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Sustainability and Competitiveness of Agriculture in Mountain Areas: A Willingness to Pay (WTP) Approach

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Abstract: One of the most evident elements of the agricultural crisis is farm abandonment in many marginal rural areas, such as mountains. Some traits of mountain agriculture such as remoteness, low productivity, extreme weather and small farm size, can limit the adaptation and the competitiveness of this branch. The analysis aims to assess the consumers' Willingness to Pay (WTP) for permanence of the upland farms and mountain pastures, by a Contingent Valuation analysis. The main results are that a WTP for the redevelopment of the pastures exists and that the personal characteristics of the sample are more influential than the opinions of the individuals on WTP. Moreover, it has been demonstrated that consumers seem to prefer an agricultural orientation of the upland farms rather than a touristic one. In the conclusion section, some policy guidelines are proposed.

Keywords: multifunctionality; sustainability; WTP; mountain pastures

1. Introduction

One of the most evident elements of the agricultural crisis is farm abandonment in many marginal rural areas, such as mountains. In fact, although the trend is the same also in intensive agricultural areas, the phenomenon is more noticeable in areas where the intensification of the agricultural practice is not compatible with the territory, as in the mountains. The problem is even more serious considering the prolonged suffering of these agricultural activities, since they were already having difficulty before the recent economic crisis. In fact, market globalization has affected mainly small barely productive farms, which are the most present in the mountain area [1]. Some traits of mountain agriculture such as remoteness, low productivity due to the poor quality land, extreme weather and small farm size, can limit the adaptation and the competitiveness of this branch. Moreover, cultural and demographic traits, like the farmers' age, ingrained tradition and the attraction exercised by the plain towards the younger generations, can reduce the renovation and the investment in this sector [2]. These difficulties were compounded by the lack of adequate infrastructure and high transport costs that preclude certain types of markets to agricultural products of the marginal zones [3]. Thus, farms must find as soon as possible market strategies allowing their survival. The concept of competitiveness of upland farms should include a substantial differentiation of their products compared to other farms: thanks to the uniqueness of the offer, for example through typical productions, farms can find a niche market favorable to their survival. Many studies [3–5] show that the multifunctionality of mountain agriculture could be the driving force of this new competitiveness. Multifunctionality is recognized as an element that must characterize the agriculture of small and medium-sized farms in the mountains in order to guarantee a differentiation of activities and an open approach to the consumer. The multifunctional approach recognizes agriculture as a multi-output activity, producing

not only private goods such as food and fiber but also public goods such as agricultural landscapes, farmland biodiversity, water quality, soil functionality, *etc.* [6,7].

In this sense, the pastures are a key element of the mountain livestock, but they have been undergoing for several decades a gradual process of abandonment with obvious consequences. The pasture productions are declining, grazing is progressively being invaded by wooded forms that are not always good, rural buildings are being abandoned and are subject to decay and collapse, the water balance is being compromised, and the quality of the mountain landscape built over centuries of agricultural activity tends to degrade. This process of abandonment of agricultural areas has produced spontaneous reforestations: the biggest changes can be seen in the reduction in grass production and in the amount of land dedicated to pasture associated with the natural increase in woodland [8]. Transhumance and grazing management are gradually disappearing, also because of high labor costs and low profitability of these agricultural practices, with a consequent loss of the biodiversity. An important part of the habitats protected by Nature 2000 is represented by semi-natural habitats, created by traditional agricultural practices. Species-rich grasslands, pastures, grazed wetlands and moorland habitats, are all examples of environmental assets associated with, or produced by, low-intensity agricultural land use, and they are often found in remote and less accessible areas, as the mountainous ones [2]. In the European Union (EU) context, due to the difficult topography and climate conditions, policy intervention in mountain areas has been justified [9]. Policy measures conceived to avoid land abandonment are mainly related to the EU common agricultural policy (CAP) and the measures regarding less favored areas. According to Nordregio (2004) [9] (p. 11) "*Natural, economic, and social handicaps exist, but not everywhere or to the same extent. In the context of globalization, mountain areas face three contradicting challenges: to turn into 'open museums' or areas for recreation and protected nature for industrialized societies; to be regarded as regions to be economically exploited, or even over-exploited; and abandonment*".

In fact, pastures, grasslands and non-intensive agriculture are important to the permanence of the typical alpine landscape mosaic and constitute a touristic attraction that could be able to improve a soft tourism that does not require heavy investments in plants and infrastructures (like skiing) and that, with a low environment impact, can revitalize the local economy [10]. In terms of European strategy, the EU has implemented the Macroregional Strategy for the Alpine region, that represents a first true comprehensive example of a strategy initiated in a bottom-up approach by the territories and backed by the States and Regions, and which have the competitiveness, the sustainability of management and the mobility as focus points of its implementation.

As mentioned above, the economic revitalization of agriculture in the mountains requires substantial innovation to approach new markets and to allow a rejuvenation needed to improve business competitiveness. Interpreting agriculture as landscape construction, maintenance of traditions and knowledge, care of the variety of the territory and its biodiversity also means being able to exploit these outputs through tourism, sport and education, and elements that go to enhance the rural economy [11]. These goals are in increasing demand for urban populations [12,13], and ignoring nonmarket goods and functions in policy design can result in substantial losses to society in general [14]. Moreover Kleynans and Reed [15] argue that multifunctionality also implies an increase in the land value, in particular with regard to lands in close proximity to mountainous areas with beautiful landscapes. Thus, alternative use buyers focus more on non-agricultural characteristics of agricultural land, where the satisfaction of owning the land for aesthetic appreciation, recreation, conservation and other purposes are prominent. Sali *et al*. [16] found that a relationship between high real estate values and the presence of agricultural mountain landscape exists. As part of the multifunctionality of farms and landscape valorization, the maintenance of human influence, biodiversity-rich, so called semi-natural ecosystems as pastures and mountain meadows must be guaranteed, but this surely needs considerable financial means [17].

In this context, the analysis aims to assess the consumers' Willingness to Pay (WTP) for the use or, rather, the permanence of the upland farms and mountain pastures in the Italian Alps. In the absence

of an intervention by the community or private enterprises, to date, mountain pastures risk being abandoned with the consequences already expressed. In order to assess an effective recovery and enhancement of upland farms, which can lead to a condition of maintaining productive activity also in the coming years, promoting the revitalization of the mountain farms, a Contingent Valuation analysis to test consumers' WTP is presented. The second paragraph presents a Contingent Valuation Method (CVM) in theory, the third exposes methodology, the fourth shows results, and, in the fifth, they are discussed. Some conclusions are drawn in the sixth paragraph.

2. Contingent Valuation Method (CVM)

CVM can be divided in indirect and direct methods. The first group is characterized by an estimation based on the indirect features of observed individuals; the direct method tries to elicit information about the value of the non-marketed goods or services directly from the individual [18]. The CVM was the most widely used model for estimating non market values. The CVM elicits consumer preferences for goods and services that are not traded directly in the market [19]. In fact, in the last three decades, economists try to assess people's WTP for landscape quality and maintenance [20,21], and, more recently, also the issue of WTP for ecosystem services was explored by many authors [6,22,23] but less frequent for evaluation of mountain farm permanence [24]. The innovation of this work is the application of the CVM to the problem of Alpine pasture survival and the quantification of their value. In this case, it is not only the value of the landscape that is calculated, for which CVM is often used, but rather the "good" as a whole is evaluated through the consumers' opinion of the goods and services produced, voluntarily or involuntarily, by the upland farms. In fact, through the questionnaire, the consumer is required to answer both questions regarding environment, landscape, services that the municipalities of the valley offer to tourists, and also about the potential economic function of the pasture, whether productivity- or tourism-related, the degree of usability and that accessibility should have farming, and the need to implement secondary activities rather than the main one.

The Contingent Valuation has its roots in Lancaster consumer theory [25] according to which the consumer choice process is based not so much on the comparison of products as in the neoclassical utility theory of the consumer due to the comparison between the characteristics of the products and possible combinations between them. In this way, in the consumer activity, the knowledge of products is approached on the basis of two parameters: consumer time and choice skill [26]. Furthermore, this interaction becomes more complex in the transition from standardized goods to highly differentiated goods, and even more with goods and services not included in the market. The CVM estimates also the monetary value of environmental goods that are essentially based on the simulation of a market for an asset which does not have it [27].

Environmental goods are described by the Total Economic Value (TEV), made up of use and non-use value. According to Marazzi and Tempesta [28], value of use is defined by the presence of a physical interaction between the good and the person who evaluates it: thus, the good is known and it will be part of the utility function of the consumer without any intermediation by others. The most important non-use values concern the existence; that is, the knowledge that the good exists, the option, that is the possibility of future use of the good, and the legacy of that good for future generations. The valuation of assets described here, which have no clear evidence in terms of market prices, as the public goods, can take place using the CVM.

Contingent Valuation implies asking a sample of the population about their WTP for the provision of a given good or service: according to Lopez [18], this is a very flexible method since one can obtain estimations for public policies or projects that have not been implemented. The CVM is based on the simulation of a hypothetical market (or contingent) in which the aim is to estimate the WTP for the improvement of the wellbeing level. In this market, a change in supply of the goods is hypothesized and asked about, through direct interviews with each of the members of the same sample (the willingness to pay a certain sum of money to finance the improvement described in

the hypothetical scenario). The final purpose is to draw guidelines for programming policies and intervention in the supply of goods or environmental services.

3. Methodology

To assess WTP, the information is directly elicited from individual i, when a contingent valuation questionnaire is applied using the dichotomous choice model—simply a dichotomous answer ($y_i = 0$ if the individual answers no and $y_i = 1$ if the answer is yes), given a question about paying a previously determined amount s_i, that varies randomly across individuals [18].

The questionnaire is functional for an analysis model based on a hypothesis of an implicit WTP y_i ($i = 1, \ldots, n$), which includes a systematic component $x_i\beta$ with the vector x_i ($= 1 \times k$) of the contextual and subjective features, and a non-observable component ε_i:

$$y_i = x_i\beta + \varepsilon_i. \quad (1)$$

The vector β of the parameter includes the intercept β_0 that β_1 coefficients of the independent variables introduced in Equation [29].

s_{1i} is the proposed value of the respondent and is assumed as an affirmative answer $I_{1i} = 1$ if $y_i \geqslant s_{1i}$ with probability $\Pr(y_{1i} \geqslant s_i \mid x_i) = 1 - G(s_i \mid x_i)$. G is the cumulative density function of y. Usually, it is assumed that y is normal or logistics.

Following the probit model that is introduced to the scale parameter σ, the condition of acceptance of the amount proposed becomes $(x_i\beta + \varepsilon_i)/\sigma \geqslant s_{1i}$; that is, $(s_{1i} - x_i\beta)/\sigma < \varepsilon/\sigma$, with the random variable $e = \varepsilon/\sigma$ normally distributed.

The probability of getting a positive answer to the proposed bid is

$$\Pr(I_{1i} = 1) = E(I_{1i}) = \Pr(y_{1i} \geqslant s_{1i}) = 1 - \Phi((s_{1i} - x_i\beta)/\sigma), \quad (2)$$

where $\Phi(.)$ is the normal cumulative density function of the random variable $e = \varepsilon/\sigma$ with σ scale parameter of y_i. This model can be estimated using the principle of maximum likelihood [30].

The logarithmic function of maximum likelihood is:

$$\ln L = \sum_i \{(1 - I_i)\ln[\Phi((s_i - x_i\beta)/\sigma)] + I_i \ln[1 - \Phi((s_i - x_i\beta)/\sigma)]\}. \quad (3)$$

Another assumption concerns the field of variation of the latent variable y, which in the majority of binary response models with logarithmic likelihood, function as the Equation (3) is identified with the real numbers.

In this paper, the assessment of potential WTP is made by dichotomous questions with follow-up [31], an alternative to classical models to improve the efficiency of the estimation. This alternative is also known as a double-bounded model, and it is based on a follow-up dichotomous question, asked after the first dichotomous choice question. If the individual answers "yes" to the first question, then he is asked about his WTP for a higher amount ($s_{2i} > s_{1i}$). If he answers "no" to the first question, then a lower amount is offered ($s_{2i} < s_{1i}$). Thus, in the second question, the amount asked depends on the answer obtained for the first question: with this method, there are two answers for each individual. Therefore, the possibility that two limits are identified is introduced, lower and upper, within which is located the individual WTP [31].

The coefficients D_1 and D_2 are introduced and they assume the value 1 if the answer is yes, and value 0 in case of a negative answer concerning the first and the second question.

They are defined as:

$$D_i^{yy} = (D_i^1)(D_i^2),$$

$$D_i^{ny} = (1 - D_i^1)(D_i^2),$$

$$D_i^{yn} = (D_i^1)(D_i^2),$$
$$D_i^{nn} = (1 - D_i^1)(1 - D_i^2).$$

If the respondent provided two different responses, it is possible to identify two limits, a lower and an upper, within which is located the implied WTP. The two bids S^u and S^d are defined as:

$$S^u = s_2 \text{ if } D^{nn} = 1,$$
$$S^d = s_1 \text{ and } S^u = s_2 \text{ if } D^{yn} = 1,$$
$$S^d = s_2 \text{ and } S^u = s_1 \text{ if } D^{ys} = 1,$$
$$S^d = s_2 \text{ if } D^{yy} = 1,$$

and the maximum likelihood function becomes:

$$\begin{array}{l} \ln L = \sum_i \left\{ \left(1 - D_i^1\right) \left(1 - D_i^2\right) \ln \left[\Phi \left(\left(S^u - x\beta\right)/\sigma\right)\right] \right. \\ + \left(D_i^1\right) \left(1 - D_i^2\right) \ln \left[\Phi \left(\left(S^u - x\beta\right)/\sigma\right) - \Phi \left(\left(S^d - x\beta\right)/\sigma\right)\right] \\ \left(1 - D_i^1\right) \left(D_i^2\right) \ln \left[\Phi \left(\left(S^u - x\beta\right)/\sigma\right) - \Phi \left(\left(S^d - x\beta\right)/\sigma\right)\right] \\ \left. + D_i^1 D_i^2 \ln \left[1 - \Phi \left(\left(S^d - x\beta\right)/\sigma\right)\right]\right\} \end{array} . \quad (4)$$

Survey Design and Implementation

The goal of the analysis is to assess the willingness to pay of the respondents for the requalification of Italian Alpine pastures. The structure of the questionnaire is based on closed questions, in order to standardize the responses and allow for easier categorization. In the first part of the questionnaires, a clear introduction about the mountain pastures and upland farms and a brief description of research scope are given. The questionnaires have been launched in the web, using "SurveyMonkey", a site for submitting online surveys. The sample to be interviewed was mainly selected through the social network "Facebook" by publishing the link of the questionnaire, followed by a description of various "groups". It has been spread in groups where users were potentially interested, such as the pages of the trekking lovers, of the Alpine Huts and mountaineers to reach tourists but also the residents of the mountain, so the respondents come from the Lombardy region. This procedure has reasonably selected subjects on the basis of a voluntary interest and not due to the insistence of an interviewer as instead can happen in a direct survey. The survey was carried out during July and August 2015, and, in total, collected 429 documents. The structure of the questionnaire includes a beginning part in which the first questions are the more general part of the survey: the subject is asked to express an opinion through a scale of 1 to 5 on the importance of environment and territory, accessibility and activity of pastures or through excluding answers (Table 1). The second part is about the willingness to pay made explicit with the double bounded method. The third part is about the personal characteristics of the respondents.

Table 1. Survey design and variable definitions.

Questions	Variables Name	Definition	Modality	Measure Unit
Importance of the presence of the following characteristics in the valley municipalities	ACCOM	accommodations	Score	From 1 to 5
	ENV	environment unpolluted		
	TOWN	well preserved villages		
	MULT	multifunctional farms		
	INFR	infrastructural equipment		

Table 1. *Cont.*

Questions	Variables Name	Definition	Modality	Measure Unit
Importance of farms in the following functions:	WATER	water management	Score	From 1 to 5
	RISK	reduction of hydrogeological risk		
	EMPLOY	job preservation		
	BIOD	biodiversity conservation		
	HERIT	heritage preservation		
What kind of pasture typology do you prefer?	AGR	agro-productive orientation	Alternative (choice)	0: no 1: yes
	TOUR	touristic orientation		
	ACT	maintenance of actual situation		
In light of the premise, which solution do you prefer?	PAST	pasture increase and forest decrease	Alternative	0: no 1: yes
	FOR	pasture decrease and forest increase		
	ACT	actual situation		
Which of the following services would you find in a pasture?	NONE	None	Multiple (choice)	0: no 1: yes
	SELL	agricultural products selling		
	RIST	food service		
	BED	accommodation service		
Pasture accessibility	PATH	by path	Alternative	0: no 1: yes
	ROAD	by road		
	TRAIL	by trail		
Willingness to pay for the permanence of pastures	WTP	30, 60, 15; 50, 100, 20; 80, 150, 40; 100, 200, 50	Double bounded	€
Information degree about the issue of questionnaire	INFO	Information degree	Score	From 1 to 5
Personal information	INCOME	family income per month	Quantitative	0–∞
	AGE	age	Quantitative	0–∞
	FEM	gender	Alternative	0: no 1: yes
	FAM	number of family components	Quantitative	0–∞
	CHILD	number of children under 18 years	Quantitative	0–∞
	MED	lower secondary school diploma	Alternative	0: no 1: yes
	HIGH	high school diploma	Alternative	0: no 1: yes
	DEGR	degree certificate	Alternative	0: no 1: yes

4. Results

In Table 2, the sample of respondents shows an average age of 37 years old, and it is well distributed between males and females and the average family consists of three members. As for the number of children and young people under 18 (CHILD), the average number per family is less than 1. This is because the sample includes a wide age range, from 18 to 72 years; therefore, it also includes very young people who have not had children or have not younger brothers or sisters, and other elderly people whose children are now grown. The median household income is around 1950 €, which compared to the ranges proposed in the questionnaire, is exactly the central range.

As can be seen from Table 2, the level of education is quite high, since 22.8% of respondents claimed to have low educational degrees, while 45% stated having a high school diploma and 29.4% were in possession of a degree. In the cognition question about the information of the topic addressed in the questionnaire, the sample declares on average to be informed; more specifically, only 15.6% claimed to be ill-informed (level 1), while 25.9% said that they were very informed (levels 4 and 5).

Table 2. Descriptive statistics of survey sample.

Sample Characteristics	Definition	Observations (Number)	Mean	St. Dev.
AGE	Respondents' age	370	37	18
FEM	Male = 0, Female = 1	370	0.51	0
INCOME	Family income per month (€)	370	1965	1148
FAM	Family components (number)	367	3	2
CHILD	Children (<18 years old) per family (number)	367	0.4	0
MED, HIGH, DEG	Respondents' school level (number)	370 MED: 92 HIGH: 169 EG: 109		
INFO	Respondents' information degree on survey issue (1 = few information to 5 = much information)	399	3	1

As for the distribution of the sample to the cognition question, the majority of respondents give the most importance (level 5) to the presence of an uncontaminated environment in the municipalities hosting the mountain pastures (55.24%), the presence of well-preserved historic villages (56%); fewer respondents give the highest rating to the presence of multifunctional farms (40.33%), accommodations (35.43%) and infrastructures (40%). Asked about the importance of agriculture to perform certain functions that go beyond the simple production of goods, most of the sample, about 41%–42%, gives the highest score (level 5) to the variables related to the biodiversity and heritage conservation and enhanced employment, while, for the variables related to risk management and water, about 50% of the population gives a value between 3 and 4. The questions concerning the type of favorite services in mountain pastures sees the prevalence option "sale of self-production"; in fact, 297 respondents choose this answer: this option is closely related to a productive orientation of farm, and less to a multifunctional characterization. Two-hundred-sixty-two people would like instead to eat in the farm, with a restaurant service, while 211 people would like to spend the night in the farm structure (as Alpine Huts). Only 18 people declare they do not want any service in the upland farms. For the question with alternative choices, the sample is split in half between those who choose the option of accessibility by footpath, 47.40%, and those who choose the option accessibility via trail (47.6%); the 5% would like to access the pasture via paved road. Finally, 60.7% survey respondents said they prefer an agricultural-production orientation of mountain farms, and 33.3% a tourist orientation of it. However, if we consider this information together with the previous information, it can be seen that previously the sample has selected answers in any way connected with tourism, such as the presence of multifunctional farms, or the presence of infrastructure and accommodations in the municipality of the valley.

Regarding the WTP, the sample is divided almost in half: 48% declares to be willing to pay the annual fee proposed by the first threshold, while 52% say they are not willing to pay. Table 3 shows the different groups of respondents divided per typology of WTP; it could be noted that in general there are no many differences between groups, but some differences exist.

The variable AGE indicates the respondent's age and it is similar for the groups yes-yes, no-no and yes-no, while it is quite different for the group no-no: this group shows a minor average age, 30 years rather than 36 or 39 years. This last group includes individuals that would be willing to pay, but, for them, the first threshold is too high, then they agree on the concept of pay but not with the proposal amount.

Regarding the variable INCOME, that is the family income per month, the group declaring the lower income per month is the no-no cluster, so there seems to be a relationship between those who have a lower income than the other and the unwillingness to pay for the redevelopment of the pasture. Moreover, it could be noted as this group has the higher percentage of MED variable—that is, the lower education level; on the contrary, the no-yes cluster, in addition to being the one that includes

individuals with the lowest average age, is the group that shows the highest percentage of graduates shown by the variable DEG with the 37.5%. The INFO variable indicates the respondents' information degree on survey issue, and it shows its maximum average value in the yes-yes group. For what concerns the yes-no group, it shows medium values and it could be only characterized for the higher percentage of the variable HIGH, that is the people who have a high school diploma.

Table 3. Respondents divided per willingness to pay's (WTP's) answers and their personal characteristics (average).

	Yes, Yes	**No, No**	**Yes, No**	**No, Yes**
Observations (number)	52	144	141	64
Observations (number)	12.97	35.91	35.16	15.96
AGE	39.9	39.6	36.4	30.4
FEM	0.44	0.52	0.52	0.59
INCOME	2131	1745	2049	2100
FAM	3.3	3.16	3.16	3.07
CHILD	0.44	0.41	0.48	0.42
INFO	3	2.6	2.9	2.3
MED (%)	23.08	25.69	21.28	18.75
HIGH	34.62	38.89	48.94	31.25
DEG	28.85	28.83	25.53	37.5
no data	13.45	6.59	4.25	12.50

To assess the WTP, different models were tested, from the first model (model 1) with no covariates to the last model with three covariates (model 11) (Table 4).

The analysis of the significance of the contribution offered by the introduced variables can be conducted by means of the likelihoods ratio test (LRT). The differences between the log-likelihoods obtained in the different estimates correspond to the ratio between the likelihoods and approximate χ^2 distribution according to the following relationship:

$$\text{LRT} = 2\left(\log L_R - \log L_U\right) \approx \chi^2, \tag{5}$$

where $\log L_R$ and $\log L_U$ are, respectively, the log-likelihood of the model with covariates and the model without covariates; in addition, the LRT is also being made for the two-variable model (10) and the three-variable model (11) in relation with the previous model with the best LRT. Covariates to be included in the table were chosen on the basis of their LRT, so many of them have been eliminated because they did not satisfy the condition of (5). Covariates are respondents'age (AGE), gender (FEM), number of family members (FAM), number of children per family (CHILD), the respondents' school level (MED, HIGH, DEGR), the family income per month (INCOME), and the best combinations between them. The introduction of covariates leads to an improvement of the basic model without covariates, tested through the likelihood ratio test (LRT). The relationships between the likelihood of model with one covariate (from model 2 to model (9)) with the no covariate model are all far superior to critical limits for χ^2, indicated in Table 3. In fact, in the table, the better models with one covariate are shown with their LRT. It should be noted that they are all descriptive variables, and they are not opinion variables in this table, because of the small LRT value of their models.

The number 3 is the best of all the models because it shows the highest likelihood ratio: model 3 uses "FAM" as covariate variable, linked to the number of respondent's family members. Since model 3 is the best, it is chosen as the basis for the addition of a second covariate: the best two−variable model is the one that uses covariates "INC" and "FAM", which is model 10.

Table 4. WTP in the different models.

Variables	Model 1 (No Covariates)	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
Observations (number)	401.00	370.00	370.00	367.00	367.00	370.00	370.00	370.00	370.00	367.00	365.00
β coeff	53.78	55.89	56.33	57.88	55.88	59.59	56.45	52.42	32.92	35.17	34.31
AGE		0.01									
FEM			−0.25								
FAM				−0.43						−0.99	−0.86
CHILD					0.83						−0.15
SCHOOL−med						−13.86					
SCHOOL−high							−0.54				
SCHOOL−degr								12.86			
INCOME									0.01	0.01	0.01
WTP	53.78	56.20	56.20	56.47	56.24	56.15	56.20	56.20	56.08	56.39	56.14
Log likelihood	−545.57	−507.20	−507.20	−502.59	−502.71	−506.08	−507.19	−506.10	−502.78	−497.79	−494.56
Δ Log likelihood mod 1 [(1)]		76.74	76.74	85.96	85.72	78.98	76.76	78.94	85.58	95.56	102.02
Δ Log likelihood mod 10/4 [(2)]										9.60	
Δ Log likelihood mod 11/10 [(3)]											6.46

[(1)]: (n > 3.841; n > 5.991; n > 7.815); [(2)]: (n > 5.991); [(3)]: (n > 7.815).

The best model of all is model 10, which uses two variables and has the best LRT. As for model 3, model 10 is also used as the basis for the addition of another covariate, in order to obtain a three−variable model. The additional covariate that gives the best result is "CHILD", and it builds model 11 with "INC" and "FAM". However, model 11 shows a LRT too low compared to the model 10 LRT, which does not exceed the critical value of χ^2 distribution.

Then, according to LRT, model 10 remains the best model.

5. Discussion

Regarding the first part of the results, the descriptive statistics of the sample based on WTP's answers highlights some evidence. In Table 3, the average values of variables are shown, and the sample could be divided into the four clusters of WTP. The first cluster includes individuals that intend to pay both the amounts proposed (yes-yes): they are characterized by an information level on pastures' issues higher than that of the other groups. At the opposite end, the no-no cluster includes individuals with the lowest average income in the sample, and in fact they are not willing to pay for anything. The no-yes group is the most interesting cluster in terms of potential participative policy: in fact, they are the youngest group in the sample and they agree on the principle of willingness to pay for the mountain pastures, but as long as the amount to be paid is low. The last group, the yes-no cluster, shows medium values for all the variables, except for the HIGH variable that reached the maximum value of the sample (48.94%).

For what concerns the WTP model, some remarks could be made: first, most of the variables, in particular the opinion variables, seem to have no influence on the decision of the respondents to pay or not. On the contrary, the "FAM" and "INC" variables appear to be the ones that most enhance the efficiency of the model, for which it can be stated that the simultaneous presence of these two features in the model leads to a greater explanation of WTP calculated.

The final WTP is an average value of € 56.39 per year and respondent. However—very similar to those of other models,—this value, in relation to the thresholds proposed in the questionnaire, from 15 € to 200 €, does not seem very high but considering that half of the samples say that they do not want to pay at all, it could be considered a good willingness to pay value. As regards the covariates meaning, in model 10, the "INC" variable shows a positive beta coefficient, meaning that the greater the value of the respondents' income, the higher the respondent's WTP. Conversely, "FAM", which indicates the number of family members, has a negative beta coefficient, which therefore indicates that, the more the number of family members, the more often the WTP is lower. It can be said that there is a WTP for the redevelopment of the pastures and for the present work settles at around € 56, although this result also depends on the thresholds that are proposed to respondents.

Extending the results of the analysis, it can be assumed that firstly, in general in the population, there is a real willingness to pay for the redevelopment of the pastures. Secondly, as shown by the cognitive question result and the high amount of respondents on a totally voluntary basis, there is real attention to the issue, and this could be explained by the fact that, in recent times, various information and awareness campaigns about the problem have also been made by the public governments and, more generally, at the European level, the CAP provides incentives for upland farms, namely disadvantaged areas. In this regard, the present work gives a precise indication to policy makers: it is necessary to consider the voluntary involvement of the users of the pastures and upland farms (as the tourists are) as well as residents in redevelopment projects and reactivation of the pastures. In fact, there seems to be not only a sensitivity to the issue and a willingness to pay for the improvement of the mountain pastures, but also a will for expression and participation of these individuals who are conscious of the issue and can be involved through participatory policies.

6. Conclusions

The survey performed leads to drawing some conclusions, starting with the fact that the competitiveness of mountain farms goes through a renewal of governance and of mountainous

agricultural function. In fact, consumers and users are available not only to pay, but to participate in the renewal of the upland farms offer expressing their opinion on the expectations they have towards the renewal of agricultural activities; they express their needs as consumers and tourists. The information on the topic is widespread, and public institutions, as well as private firms, can take advantage of the awareness and knowledge that exists on this issue in order to involve users in projects. Consumers seem to prefer an agricultural orientation of the upland farms and favor the services related to the sale of the products. However, even the food service is appreciated, and this implies openness to the public and a touristic approach to agriculture. Considering the degree of appreciation enjoyed by multifunctional farms in the responses to the survey, it can be stated that the main indication that can be drawn from the policies is that mountain farming renovation must include the multi−functional orientation of the farm by maintaining the traditions and typical Alpine productions on the one hand, and an opening to tourism on the other. The major contribution that this research adds to the literature is the application of CVM to the issue of the Alpine pastures' survival and permanence. According to a comprehensive vision of pastures, they are not only representative of the mountain environment that should be preserved for the functions related to the environment and biodiversity or to the conservation of specific traditional production, but they are also an interesting resource for the renewal of the mountain economy as a whole, not only the agricultural aspects. The consumer is asked through a WTP approach to express their views also on the services that the pastures could and should offer, for which the respondent has been led to imagine a future of farming to which he gives a precise characterization and for which he makes precise choices.

However, the paper is the authors' first work, which can be further developed through survey implementation with open-ended questions that could expand the quantitative approach: thus, a deeper analysis could be improved with a qualitative approach highlighting any other features of the respondents.

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