Belcher (2011[76])	CAN	Jul-07	- Compensation level: (CAN per acre: 10 - 55 in USD 5 increments)	212	Randomly assigned compensation level varying between CAN10-CAN55/acre	Mail	Conserving riparian areas	Binary PM and CLM

Notes: a BLM = binomial logit model, CLM = conditional logit model, FEM = fixed effects model, LCM = latent class model, OLS = ordinary least squares, PM = Probit model, RPLM = random parameter logit model. GTGP = Grain-to-Green Program.