

Does accounting for discrete-continuous choices matter?

A case study of farmers' preferences for practice- vs. result-based agri-environmental-climate measures

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Agri-environmental-climate measures

– general theme

– in the light of changes in EU Common Agricultural Policy

– AECM programme offers contracts to farmers & rewards pro-environmental practices

– voluntary participation – WTA

– farmers' preferences help design efficient programmes

– aimed to design new features of contracts

– *ex ante* assessment result- vs. practice-based schemes:

– level of payment depends on actual improvement of environmental conditions

– require implementation specific practices

– large cross-country differences in adoption of innovative AECM designs - explain

Result-based AECM

– implementation & policy-relevance

- literature on acceptability of result-based contracts largely qualitative (Birge et al., 2017)
- issues with implementation of payment-for-results schemes:
 - transfer risk to farmers
 - farming is a risky business
 - farmers' attitudes to risk are central to their decisions
 - partial control over environmental outcomes (eg. number of breeding birds on meadows), effort and uncertainty over profits
 - use of private information to “produce” better environmental outcomes
 - farmers introduce such practices without payment (intrinsic motivation) →
 - more efficiently to incentivize such actions than setting uniform recommended management practices
 - open questions:
 - monitoring of environmental outcomes (who? how? is it more costly than monitoring of practices in place?)
 - how the mechanism of payments should look?
 - measuring effort vs. outcome, per hectare vs. outcome
 - 2-part (hybrid) payment schemes
 - (i) payment for participation/outcome
 - (ii) spatial bonus – reward potential for ecological spillovers, to measure performance of such additional incentives in interaction



Buffer strips

Result-based AECM

– implementation & policy-relevance

– Pilot programmes with payment-for-results schemes worldwide

– usually on small scale, very specific practices

– for example: Switzerland - plant diversity in alpine meadows (Zabel, 2019)

– Netherlands, UK (Natural England), Scotland (NatureScot), France, Germany, Ireland and the Netherlands (Herzon et al., 2018)

– few examples on arable (cultivated) land

– This study investigates potential wider enrollment by European farmers

– generalize findings (no focus on one particular outcome or practice)

– in design: universal agricultural practices and generic description

– a lot of general attitudes questions: why farmers want to uptake a contract?

Result-based AECM

– existing evidence from choice experiments

DCEs:

Authors	Country	Results
Niskanen et al. (2021)	Finland – high participation rates	<ul style="list-style-type: none">- large heterogeneity of preferences- large farms, young farmers, with farming as main source of income (“entrepreneurial identity”) vs. small farms and high transaction costs of change- practice-based approach (“maintain the current programme”) more acceptable- effort based (rather than result)
Tanaka et al. (2022)	Japan	<ul style="list-style-type: none">- when payments are conditioned to higher environmental objectives, participation rates decrease
Šumrada et al. (2022)	Slovenia	<ul style="list-style-type: none">- result-based preferred, but relations between payments and monitoring
New studies “hot topic”: Laure Kuhfuss, Anastasio J. Villanueva – presented at REECAP 2022		

– Many gaps, differences in design, status quo option

Discrete-continuous choices

Modelling approach

- In DCE for farmers, standard approach – ask 2 questions – Kuhfuss et al (ERAЕ, 2016)
 - “Choose your preferred option/contract”
 - farmers’ willingness to enroll
 - contract adoption/number of farms
 - + “What area of your land would you engage in the chosen alternative?”
 - acreage allocation when a contract is chosen
 - proportion of farmland enrolled
- more effort on decision, with multiple choice cards:
 - Does it influence the results?
 - What share of farmers declare partial participation?
 - Who does? Which areas they enroll?
- mixed logit vs. multiple discrete-continuous extreme value (MDCEV) model-
Bhat (2008)

Study description

- Stated preference choice experiment, CAWI, January-March 2022
- Recruitment: market-research company (series of screening out questions on general panel)
- Decision makers for a farm, who own or lease land (at least 1 ha)
- 4 countries:
 - Germany – 304 farmers
 - Netherlands – 512
 - Poland – 804
 - Czechia – ongoing
- 12 cards
 - contracts aimed at biodiversity promotion on arable land
 - payments in national currencies

AECM

– Labelled alternatives:

– **Practice-based** contract requires the adoption of ALL of the following practices:

- 1) Introducing winter cover crops and stubble intercrops (catch crops)
- 2) Using at least five different main crop types, including the cultivation of legumes, with a minimum share of 10% each
- 3) Allocating at least 10% of the arable land covered by the contract to flowering field margins and winter bird use
- 4) Allocating at least 10% of arable land covered by the contract to set-aside

– **Results-based** contracts allow farmers to choose ANY practices they want. [+ list of potential practices]

- If you implement the **same practices** as required by practice-based contract, your **remuneration will be approximately the same**;
- If you implement additional practices, or choose other practices that will be **more effective** for conserving or increasing biodiversity at your farm, your **remuneration will be larger**;
- If you implement fewer practices or other practices that will be **less effective**, your **remuneration will be lower**.

– **No contract**

Choice cards

- example

	Practice-based contract	Results-based contract	No contract
Annual payment per ha of arable land enrolled in the contract	200 EUR (fixed if practices are implemented)	112 – 448 EUR (depending on measured biodiversity level)	0 EUR
Bonus payment depending on the biodiversity of the farm's environs (annually, per ha of arable land enrolled)	8 – 32 EUR (depending on the measured biodiversity level of the area surrounding your farm)	19 – 29 EUR (depending on the measured biodiversity level of area surrounding your farm)	0 EUR
How much arable land would you enroll?	_____ ha	_____ ha	_____ ha

Choice cards

- example

	Practice-based contract	Results-based contract	No contract
Annual payment per ha of arable land enrolled in the contract	200 EUR (fixed if practices are implemented)	112 - 448 EUR <u>Fixed:</u> 100, 125, ...300	0 EUR
Bonus payment depending on the biodiversity of the farm's environs (annually, per ha of arable land enrolled)	8 - 32 EUR (depending on the measured biodiversity level of the area surrounding your farm)	<u>Range:</u> Min. 8 Max. 90 Ex. 18-22, 20-60, 45-75, 30-90	0 EUR
How much arable land would you enroll?	_____ ha	_____ ha	_____ ha

Practice-based - remunerated for implementing specific practices for arable land enrolled in the contract. In this case, whether or not you implemented the practices according to the contract requirements would be monitored.

The annual payment per ha of arable land enrolled will be a fixed amount.

Depending on the **expert-measured biodiversity level of the area surrounding your farm ("the farm's environs")**, you may receive a bonus payment. This will to a great extent depend on whether your neighboring farmers also adopt measures to conserve, or even increase, the biodiversity of their farms.

Choice cards

- example

	Practice-based contract	Results-based contract	No contract
Annual payment per ha of arable land enrolled in the contract	200 EUR (fixed if practices are implemented)	112 – 448 EUR (depending on measured biodiversity level)	<u>Range:</u> Min. 50 Max. 450 Ex. 140-170, 150-450
Bonus payment depending on the biodiversity of the farm's environs (annually, per ha of arable land enrolled)	8 – 32 EUR (depending on the measured biodiversity level of the area surrounding your farm)	19 – 29 EUR (depending on the measured biodiversity level of area surrounding your farm)	<u>Range:</u> Min. 8 Max. 90 Ex. 18-22, 20-60, 45-75, 30-90
How much arable land would you enroll?	_____ ha	_____ ha	_____ ha

Result-based - remunerated for the expert-measured biodiversity level of the arable land enrolled in the contract. The measurement will take into account various characteristics of your farm, such as soil life, flowering and native plants, and ecological corridors, and combine them to assign a single biodiversity index result for all the land enrolled in the contract.

The annual payment per ha of arable/ land enrolled will be a range, depending on the measured biodiversity level.

Depending on the **expert-measured biodiversity level of the area surrounding your farm ("the farm's environs")**, (...)

Results – MXL in preference space (extraction)

	PL		NL		DE	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Practice	3.2283***	5.7482***	2.5193***	2.9759***	1.7084***	2.5064***
Results	2.0142***	5.4711***	1.5843***	2.6948***	0.9178***	2.5913***
Annual payment (in 100 €)	0.8035***	1.2323***	-0.0658	0.8129***	0.1389**	0.7291***
AP variation	-0.0282	0.0957***	0.0652	1.3656***	-0.1246	1.5412***
Bonus payment (in 100 €)	0.7744***	3.1389***	0.0697	1.9704***	0.1699	2.0713***
BP variation	-0.2822**	1.1761***	0.0235	1.3477***	-0.0082	0.9676***

- based on best choice only
- on average
 - preference for practice- to result-based contracts
 - insignificant effect of variation in payments
- large preference heterogeneity – drivers of variation not explored yet
- bonus works as incentive only in Poland

Results – Mixed MDCEV in preference space

(extraction)

	PL		NL		DE	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Practice	3.2477***	6.1745***	2.5628***	3.6786***	1.6100***	3.5103***
Results	2.5273***	5.5611***	2.0221***	3.4924***	1.1113***	3.1776***
Annual payment (in 100 €)	0.7627***	1.5122***	-0.0043	0.8953***	0.2437***	0.9264***
AP variation	-0.0303	0.1283***	0.1410	0.7308***	-0.0757	2.2463*
Bonus payment (in 100 €)	1.0539***	3.4229***	0.1244	1.3803***	0.3611*	2.7677**
BP variation	-0.1881*	1.129**	0.1034	1.4547**	0.0044	3.7367**
Coefficients of Gamma-profile						
Alpha: common for all alt	-0.7965***		-0.276***		-0.036***	
Gamma: Practice contract	3.4560***		3.2039***		2.2872***	
Gamma: Results contract	3.4616***		3.4532***		2.9395***	
Gamma: No contract	5.3720***		4.3379***		3.3314***	

- uses data on choices and the area of land allocated to each contract
- MXL and MDCEV provide similar conclusions

Summary

- On average, small difference in preferences between result- and practice-based
- Poland – payment as more important attribute (low payments now)
- Large preference heterogeneity – to be explained
 - how responses vary across different types of farmers/farms
 - exploratory analyses: owned/leased land, concern for environment, risk-preferences, uncertainty over environmental outcomes, trust, size, experience with such practices and AECM, on-farm level of biodiversity, expected payment, trust (general and in experts' measurement), perception of both contract types
- meta-analysis of farmers' discrete continuous responses
 - in our study, majority did not share land between different contracts
 - compare with data from other studies
- welfare measures for CAP suggested by reviewer: interest in comparison of WTAs
 - methodological advancement in terms of calculating WTPs from MDCEV
 - suggestions about literature very welcome

Thank you!

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