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Farmers' preferences and social capital towards agri-environmental schemes for protecting birds

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Abstract: The steady decline of birds living in steppes is a worrying situation that the European Commission is attempting to remediate through the application of agri-environmental schemes (AES). The aim of this study is to assess farmers' preferences towards these AES, which call for a number of harvesting restrictions in order to protect birds. We conducted a face-to-face survey in farming communities in Aragon (Spain) and through the estimation of a Rank Ordered Logit model, we found that farmers have strong preferences in favor of these AES. They generally request relative small amounts of monetary compensations to comply with the contractual requirements established by the proposed AES. Our results also show the importance of social trust and expectation of compliance by other neighbors that encourage farmers to cooperate with AES. These and other results may be used to design more effective AES and remediate this important biodiversity problem.

Keywords: agri-environmental schemes, birds, farmers' preferences, rank ordered logit, social capital.

1. Introduction

In recent years, farming communities in the north east of Spain have suffered a steady decline in the number of birds living on the steppes. Currently, these birds are classified in some regional communities, such as Aragón, as endangered species (Gobierno de Aragón, 2012a). There are several factors that are contributing towards aggravating this situation. Firstly, a change in harvesting technologies, using techniques that are more modern and aggressive for birds; and secondly, the reduction of cropping areas due to a process of abandonment or conversion to other uses, leaving less food available for birds (SEO/Birdlife, 2012).. These trends are contributing greatly to a reduction in the number of birds that live in Aragon's steppe. *Fundación Biodiversidad* (2009), a public foundation in Spain working to preserve natural heritage and biodiversity, highlights that Spain is one of the countries with the highest number of bird species. Specifically, they have reported 580 different species, noting that around one quarter of them are threatened or endangered, representing more than 45% of the total number of birds. This is a worrying situation, considering that balanced ecosystems are essential in order to maintain Spain's rich diversity of bird species. In 2012 the European Commission also reached the same conclusions, indicating that birds are considered to be a good indicator of the diversity and integrity of ecosystems.

With the aim of remedying this difficult biological situation and based on the programs developed by Rural Development Program under the fund FEADER for the period 2007-2013, each Autonomous Community in Spain with special protection areas for birds has included agri-environmental schemes (AES) with the aim to conserve these birds. These

measures establish economic aids to compensate farmers who voluntarily agree to carry out farming practices over a five-year period to protect and preserve bird habitats. Farmers who do this agree to implement measures to promote the breeding and feeding of steppe birds in rainfed arable land. At the same time, and as a compensation for this effort, an extra payment is provided via an agricultural subsidy in order to improve their actual economic situation and compensate the higher production costs linked to the fulfillment of the contractual requirements.

These AES require that farmers should change the management of their farms in order to improve the environment, and in return the public administration provides a compensatory premium for the host surface. In our study area, Aragón, the AES destined to protect steppe birds have been implemented for the last 15 years, although it would seem that little has been achieved, since birds population continues to decline and agricultural systems on which they depend continue suffering from abandonment, intensification or transformation processes (Carricondo et al. 2012). Therefore, it is important to understand farmer's preferences about AES and gather information in order to demand effective measures to support agricultural systems and biodiversity.

Currently, these AES have some general requirements, although there are specific conditions depending of each region. In Spain, these contracts require the establishment of fallows in order to create and to maintain refuge areas that benefit certain species of birds. Furthermore, there is also a condition that establishes a crop rotation to create a diverse and rich structure of plants and invertebrates. Another requirement is the obligation to cultivate fodder or green crops that provide habitat and food for birds. Finally, there are two other contractual requirements; one is to create and to maintain boundaries to provide food and

refuge areas for birds, the other is the obligation to delay harvesting or plowing until the birds' reproductive cycle is complete (SEO/Birdlife, 2012).

In this study, we evaluate farmers' preferences towards AES contracts. These contracts vary with respect to their attributes: the freedom (or not) to decide the percentage reduction allowed from the surface of the first year dedicated to these AES; the obligation to include some crops in a given percentage, the prohibition to harvest in some months of the year; the payment received per Ha/crop (via an agricultural subsidy), and the potential fine to be paid in the event of failing to comply with the contractual requirements.

Because of the limited success of the existing measures in terms of stopping the decline of birds population, the aim is to assess how conservation these contracts should be designed in order to favor their adoption by farmers and their effectiveness. Therefore, the main goal of these policies is to ensure that the conservation measures are effective from two points of view: on the one hand, allowing the conservation of birds; but secondly, supporting farmers with adequate rewards to undertake sustainable farm practices. Preference evaluation is a fundamental point for the effective design of conservation policies. After identifying contractual aspects that are more attractive to participants, conservation contracts can include aspects that ensure more successful results. To achieve this objective, we conducted a survey in the area of Aragon, which included a choice experiment (CE) exercise. This methodology has been successfully used in different studies (Adamowicz et al. (1994); Boxall et al. (1996); Roessler et al. (2008)). Specifically, and with respect to agri-environmental measures, CE have been used in a range of contexts by Ruto and Garod (2009), Espinosa-Goded et al. (2010), Christenssen et al. (2011) and Wamberg and Vedel

(2012). In addition, there are other two landowners´ preferences studies conducted by Hudson and Lusk (2004) and Horne (2006).

The rest of the paper is organized as follows: Section 2 presents a short review of the literature and the research hypotheses to be tested, and section 3 presents a survey description. Section 4 contains the data. Empirical models are in section 5. Section 6 presents results and the estimation of willingness to pay or accept while the paper concludes with a final discussion in section 7.

2. Literature review

Recently, several studies have explored the factors that influence the willingness to participate in AES. The most commonly analyzed variable to explain this participation decision are the characteristics of the farms and farmers. In this respect, Vanslembrouck et al. (2002) found that elderly farmers, larger farms and people who have perspectives of success in the future are less willing to participate in agri-environmental policies. On the contrary, a positive attitude from farmers regarding the environmental effects of the program, a higher education level and previous experience with these measures contribute towards a greater willingness to participate in these policies. Wossink and Wenum (2003) examine an actual and contingent participation of Dutch arable farmers in biodiversity conservation programs, finding that contingent participation is better explained by the production environment and by familiarity with conservation programs than by the characteristics of the farmers or their fields. They note that a participation of up to 60% may be achieved with suitable bid offers. Other studies have focused their attention more closely on the characteristics of the farms. In particular, Mann (2005) explores the

relationship between farm size growth and participation in agri-environmental programs. His results show that growing farms in Swiss agriculture are likely to reduce their participation, whereas shrinking farms have a growing share of their meadows in AES. Defrancesco et al. (2008) analyze Italian farmers with the aim of explaining the probability of non-participation (or participation) in a specific AES, showing that labor intensive farming types and a high dependency of household income on farming activities decreases farmers' participation; while, on the other hand, previous experience, environmentally friendly farm practices and adequate compensation of extra costs encourage participation.

In addition, Dupraz et al. (2002) found results that underline the importance of both farm and farmers' characteristics as well as attitudinal issues. Similarly, Polman and Slangen (2008) confirm that AES only based on farmers' and farms' characteristics result in an incomplete analysis, given that other effects related to motivational issues are being neglected. Specifically, they include as motivational issues the perception of the institutional design, the use of extensive services, trust in government, and preferences for stable policies. They remark that besides typical characteristics of farms and farmers, motivational factors are important for the likelihood of enrolling in agri-environmental contracts. Beedell and Rehman (2000) investigate farmers' attitudes and motivations, finding that farmers with greater environmental awareness and members of social organizations are more influenced by conservation concerns and less by farm management concerns than other people. A more recent study (Mzoughi, 2011) introduces moral and social concerns in order to explain the farmers' decision to adopt integrated crop protection and organic farming, concluding that both factors increase the likelihood of turning to organic farming, while on the other hand, farmers' who place more importance on economic concerns are less likely to adopt organic farming.

Attending to the study of farmers' preferences, few studies have focused on agri-environmental measures. Wynn et al. (2001) and Vanslembrouck et al. (2002) refer to the important role of considering the characteristics of the required practices, finding that the flexibility of proposed contracts is one of the most important and valued characteristics (Wynn et al. 2001). In the present study, and following Ruto and Garod (2009), we investigate the role that scheme design can have on encouraging farmers' participation. They show that farmers prefer short-term contracts and have positive preferences for the attribute that reflects the flexibility over which areas of the farm enter into the scheme. In Spain, Espinosa-Goded et al. (2010) investigate farmer preferences for different contract options, concluding that farmers show a strong preference for maintaining their current management strategies; however, participation can be increased by modifying some attributes of the AES. Christensen et al. (2011) examined how to improve existing agri-environmental subsidies, finding that farmers are interested in participating in contracts not only for the higher payments. They find evidence that farmers are willing to trade off contract obligations against the size of the payment. The most recent study was carried out by Wamberg and Vedel (2012) investigating preference heterogeneity, in order to improve policy acceptability. This current application complements earlier cited studies in two ways. First, we estimate a Rank Ordered Logit model (ROL) that accounts for the intensity of preferences; and second, by assessing the importance of social capital and punishment in terms of the compliance with contractual obligations.

Research Hypotheses

As Pretty and Smith (2004) states, economic incentives are important, but sometimes these are not sufficient in order to achieve a certain goal. And in this point, social capital and

altruistic behavior can play an important role. Therefore, with the aim to understand in a best way farmers´ preferences we include some indicators related with these aspects. We present two hypotheses:

1. *Which are the implications of social capital?*

There is no single definition for social capital. However, several studies as elaborated by Coleman (1990) or Putnam (1993, 1995, and 2000) highlight as social capital is related to positive outcomes which facilitate cooperation and coordination. We follow Pretty and Smith (2004) who define social capital as social bonds and norms, highlighting the role that this aspect plays "in collective management programs at different scales." Four features of social capital have being mentioned by Pretty and Ward (2001). Specifically, these components are the relations of trust; relations of reciprocity and exchanges; common rules, norms and sanctions and the connectedness in networks and groups. Furthermore, Halkos and Jones (2012) suggest (in the same way as Coleman (1990) and Putnam (2000)) that the most important elements of social capital are social trust, institutional trust, social norms and social networks. In this sense, relations of trust may reduce the transaction costs and at the same time establish social obligations. Relations of reciprocity and exchanges also can create trust. However, trust is easily broken (Pretty and Smith, 2004).

With respect to common norms and sanctions, it is important take into account that these ensure group interests and sanctions aid to ensure that those who break the rules will be punished. Finally, with respect to the connectedness in groups, Pretty and Smith highlight three types of relations proposed by Woolcock (2001). These are links between people with similar objectives (bonding), the capacity of groups to make links with others that

may have different views (bridging) and the ability of groups to engage vertically with external agencies (linking types of social capital). We include these characteristics in our empirical modeling strategy with the goal to analyze what role play in farmers´ decisions.

2. *Which are the implications of the establishment of punishment?*

We are analyzing a public program, and when considering a public good it is also important to take into account that anomalies in behavior can arise. In this paper, we consider moral hazard. This is a special case of information asymmetry, a situation in which one party in a transaction has more information than the other . Hart and Latacz-Lohman (2005) and Ozanne and White (2008) have studied moral hazard through the effect of monitoring and compliance in AES. In our study, farmers are espoused to a likelihood being monitored, as today. Further a fine for non compliance has been included as one of the characteristics of the contracts. As far as we know, no other study has included this characteristic into the potential elements to be considered when signing a contract. In the reviewed literature, only Wamberg and Vedel (2012) study the implications of monitoring. This penalty requires returning the payment received and a fine. This fine varies, as shown in Table 1.

Fehr and Gächter (2002) bring the idea of altruistic punishment. This is characterized by the fact that sometimes individuals punish other individuals although the punishment is costly for them. Another study elaborated by Fehr and Rockenbach (2004) conclude that those penalties that reveals selfish intentions destroy altruistic cooperation while fines perceived as fair do not affect altruism. We analyze the implication of the stablishment of a fine where farmers have trust in neighbors. We expect that although there may be a certain level of trust in neighbors, it may also exist a degree of distrust about their level of

compliment with the requirements proposed, given that in the provision of public goods, moral hazard is common and that trust is easily broken. Therefore, the fine is expected to act as an altruistic punishment or a fair punishment.

3. Survey description

A face-to-face survey was carried out in north-eastern Spain, in the region of Aragon, during the summer of 2012, interviewing a sample of 359 farmers. The survey solicited information about the farmers' knowledge of AES; their experience with these policies, and the perceived benefits and associated drawbacks. Furthermore, a second block of questions dealt with the characteristics of the contracts. Perceived success indicators were contemplated in the third block, and the fourth block included questions related to the profiles of the farmers and their farms. Finally, socio-demographic characteristics were elicited in the last part of the survey.

As previously mentioned, we used a CE to study farmers' preferences. In the choice modeling experiment, farmers were given the opportunity to rank two types of agri-environmental contracts with the same attributes, but at different levels. In each choice experiment task, farmers were also given a third option to rank the decision to adopt neither Contract A nor Contract B. In this last case, when farmers choose the status quo option as the most preferred option they cannot participate in AES destined to protect steppe birds. To select these characteristics we reviewed the literature and carried out a pre-test where a valuation of the different proposed attributes was included. Table 1 contains a detailed description of the characteristics included in the choice experiment. Table 2 contains a summary of the perceptions of farmers about the characteristics of the contracts.

The aim of these contracts is to protect steppe birds and provide a payment to farmers The selected attributes included in the contractual design were: a *payment,* the money that farmers receive as a subsidy or compensation for taking part in the conservation measures; *flexibility,* which indicates the flexibility to decide the amount of host surface yearly (percentage reduction allowed from the surface of the first year) without penalty ; and a *fine,* representing a penalty for those farmers who did not comply with the established requirements. Next is the obligation to cultivate a certain percentage of green crop (*cultivate*), and finally, a *restriction* was included, defined as the prohibition of plugging in fallow lands during certain months of the year in order to avoid trampling ground nests. In addition, there are other additional requirements. It is required to keep the cereal stubble until 31st December while leaving the straw on the ground in at least 50% of the surface. Further, the use of pesticides in the non-cultivation period is not allowed in any of these contracts.

All of the attributes entered the choice set with two levels, except the payment attribute with four levels. We choose these levels in order to favor the understanding of the farmers taking part in the survey, given that these were relatively elderly people (mean age is 56.29[1].)After defining the attributes and their levels, we designed the combination of choices to be presented to respondents. The total number of possible combinations of the attributes level was 4^2 x 4. We used eight profiles in order to obtain suitable pairs, using one of the generators derived from the suggested difference vector proposed by Street and Burgess (2007), designed for four attributes with two levels and one attribute with four levels and two alternatives. We obtained a choice of eight pairs with 97.60% efficiency

[1] According to Gobierno de Aragon (2012b), more than 65.24% of the population has between 16-64 years and more than 20.05% of the population has more than 65 years. This characteristic of aged residentsis more present in farming areas.

relative to the optimal design estimating only main effects. We also decided to split randomly the total number of choices into two surveys, in order to reduce the number of choice sets per individual (An example of the choice set can be seen in Table 3).

4. Data

In order to study farmers' preferences, we analyze the influence of different factors based on previous literature. First, it is important to clarify that we have included both farmers with and without experience with these AES, because more 87% of farmers have been previously enrolled in these schemes.

In terms of the sample characteristics, the average age of farmers is more than 56 years. In addition, around 19.6% have studies above the basic level. With respect to gender, only 11.9% of the sample are women[2]. Furthermore, 22.7% of farmers obtain an agricultural income below 20,000€/year and around 44.8% of farms have less than 55 hectares. Moreover, 25.8% of respondents affirm to have cattle and 72.54% of the farms have one member of the family working on them. Around 37.11% also have machinery to work lands, and 13.09% of respondents think that their farms will be abandoned in the future. With respect to the success of the AES, 37.1% of farmers think that they are very or extremely effective in protecting steppe birds. Finally, 69.6% of respondents works full time in agricultural activity in our sample.

In addition, we also consider indicators of social capital[3]. First, look at the relationships of trust. We include two variables indicating social trust and institutional trust. We find that

[2] This is a typical characteristic of Spanish farm´s. Specifically and attending to data of national institute of statistics, for the year 2007 only the 11.15% of women worked in farms (INE, 2012).

[3] We cannot include the relations of reciprocity or exchange; however this can be included as a component of trust.

67% of respondents trust that their neighbors are fulfilling the contractual requirements in a large degree. The answer to this question was presented with a 5-point scale, where 1 represents “not at all compliance” and 5 “compliance at 100% level”. Moreover, 48.5% of farmers indicate that the probability of being caught and penalized if somebody infringes the established contractual rules is high or very high on a 5-point scale. Other components are the common norms, rules and sanctions. Trying to reflect this aspect we specify that there is a likelihood of monitoring and one of the characteristics of the contract is the fine. The connectedness in groups is composed by three indicators, as we have mentioned before. With respect to the bonding component, we observe that around 23.7% affirm have known these contracts through other farmers. The bridging indicator is reflected in that 24.7% of the sample is part of labor unions. Finally, attending to the linking aspect, we find that 12.88% of respondents have known these schemes through bank offices and 54.12% through agricultural offices. To conclude and with the aim to reflect the cultural diversity and the environmental awareness, we observe that 7.2% of respondents know any popular sayings associated with steppe birds. And around 27.3% of farmers participate in these AES because they think that these types of measures are very necessary from an environmental point of view.

In this study, we analyze the role of farms’ and farmers’ characteristics and social capital on ranking of contracts through cross-products of these variables with the different contractual attributes. As we stated in the literature review section, both types of factors are the most typically analyzed when explaining the willingness to participate in these conservation schemes. Specifically, we include the following cross-products. First, with respect to the *payment* attribute, we try to identify the implications for woman (*payment*woman*), for farmers who obtain lower incomes (*payment*low income*), for

young respondents (*payment*young*) and for farmer with higher levels of studies (*payment*high education*). In addition, and with the aim to understand in a better way farmer preferences for the contractual attributes *flexibility*, *restriction* and *cultivate*, we included some cross-products in the empirical specification. In particular, in the case of *flexibility*, we include the effect of having a positive opinion about the effectiveness of these measures in terms of protection birds (*flexibility*effectiveness*) and the fact of being a farmer with cattle (*flexibility*cattle*). Attending to the *cultivate* requirement, we study what are the implication for respondents with small farms (*cultivate*small farm*). Finally, for the *restriction* attribute we analyze the role on farmers who work full time in agricultural activity (*restriction*full time*).

To study the influences of social capital variables[4] and punishment, we analyze the effect of trusting relationships and the *fine* attribute (fine*social trust), while considering institutional trust and bridging relations (to be member of a labor union) together with the *fine.* In addition, we reflect the influence of bonding relations (to have known these AES through other farmers) and the *restriction* attribute (*restriction*other farmers*). Finally, we study what means the payment characteristic for those farmers who have an environmental awareness or for those who know any proverb related to birds (*payment*environmental awareness, payment*proverb*). In Table 4 we present the full description of the variables.

5. Empirical models

In order to elicit consumers' preferences, we use a CE framework, which allows individuals to select between N alternative options; in our case, two alternatives (two

[4] We do not include the component of linking relations into the regression model, due to the fact that it is not statistically significant.

different contracts) that contain a number of attributes at different levels presented to each individual four times. As recommended by Adamowicz, Louviere and Swait (1998), a non-choice option was also presented to participants, as this is an obvious element of choice behavior. Similar exercises have been used to evaluate other agri-environmental measures (see for example, Christensen et al. 2011; Espinosa-Goded et al. 2010; Ruto and Garod, 2009). However, and as a novelty in our CE each respondent has to order the contracts according to their preferences. Therefore, we estimate a Rank Ordered Logit (ROL) model. This is the standard tool in case rank data is available. In addition, when individuals have to rank the alternatives instead of only choosing the most preferred contract, the parameters and the preferences can be estimated more efficiently (Fok et al. 2012).

Following Fok et al. (2012), we denote the number of alternatives by J ($j = 1,...,J$). The utilities for individual $i = 1,...,I$ are given by $U_{i1},...,U_{iJ}$. Traditionally, respondents are asked to choose their most preferred option out of the complete set of J alternatives. So, whether $Y_{ij} = 1$ denote that respondent i prefers alternative j most. The information $Y_{ij} = 1$ implies that $U_{ij} \geq \max\left\{U_{i1,},...,U_{iJ}\right\}$. It is generally assumed that the respondent makes a deterministic choice and therefore actually knows all U_{ij}, $j = 1,...,J$ .However, we do not observe U_{ij} and therefore we need a stochastic model for the utilities. We use the random utility framework following Manski (1977) with the aim to represent the preferences of individuals. The random utilities for individual i are defined as $U_{ij} = V_{ij} + \varepsilon_{ij}$, where V_{ij} is the deterministic component of the utility, determined by observed individual characteristics, and ε_{ij} is the random component of the utility. In general, the V_{ij} is modeled as $V_{ij} = x_i^{'}\beta_j$, where x_i is an m-dimensional vector with

characteristics of individual i and β_j is an m-dimensional parameter vector specific to alternative j.

If we assume that all ε_{ij}'s are independent and follow a type I extreme value distribution, we have the setup of an Multinomial Logit model (McFadden, 1973). This leads to the well-known expression for the probability that item j is most preferred by individual i:

$$\Pr\left[y_{ij} = 1; \beta \right] = \frac{\exp(V_{ij})}{\sum_{l=1}^{J} \exp(V_{il})}$$

where $\beta = \{\beta_1, ..., \beta_{J-1}\}$ and $\beta_J = 0$ for identification.

The information on the most preferred item is sufficient to estimate the model parameters. However, we can obtain more information if we ask for a ranking of alternatives. We will denote the response of respondent i by the vector $y_i = (y_{i1,...,y_{iJ}})'$, where y_{ij} now denotes the rank that individual i gives to item j. We also use the equivalent notation $r_i = (r_{i1}, ..., r_{iJ})'$, where r_{ij} denotes the item number that received rank j by individual i. Note that $y_{ik} = j$ is equivalent to $r_{ij} = k$. As it is assumed that the individual knows all utility values, the respondent can easily provide a full ranking. From the respondent's point of view the ranking is deterministic. Under the above assumptions on utilities, the probability of observing ranking r_i equals:

$$\Pr\left[r_i; \beta \right] = \prod_{j=1}^{J-1} \frac{\exp(V_{ir_{ij}})}{\sum_{l=j}^{J} \exp(V_{ir_{il}})}$$

6. Results

The first three columns present the results of the baseline ROL. In Table 5 we can observe that all of the attributes are statistically significant at the 1% level of significance, except for the attributes *restriction* and *flexibility*, which are significant at 5%. The *payment* attribute carries a positive coefficient, and so the consequence of receiving compensation increases the utility obtained by respondents. As expected, the coefficient associated with the *fine* in case of not fulfilling the contractual requirements has a negative sign, indicating a reduction in utility. Attending to the rest of the attributes, *flexibility* and *cultivate* have positive coefficients indicating a positive preference for both. Therefore, farmers increase their utility when they have flexibility over what surface enters into the scheme (Wynn et al. (2001); Ruto and Garod (2009)) and when they have the obligation to include some crops in their lands. This is an unexpected result but it may be due to the fact that farmers currently are including these crops in their usual management strategies. Finally, the coefficient associated with the *restriction* has a negative sing. . Therefore, the fact that some months of the year they are not allowed to work their lands is valued negatively by farmers.

With the objective to obtain more information about farmer preferences, we also estimate an extended ROL. The three following columns show the results of this model. In order to test the correct empirical specification used, we have tested the presence of multicollinearity through the Variance Inflation Factor (VIF) indicator with a mean of 1.79, not finding any correlation problem. As we can observe, all attributes are

statistically significant and carry the same signs, except the *restriction* attribute. In addition, attending to the cross products variables, we observe that young farmers obtain less utility from these contracts than elderly farmers *(payment*young*). Furthermore, farmers with higher level of studies obtain more utility from the *payment* attribute (*payment*high education*). Attending to variable that reflects the cross-product of having cattle and the earlier described *flexibility (flexibility*cattle)*, we conclude that farmers with cattle value negatively this attribute. This can be a consequence that these farmers do not pay much attention to this characteristic, in comparison with farmers who only work their lands, because these have other sources of income. In the same line, those who are full time famers also suffer a negative impact on utility from the *restriction* characteristic (*restriction*full time*). Therefore, although with the extended model this attribute shows a positive coefficient, if we consider farmers who live exclusively from agriculture, we find that they value negatively that some moths of the year, working restrictions apply. Respondents with small farms also reduce their utility from the *cultivate* attribute (*cultivate*small farm*). In this sense, those farmers who have farms with smaller number of hectares also suffer a decrease in their utility when obligation to include some some crops is imposed because this implies that they have less land at their disposal.

With respect to the formulated hypothesis, we find that when farmers consider neighbors' compliance with the contractual requirements (*social trust*) jointly with the existence of a penalty in the event of failing to fulfill the requirements, (*fine*neighbor behavior*), the utility level increases. Therefore, farmers view the *fine* as an effective way of controlling the potentially selfish behavior of others (altruistic or fair punishment). In addition, farmers

who are members of a labor union (*bridging*) and that think there is a likelihood of be caught and sanctioned (*institutional trust*) decrease their utility level as a consequence of the presence of the fine (*fine*labor union*institutional trust*). In addition, those farmers who have environmental awareness do not suffer an increase in their utility level as a consequence of the payment attribute (*payment*environmental awareness*). This may be consequence of that these respondents act more in a disinterested way, and less driven by the subsidy.

Estimation of Willingness to Pay to Avoid and Accept Compensation

After estimating the proposed models, we calculate the willingness to accept (WTA) and willingness to pay (WTP) from the model that has the best statistical fit (the extended model). WTA is defined as the amount of money that must be given to an individual experiencing deterioration in their wellbeing in order to keep their utility constant. WTP is defined as the amount that a person would be willing to pay in order to receive a good or to avoid an undesired effect.

In Table 6 we can observe the reported WTA/WTP for the extended ROL model. Reported values represent per-hectare payments. As it is observable, the attribute representing the *fine* is the most valuable for farmers. Specifically, farmers should be willing to pay an amount of €15.49/ha. to avoid one contract which includes this penalty. The second most valued characteristic is the *restriction*, specifically, farmers require €10.56 to choose one of the contracts proposed that include a restriction on harvesting during the spring or summer months, ceteris paribus. Next, the third most valued attribute corresponds to the obligation to introduce green crops, where farmers should be compensated with €8.94/Hta

for this requirement. And finally, it follows the degree of flexibility to decide the yearly participation rate of their lands with an estimate of €7.88/ha. Comparing our WTA with previously obtained results, we find that our WTA are similar. Ruto and Garod (2009) found that farmers value in €9.08/ha and €6.76/ha the flexibility over land or over measures in AES. In addition, Espinosa-Goded et al. (2010) obtained an implicit price for the attribute that identifies the flexibility over the host surface of €24.6/ha and €31.9/ha depending of the area. Therefore, our results provide similar results to previous studies in terms of WTA values for some attributes previously valued.

7. Conclusions

In this study, we model farmers' preferences for participating in agri-environmental contracts. This is an important aspect for the effective design of conservation policies, as after identifying the aspects of contracts that are more attractive to respondents; we may design measures in which participants are satisfied, thereby making it possible to expect more successful results. We also consider the influences of social capital on preferences towards the various contracts.

We find important conclusions that policy makers should take into account when designing effective policies. In particular, we find that farmers should be willing to pay to avoid the fine of the contracts. However, harvesting restrictions in fallow lands during the spring and summer months is the aspect that has to be compensated the highest, from amongst all of those considered. This makes good economic sense, as this type of restriction considerably reduces the profitability of farming in this area in the same line that fine. In addition, we find that farmers with a higher level of education and with lower incomes value positively the *payment* characteristic. On the contrary, young farmers with environmental awareness

value more negatively the payment instead in comparison with their elderly counterparts. . Farmers with cattle value more positively the *flexibility* attribute. People with small farms suffer a decrease in their utility due to the *cultivate* attribute and people who work full time also decrease their utility for the *restriction.* Interesting results are also obtained regarding the influences of social trust. Specifically, one of our results show that when complying with the requirements is the general norm in this group of farmers, the cross product with the fine attribute has a positive sign on utility, potentially due to the fact that participants want to make sure that when their neighbors act as free riders, they may be penalized and therefore the fine is was as a fair penalty.

Tables

Table 1 Attributes and respective levels

Attributes	Description	Levels			
Payment	Subsidy rate (euros per ha crop)	30€/ha	60€/ha	90€/ha	120€/ha
Flexibility	The flexibility to decide the amount of host surface yearly (percentage reduction allowed from the surface of the first year) without penalty	0%	40%		
Fine	Penalty for breach of the rules on aid, in addition to the return of the premium may lead to the payment of an additional amount (EUR / ha)	0€/ha	200€/ha		
Cultivate	Obligation to include alfalfa or sainfoin in a variable percentage of the area	0%	20%		
Restriction	Prohibition of working in fallow lands in some months of the year in order to avoid trampling ground nests	No restrictions	April 1 to August 1		

Table 2 Valuation of proposed attributes (%)

Characteristics	Stated Consideration Level				
	I do not consider it	**I do not consider it much**	**I consider it somewhat**	**I consider it a lot**	**This is what I consider the most**
Payment	0.57	1.15	4.58	20.06	73.6
Flexibility	9.48	19.25	33.33	30.75	7.18
Fine	26.72	33.91	21.55	13.22	4.6
Cultivate	23.92	34.29	25.07	12.97	3.46
Restriction	15.03	25.43	33.82	19.08	6.65

Table 3 Example of a choice set presented in the survey

CHARACTERISTICS OF CONTRACT	Contract A	Contract B	Does not endorse any contract for bird protection
Payment	120€/ha	30€/ha	
Flexibility	40%	0%	
Fine	0€/ha	200€/ha	
Cultivate	0%	20%	
Restriction	April 1 to August 1	No restrictions	

Which contract do you select? Indicate 1 = most preferred, 2 = average, 3 = least preferred

Table 4 Description of variables

Variable	Description	Mean	Std. Dev.
Dependent variable	3, for the most preferred contract: 2 for the average contract; 1 for the least preferred contract; 0 if respondent not values the contract	1.960	0.876
Payment	The payment attribute	50.000	44.731
Fine	The fine attribute	0.333	0.472
Cultivate	The cultivate attribute	0.333	0.472
Restriction	The restriction attribute	0.333	0.472
Flexibility	The flexibility attribute	0.333	0.472
	Farm and farmer characteristics		
Effectiveness	1, if the farmers think that agri-environmental measures are very or extremely effective to protect steppe birds; 0 otherwise	0.371	0.483
Cattle	1; if the farmer has cattle; 0 other wise	0.258	0.437
Flexibility*cattle	Flexibility*cattle	0.043	0.203
Small farm	1; if the farm size is less than 55 hectares; 0 otherwise	0.448	0.497
Cultivate*small farm	Cultivate*small farm	0.149	0.357
Low income	1, if the respondent obtain an agricultural income less than 20,000€/year; 0 otherwise	0.227	0.419
Payment*lowincome	Payment*low income	11.340	29.873
Young	1, if the farmers are less than 55 years; 0 otherwise	0.443	0.497
Payment*young	Payment*young	22.165	38.784
High education	1; if the farmer have more studies than basic education; 0 otherwise	0.196	0.397
Payment*high	Payment*high education	9.794	28.033

education			
Full time	1; if the farmer works full time; 0 otherwise	0.696	0.460
Restriction*full time	Restriction*full time	0.232	0.422
Women	1, if the respondent is a woman; 0 otherwise	0.119	0.323
Payment*woman	Payment*woman	5.928	22.329
Fine*women	Fine*women	0.039	0.195
	Social capital		
Social trust	1, if the respondent thinks that their neighbors are fulfilling the requirements of the contracts at a very high level; 0 otherwise	0.670	0.470
Fine*social trust	Fine*social trust	0.223	0.417
Labor union	1, if the respondent is member of a labor union; 0 otherwise	0.247	0.432
Institutional trust	1, if the respondent thinks that likelihood to be caught and penalized is high or very high; 0 otherwise	0.485	0.500
Fine*labor union*institutional trust	Fine*labor union*institutional trust	0.041	0.199
Other farmers	1, if the respondent has known these contracts through other farmers; 0 otherwise	0.237	0.425
Restriction*other farmers	Restriction*full time	0.079	0.270
Environmental awareness	1, if the respondent have interest in this measures because he thinks that they are very necessary from an environmental point of view; 0 otherwise	0.273	0.446
Payment*environmental awareness	Payment*environmental awareness	13.660	32.299
Proverb	1, if the respondent knew a proverb related to birds; 0 otherwise	0.072	0.259
Payment*proverb	Payment*proverb	3.608	17.659

Table 5 ROL results

	Baseline ROL			Extended ROL		
Variable	**Coefficient**	**Std. Err.**	**P>|z|**	**Coefficient**	**Std. Err.**	**P>|z|**
Payment	0.017	0.001	0.000	0.030	0.002	0.000
Fine	-0.155	0.045	0.001	-0.459	0.120	0.000
Cultivate	0.138	0.046	0.003	0.265	0.096	0.006
Restriction	-0.097	0.045	0.033	0.313	0.125	0.012
Flexibility	0.097	0.045	0.032	0.234	0.087	0.007
Farm and farmers characteristics						
Payment*women				0.004	0.003	0.175
Fine*women				-0.248	0.213	0.245
Payment*low income				0.003	0.002	0.260
Payment*young				-0.008	0.002	0.000
Payment*high education				0.006	0.003	0.023
Flexibility*effectiveness				-0.082	0.135	0.543
Flexibility*cattle				0.324	0.172	0.059
Cultivate*small farm				-0.240	0.134	0.072
Restriction*fulltime				-0.292	0.143	0.042
Social capital						
Fine*social trust				0.787	0.138	0.000
Fine*labor union*institutional trust				-0,510	0.196	0.009
Restriction*other farmers				-0.210	0.156	0.178
Payment*environmental awareness				-0.004	0.002	0.036
Payment*proverb				0.004	0.004	0.316
Log-likelihood	-3204.279				-1308.544	
LR chi2(5)	1105.060				1457.080	
Prob > chi2	0.000				0.000	
N	4320				2328	

Table 6 WTP/WTA from the Extended ROL model

WTP/WTA for Rank Ordered Logit					
Variable	**Coefficient**	**Std. Err.**	**P>|z|**	**95% Confidence Interval**	
Fine	-15.487	4.047	0.000	-7.555	-23.419
Cultivate	+8.944	3.308	0.007	+15.428	+2.460
Restriction	+10.561	4.253	0.013	+18.897	+2.225
Flexibility	+7.879	3.009	0.009	+13.777	+1.982

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