Factors Affecting Participation of Italian Farmers in Rural Development Policy

Pascucci S.[1], Capitanio F.[2], Adinolfi F.[3] and De Magistris T.[4]

1 Wageningen University, Agricultural Economics and Rural Policy Group, Wageningen, Netherlands
2 University of Naples Federico II, Department of Agricultural Economics and Policy, Napoli, Italy
3 University of Bologna, Department of Agricultural Economics, Bologna, Italy
4 Agro-Food Economics Unit Center for Agro-Food Research and Technology (CITA), Spain

capitani@unina.it

Factors Affecting Participation of Italian Farmers in Rural Development Policy

Pascucci S., Capitanio F., Adinolfi F. and De Magistris T.

Abstract
In this paper a (micro)econometric approach is developed by considering the farmer likelihood to participate in different policy programs as linked to the objective of farmer to maximize their welfare. In this way we model farmers participation in policy support scheme by using a new institutional economics approach and conceptualizing the decision to entry as a contractual choice between two rural development types of policy. Different discrete choice modelling approaches are used to analyze the complementarity/ substitutability of different policy programs such as environmental-related measures and farm investment supports policy schemes and the main driving factors behind them.
We use an extensive cross-sectional database related to the Italian FADN 2006. Results indicate that social capital and institutional factors should be taken much more into account in order to understand farmers likelihood to entry in policy support schemes. Location and farm(er) socio-economic features are also relevant factors. Moreover complementarity has been found between different policy schemes.

Keywords: Rural development policy, contract design, discrete choice modelling, Italy

JEL classification: Q12, Q18.

1. INTRODUCTION

Rural Development Policy (RDP) is a considerable source of financial support for European farmers and rural communities (Dwyer et al., 2008). Still many farmers and rural actors are not benefiting adequately from RDP, mainly due to lack of capacities to access and use this financial support. If, however, factors that constitute a barrier to participate could be better understood and adequately addressed, a larger number of farmers and rural actors could benefit from RDP support and increase their welfare. Unfortunately this mechanism is still not completely clarified.

Previous papers have studied farmers' motivations for participating in different RDP measures. These papers have been focalized mainly on farmers' participation in Agro-Environmental Schemes (AES) in different EU contexts[1]. They have shown that decision are driven by a plurality of potential factors such as farm structural features, specialization, non-farm activities, local context, policy networks, institutions, farmers' attitudes (Beedell and Rehman, 2000; Wynn et al., 2001; Defrancesco et al., 2008). The way these factors interact and influence the farmers likelihood to enter or not in RDP measures is crucial to understand the capacity of a policy intervention to be successful but gaps and puzzling issues still remain.

---

[1] The list of papers analyzing European farmers participation in agri-environmental schemes and measures is extensive. Interesting overviews have been recently provided by Defra (2006) and Defrancesco et al. (2008).

For example whether or not participating in AES also increases the farmers' likelihood to participate in other types of RDP measures such as investment and marketing-related ones.

If such correlations and interrelations do exist, these factors might be used to better predict farmers behavior. We propose to take a first step in developing a predicting model.

Therefore the aim of this paper is to analyze the likelihood of Italian farmers to participate in different policy program. More specifically we aim at answering the following research questions: (i) what combinations of factors correlate significantly with the occurrence of participation in RDP measures? (ii) To what extent do the factors explain the variance of participation in RDP measures by different types of farmers? (iii) What is the specific role of institutional factors?

To address these research questions we decide to model farmers participation in RDP measures by using a new institutional economics approach and conceptualizing the decision to participate as a choice between different contractual solutions (Masten and Saussier, 2002). A (micro)econometric approach has been developed by considering the farmer likelihood to participate in different Rural Development Policy related contracts (RDP contracts) as linked to the objective of farmer to maximize their welfare. Our hypothesis is that different RDP contracts could be implemented at farm level to reach this goal simultaneously. Accordingly we model the choice setting as constitute by two main types of RDP contracts: a first type which related to schemes supporting economic competitiveness of the farm, such as investments and marketing (SCS); a second type which relates to schemes supporting the provisions of environmental services, such as AES, afforestation and extensification (SAS).

The contractual design perspective has been applied in several context and it is in line with other papers' approach which tries to model farmers participation in AES and RDP measures (Jongeneel et al., 2008; Polman and Slangen, 2008; Peerlings and Polman, 2004; 2008; 2009). In this approach the role of institutional factors, such as social capital, local networks, formal rules of a given socio-economic context can be emphasized and specifically addressed. Moreover in this approach both contractual design and associated transaction costs assume a central role to define the explanatory variables involved in the farmers' decision making.

To empirically test our research questions we use an extensive cross-sectional database related to the Italian FADN 2006. The econometric strategy is reflected in the application of two different discrete choice modelling approaches, such as a bivariate probit (BVP) model (model 1) and a multinomial logit (MNL) model (model 2). The BVP is used to analyze the complementarity/substitutability of different policy programs such as SCS and SAS contracts (Polman and Slangen, 2008); the MNL model follows the usual econometric approach to analyze this type of farmers' behavior and it is also used as benchmark (Defrancesco et al., 2008; Peerlings and Polman, 2009).

To our knowledge this is the first paper which tries to approach farmers' participation in different types of RDP contracts and to quantify the interconnections between them using this econometric strategy. The results are compared with other conclusions provided in other papers in order to use our Italian case study in the overall discussion around participation of

the European farmers in RDP contracts. These results are rather new for the Italian context and they can contribute to improve policy-making debate at the EU level.

2. THEORETICAL MODEL

In this paper we use a model originally introduced by Peerlings and Polman (2009)[2] by extending it to all types of RDP contracts. In the PP model it is assumed that farmers maximise the expected value derived from the individual contracts selected. Therefore by choosing a contract farmers allocate (part of) their resources (i.e. land and capital) to that contract. Typically in AES contracts resource allocation involves farmland while in other types of RDP contracts, such as investment support schemes, it mainly involves capital goods (buildings, machineries, financial capital).

In this model if an unit of resource is used for contract A (i.e. one hectare is enrolled in biodiversity protection contract) it cannot be used for contract B (i.e. land improvement). However, as in the original PP model it will be assumed that more than one contract can be selected by one farmer (Peerlings and Polman, 2009). So the model can be perceived as a resource allocation model. Farmer j decision space relates to the optimal allocation of resources ($\bar{\theta}_j$) in order to maximise her expected value (*Yj*) deriving from contracting decisions[3]:

$$\max_{\theta_{sj}} E(Y_j) = \sum_{s=1}^{S} Y_{sj} \tag{1}$$

subject to:

$$Y_{sj} = p_{s_j} \times \theta_{sj} - C_{sj}(\theta_{sj}, \gamma_{sj}) \qquad \forall s \in S \tag{2}$$

$$\gamma_{sj} = \gamma_{sj}(X_j); \quad \sum_{s=1}^{S} \gamma_{sj} \qquad 0 \leq \gamma_{sj} \leq 1 \qquad \forall s \in S \tag{3}$$

$$\sum_{s=1}^{S} \theta_{sj} = \bar{\theta}_j \tag{4}$$

$$\theta_{sj} \geq 0 \qquad \forall s \in S \tag{5}$$

where *E* is expectations operator; *Yj* total value from contracting for farmer j; Y_{sj} is the value of choosing contract s by farmer j; p_{s_j} is the payment/support received by farm j due to the allocation of one unit of resource to contract s by farmer j; C_{sj} is the total cost of contract

---

2 Later on we refer to Peerlings and Polman (2009) model as PP model
3 To model this setting of contractual decision making we follow arguments from Peerlings and Polman (2009) and Masten and Saussier (2002) and we adapted them to the specific purposes of this paper.

s by farmer j; X_j is a vector of farm and farmer characteristics and features related to farm location such as geographical, socio-economic and institutional factors. γ_{sj} is the probability that contract s is chosen by farmer j; θ_{sj} represents the farmer j's resource allocated to contract s; $\bar{\theta}_j$ resource availability of farm j.

Equation (1) indicates that the total expect value is the sum of the value from the selected contracts. Non participation in policy-related contracts leads to zero profit while profit from other activities are ignored as in the original PP model setting (Peerlings and Polman, 2009). In other words profit from other than policy-related contracts are not relevant in the decision making process we are analysing here.

Equation (2) shows that value from policy-related contract equals benefits minus costs, where revenue refers to payment per unit of resource times the total amount of resources allocated to the contract s for the farmer *j*. Benefits from RDP contracts can be of various types. For example in case of measures related to Support Competiveness Schemes (SCS), such as an investment-related project linked to the modernization of agricultural holdings. This type of RDP measures assumes the form of a transfer of financial resources. This transfer is proportional to the overall amount of (private) financial resources which will be dedicated by the farmer to the project. In case of Support Agri-environmental Services (SAS) benefits assume the form of a per hectare payment, as a compensation of reduced revenue (Polman and Slangen, 2008: Peerlings and Polman, 2008; 2009).

Costs of contract *s* include the transaction and opportunity costs (forgone profits) deriving from the contract commitments. Transactions and opportunity costs are generated by the nature of the contractual relation between the public agency and the farmer. This is often described as a principal-agent relationship (Ozanne et al., 2001; White, 2002; Ferraro, 2008). As a consequence farmers experience both ex-ante and ex-post transaction costs when they have to decide whether or not to participate to an RDP contract. Search and information costs are typical ex-ante transaction costs experienced by farmers to get information about funding opportunities. Farmers are concerned with information related to the contractual setting, therefore the level of support, the type of penalties and the additional production constrains due to contract commitments. Negotiation costs are the costs of carrying out the transaction and may include administrative and legal costs, such as the costs of negotiating the terms of the agreement, and the costs of formally design the contracts (Hobbs, 1997). Ex-post transactions costs are for example monitoring costs which occur to the farmer in order to ensure that the terms of the RDP contract are adequately fulfilled (i.e. she has provided the requested amount and quality of environmental service).

The specific benefits and costs of equation (2) are unknown in the context of this paper. Therefore we assumed that they are dependent on explanatory variables which are known and measurable such as farm's resources allocated in the contract and farmers' probabilities to participate (Masten and Saussier, 2002; Peerlings and Polman, 2009).

Equations (3) gives the probabilities for entering into a contract as a function of farm and farmer's characteristics, institutional factors and location. Equation (4) indicates that the

total amount of farm resources equals those allocated under the different contracts while equation (5) is the non-negativity constrain for allocated resources.

3. ECONOMETRIC STRATEGY

As pointed out by Peerlings and Polman (2009) it is straightforward that in the theoretical model we are using we assume that where costs increase then the probability of participation in a RDP contract decreases (and vice-versa). A high probability is assumed to be correlated to low (expected) costs associated with RDP contracts, whilst a low probability is linked to high (expected) costs (Peerlings and Polman, 2009). Farm and farmer characteristics that increase the probability are likely to correlate with low costs. The same applies for both institutional issues and location.

A widely used approach to estimate the probabilities of choosing different contractual solutions is to implement a discrete-choice model (Masten and Saussier, 2002). In this case the observed contractual choice is considered as an expression of a continuous latent variable reflecting the propensity to choose a specific option among different alternatives (Defrancesco et al., 2008). The generic empirical model related to farm j to choose a RDP contract s can be written as follow:

$$Y^*_{sj} = X^{'}_{j}\beta_s + \varepsilon_{sj} \qquad\qquad \forall s \in S \qquad (6)$$

$$
\begin{aligned}
Y_{sj} &= 1 \qquad if \qquad Y^*_{sj} > 0 \\
Y_{sj} &= 0 \qquad otherwise
\end{aligned}
\qquad\qquad \forall s \in S \qquad (7)
$$

where Y^*_{sj} is the unobservable value of the contract s for farmer j (latent variable), Y_{sj} is the observable contract choice, $X^{'}_{j}$ is the vector of explanatory variables for farmer j as defined in equation (3), β_s a vector of coefficients for contract s and ε_{sj} a vector of unobservable characteristics related to farmer j and contract s.

Re-arranging equations (3), (6) and (7) we can derive the probability that contract s is chosen by farmer j (γ_{sj}) as a function of the potential explanatory variables:

$$\gamma_{sj} = P(Y_{sj} = 1) = P(Y^*_{sj} > 0) = P(X^{'}_{j}\beta_s + \varepsilon_{sj} > 0) = P(\varepsilon_{sj} > -X^{'}_{j}\beta_s) = F(X^{'}_{j}\beta_s) \quad (8)$$

where F denotes the distribution function of the unobservable characteristics ε_{sj}. Different econometric strategies can be implemented accordingly to the nature of the contractual choice analysed and the distributional form it is assumed for F (Verbeek, 2004). For example a relatively common approach is to use separate logit/probit models to depict the basic binary choice of participation or non-participation in a given RDP contract (Dupraz et

al., 2002; Damianos and Giannakopoulos, 2002; Wossink and van Wenum, 2003; Vanslembrouck et al., 2002). In this case the decision setting is about (1) choosing a SCS type of contract (or not choosing this type of contract) and (2) choosing SAS (or not choosing this type of contract). This would lead to a system of (two) equations. The implicit assumption is that the probability of choosing SCS is independent from the probability to choose SAS type of contract. But there is a good chance that the farmer likelihood to choose SCS is conditional to the decision whether or not to choose SAS type of contract. In other word these decisions are likely to be interrelated . The usual alternative would be to estimate a multivariate probit model (Polman and Slangen, 2008). With the multivariate probit model again there are several decisions, each between two alternatives. However, for each choice a probit model is estimated it is assumed that the error terms for the equations are correlated. In the logit, probit and multivariate probit model the explanatory variables can be identical between equations (choices made), but are not necessarily so. Therefore each choice can have its own explanatory variables. As pointed out by Peerlings and Polman (2009) the main disadvantage of both separate logit/probit and multivariate probit approaches is that probabilities are difficult to interpret because a normalization of probabilities is missing (Verbeek, 2004). Each RDP contract is compared to all other choices. In other words, the probability of choosing a SCS contract cannot be explicitly linked to the probability of choosing an AES contract. Another often used approach is to set a multiple-choice decision-making process using multinomial models to investigate both participation decision and participation in different RDP contracts (Wynn et al., 2001; Dupraz et al.,2002; Espinosa-Goded, 2010). In a multinomial logit model such a normalisation takes place because the probability of selecting a RDP contract is determined relative to the probabilities of other possible contractual choices (Verbeek, 2004; Greene 2008). A disadvantage of the multinomial logit is that it assumes that either one contract or no contract is selected (just as in a normal logit or probit) not considering that a farmer can participate more than one RDP contract (see Peerlings and Polman, 2009).

Given the opportunities and limitations of each of the above discussed approaches and given the purpose of this paper our econometric strategy is to implement both a BVP model (model 1) and a MNL model (model 2).

3.1. Model 1: the Bivariate Probit (BVP)

With a bivariate probit model approach the empirical model related to farm j to choose a RDP contract s can be written as follow:

$$Y_{sj}^* = X_{\cdot j}^{'} \beta_s + \varepsilon_{sj} \qquad\qquad \forall s \in S \qquad\qquad (8)$$

$$
\begin{aligned}
Y_{sj} &= 1 \quad\quad if \quad\quad Y_{sj}^* > 0 \\
Y_{sj} &= 0 \quad\quad otherwise
\end{aligned}
\qquad\qquad \forall s \in S \qquad\qquad (9)
$$

where Y_{sj}^* is the unobservable value of the contract s for farmer j (latent variable), Y_{sj} is the observable contract choice, for s = 1 in case of SCS type of contracts and s = 2 in case of SAS type of contracts. As defined in equation (3) X_j' is the vector of explanatory variables for farmer j, β_s a vector of coefficients for contract s and ε_{sj} a vector of unobservable characteristics related to farmer j and contract s. The BVP model enables us to model farmers' decisions to choose more than one contract simultaneously (Greene, 2003; Capellari and Jenkins, 2003). Since the outcomes are treated as binary variables any combination of contracts is possible. The contracts can be complements rather that substitutes only (Polman and Slangen, 2008). The two equation model (one for s = 1 and the other for s = 2) is featured by correlated disturbances, which (due to identification reasons) are assumed to follow a normal distribution (variance is normalized to unity). That is for each jth farmer:

$$E[\varepsilon_{1j}] = E[\varepsilon_{2j}] = 0$$
$$\text{cov}[\varepsilon_{1j}, \varepsilon_2 j] = \rho = \{\rho_{12}\} \tag{10}$$
$$\text{var}[\varepsilon_{1j}] = \text{var}[\varepsilon_{2j}] = 1$$

where ρ is a vector of correlation parameters denoting the extent to which the error terms co-vary. Should this be the case, we would need to estimate the two equations jointly, following a bivariate normal distribution: $\{\varepsilon_1, \varepsilon_2\} = \phi_2(0,0,1,1,\rho)$. Because in this model we are interested in simultaneous contractual decisions we have to define the joint probability. For example, the probability of farmer j of choosing the two type of RDP contracts at the same time $(Y_{1j} = Y_{2j} = 1)$ would be:

$$\gamma_{sj} = P(Y_{1j} = 1, Y_{2j} = 1) = \int_{-\infty}^{\varepsilon_{1j}} \int_{-\infty}^{\varepsilon_{2j}} \phi_2(X_{1j}'\beta_1, X_{2j}'\beta_2, \rho) d\varepsilon_{1j} d\varepsilon_{2j}$$
$$= \Phi_2(X_{1j}'\beta_1, X_{2j}'\beta_2) \tag{11}$$

In this model the log-likelihood is then a sum across the four possible contracting variables (that is, four possible combinations of participation $(Y_{1j} = Y_{2j} = 1)$ and non-participation $(Y_{1j} = Y_{2j} = 0)$ times their associated probabilities (Greene, 2003). These probabilities may be drawn from (11) as well.

The most relevant coefficients estimated in the model are β_1, β_2 and $\rho(\rho_{12})$. The latter, if significantly different from zero, will evaluate to which extent each pair of decisions are interrelated.

3.2. Model 2: the Multinomial Logit (MNL)

In the MNL approach the empirical model related to farm j to choose a RDP contract s can be written as follow:

$$Y_{sj}^* = X_{'j}' \beta_s + \varepsilon_{sj} \qquad\qquad \forall s \in S \qquad\qquad (12)$$

$$
\begin{aligned}
Y_{sj} &= 1 \qquad if \qquad Y_{sj}^* > 0 \\
Y_{sj} &= 0 \qquad otherwise
\end{aligned}
\qquad\qquad \forall s \in S \qquad\qquad (13)
$$

where Y_{sj}^* is the unobservable value of the contract s for farmer j (latent variable), Y_{sj} is the observable contract choice, for $s = \{0,1,2,3\}$ representing the four different RDP contractual combinations such as non-participation (s=0), participation in SCS (s=1) only, participation in SAS (s=2) or both SCS and SAS (s=3). X_j' is the vector of explanatory variables for farmer j as defined in equation (3), β_s a vector of coefficients for contract s and ε_{sj} a vector of unobservable characteristics related to farmer j and contract s. With a multinomial logit function the probability that a farm *j* selects a contract (or does not participate) *s* is given by:

$$\gamma_{sj} = P(Y_{sj} = 1) = \frac{\exp(X_j' \beta_s)}{\sum_{s=0}^{3} \exp(X_j' \beta_s)} \qquad\qquad \forall s \in S \qquad\qquad (14)$$

4. DATA

The empirical analysis on Italian farmers' participation in RDP measures is based on the information from the 2006 Farm Accountancy Data Network (FADN). This dataset contains detailed information on more than 15,000 farm businesses. The Italian National Institute of Agricultural Economics (INEA) is responsible for collecting and organizing the FADN on a yearly basis. The data is representative for the population of farmers in Italy and it is in line with the formal procedures of the European Commission. Data is counter-checked by the National Institute of Statistics (ISTAT). The sample is stratified on three key variables, i.e. location (21 NUTS2 regions), economic size (6 classes) and farm types (19 typologies) (INEA, 2006). We use the information related to farm location to attach site specific variables to each observation. In 2006 FADN recorded farmers participation in RDP measures related to the different Regional Rural Development Plans 2000-2006 as defined by the Council Regulation (EC) 1259/99. Accordingly we define the two types of RDP contracts (SCS, SAS) as described in table A1 in the Appendix.

Table 1 shows that a relatively small share of Italian farms is engaged in RDP contracts.

Table 1: RDP contracts in Italian farms, 2006

	Share of farms		
Type of RDP contract	*Non-convergence regions*	*Convergence regions[4]*	*Italy*
1. Supporting Competitiveness Schemes (SCS)	7.5	0.6	5.6
2. Supporting Agri-Environmental Services (SAS)	20.8	14.7	19.1

Source: own calculations based on FADN (2006)

Table 2 describes the explanatory variables that are used to explain the choice of RDP contracts. Accordingly to the theoretical model we select four groups of explanatory variables and namely farm and farmer characteristics, institutional characteristics and location.

Table 2. Description of variables

Variables		Explanation	Mean	Standard deviation
Internal factors (farm/farmer)				
Farm characteristics				
Farm size	*small*[(a)]	1 if farm < 16 ESU	0.36	0.48
Farm structure	*fixasset* [(a)]	Total fixed assets	8,710	23,531
	arable[(a)]	1 if specialized in arable crop production	0.22	0.41
Farm specialization	*horticult*[(a)]	1 if specialized in horticulture	0.07	0.26
	perm_crop[(a)]	1 if specialized in permanent crops	0.30	0.46
	livestock[(a)]	1 if specialized in livestock	0.23	0.42
	lu_uaa[(a)]	Labour intensity measured in Annual Working Unit (AWU) per hectare of Utilized Agricultural Area (UAA)	9.17	491.78
Labour use	*fam_labor*[(a)]	% AWU provided by family members	85.16	25.79
	offfarm	1 if family off-farm labour is present		
Land tenancy	*uAA_rent*[(a)]	% UAA rented	30.13	38.63
Farm management	*dev_plan*[(a)]	1 if farm followed a business plan for development	0.4957	0.4999
	acc_serv[(a)]	1 if farm used an accountancy service	0.0702	0.2556
Farmer characteristics				
Type of land manager	*manager*[(a)]	1 if manager also provides farm labour	0.91	0.29
Farmer age	*age*[(a)]	Number of years	54.02	13.81
Presence of successor	*succes*[(a)]	1 if a successor is present	0.06	0.23
External factors				
Social capital				
Social security (trust)	*crim*[(d)]	% of households with high perception of	26.00	9.91

---

4 As defined by the EU regulations on Structural Funds in the period 2000-2006 the Italian regions belonging to the Objective 1 – Convergence were Campania, Basilicata, Apulia, Molise, Calabria, Sardinia and Sicily.

Variables		Explanation	Mean	Standard deviation
		criminality		
Networks	*coop*[a]	1 if member of agriculture-related cooperative	0.52	0.50
	assoc[a]	1 if member of an association	0.44	0.50
Farm location				
South	*south*[b]	1 if located in south Italy	0.27	0.45
Population density	*pop_den*[c]	Population density per square km	228.77	379.17
Mountain	*mount*[b]	1 if located in a mountainous area	0.20	0.40

Source: (a) INEA, 2006; (b) MIPAAF, 2007; (c) ISTAT, 2001 (d) ISTAT, 2006

Among farm's characteristics firm size, specialization and structure are considered of primarily importance to explain farmers' participation for example in different agri-environmental contracts (Wynn et al., 2001; Damianos and Giannakopoulos, 2002; Vanslembrouck et al., 2002; Polman and Slangen, 2008; Defrancesco et al., 2008; Peerlings and Polman, 2009). Previous findings confirm that the type of AES contract used by farmers is different depending on the type of farming system (Wynn et al, 2001; Vanslembrouck et al., 2002; Polman and Slangen, 2008). For example participating in an agri-environmental scheme in an intensive and specialized dairy farm will be different from implementing the same contract on a specialized arable farm (Polman and Slangen, 2008). We also include variable related to farm management, family labour and off-farm income. For example Jongeneel et al. (2008) indicate that income from non-farming activities has an important and positive role in conditioning farmer likelihood to participate in AES. We also included farmer-specific characteristics in the model such as farmer's age and presence of successor (Defrancesco et al., 2008; Polman and Slangen, 2008).

Factors related to external conditions such as social capital and farm location are also taken into account. Based on Polman and Slangen (2008) we introduced indicators related to social capital related to: (1) trust in society (criminal); (2) participation in professional networks; (3) participation in social networks. Higher levels of trust in society are expected to increase the likelihood of participation. The social networks are more general networks not related to agriculture but for example to involvement in sports clubs. Agricultural networks focus on improving agricultural practices. Accordingly to Polman and Slangen (2008) participation in more general networks increase the probability of choice for agri-environmental contracts because these farmers feel a large social responsibility. On contrary participation in agricultural networks is expected to positively influence participation in investment supporting schemes because the farmers are more oriented towards improving on agricultural operation (Polman and Slangen, 2008).

External conditions relate also to farm location. It includes for example the degree of rurality (in terms of population density). Other aspects relate to being located in one of the regions of South Italy and in a mountainous area. The relevance of the location of farmers in different socio-economic and geographical context has been highlighted in other papers (see Vanslembrouck et al., 2002; Vandermeulen; 2006). Vandermeulen et al. (2006) emphasised

the role of different institutional environment to shape farmers decisions but also alternative business opportunities and dynamicity of business activities.

5. RESULTS

Estimation results and measures to assess the goodness of fit for both model 1 and model 2 are reported in table A2 in the Appendix. Hereby we discuss the impact and significance of each explanatory variables by comparing the results obtained in the two empirical models.

Several of the explanatory variables related to farm characteristics show a significant impact on the likelihood of farmers to participate in RDP contracts. For example being a small farm (small) increases the likelihood to participate in RDP contracts and especially join decision on SCS and SAS. As stated in the previous section the role of farm size is very controversial. In this case the result is in line with previous findings from Vanslembrouck et al. (2002) for small farms participation in environmentally-oriented policy contracts while it is rather new in terms of participation in investment-related policy contracts. Regarding the farming systems, and therefore farm specialization, intensity of inputs use and type of management, results indicate that farms specialized in horticulture (horticult), family-farms and farms with intense use of labor (lu_uaa) are less likely to participate in RDP contracts. On contrary dairy farms, and farms with "advanced" management systems, such as adoption of a business and development plan (dev_plan) and use of accountancy service (acc_serv), show a positive attitude for both SCS and SAS type of contracts. Land tenure shows a significant effect only in model 2 with a negative impact on the likelihood of farmers to contract only SAS or SCS while positive in case of participation in both type of policy.

Farmer characteristics also matter. Oldest farmers are less likely to participate, while in case managers are also participating in manual activities in the farm (the most used form of management in Italy) they are more willing to participate in both SAS and SCS contracts.

If we refer to explanatory variables related to *social capital* issues it is interesting to highlight that a negative social embeddedness (distrust in society) leads to a lower partipation of farmers in RDP contracts while the opposite is found in case of memebrships in both professional and non-strictly professional related networks.

Finally *farm location* also matters. More specifically being located in one of the regions of South Italy where decreases the likelihood to participate in both SCS and SAS, while location in a mountainous area (*mount*) increases farmers likelihood to partipate in RDP contracts.

6. DISCUSSION AND CONCLUSIONS

European public intervention in rural development became concrete in the 1970s with the so-called socio-structural directives, chiefly devoted to modernizing the farm sector. In the years to follow, the approach evolved, increasingly privileging the area element over the sectoral element. Thus several principles were established and consolidated in time, including not only improvements in farm efficiency but also the enhancement of its multifunctional role

and the creation of a link between agriculture and region, chiefly aiming to forge sustainable paths of local development. The essentially role to be played by rural areas in the balanced development of European society was thus officially recognised and supported. Agenda 2000 moved closer to an organic policy for rural development guided by principles of integration among economic activities, of sustainability, promotion of diversification and subsidiarity (which privileges the active role of local economic and social stakeholders in programming and managing interventions). Today, with the enlargement to 27 Member States, 90% of EU territory consists of areas classified as rural, comprising about 50% of Europe's population. The heterogeneity of rural areas in Europe has thus increased in recent years: this has led to greater social and economic differences within Europe's rural context. Some areas experience difficult geomorphological conditions and suffer from socio-demographic decline, while others, especially those close to large conglomerations, are subject to expansive urban pressures and to inevitable competition for land use.

In light of such considerations, the need to support and contextualise intervention within the new scenario of the enlarged EU was reinforced first with the Fischler Reform in 2003, which permitted a transfer of resources from Pillar I to Pillar II, and then with the renewed set of objectives and actions configured by Regulation 1698/2005[5], with which more space was given to the programming and management functions of local partnerships and with which the room for manoeuvre was extended by new opportunities tied to scenario developments (especially with regard to quality, animal welfare and energy saving).

In the light of the results achieved carrying out our analysis, and due to the unsatisfactory actual public intervention, a point which clearly surface lies in the difficulty of the current RDP framework to warrant a widespread significant impact on farms competitiveness. It would appear the need for a more targeted framework of RDP policy by achieve the main objective declared by the EC throughout the years and the Reform.

In fact, it is often the more marginal areas which are stewards of outstandingly important environmental assets, whose continuity in time can only be ensured by human presence and by agricultural activities able to offer both economic support and environmental services. In such areas the CAP must continue to be a bulwark against depopulation and environmental degradation. This may be done by privileging agriculture that respects the environment and is capable of enhancing the area's specific value, but also with more incisive action to promote diversification of local economies. This will help all the stakeholders in such areas to play an ever more active role in performing economic and social services.

In sum, strengthening regional competitiveness and attractiveness and reducing disparities among the regions is indeed a big challenge which deserves its own agenda.

To achieve such a vision, the European Commission should use all the opportunities offered by its regulatory, budget and coordination power and responsibilities in view of ensuring:

---

5 Regulation for rural development policy for the period 2007-2013, focused on three themes or thematic axes, and the Leader approach (or fourth thematic axis) which permits the setting-up and implementation of highly specific projects by local partnerships so as to respond to particular local problems.

- A good balance between investment in infrastructure and in soft measures to improve the competitiveness and attractiveness of all regions.
- Strong coordination of all EU policies having a spatial dimension, even if they are primarily defined as having sectorial one, in order to create critical mass and leverage effects at mesoeconomic level.
- A framework for a concept of Community Interest Programmes focusing on thematic priorities to give EU interventions a greater visibility. This should be implemented by programmes rather than by multiple projects.
- An increased use of all revolving financial instruments in order to improve the formation and availability of equity capital in the regions.
- Qualitative evaluation criteria for the implementation of the cohesion policy in order to ensure higher added value of EU interventions and avoid small-scale "political wishes" projects.
- Alignment of European funding with regional priorities by providing a greater role to regions in the management and implementation of programmes in order to maximise the leveraging effects of EU financial contributions.
- Stronger integration of rural development in the cohesion policy.

REFERENCES

Agugli L., Henke R., Salvioni C. (2009). Multifunctional Agriculture. Edizioni Scientifiche Italiane, Naples (Italy).

Beedell, J. and Rehman, T. (2000). Using social-psychology models to understand farmers' conservation behaviour. Journal of Rural Studies 16: 117–127.

Council Regulation (EC) No 1257/1999 (1999). Support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF) and amending and repealing certain Regulations. Official Journal of the European Communities of 17 May 1999.

Defra, Department for Environment, Food and Rural Affairs (2006). Research to Understand and Model the Behaviour and Motivations of Farmers in Responding to Policy changes (England). Research project EPES 0405/17 Final Report November 2006. London: Defra.

Defrancesco E, Gatto P, Runge F, Trestini S. (2008). Factors affecting farmers' participation in agri-environmental measures: A northern Italian perspective. Journal of Agricultural Economics 59: 114–131.

Damianos, D., Giannakopoulos, N. (2002). Farmers' participation in agri-environmental schemes in Greece. British Food Journal 104: 261–273.

Dupraz, P., Vanslembrouck, I., Bonnieux, F. van Huylenbroeck, G. (2002). Farmers' participation in European agri-environmental policies. Paper presented at X EAAE Congress on Exploring Diversity in the European Agri-Food System. Zaragoza, Spain.

Dwyer, J., Clark, M., Kirwan, J., Kambites, C., Lewis, N., Molnarova, A., Ken Thomson, K., Mantino, F., Tarangioli, S., Monteleone, A., Bolli, M., Fagiani, P. , Storti, D., Schiller, S., Knickel, K., Farmer, M., Baldock, D., Bartley, J., Hart, K., Keenleyside, C., Trantinova, M., Prazan, J., Bradley, D., (2008). Review of Rural Development Instruments. DG Agri project 2006-G4-10, pp. 178.

Espinosa-Goded, M., Barreilo-Hurle, J., Ruto, E. (2010). What Do Farmers Want From Agri-Environmental Scheme Design? A Choice Experiment Approach. Journal of Agricultural Economics 61 (2): 259-273.

European Commission (2009). Rural Development (2000-2006) in EU Farms. Directorate-General for Agriculture and Rural Development, Directorate L. Economic analysis, perspectives and evaluations. L.3. Microeconomic analysis of EU agricultural holdings. Brussels.

Ferraro, P. J. (2008). Asymmetric information and contract design for payments for environmental services. Ecological Economics 65(4): 810-821.

Greene, W.H. and Hensher, D.A. (2003). A latent class model for discrete choice analysis: contrasts with mixed logit. Transportation Research B 37: 681–698.

Greene, W.H., (2008). Econometric analysis. Upper Saddle River: Prentice-Hall.

Hobbs, J.E. (1997). Measuring the Importance of Transaction Costs in Cattle Marketing. American Journal of Agricultural Economics 79(4): 1083-1095.

Jongeneel, R., Polamn, N. and Slangen L.H.G. (2008). Why are Dutch Farmers going Multifucntional?. Land Use Policy 25: 81-94.

Masten, S.E. and Saussier, S. (2002). Econometric of contracts: An assessment of developments in the empirical literature on contracting. In Brousseau, E. and. Glachant, J.M. (eds.), The economics of contracts: Theories and applications (pp. 273–292). Cambridge: Cambridge University Press.

Ozanne, A., Hogan, T, Colman, D. (2001). Moral hazard, risk aversion and compliance monitoring in agri-environmental policy. European Review of Agricultural Economics 28 (3): 329-348.

Peerlings, J., Polman, N. (2004). Wildlife and landscape services production in Dutch dairy farming; jointness and transaction costs. European Review of Agricultural Economics 31: 427–449.

Peerlings, J., Polman, N. (2008). Agri-environmental contracting of Dutch dairy farms: the role of manure policies and the occurrence of lock-in. European Review of Agricultural Economics 35 (2): 167-191.

Peerlings, J., Polman, N. (2009). Farm choice between agri-environmental contracts in the European Union. Journal of Environmental Planning and Management 52 (5): 593 – 612.

Polman, N., Slangen, L.H.G. (2008). Institutional design of agri environmental contracts in the European Union: the role of trust and social capital. NJAS Wageningen Journal of Life Science 55 (4): 413   430.

Vandermeulen, V., Verspecht, A., Van Huylenbroeck, G., Meert, H. Boulanger, A. and Van Hecke, E. (2006). The importance of the institutional environment on multifunctional farming systems, in the peri-urban area of Brussels. Land Use Policy 23 (4): 486 - 501.

Vanslembrouck, I., Van Huylenbroeck, G., Verbeke, W. (2002). Determinants of the willingness of Belgian farmers to participate in agri-environmental measures. Journal of Agricultural Economics 51 (3): 489–511.

Verbeek, M., 2004. A guide to modern econometrics. Chichester: John Wiley & Sons.

White, B. (2002). Designing voluntary Agri-environmental policy with hidden information and hidden action: a note. Journal of Agricultural Economics 53: 353-360.

Wynn, G., Crabtree, B., Potts, J. (2001). Modelling farmer entry into the environmentally sensitive area schemes in Scotland. Journal of Agricultural Economics 52 (1): 65–82.

Wossink, G.A.A., van Wenum, J. H. (2003). Biodiversity conservation by farmers: Analysis of actual and contingent participation. European Review of Agricultural Economics 30: 461–485.

Appendix

Table A1: Definition of RDP contracts used in the micro-econometric analysis

RDP contract choice		RDP measures 2000-2006	Description of the support scheme
(1) Supporting Competitiveness Schemes (SCS)	**Investment subsidies for supporting the competitiveness of agricultural activities**: all subsidies for investment in farm assets (agricultural land, human capital, buildings, property rights, forest, land, machinery and equipment) received during the accounting year. They also include any subsidies on interest rates. In addition, they may include national (or regional) investment aids	(a) Investment in agricultural holdings	The total amount of support, expressed as a percentage of the volume of eligible investment, is limited to a maximum of 40% and 50% in less favoured areas. Where investments are undertaken by young farmers these percentages may reach a maximum of 45% and 55% in less-favoured areas.
		(b) Young farmers setting up	The setting-up aid may comprise (i) a single premium up to the maximum eligible amount of 25,000 euro per farmer, (ii) an interest subsidy on loans taken on with a view to covering the costs arising from setting up; the capitalized value of the interest subsidy may not exceed the value of the premium.
		(c) Training	The total amount of support is a percentage of the total investment in training activities fixed per year and farm at Member State level.
		(g) Improving processing and marketing of agricultural products	The total amount of support, expressed as a percentage of the volume of eligible investment, is limited to a maximum of (a) 50% in Objective 1 regions and (b) 40% in the other regions.
		(m) Marketing of quality agricultural products and setting up of quality schemes	The total amount of support is set as a percentage of the total investment in marketing and quality management activities per year and farm at Member State level.
		(j) Land improvement	The total amount of support is a percentage of the total investment in land improvement fixed per year and farm at Member State level.
		(y) Use of farm advisory services	The total amount of support is a percentage of the total investment in advisory services fixed per year and farm at Member State level.

(Table A1 continue)

(2) Supporting Agri-Environmental Services (SAS)	**Rural development ("second pillar") direct payments due to agricultural activities which provide environmental services**: all direct payments received during the accounting year.	(f) Agri-environment	Support is granted to farmers who give agri-environmental commitments for at least five years. Where necessary, a longer period is determined for particular types of commitments in view of their environmental effects. Support in respect of an agri-environmental commitment shall be granted annually and be calculated on the basis of (1) income foregone, (2) additional costs resulting from the commitment given, and (3) the need to provide an incentive. The cost of any non-remunerative capital works necessary for the fulfilment of the commitments may also be taken into account in calculating the level of annual support. Maximum amounts per year eligible for community support are 600 euro per hectare in case of annual crops, 900 euro per hectare in case of specialized perennial crops and 450 euro per hectare in case of other land uses. These amounts shall be based on that area of the holding to which agri-environmental commitments apply.
		(e1) Less-favoured areas and areas with environmental restrictions	Compensatory allowances granted to farmers per hectare of areas used for agriculture. Minimum compensatory allowance is fixed in 25 euro and maximum compensatory allowance is fixed in 200 euro per hectare of areas used for agriculture.
		(h) Afforestation of agricultural land	Support shall be granted for the afforestation of agricultural land provided that such planting is adapted to local conditions and is compatible with the environment. Such support may include in addition to planting costs (i) an annual premium per hectare afforested to cover maintenance costs for a period of up to five years, (ii) an annual premium per hectare to cover loss of income resulting from afforestation for a maximum period of 20 years for farmers or associations thereof who worked the land before its afforestation or for any other private law person. Maximum amounts per year of the annual premium to cover loss of income eligible for community support are fixed in 725 per hectare
		(i) Other forestry measures	Payments are granted to the beneficiaries provided that the protective and ecological values of these forests are ensured in a sustainable manner and the measures to be carried out are laid down by contract and their cost specified therein. Payments are fixed between a minimum payment of 40 euro per hectare and a maximum payment of 120 euro per hectare.
		(t) Protection of the environment	The total amount of payment is a percentage of the costs determined per year and/or farm and/or hectare at Member State level.

Source: own elaboration based on Reg. CE (1257/99) and European Commission (2009)

Table A2: Comparison of the estimation results of the MVP model (Model 1) and the MNL model (Model 2)

| | | BVP (Model 1) | | MNL (Model 2) | | |
| | | SCS | SAS | SCS | SAS | SCS and SAS |
Explanatory variables		Coef.	Coef.	Coef.	Coef.	Coef.
	cons	-1.7345 (0.1667) ***	-0.3810 (0.0987) ***	-2.8124 (0.4640) ***	-0.4497 (0.1851) **	-5.2039 (0.5523) ***
	small	0.3612 (0.0459) ***	0.1719 (0.0283) ***	-0.0335 (0.1429)	0.0900 (0.0539) *	1.4441 (0.1280) ***
	fixasset	0.0000 (0.0000) **	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000) ***
	arable	-0.0925 (0.0699)	-0.0637 (0.0395)	-0.2991 (0.1920)	-0.1268 (0.0729) *	-0.2470 (0.2574)
	horticult	-0.3715 (0.1195) ***	-0.5747 (0.0708) ***	-1.2261 (0.3528) ***	-1.1633 (0.1487) ***	-0.9741 (0.4689) **
	perm_crop	-0.0958 (0.0647)	0.0217 (0.0373)	-0.4741 (0.1827) ***	-0.0120 (0.0688)	0.0343 (0.2140)
Farm characterstics	livestock	0.3867 (0.0621) ***	0.1643 (0.0388) ***	0.3508 (0.1730) *	0.1216 (0.0722) *	1.2040 (0.1962) ***
	lu_uaa	-0.0106 (0.0045) **	-0.0017 (0.0007) **	-0.0178 (0.0107) *	-0.0034 (0.0017) **	-0.0506 (0.0238) **
	fam_labor	-0.0073 (0.0010) ***	-0.0023 (0.0006) ***	-0.0101 (0.0028) ***	-0.0023 (0.0012) **	-0.0171 (0.0029) ***
	offfarm	0.1766 (0.0483) ***	-0.1268 (0.0310) ***	0.4414 (0.1371) ***	-0.2973 (0.0606) ***	0.1372 (0.1361)
	uAA_rent	0.0002 (0.0006)	0.0003 (0.0003)	-0.0046 (0.0017) ***	-0.0006 (0.0007)	0.0058 (0.0016) ***
	dev_plan	0.4500 (0.0462) ***	0.2304 (0.0262) ***	0.5127 (0.1295) ***	0.2804 (0.0490) ***	1.8533 (0.1702) ***
	acc_serv	0.7917 (0.0571) ***	0.8606 (0.0437) ***	1.1717 (0.1788) ***	1.2282 (0.0815) ***	2.2462 (0.1453) ***
Farmer characteristic	manager	0.1993 (0.0932) **	0.0913 (0.0511) *	0.1954 (0.2468)	0.1135 (0.0966)	0.7314 (0.3461) **
	age	-0.0016 (0.0016)	-0.0030 (0.0010) ***	-0.0111 (0.0048) *	-0.0066 (0.0019) ***	0.0037 (0.0048)
	succes	0.0898 (0.0779)	-0.0474 (0.0539)	0.2992 (0.2066)	-0.0763 (0.1017)	-0.0235 (0.2172)
	criminalit	-0.0121 (0.0025) ***	-0.0156 (0.0014) ***	-0.0002 (0.0069)	-0.0208 (0.0025) ***	-0.0612 (0.0076) ***
Social capital	coop	0.1610 (0.0424) ***	0.0773 (0.0263) ***	0.0828 (0.1254)	0.0366 (0.0494)	0.6268 (0.1235) ***
	assoc	0.1438 (0.0505) ***	-0.1048 (0.0287) ***	0.3123 (0.1572) *	-0.1985 (0.0529) ***	0.0070 (0.1366)
	south	-0.8575 (0.0794) ***	-0.0818 (0.0306) ***	-1.8151 (0.2503) ***	-0.0859 (0.0566)	-2.4935 (0.3693) ***
Farm location	pop_den	0.0000 (0.0001)	-0.0004 (0.0001) ***	0.0000 (0.0002)	-0.0010 (0.0001) ***	-0.0002 (0.0002)
	mount	0.6830 (0.0480) ***	0.2953 (0.0314) ***	0.8832 (0.1405) ***	0.2188 (0.0596) ***	1.9485 (0.1487) ***
	$P_{SCS,SAS}$	0.2097 (0.0200) ***				

Likelihood ratio test of rho21 = 0: chi2(1) = 105.271 > chi2 = 0.0000

Log likelihood = -8658.8463; Pseudo-R^2 = 0.1665; LR chi2(63) = 3458.68 P > chi2 = 0.0000

Statistical significance: * = P < 0.10; ** = P < 0.05; *** = P <0.01; Standard errors in parenthesis; N. obs. = 15,380