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Wildlife conservation by farmers: analysis of actual and contingent participation

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Abstract

This paper examines actual and contingent participation of farmers in wildlife conservation programmes. Probit and tobit modelling were used to analyse the effect of farm characteristics and farmer attitudes on participation. The optimal bid offer was derived from a referendum CV survey for a proposed field margin programme. Actual participation was highest for organic farmers and farmers facing area specific restrictions. Contingent participation was strongly affected by bid offer. Furthermore, specialisation, integrated farming, off farm income sources, risk perception and ditch length positively influenced contingent participation. The CVM-experiment showed that up to 60 percent participation might be achieved with appropriate bid offers. Implications of the results for policy are discussed.

Keywords: wildlife conservation, CVM, intensity of participation, probit, tobit.

Introduction

Recently, wildlife conservation on agricultural land receives much attention from policy makers in the European Union. Land use policies are being developed that pursue both environmental and wildlife objectives. These policies provide incentives to landowners and farmers to maintain the current situation or to convert land to more environmentally benign uses.

In a conservation program determined through (textbook) market interaction, farmers compete for a given conservation budget with self-defined practices through a tender approach. The competition ensures efficient allocation of the budget. Real world conservation schemes rarely take this approach. Instead these programs are basically a combination of incentive based policies and command and control in the sense that fixed amounts are offered for a limited number of approved conservation practices. A judgement of what can be expected from using such policies requires a representation of both the command and control and the incentive component and a detailed representation of the activities these real world policies intent to target (Schwabe and Smith, 1998). Specifically, a lack of participation in these programs may be due to either the incompatibility of the approved conservation practices with farm and farmer characteristics or to an inappropriate amount of incentive payments. This paper examines both aspects.

Exactly which factors influence farmers' participation in voluntary agri-environmental schemes in not yet fully understood. Brotherton (1989) provided an influential theoretical analysis that highlighted that both 'scheme factors' and 'farmer and farm factors' need to be taken into consideration. For example, Wilson's (1997) factor analysis for the ESA UK includes *e.g.* farmer's age, education, succession, the information environment as well as farm size and tenure and characteristics of the scheme such as payments levels and scheme duration. Other studies in more recent years emphasise the importance of farmer's attitudes towards the environment (Morris and Potter, 1995) and how structural and attitudinal factors interplay in the individual farmers' decision making process (*e.g.*, Falconer, 2000). Economic models based on profit maximisation fail to encompass attitudinal variables altogether whereas omission of important explanatory variables that are correlated with variables included in econometric models leads to biased estimators and to invalidation of inference procedures (Greene, 1997). In order to handle this problem a comprehensive approach to explain programme participation is required that integrates normative economic and behavioural aspects, together with institutional and biophysical aspects.

The contingent valuation method (CVM) is the predominant method for analysing opportunities for (new) incentive schemes. Typically consumers' Willingness To Pay (WTP) is measured for the non-market goods associated with agriculture, viz. species conservation, water quality and pastoral landscapes. In contrast, few studies have addressed the concomitant supply side of these environmental goods. Bonnieux and Rainelli (1995) estimated a value for agricultural landscape using the WTA-concept. Farmers were asked the minimum amount they were willing to accept to implement a specific change in their farming practices. Cooper (1997) also used CVM to estimate the minimum incentive payment farmers would require in order to adopt more environmentally friendly "best management practices" (BMPs). To predict adoption the CVM data were combined with actual market data on enrolment in BMPs, furthermore Cooper considered intensity of adoption by estimating the acres enrolled as a function of the incentive payment. Only a limited number of farm and farmer characteristics were used in the regressions and none of the studies mentioned, incorporated farmer attitudes and perceptions.

The purpose of this paper is twofold. Firstly, we intend to assess the factors that explain farmers' participation in existing conservation programs. Secondly, we analyse farmers' contingent participation in a new wildlife conservation program and the acreage enrolled as a function of the incentive payment. A range of farm and farmer characteristics including attitudes and perceptions were considered. Measuring respondent attitudes, as recommended by the US NOAA (National Oceanic and Atmospheric Administration) may help interpret valuation questions (Arrow *et al.*, 1993; Kotchen and Reiling, 2000). Eliciting attitudes toward the environment is expected to enhance CVM, in particular.

The outline of the paper is as follows. The next section presents the theoretical background followed by an application for field crop farmers in the Netherlands. The new incentive scheme consisted of a voluntary nation-wide field margin programme with carefully selected vegetation and management opportunities, reducing the risk of weed and pest problems. The paper finishes with conclusions and special attention for policy implications.

2. Theoretical background

Actual participation

The decision to participate in an existing wildlife conservation program takes the form of a binary variable which suggest that either a logit or probit model is appropriate. Both type of models relate the dependent and independent variables non-linear, however based on two different cumulative distribution functions (CDF) of the random variable. Whereas the logit model is based on the logistic CDF the probit model is based on the normal CDF. In this study the following probit model is proposed to explain actual participation in conservation programs:

$$y_i^* = \beta_0 + \sum_{j=1}^{k} \beta_j x_{ij} + u_i \qquad (1)$$

with:

$y_i = 1$, if $y^* > 0$ (farmer i adopted wildlife conservation measures), and

$y_i = 0$, otherwise

x_{ij} = vector of explanatory variables: farm and farmer characteristics

u_i = random error

Contingent participation

To analyse contingent participation in a proposed wildlife conservation program both the WTA (receiving compensation for a loss) and WTP format (paying something for a foregone gain) may be used. Respondents however, will be far less familiar with the notion of paying for a foregone gain causing far greater uncertainty and variability in answers to WTP questions than occurs with WTA questions (see also Turner *et al*, 1994). Therefore WTP was avoided in favour of WTA.

While it is possible to directly elicit farmers' minimum WTA to adopt a conservation practice, the referendum approach, as recommended by the US NOAA Panel, is likely to be preferable (Arrow *et al.* 1993). The dichotomous choice (DC) form of CVM was used to take the referendum approach. Under DC-CVM, the respondent is prompted to provide a yes or no response to a bid amount contained in the valuation question, where the bid amount is varied across the respondents. Compared with eliciting the WTA in an open-ended fashion, this method is particularly likely to reveal accurate statements of value as the format reduces the ability of the respondent to purposely bias the study results (Hoehn and Randall, 1987; Cooper, 1997).

When using the referendum approach, CV responses are binary variables, therefore one need a statistical model appropriate for a discrete dependent variable.

Logit and probit models play a key role in the analysis of discrete CV data. A probit model is proposed to explain farmers' contingent participation. To this end the bid amount is incorporated in the model as an explanatory variable.

$$z_i^* = \beta_0 + \sum_{j=1}^{k} \beta_j x_{ij} + u_i \qquad (2)$$

with:

$z_i = 1$, if $z^*>0$ (farmer i accepts the offer), and

$z_i = 0$, otherwise

x_{ij} = vector of explanatory variables: farm and farmer characteristics, bid amount

u_i = random error

Intensity of participation

When participation in a wildlife conservation program is considered a binary decision, all participants are treated the same neglecting quantity differences among participants: intensity of the participation decision. In case of wildlife programs the maximum intensity is reached when the total available acreage is used for conservation. Intensity of participation is therefore defined as the proportion of the total available acreage that is used for conservation. Since this variable has a censored distribution (values between 0 and 100) a tobit model is proposed to explain intensity of participation:

$$a_i^* = \beta_0 + \sum_{j=1}^{k} \beta_j x_{ij} + u_i$$

with:

$$a_i = \begin{cases} \beta_0 + \sum_{j=1}^{k} \beta_j x_{ij} + u_i \text{ for participating farmers} \\ 0 \text{ for farmers who are not participating} \end{cases} \qquad (3)$$

$u_i \sim \text{IN}\,(0, \sigma^2)$

and

a_i = extent of participation farmer i in incentive program

x_{ij} = set of explanatory variables: farm and farmer characteristics, bid amount

3. Application

3.1 Review of wildlife conservation in the Netherlands

Until recently, in the Netherlands as well as in other EU member states, wildlife conservation mainly focused on farming areas located within or alongside the so-called Ecological Main Structure (EMS): An ecological network of nature reserves and interconnecting zones. Farmers in and near these areas receive subsidies for a variety of conservation management practices, ranging from extensive cereal growing to the development and maintenance of landscape elements.

The majority of farmers in the EU are located outside the EMS. EU-Regulations 1760/87 and 2078/92 mark the acceptance, that instead of the traditional distinct geographical segregation of agricultural and wildlife functions as in the EMS, both functions should to a large extent blend within the rural environment. Besides, also in ecological circles attention is shifting towards the preservation of wildlife within the major forms of primary land use in addition to nature reserves and other protected areas (Edwards and Abivardi, 1998). In the Netherlands, policy towards these so-called white areas has taken two forms. Incentives for pastoral farming have been introduced which focus on meadow bird protection and alternative ditch bank management. For crop farming areas, conservation activities concentrate on fallow land and in field margins. The Ministry of Agriculture, Fisheries and Nature Management developed an incentive for enhancing wildlife on land that has been set-aside as part of the EU-support regulations for cereal crops. Payments are offered to cover the extra cost associated with the wildlife management including seed and seeding costs of special mixtures of dicotyledons. In 2000, only 190 crop farmers participated with a total of 500 hectares consuming approximately 25% of the total budget available. In addition, provincial authorities developed incentives for field margins. Management opportunities vary across provinces and payments vary accordingly. Participating in these national and regional schemes has been disappointing. Only a limited number of farmers participate in the cost share programs offered for the white areas. The most recent data provided by the Central Bureau of Statistics show that 3,3% of specialised crop farmers are involved in activities concerning wildlife conservation (LEI/CBS, 2000). These include both farmers involved in EMS related activities and activities regarding the white areas. This number is much lower than for land based animal husbandry (cattle, sheep, etc.) where 8,2% of the farms is involved in wildlife conservation.

It is hypothesised that participation in wildlife conservation programs is affected by:

- The production environment on the farm. When less favourable conditions exist on the farm, gross margins of crop production will be smaller and other activities such as wildlife management are relatively more attractive.
- Farm size. Small farms usually grow a larger proportion of (labour) intensive high-returning crops and will therefore be less attracted to wildlife activities. Morris and Potter (1995) found that, when looking at participation in agri-environmental schemes in the United Kingdom, it was the younger farmers with the largest more economically buoyant farms who tended to find schemes attractive.
- Successor situation. It is assumed that farmers without successor are less production oriented and more willing to adopt conservation oriented farming (Potter and Lobley, 1992).
- Familiarity with conservation programs. Not all farmers are aware of the regulations and incentives available for wildlife conservation, hampering participation.
- Societal commitment of farmer. Farmers that are more sensitive to what society wants are expected to be more open to wildlife conservation activities.
- Innovativeness of the farmer. Innovative farmers that like to try new production methods are expected to be less hesitant towards wildlife conservation.
- Risk attitude towards wildlife conservation practices. From other studies (Van der Meulen *et al.*, 1996; Buys *et al.* , 1996) it is known that the perceived risk of weed infestation and spread of pests and diseases is a major factor for not participating in wildlife conservation programs

It is hypothesised that wildlife schemes that have lower weed and disease risk features than existing programs may increase participation rates. Furthermore we expect a higher participation rate and a higher intensity of participation, in terms of the area used for the practice, when payment levels increase.

3.2 Survey

A survey was compiled and pre-tested with 8 crop farmers. After minor adaptations the survey was mailed to 1000 farmers from three important crop farming regions in the Netherlands: the provinces of Groningen, Drenthe and Flevoland. 278 questionnaires were returned. After removing questionnaires from test farms, non-crop farms as well as incomplete questionnaires, 250 remained for analysis.

The survey consisted of five parts: (1) general information about the farmer and the farm, (2) detailed information on the production environment of the farm (parcellation, ditches, woodrows), (3) farmer attitudes: towards society, towards agricultural wildlife conservation (risk perception and valuation of positive externalities), and innovativeness by scoring statements on 5-point Likert scales, (4) familiarity with existing wildlife conservation programs, (5) actual adoption of wildlife measures in terms of alternative field margin and fallow management (6) contingent participation: a fictitious field margin practice was introduced to the farmer (Table 1) and his or her Willingness to Accept was analysed using the referendum approach. As discussed in section 2, the dichotomous choice (DC) form of CVM was used to take this approach. Bid amounts in this study varied between NLG 1000 and 5000 per hectare. Average gross margins (excluding costs for contract work) for a cropping plan with cereals, potatoes and sugar beet range from NLG 3000 for sandy soils to NLG 5000 for the top clay soils (PAV, 2000). However, near the field edge, yields and associated gross margins are significantly lower than for the field centre (De Snoo, 1996).

<TABLE 1>

Table 2 presents descriptive statistics of the data set as well as variable definitions. Variables INNOV, SOCIE, NVALUE and RISK reflecting farmers attitudes were measured on a 5 point Likert scale and converted to dummy variables (agree/disagree) because Likert scales are non-metric variables. Likert values 1 and 2 were converted to 0 (disagree) and Likert values 3, 4 and 5 were converted to 1 (agree). No multicollinearity was found among variables used. From the data it was concluded that farmers from the Province of Flevoland had the highest response rate. Furthermore there was a positive response bias towards larger farms and "wildlife oriented "farms. 20 Percent of the respondents participated in a wildlife program for at least one year during the period 1997-1999, whereas in 1999 for the whole of the Netherlands 3,3 % of specialised crop farms and 5,9% of mixed crop farms employed wildlife activities (LEI/CBS, 2000).

<TABLE 2>

3.3 Empirical Model

Given the theoretical model and the hypotheses formulated, the empirical application focuses on both actual and contingent participation in wildlife programs. Data were obtained from different geographic regions. Soil type, crop rotation but also parcellation characteristics are different for these regions enabling a wide range of conditions to be studied.

Actual participation (PART) was considered a binary choice: farmers participating in at least one wildlife program in one of the last three years were regarded participants. The wildlife programs considered were, provincial field margin programs, the nation-wide program for fallow land, and programs linked to the Ecological Main Structure. Explanatory variables include farm and farmer characteristics:

$$PART_i^* = \beta_0 + \beta_1 AGE_i + \beta_2 SUCC_i + \beta_3 FTYP_i + \beta_4 OINC_i + \beta_5 LABF_i + \beta_6 TOTHA_i + \beta_7 PMETI_i + \beta_8 PMETO_i + \beta_9 SHREN_i + \beta_{10} CEREA_i + \beta_{11} PROVF_i + \beta_{12} PROVG_i + \beta_{13} RESTR_i + \beta_{14} STYP_i + \beta_{15} FISIZ_i + \beta_{16} DITCH_i + \beta_{17} WOODR_i + \beta_{18} YEARS_i + \beta_{19} FAM1_i + \beta_{20} FAM2_i + \beta_{21} INNOV_i + \beta_{22} SOCIE_i + \beta_{23} NVALU_i + \beta_{24} RISK_i + u_i$$

$$\text{With } PART_i = \begin{cases} 1 & \text{if } PART^* > 0 \\ 0 & \text{otherwise} \end{cases}$$

For variable definitions see Table 2.

Contingent participation (CPART) was considered a binary choice. Table 1 presents the proposed field margin program that was offered to farmers. The proposed program was derived from the existing program for set aside land (MINLNV, 2000). This scheme was set up to encourage wildlife enhancing practices on set MacSharry- side land by providing compensation payments for additional seed and costs for specific nature fallow mixtures. The program however is only available for full field application and only seed costs are remunerated. Compared to existing field margin programs, usually predominantly consisting of unsprayed cereals, weed and disease risks of the proposed program are lower, increasing compatibility with ordinary farming practices. In addition to the actual participation regression, bid offer and actual participation (0/1) were used to explain contingent participation:

$$CPART_i^* = \beta_0 + \beta_1 AGE_i + \beta_2 SUCC_i + \beta_3 FTYP_i + \beta_4 OINC_i + \beta_5 LABF_i + \beta_6 TOTHA_i + \beta_7 PMETI_i + \beta_8 PMETO_i + \beta_9 SHREN_i + \beta_{10} CEREA_i + \beta_{11} PROVF_i + \beta_{12} PROVG_i + \beta_{13} RESTR_i + \beta_{14} STYP_i + \beta_{15} FISIZ_i + \beta_{16} DITCH_i + \beta_{17} WOODR_i + \beta_{18} YEARS_i + \beta_{19} FAM1_i + \beta_{20} FAM2_i + \beta_{21} INNOV_i + \beta_{22} SOCIE_i + \beta_{23} NVALU_i + \beta_{24} RISK_i + \beta_{25} PART_I + \beta_{26} BID_i + u_i$$

$$\text{With } CPART_i = \begin{cases} 1 & \text{if } CPART^* > 0 \\ 0 & \text{otherwise} \end{cases}$$

Intensity of participation (INTPA) was measured as the proportion of the total margin length that farmers intended to use for the proposed conservation practice (see Table 1). Since this explanatory variable has a censored distribution (values between 0 and 100) a tobit model was estimated with:

$$INTPA_i = \beta_0 + \beta_1 AGE_i + \beta_2 SUCC_i + \beta_3 FTYP_i + \beta_4 OINC_i + \beta_5 LABF_i + \beta_6 TOTHA_i + \beta_7 PMETI_i + \beta_8 PMETO_i + \beta_9 SHREN_i + \beta_{10} CEREA_i + \beta_{11} PROVF_i + \beta_{12} PROVG_i + \beta_{13} RESTR_i + \beta_{14} STYP_i + \beta_{15} FISIZ_i + \beta_{16} DITCH_i + \beta_{17} WOODR_i + \beta_{18} YEARS_i + \beta_{19} FAM1_i + \beta_{20} FAM2_i + \beta_{21} INNOV_i + \beta_{22} SOCIE_i + \beta_{23} NVALU_i + \beta_{24} RISK_i + \beta_{25} PART_i + \beta_{26} BID_i + u_i$$

for those participating and

$$INTPA_i = 0$$

for those not partcipating in the proposed field margin program.

4. Empirical Results

4.1 Actual participation

The effects of the explanatory variables on the probability that a farmer participates in an existing wildlife management program are presented in Table 3. PMETO and RESTR are significant at the 1% and 5% level respectively, indicating that organic farmers as well as farmers that face area specific restrictions are more likely to participate. Furthermore PROVG was significant at the 5% level indicating that participation of farmers from the Province of Groningen was lower compared to the referencen area (Province of Drenthe). FAM2 (Familiarity with field margin regulations) was nearly significant at the 5% level (P=0.07), with the magnitude of the coefficient indicating an effect on participation.

<TABLE 3>

4.2. Contingent participation

The effects of the explanatory variables on the probability that a farmer would accept the bid offered in the contingent valuation experiment is presented in table 4. A highly significant effect (P<0.001) of bid offer (BID) on contingent participation was found. Figure 1 present the relationship between bid offer and percentage of acceptors of the offer. It is clear that from NLG 3000 per hectare onwards participation rates remain fairly constant at levels around 60%.

Factors FTYPE and OINC are significant at the 1% level indicating that specialised crop farmers and farmers with non-farm income sources are more willing to accept the offer. Also ditch length per ha had a significant affect on contingent participation (P<0.05). Contrary to actual participation, contingent participation was not affected by production method and province.

<TABLE 4>

<FIGURE 1>

4.3 Intensity of participation

A tobit regression was carried out to determine the effect of the explanatory variables on the intensity of participation. Intensity was defined as the proportion of the total acreage of field margins on the farm that was offered for the new incentive program. Table 5 shows the effect of the explanatory variables on intensity of participation. All factors that were significantly affecting contingent participation, also significantly affect intensity of participation. In addition to the CPART-model, PMETI and RISK are significant the 5% level, indicating that integrated farmers and farmers that have a lower perception of weed risks are willing to devote a higher proportion of their field margins to the proposed program.

<TABLE 5>

5. Discussion and conclusions

A survey among crop farmers was conducted to analyse actual participation in wildlife conservation programs and contingent participation in a proposed field margin program. Probit and tobit modelling were used to analyse the effect of farm characteristics and farmer attitudes on participation.

Participation in existing wildlife programs was highest for organic farmers, as well as for farmers that face area specific restrictions. Contingent participation was highest for specialised crop farmers and for integrated farmers. Furthermore it was concluded from the CVM-experiment that participation rates around 60 % may be achieved with a bid offer above NLG 3000 per hectare for the proposed field margin program.

The expected positive influence of farm size and successor absence on participation in wildlife conservation programs was not confirmed by the survey and neither was familiarity with existing conservation programs. The hypothesised relation between societal commitment and innovativeness of the farmer on the one hand and willingness to participate in wildlife programs on the other hand was not observed for any of the models. Risk perception of wildlife measures did not significantly affect the decision to participate in both the actual programs and the proposed program. It did however significantly affect the intensity of participation in the proposed program. The hypothesis that the production environment would influence participation was confirmed by the survey. Area specific restrictions significantly and positively affected actual participation.

Overall the conclusions regarding the importance of the location of the farm (area specific institutional constraints) corresponds very well with the findings of Wilson (1997) for the ESA UK and of Kristensen *et al.* (2001) for landscape activities in Denmark. These studies found that the location factor (local socio-economic and biophysical environment) is a more important factor for understanding farmer involvement than a large range of farm and farmer characteristics. This study observed between an interesting difference in participation in existing wildlife programs and contingent participation, which might be due to scheme factors and farm and farmer factors. Scheme factors include the bid amount, and lower weed risks of the proposed field margin program as opposed to existing conservation programs. Whereas organic farmers, familiar with weed and disease risks, were attracted by the existing programs, the proposed program predominantly attracted integrated farmers, stressing the importance of scheme factors. Farmer factors in the first place include the bias towards wildlife-orientation in the sample. Familiarity with existing programs on the other hand was not found to significantly influence actual or contingent participation.

The study results regarding contingent participation suggest that participation rates in wildlife programs could be enhanced through conservation schemes that reduce the risks of weed and disease when compared to existing programs and that have adequate financial compensation features. Co-operation between policy and the farming community to discuss agronomically appropriate incentive schemes that are also adapted to the local circumstances therefore may well result in an increased participation in conservation schemes.

Finally it should be noticed that in spite of the high amounts of money that were offered for the proposed program in this study, 40 % of the farmers were still reluctant to participate. From the comments written by farmers on the returned survey forms it was clear that the perceived government interference with farming, was a major factor for not participating. Further research into the motives of these farmers is advised.

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Table 1 Field margin package offered in contingent valuation experiment

1.	Field margins of 3 m
2.	No chemical spraying and fertilizing of margins between 1 January and 1 October. Incidental knapsack spraying to control problem weeds is allowed
3.	Margins have to be sown with a mixture of at least 3 different dycotyledons such as clovers, phacelia etc. (seed costs: approx. NLG 150/ hectare)
4.	The regulation is not valid for margins of whole fields that have already been set aside
5.	The margins do not count for the MacSharry set aside scheme.
6.	Sowing before 15 May and no tillage until 1 October
7.	A maximum of one cutting is allowed
8.	Minimum length of 500 meters
9.	Participation is voluntary and stopping is allowed after every year
10.	Variable premium amounts (NLG /ha)

Table 2. Description and summary statistics of dependent and independent variables

Variable	Description	Mean	St. dev.	Min.	Max.
PART	Experience with wildlife oriented field margin and fallow land practices in past 3 years (1if yes, 0 if no)	0.2	0.4	0	1
CPART	Willingness to Accept offered field margin package (1 if yes, 0 if no)	0.5	0.5	0	1
INTPA	Percentage of field margins on the farm used for offered fictitious field margin package	24.9	34.9	0	100
AGE	Age of eldest farm manager	49.7	10.2	26	77
SUCC	Successor (1 if present or not yet known, 0 if no)	0.8	0.4	0	1
FTYP	Farm type (0 if crop, 1 if mixed crop)	0.3	0.5	0	1
OINC	Number of non-farm income sources	0.4	0.53	0	2
LABF	Labor force (FTE)	1.7	1.1	0.1	13.7
TOTHA	Farm size (Ha)	66.7	54.0	8	460
PMETI	Integrated Production method (1 if yes, 0 if no)	0.1	0.4	0	1
PMETO	Organic production method (1 if yes, 0 if no)	<0.1	0.2	0	1
SHREN	Percentage of short term rented land (max 1 yr.)	6.5	13.0	0	69
CEREA	Percentage of cereals in crop rotation	25.7	17.8	0	100
PROVF	Province Flevoland (1 if yes, 0 if no)	1.8	0.8	1	3
PROVG	Province Groningen(1 if yes, 0 if no)				
RESTR	Number of area specific restrictions applicable to the farm (e.g. drinking water area, Ecological Main Structure)	0.2	0.4	0	2
STYP	Soil type (0=sandy, 1=clay)	0.6	0.5	0	1
FISIZ	Average field size (Ha)	7.0	4.9	1	45
DITCH	Ditch length per ha (m)	95.5	60.1	0	595
WOODR	Woodrows per ha (m)	11.7	35.7	0	357
YEARS	No. of years actual participation	0.5	1,0	0	3
FAM1	Familiarity with nature fallow regulations (1 if yes, 0 if no)	0.5	0.5	0	1
FAM2	Familiarity with field margin regulations (1 if yes, 0 if no)	0.7	0.5	0	1
INNOV	I like to try new ideas on my farm (0=disagree, 1=agree)	0.6	0.5	0	1
SOCIE	I want to know how society thinks about my farm (0=disagree, 1=agree)	0.4	0.5	0	1
NVALU	Cropping set aside land with a nature fallow mix is good for the image of agriculture (0=disagree, 1=agree)	0.6	0.5	0	1
RISK	Cropping field margins with a nature fallow mix will cause more weed problems on my farm(0=disagree ,1= agree)	0.2	0.4	0	1
BID	Bid amount in CV question (cents/m2)	30.4	13.7	10	50

Table 3. Probit estimates for parameters explaining actual participation in conservation programs

Variable	Coefficient	P-value
Constant	-1.4897*	0.018
AGE	-0.0028	0.117
SUCC	-0,3192	0.230
FTYP	0.1604	0.498
OINC	0.1149	0.578
LABF	0.0012	0.865
TOTHA	0.0035	0.104
PMETI	-0.0661	0.825
PMETO	1.7278**	0.003
SHREN	-0.0026	0.410
CEREA	-0.0004	0.387
PROVF	-0.1178	0.663
PROVG	-0.6040*	0.043
RESTR	0.4898*	0.029
STYP	-0.0073	0.717
FISIZ	-0.0014	0.143
DITCH	0.0014	0.490
WOODR	0.0039	0.326
FAM1	0.2341	0.333
FAM2	0.4936	0.071
INNOV	-0.1175	0.465
SOCIE	0.1660	0.454
NVALU	0.1190	0.459
RISK	-0.1584	0.511

* significant at the 5% level
**significant at the 1% level
***significant at the 1‰ level

Table 4. Probit estimates for parameters explaining contingent participation in proposed field margin program

Variable	Coefficient	P-value
Constant	-2.2655***	<0.001
PART	0.8595	0.228
AGE	-0.0007	0.700
SUCC	-0.1148	0.632
FTYP	-0.7521**	0.006
OINC	0.5607**	0.002
LABF	-0.1851	0.164
TOTHA	0.0044	0.071
PMETI	0.4410	0.107
PMETO	0.7903	0.155
SHREN	0.0029	0.304
CEREA	0.0001	0.888
PROVF	0.2292	0.397
PROVG	0.3955	0.270
RESTR	0.3751	0.129
STYP	0.5119	0.172
FISIZ	-0.0026	0.511
DITCH	0.0042*	0.025
WOODR	0.0010	0.744
YEARS	-0.3006	0.301
FAM1	-0.0211	0.923
FAM2	0.4134	0.065
INNOV	0.0011	0.666
SOCIE	0.0003	0.898
NVALU	-0.0001	0.819
RISK	0.0037	0.250
BID	0.0355***	<0.001

* significant at the 5% level
**significant at the 1% level
***significant at the 1‰ level

Table 5. Tobit estimates for parameters explaining intensity of participation in proposed field margin program

Variable	Coefficient	P-value
Constant	-128.9992***	<0.001
PART	44.4881	0.243
AGE	-0.0046	0.972
SUCC	-18.9175	0.189
FTYP	-32.0288*	0.012
OINC	28.1477**	0.009
LABF	-4.1679	0.485
TOTHA	0.0753	0.548
PMETI	33.9998*	0.035
PMETO	28.0392	0.352
SHREN	0.1942	0.377
CEREA	0.0094	0.764
PROVF	27.7271	0.081
PROVG	0.3529	0.985
RESTR	24.7128	0.053
STYP	1.6590	0.917
FISIZ	-0.0001	0.999
DITCH	0.2574*	0.026
WOODR	-0.1874	0.257
YEARS	-10.5054	0.499
FAM1	9.4507	0.464
FAM2	1.9498	0.886
INNOV	-0.1428	0.835
SOCIE	0.1368	0.901
NVALU	0.0123	0.704
RISK	-21.0476*	0.038
BID	0.3476***	<0.001

* significant at the 5% level
**significant at the 1% level
***significant at the 1‰ level

Figure 1. Participation rate in proposed field margin program for different payment levels