Rural landscape valuation in a cross-border region

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Évaluation économique du paysage rural en Italie et en Slovénie

Résumé – Le paysage rural représente l'une des externalités agricoles la plus susceptible, à la fois, d'être valorisée et d'évoluer en fonction des changements démographiques ou des systèmes de production. Cependant, les mesures de préservation du paysage doivent-elles être considérées uniquement comme génératrices de coûts ou peuvent-elles être sources de bien-être, et justifier ainsi de certaines formes de soutien ? À partir de l'étude de deux zones viticoles – l'une italienne (qui produit sous un signe de qualité proche des appellations d'origine contrôlée françaises, 'Collio' et 'Colli Orientali del Friuli') et l'autre slovène (commune de Brda) – nous avons tenté de répondre à cette question en estimant le bénéfice social pour la population de la préservation du paysage. Pour cela, nous avons mis en œuvre une méthode d'évaluation contingente (MEC). Deux séries d'enquêtes ont été menées dans chacun des deux pays et, malgré la similitude des démarches, les résultats obtenus sont sensiblement différents. L'évaluation montre que les Italiens sont très sensibles au paysage viticole alors que les Slovènes restent très attachés aux paysages "traditionnels" d'avant-guerre qui alternent cultures, vergers et vignes. Basée sur la méthode des scénarios hypothétiques de marché, la MEC s'est avérée difficile à appliquer dans le cas slovène. D'autres recherches devraient être menées pour améliorer la démarche d'analyse du paysage rural.

Mots-clés : paysage rural, méthode d'évaluation contingente, Collio (Italie), Colli orientali del Friuli (Italie), Brda (Slovénie)

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Summary *– The rural landscape is one of the most valuable agricultural externalities and it is often affected by modifications in the agricultural production process. Moreover, some rural areas are deteriorating due to the depopulation process while others are being transformed owing to socio-economic pressures.*
However, should agricultural policies concerning landscape preservation only be considered as cost items or should they be seen as sources of social benefits able to justify economic support?
On this basis two surveys were carried out in order to study the economic value of the rural landscape, focusing in particular on viticulture. Both studies covered quality wine-producing areas on the Italian/Slovenian border: The Controlled Denomination of Origin zones of 'Collio' and 'Colli Orientali del Friuli' in Italy, and the municipality of Brda in Slovenia. Both surveys assessed the economic value of the rural landscape in order to estimate the social benefit that populations attach to landscape preservation measures.
Despite the fact that similar methods were applied, results differed. The peculiar backgrounds affected our results in two ways. Firstly we found that there was a considerable difference in the way Italians and Slovenes valued the rural landscape. While Italians considered the development and extension of vineyards to be very important in counteracting the abandonment of rural areas, Slovenes preferred "traditional" landscapes (orchards, grasslands and vineyards). Secondly, in Slovenia it was difficult to apply the contingent valuation method, which is based on a hypothetical market scenario. More research should be carried out in order to study the methods that best fit the preferences for rural landscape.

Key-words*: rural landscape, contingent valuation method, Collio (Italy), Colli orientali del Friuli (Italy), Brda (Slovenia)*

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THE RURAL LANDSCAPE is one of the most valuable agricultural externalities. Agriculture plays a key-role in shaping the landscape, especially as in most countries farming is the greatest user of land. For that reason, in many countries, the relationship between agriculture and landscape is a high priority. In an international context, agricultural landscapes are also attracting attention as a result of the inclusion in 1993 of cultural landscapes in the UNESCO World Heritage List, and the signing in 2000 of the European Landscape Convention. Since landscapes are not valued through markets (*i.e.* pure public goods), the challenge for policy-makers is to judge the appropriate provision of landscape and which landscape features society values, and to assess to what extent policy changes influence the agricultural landscape.

Since the European Conference on Rural Development hosted in Cork in 1996, efforts have been made to create a broad awareness of landscape preservation and diversification. This process launched a wide debate on rural development policy, culminating in the Agenda 2000 reforms, in which rural development policy was established as the second pillar of the Common Agricultural Policy (CAP). At the end of 2003 the Salzburg Conference on "Rural Policy Perspectives for a Wider Europe" followed on the Cork Conference by stressing that rural policy should evolve to meet new challenges within an enlarged European Union (EU). It also recognized that the characteristics of rural areas should not be considered as a source of weakness, but as an opportunity for development (European Commission, 2003).

It is in the Central Eastern European Countries (CEECs) that changes in the production process are more likely to affect the shape of the landscape and lead to the deterioration of rural areas through depopulation and socio-economic pressures. EU Rural Development Regulation has tried to address these challenges by including a number of economic measures. However, the issue is whether these policies should only be considered as cost items or should they also be seen as sources of social benefits, which are able to justify support? Before asking whether and to what extent farmers should be compensated, it is necessary to measure and give a value to the economic benefits associated with the multifunctionality of agriculture (Pruckner, 1995).

On this basis two surveys were carried out to examine the economic value of the rural landscape, focusing in particular on viticulture. Both studies covered quality wine-producing areas. The first one examined a viticulture area in the North-East of Italy, the so-called Controlled Denominations of Origin "Collio" zone and the "Colli Orientali del Friuli" zone. The second one explored the case of the municipality of Brda, in Slovenia, which borders with the 'Collio' area.

Little research has been done to estimate the economic value of the rural landscape due to the fact that landscape is a highly composite good, and therefore the estimation process is complicated by difficulties in defining attributes and their levels. In this paper we wish to give our contribution to international literature, in which fewer than 100 case studies valuing the rural landscape have been developed so far (Santos, 2001).

Landscape valuation issues

Rural land contributes to social welfare in many ways: Supplying food and raw materials; replenishing groundwater resources; offering open spaces for recreation, wildlife habitats and visual enjoyment; conserving cultural identity, and guaranteeing rural employment (Santos, 2000). Agriculture has had a major, but not exclusive, influence on these multiple functions. In this sense we can say that agriculture is multifunctional.

"*Multifunctionality refers to the fact that an economic activity may have multiple outputs and, by virtue of this, may contribute to several social objectives at once. Multifunctionality is thus an activity-oriented concept that refers to specific properties of the production process and its multiple outputs*" (OECD, 2001, p. 11).

The fundamental aspects of multifunctionality are, on the one hand, the existence of multiple commodity and non-commodity outputs (the landscape is a typical non-commodity output), which are both produced by agricultural activities; and, on the other hand, the fact that non-commodity outputs may have characteristics of externalities and public goods. The first case implies that any modification in agricultural techniques and commodity outputs may change the landscape's features and shape. The result of the second characteristic is that the demand function for these goods does not exist and the supply function does not meet the optimum social output level.

Externalities and public goods cause market failures if the price mechanism does not take full social costs and the social benefits of production and consumption into account. One strategy to avoid this failure consists in assigning an economic value to the non-commodity outputs in general and to the rural landscape in particular.

Valuation could be particularly helpful for policy-makers, especially as concerns decisions on agricultural policy reform. Indeed, the Common Agricultural Policy (CAP) aims at meeting the increasing public demand for environmental quality, biodiversity, cultural attributes and landscape scenery of rural land (EORG, 2002). The policy issues are dominated on the one hand by the need for a more effective delivery of environmental benefits, and on the other by the criterion as to whether these benefits actually offset policy costs (Willis and Garrod, 1994). Trade-offs between effects need to be assessed in order to select the optimal policy. Assessing trade-offs between costs and benefits requires some form of valuation in a common monetary unit. Assessment of the value of social cost and benefit is based on individuals' willingness to pay (WTP). In this manner the policy-maker is able to select policies that improve welfare and are optimal from a social point of view.

This discussion leads us to the economic valuation of agri-environmental policy. Valuation can be used for pricing non-commodity agricultural outputs, and may help design schemes to obtain the optimum social mix of commodity and non-commodity outputs from rural land (Santos, 2000).

Methodology

Methodologies to estimate social benefit from an economic point of view vary depending on the nature of the non-commodity outputs (NCO). Among the 100 case studies analyzed by Santos (2001), Contingent Valuation Method (CVM) seems to be most widely used for estimating demand for landscape both among European (Drake, 1992; Garrod and Willis, 1995; Hanley and Ruffell, 1993; Pruckner, 1995; Willis and Garrod, 1992 and 1994; Zander *et al.*, 2005) and US researchers (Bergstrom *et al.*, 1985; Dillman and Bergstrom, 1991; Kline and Wichelns, 1996; Hoehn and Loomis, 1993; Mitchell and Carson, 1989). Following the National Oceanic and Atmospheric Administration (NOAA) panel guidelines and standards (Arrow *et al.*, 1993), CVM has been widely applied and there is a smaller number of examples of Travel Cost Methods and Contingent Ranking being used. There are many reasons for the preference for CVM: Ability to capture non-use values and rural amenities comprise non-users among their potential beneficiaries, flexibility of direct valuation techniques in terms of output definition and possibility of *ex-ante* valuation. More recent valuation studies display an increasing interest to other direct valuation techniques, namely the Choice Experiments (CE) and related techniques derived from Conjoint Analysis, to value farming-related NCOs defined in terms of bundles of attributes (Zander *et al.*, 2005). Hedonic Price Analysis is sometimes used in estimating demand for landscape mainly with respect to recreational value of the area (Garrod and Willis, 1999). Replacement Costs (RC) are usually used to estimate damages, negative externalities and demand for flood protection as well as water recharge. In these cases, the cost of supplying these functions through reservoirs is used as a proxy to value demand. The only study estimating demand for food security used CVM (Santos, 2001).

The most recent approaches apply Benefit Transfer (BT) and CE methodologies (Desvousges *et al.*, 1998; Santos, 2000 and 2001; Scarpa *et al.*, 2002). BT methodology analyses previous valuation studies and transfers valuation information from these studies to build the benefit estimate that is required for the policy evaluation problem. CE differs from CVM, which values a particular scenario and tend to provide information on preferences for the whole scenario rather than for a specific aspect of it. On the contrary CE breaks down the scenario in attributes and levels per each attribute. In this manner researchers evaluate preferences over attributes (Garrod and Willis, 1999). Nevertheless the sum of attributes values could exceed the value of the whole. In this case Randall (2002) suggests the adoption of both CV and CE methodology.

In particular if CVM is used to elicit WTP for two government policies independently (the parts) the sum of the independently estimated WTP amounts may not be different than the WTP elicited for both (the whole). Part-whole bias is a discrepancy in individual's valuation of goods and occurs if (Bateman *et al.*, 1997):

– The component parts of a whole, evaluated separately, summed tend to exceed the valuation placed on the whole;

– The value of the good varies depending on the presentation order of alternatives;

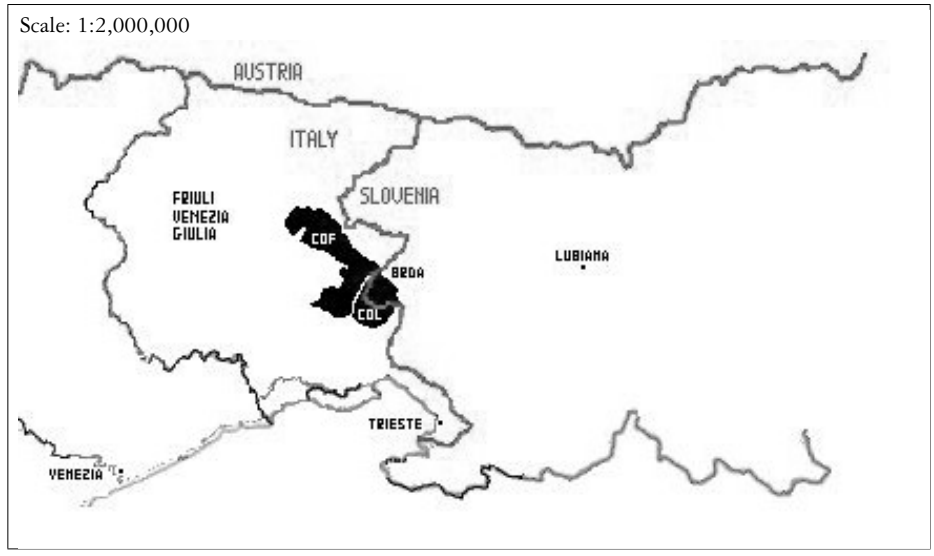
– The sum of changes exceeds the whole change.

In this paper we illustrate two surveys carried out in order to estimate the economic value of the rural landscape, focusing in particular on viticulture in a hill region. This region straddles the national border between Italy and Slovenia. The Italian side includes two zones, Controlled Denominations of Origin "Collio" (which from here on will be referred to as COL), and "Colli Orientali del Friuli" (from here on referred to as COF). In Slovenia, the area covers the municipality of Brda (figure 1). As depicted in figure 1, Brda represents a *cul-de-sac*. Only one main road connects the municipality with the rest of Slovenia and the most important city nearby Brda is Nova Gorica, while fast 15 among main and small roads connect Brda with Italy. In fact, from an historic point of view since the 16th C, Brda was governed by the Venice Republic, then by the King of Italy and finally the Austro-Hungarian Empire. As a result of the Second World War the broad region of Collio was divided leaving the smallest area to Italy (Collio) and assigning the main part to Yugoslavia (Brda). The border limited the connection between the two areas, except for job opportunities, giving rise to significative transfrontier worker movements from Yugoslavia to Italy.

The Slovenian survey was an experimental application. In fact in the literature we did not find any research applying valuation methodology (end of 2004), except the case of Medmont project. The study assessed the recreational and conservational value of Panovec forest (384 hectares) nearby Brda. Visitors assigned a value of 1 euro per visit (considering a mean of 100 visits per year) and a conservation value of € 18 per year. Some difficulties rose during the questionnaire administering, mainly due to the comprehension of hypothetical scenario (Zadnik Stirn and Kladnik, 2001).

Survey data were collected by means of questionnaires and through interviews. Samples are composed by 360 Italian, and 236 Slovenian citizens. The Italian sample

Figure 1. **Trans-border region**



was made up of a random selection of inhabitants from the area studied, while the Slovenian sample was comprised of citizens living in Brda itself (residents) and Nova Gorica (non-residents), which is a town of 35,640 inhabitants. Introducing a dummy variable (residents/non-residents) we could verify the hypothesis that residents and non-residents may have different demand functions for the rural landscape (OECD, 2001, p. 21).

In both surveys we applied the CVM in order to assess the citizens' WTP for specific rural landscape features. In general the CVM is characterized by three elicitation formats: Open ended, bidding game and dichotomous discrete choice (Bishop and Heberlein, 1979; Hanemann, 1984; Mitchell and Carson, 1989; Navrud, 2000; Santos, 2001). The NOAA Panel (Arrow *et al.*, 1993) suggested the use of the dichotomous discrete choice format. Moreover, recent literature has confirmed that among elicitation formats it is the referendum context that fits individual behaviour more realistically. Regarding referendum format, social scientists appreciated the use of a familiar institution in its appropriate context, while economists found virtue in its incentive-compatibility (Green *et al.*, 1998; Hoehn and Randall, 1987; Randall, 1998). The application of the dichotomous discrete choice requires the construction of scenarios that offer two different alternatives: One being the *status quo* policy at zero cost, the other having a cost (also called bid) related to the expenses involved in improving the landscape. More in depth, the hypothetical scenario should explain what the alternative policy will provide, how it will provide it, how much it will cost and how it will be paid for. Respondents are informed that a conservation policy for the rural landscape will cost money. The referendum format postulates the introduction of a national law, which respondents may accept or reject. The sample design distributes respondents over a range of different bids. The employed referendum format elicits the statements in the form of "Yes-No" WTP responses at given bid amounts (Cicia and Scarpa, 2000).

The method requires that the respondent has an exact description of the resource. Because of the richness of attributes and levels of the landscape, two photographs were used; one portraying the *status quo* (*i.e.* the rural landscape under the current cultivation regime), and the other showing the improved landscape.

The construction of the scenario depends on the environmental emergencies that have affected the resources. In spite of geographical similarities, the landscapes in the two examined areas have a number of differences.

The Italian area (COL-COF) is characterized by an agricultural economy that is based on the production of high-quality white wines that are renowned throughout the world. In the last ten years there has been an increasing unification and consolidation of the farms. The vineyard is the most extensive form of cultivation. Viticulturists offer services connected with rural tourism, organise events and attend exhibitions in order to promote not only wines, but also the territory. In this context the most widespread problem is the abandonment of vineyards, which is contributing to the deterioration of the landscape, especially in marginal, hill areas (Marangon and Tempesta, 2001).

The hypothetical scenario and policy issue were described to the respondent as follows:

> *"Agricultural development and the rural landscape are undergoing change. In some hill areas viticulture is being abandoned. Fields, which once contained vineyards, are now uncultivated and the features of the rural landscape are deteriorating. The main problem regards the conservation of the rural landscape for historical and cultural reasons. The Government is going to introduce a law that provides subsidies for farmers involved in landscape conservation programs, and taxes will increase as a consequence. In a consultative referendum, would you vote "Yes", and agree to contribute towards the conservation of hill viticulture, paying the bid amount? Or, on the contrary, would you vote "No", and reject making a contribution towards the conservation of hill viticulture, accepting the* status quo *policy at zero cost?"*

As previously mentioned, two photos were submitted illustrating the two choice alternatives: *Status quo* and improvement.

On the contrary, the Slovenian area is placed in a completely different geo-political and economic context. Slovenia, like most CEECs, is going through a rapid transformation process, developing from an economy based on agriculture to one based on industry and services. But respect to other CEECs, Slovenia has some peculiarities that have influenced landscape features. While in most CEECs the former regimes imposed agrarian collectivism, in the former Yugoslavia, the Rural Reform of 1965 introduced small-farm ownership (Elliott and Lowe, 2001; Prasnikar *et al.*, 2003). Over time this model favoured the conservation of traditional landscape features, characterized by the presence in the same field of vineyards, orchards, cereals, vegetables, meadows and shrubs. Consequently, the landscape took on the appearance of a "mosaic" of crops and plantations. We can therefore say that small-farm ownership defended landscape biodiversity against the monoculture of the collectivist model. In this context the main problem arises from the absence of a natural turnover in agricultural workers. Old farmers tend to sell their farms to a very limited number of entrepreneurs, who tend increasingly to unify and consolidate the parcels of land. This leads to the disappearance of the traditional "mosaic" feature of the landscape, substituted by extensive farming, in particular extensive farming of vineyards (Visintin, 2004).

If the Italian scenery is well known to the authors (Marangon and Visintin, 2002; Tempesta, 1998), no information about emergencies affecting the Brda rural landscape was available. In order to recover data, structured interview was preferred to focus group analysis, because we supposed that the presence of relevant people in the focus group could affect the confrontation. Interviewees chosen among qualified people [1] were submitted to a structured interview form listing questions that are effective in obtaining information on attributes and levels of the landscape, preferences and emergencies. This phase had been particularly important in order to

[1] Mayor of Brda, Director and Chairman of Brda's Social Wine Cellar, Director of Wine Route, Institute for Agricultural Development, Architect, Agricultural Unions, local historian, public employees.

guarantee the validity of methodologies. Certain biases claimed to be associated with CVM are often pointed out (*e.g.* the lack of information on what is valued) (Santos, 2001). Owing to the first step of analysis, two Brda scenarios were defined: The "mosaic" representing the desired scenario and the extensive farming representing the "emergency".

As in the Italian case, the hypothetical scenario and policy issue were described to the respondent as follows:

> *"Agricultural development and the rural landscape are undergoing change. In some areas, the extensive farming is increasing. The unification of farmlands, and the re-parcelation in particular, is destroying the traditional features of the rural landscape. The main problem regards the conservation of the traditional rural landscape, the so-called "mosaic", for historical and cultural reasons. The Government is going to introduce a law that provides subsidies for farmers involved in landscape conservation programs, and taxes will increase as a consequence. In a consultative referendum, would you vote "Yes", and agree to contribute towards the conservation of the "mosaic" landscape, paying the bid amount? Or, on the contrary, would you vote "No", and reject making a contribution towards the conservation of the "mosaic" landscape, accepting the* status quo *policy at zero cost?"*

Once more, two photos were submitted illustrating the two choice alternatives: "mosaic" landscape (the *status quo*) and extensive farming.

The scenario was proposed to two sub-groups: residents and non-residents.

In both the surveys questionnaires asked for individual preferences regarding the qualitative features of the rural landscape.

Results

This section is divided into two parts. In the first one we present the results of the qualitative analysis, and in the second the findings of the estimative analysis.

Qualitative analysis

In the first part of the questionnaire the respondents were asked about their preferences on landscape attributes. Two questions focused on attributes that may qualify the landscape, and elements that may worsen the landscape. Table 1 shows the percentages of preferences that respondents assigned to each attribute according to the area studied.

Responses in the Italian survey focused more on natural and agricultural features than in the Slovenian one. Italian respondents assigned an important role to the presence of woods, rivers, vineyards, and in particular to the use of wooden poles to support the vines. The effect of socio-economic variables on landscape attributes was examined with bivariate tests (Pearson correlation coefficient, chi squared test). Results showed that at the 0.01 level WTP is negatively correlated with behavioural variables (hunting, fishing and mushroom harvesting in the area), age of respondent,

Table 1. **Role of attributes in qualifying the rural landscape**

	Very important			Quite important			Not very important			Not important		
	Col-Cof	N-G	B	Col-Cof	N-G	B	Col-Cof	N-G	B	Col-Cof	N-G	B
Trees and hedgerows	57			42			1			0		
Poplar groves	12			26			43			19		
Ditches	40			46			12			2		
Local architecture	62	80	87	34	18	11	4	1	2	0	1	0
Woods	67	55	63	32	32	26	1	12	10	0	2	1
Cultivated fields		49	55		39	31		6	7		7	8
Uncultivated fields		10	13		32	11		22	8		36	68
Churches, monuments		63	89		31	11		6	0		1	0
Rivers	77	76	87	23	21	13	0	3	0	0	0	0
Orchards	56	65	86	38	29	13	6	7	0	0	0	0
"Mosaic"		70	86		20	10		9	5		1	0
Olive groves		41	71		41	18		15	11		4	0
Small fields		42	37		28	42		23	10		7	13
Meadows	52	32	23	44	36	39	4	23	32	0	9	7
Dirt roads	34	30	24	43	27	40	19	35	26	4	8	10
Vineyards	62	86	84	27	14	15	10	1	2	1	0	0
Grass between vine rows	63	39	63	25	30	21	11	19	11	1	12	5
Wooden poles	67	71	82	23	20	15	10	7	3	0	2	0
Hill villages		83	94		17	5		1	2		0	0

Notes: N-G: Nova Gorica (non-residents), B: Brda (residents)

and positively correlated with education. At the 0.05 level WTP is negatively correlated with the presence of some attributes: Vineyards, grass between vine rows, wooden poles and hill villages, and the absence of industries and urban houses. Respect to other socio-economic variables WTP is positively correlated (at the 0.05 level) with income and negatively with some professions (student, retired, housewife). Living in rural areas assigned more value to vineyards (vineyards, grass between vine rows and wooden poles), orchards and wood respect to other attributes. High scholarship interviewees preferred woods and rivers. The profession and in particular father's profession influenced preferences. Farmers' son appreciated vineyards, grass between vine rows and wooden poles more than farmer himself. Medium-low income families preferred trees, hedgerows and rivers, while medium-high income levels vineyards (vineyards, grass between vine rows and wooden poles). Young people assigned high value to bucolic landscape: Wood, rivers, meadows, vineyards.

On the other hand, for resident Slovenian respondents, hill villages, churches and historical monuments, and local architecture were the three most important attributes of the rural landscape. Non-resident Slovenians assigned the three highest preferences to vineyards, hill villages and local architecture. The response rate for vineyards was also high in the case of residents. The Brda attributes list was selected during the first step (structured interview). Qualified interviewees were asked to choose and assign preference among the list of attributes adopted in the former research in Collio. They could select from them and add new attributes that represent the Brda rural landscape from their point of view. Every qualified interviewer stressed the relevance of two new attributes over local architecture: Hill villages, churches and historical monuments. It depends on the history of the area. During the former Yugoslavia the Government assigned a relevant role to the so-called "new Slav identity", preferring new buildings rather than conserving historical buildings/monuments. Nevertheless the marginality of the area helped preserve from demolition but not from abandon the historical features, which today are affected by a rediscovery. Rural landscape is built up not only of natural and agricultural features but also of cultural features: Local architecture, hill villages, churches and historical monuments.

The large number of preferences for the "mosaic" landscape is an important finding. "Mosaic" is the landscape that is characterized by the presence of very small fields containing rows of grapevines, orchards, trees, hedges, meadows and woods. This kind of cultivation mix is what residents defined as "mosaic" landscape during the first step (structured interview).

Clearly, the findings indicate that residents are more sensitive towards attributes that not only qualify the landscape, but are also evidence of their history. Residents and non-residents are interested in maintaining vineyards, even if they are submitted to the previous restricted clause.

Estimative analysis

Economic valuation measures change in individual welfare associated with variations in environmental quality. The Compensative Surplus (CS) measures the quantity of income necessary for improvements that the individual is willing to pay.

Consider an individual i having an indirect utility function $U(j,Y)$, where j is a binary variable assuming value 1 if the event occurs, and 0 on the contrary, and Y is the income. We assume that:

$$U(1,Y) > U(0,Y) \tag{1}$$

WTP corresponding to the CS respects the following equation:

$$U(1,Y - WTP) = U(0,Y) \tag{2}$$

Neoclassical economic theory assumes that the decision-maker has a perfect discrimination capability. In this context, however, the analyst is supposed to have incomplete information (unobserved alternative attributes, unobserved individual attributes, measurement errors) and, therefore, uncertainty must be taken into account.

The utility is modelled as a random variable in order to reflect this uncertainty. More specifically, the utility function can be separated into a deterministic component, V_{ij}, and a stochastic component, ε_j (j=0,1), capturing the uncertainty. The composed utility function introduces McFadden Random utility models (McFadden, 1974) and the distribution of the error term, ε, determines the probability of choice (Hanemann, 1984; Hanemann and Kaninnen, 1996).

Therefore (2) can be written as:

$$V(1,Y - WTP) + \varepsilon_1 = V(0,Y) + \varepsilon_0, \tag{3}$$

where $V(\ )$ is the mean of the casual variable $U(\ )$.

The interviewee will accept to pay the amount, bid_i, if and only if:

$$V(1,Y - bid_i) + \varepsilon_1 \geq V(0,Y) + \varepsilon_0 \tag{4}$$

The probability of choice j is a casual variable whose probability distribution is given by:

$$\begin{aligned} Prob(Yes|bid_i) &= ProbV(1,Y - bid_i) - V(0,Y) \geq \varepsilon_0 - \varepsilon_1 \\ &= ProbF(\Delta V) \geq \eta \\ &= F_\eta(\Delta V) \\ &= 1 - G_{WTP}(bid_i) \end{aligned} \tag{5}$$

where $F_\eta(\Delta V)$ is the cumulated density function (cdf) of $\eta = \varepsilon_0 - \varepsilon_1$ and $\Delta V = V(1,Y - bid_i) - V(0,Y)$.

The solution of the probability distribution function $Prob(Yes|bid_i)$ implies the specification of both stochastic $F_\eta(\Delta V)$ and deterministic component.

The approach to discrete dependent variable implies the adoption of logistic (model logit) and normal (probit model) cumulated density function, respectively:

$$F_\eta(\Delta V) = \int_{-\infty}^{\Delta v} \frac{1}{\sqrt{2p}} . e^{-t^2/2} dt \tag{6}$$

and

$$F_\eta(\Delta V) = 1/(1 + e^{-\Delta V}) \tag{7}$$

whose distributions depend on the cumulated distribution of the error term. In principle, one should use logit if one assumes the categorical dependent reflects an underlying qualitative variable (hence logit uses the binomial distribution), and use probit if one assumes the dependent reflects an underlying quantitative variable (hence probit uses the cumulative normal distribution). In practice, these alternative assumptions rarely make a difference in the conclusions, which will be the same for both logit and probit under most circumstances. Prime among these circumstances is the fact that logit regression is better if there is a heavy concentration of cases in the tails of the distributions (Green, 2000).

In the Italian survey we applied logit model, whose cdf assumes a logit distribution for the error term. Logic models are more popular than probit models due to two reasons: The exponential logistic coefficients can be interpreted as odds ratios, and there are more diagnostic tools available in logistic regression. In this manner (5) can be rewritten as:

$$Prob(Yes|bid_i) = F_\eta(\Delta V) = 1/(1 + e^{-\Delta V}) \quad (8)$$

The assumption about the functional form of U is the linear form:

$$U_j = \alpha_j + \beta Y \quad (9)$$

where $j = 0,1$; α_j is intercept; β is the marginal utility of income. ΔV can be written as:

$$\Delta V = \alpha - \beta(bid_i) \quad (10)$$

where $\alpha = \alpha_i - \alpha_0$.

Combining (8) and (10) we obtained the cdf $F_\eta(\Delta V)$:

$$Prob(Yes|bid_i) = F_\eta(\Delta V) = 1/(1 + e^{-\alpha + \beta xi}) \quad (11)$$

Maximum likelihood estimators assess α and β values. It is important to note that whatever distribution is used, the parameters are not necessarily the marginal effects. The expected value (in the linear model mean equals median) of WTP is computed with the Hanemann formula for linear models (1984):

$$E(WTP) = -\alpha/\beta \quad (12)$$

In the Slovenian survey we applied probit model, whose cdf assumes a normal distribution for the error term. In particular we applied a bivariate probit approach. Dichotomous choice contingent valuation survey frequently elicit multiple values. If individual responses are correlated across scenarios, the standard approach assessing each scenario independently may result in biased estimates of the significance of the difference in mean WTP value. The Slovenian survey analysed two scenarios: The mosaic and the field conservation, even if in this paper we report results of the first scenario. So as suggested by Poe *et al.* (1997), we applied a bivariate probit approach. In this manner assuming the former functional form of U (9) and the following ΔV expression form, the cdf $F_\eta(\Delta V)$ can be describe as follow:

$$Prob\,(Yes|bid_i) = F_\eta(\Delta V) = \int_{-\infty}^{a-bx_i} \frac{1}{\sqrt{2\pi}} \cdot e^{-t^2/2} dt \quad (13)$$

Maximum likelihood estimators assess α and β values. The expected value of WTP is computed as:

$$E(WTP) = -\alpha/\beta \quad (14)$$

Table 2 reports the main results regarding the economic valuation of the rural landscape in relation to the conservation of hill viticulture. The table shows the estimated expected value of WTP obtained with the Hanemann formula and the

Table 2. **Economic valuation of hill viticulture in Italy**

Areas	Collio	Colli Orientali del Friuli	Friuli Venezia Giulia
Number of observations	102	152	106
WTP/household/year (€)	72	113	375
α coefficient	3.2228	6.3320	2.1068
Standard error	*0.7182*	*1.2845*	*0.4640*
Wald test	*20.1368*	*24.3000*	*20.6131*
β coefficient	-0.000023	-0.000029	-0.000029
Standard error	*0.0000*	*0.0000*	*0,0000*
Wald test	*19.2865*	*15.0349*	*13.4249*
-2Log-likelihood	99.717	73.021	119.259

parameters estimates of the univariate logit model. Vineyard conservation policies in the Italian area produced benefits of € 73, € 113 and € 396 per household per year respectively for COL, COF and for the Friuli Venezia Giulia hill region as a whole.

If we consider the vineyard surface, the value per hectare is € 1,188 for Collio and € 930 for Colli Orientali del Friuli. These figures represent the subsidies that residents are willing to transfer to farmers in order to protect the viticultural landscape. These amounts should be compared with the subsidies settled by Rural Development Plan of Friuli Venezia Giulia Region (2000-2006). An agro-environmental measure like for example "Permanent grass between vine rows" is subsidized € 100 per hectare.

Table 3 shows the main findings as regards the economic valuation of the traditional "mosaic" feature of the landscape. The table shows the estimated average WTP obtained estimating a bivariate probit model from 201 useful interviews (we interviewed 234 persons). During this phase we tested the hypothesis that the landscape is a local public good, *i.e.* a good characterized by different demand for residents and non-residents introducing the dummy variable. The model did not consider consumer's characteristics. Among others, income and education level variables were included in the model, but could not improve the statistical significance of parameters and model estimates. So we decided not to include consumer's characteristics.

Conservation policies for the "mosaic" landscape in the Slovenian area produced benefits of € 239 and € 38 per household per year respectively for residents and non-residents. Owing to the surface area submitted to this conservation policy (ha. 4,500) and the number of households the landscape value per hectare rose to € 172. The sample size represented 3.8% of Brda families and 1.4% of Nova Gorica families. Despite the dummy variable divides the sample in an unequal manner, we could not submit to residents less surveys we did unless incur representative issues.

Table 3. **Economic valuation of "mosaic" landscape in Slovenia**

	Residents	Non-residents
Number of observations	62	139
WTP/household/year (€)	239	38
Standard error	*41*	*37*
Sig. Wald test	*0.0000*	*0.0307*
α coefficient	0.9812	
Standard error	*0.2659*	
Wald test	*0.0002*	
β coefficient	–0.1723E-04	
Standard error	*0.3889E-05*	
Wald test	*0.0000*	
Dummy	–0.8238	
Standard error	*0.2113*	
Wald test	*0.0001*	
Landscape value (€/ha)	87	85

Discussion

Despite the fact that similar questionnaires were used in both studies, in some ways results differed. The different socio-economic backgrounds affected our results in two ways.

Firstly, we found that there was a considerable difference in the way Italians and Slovenes valued the rural landscape. While Italians considered the development and extension of vineyards to be very important in counteracting the abandonment of rural areas, Slovenes preferred traditional landscape to vineyards, whose extension could transform the "mosaic" into a monoculture. Even if Slovenes consider vineyards to be the most significant feature in the rural landscape, it should not prevail over the "mosaic". The analysis of qualitative landscape features showed that Slovenes were increasingly interested in the conservation of historical and traditional architecture (churches, monuments, hill villages).

One possible conclusion is that the political and historical past influences the point of view of the Slovenian sample, in line with the assumption that *"beauty is in the eyes of the beholder rather than in the observed object"* (Kant cited in Lothian, 1999). The regimes of the former Yugoslavia imposed policy reform oriented towards the building of a new society through the deletion of historical and cultural landmarks. What the regime imposed did not correspond to what Slovenes preferred. Indeed in many cases rural villages were abandoned and now have been rebuilt.

Secondly, Slovenes appear to have found it difficult to apply a CVM based on a hypothetical market scenario. This may depend on the fact that during the regime of

the former Yugoslavia the management of natural resources lacked a market or quasi-market structure. The free use of natural resources in the past may have resulted in the fact that today Slovenes are not very familiar with market mechanisms in the management of natural resources. Indeed, some results might suggest that the values of the WTP are influenced by the value proposed to the respondent in the previous elicitation of the WTP (*i.e.* anchoring effect). As remarked by Zadnik Stirn and Kladnik (2001) the difficulties with the comprehension of hypothetical scenario could in some manner have biased the result of the study in two different manner: On one side rejecting the scenario in case of protest response (for ex. when the implementation of the targeted development scenario should be financed by someone else), on the other side willing to pay bids that are not comparable with household income.

Finally, considering income effect in 2006 GDP per inhabitant (in purchasing power standards at current market prices) is forecast to be € 24,900 and 19,600 in Italy and Slovenia respectively (European Communities, 2005). Despite the fact that among the two countries national income differs, we consider that these differences are insignificant because of the strictly economic bindings among the two border areas (2 million of local border passages from the Italian border area to Slovenian border area [2] and 3 million vice-versa in 2003 justified by cross-border shopping and commuting).

Conclusion

The findings give evidence to the fact that agricultural activity produces externalities that create benefits for both residents and non-residents. We applied referendum CVM to value the traditional rural landscape. The hypothetical markets were based on different development scenarios. In this way we were able to assess the value that Italians assigned to policies aiming to prevent the abandonment of viticulture in the hill area. In Brda we assessed the value that Slovenes attached to the landscape policy, which protects the traditional "mosaic" landscape against the extension of viticulture.

In general, we cannot ignore *a priori* that the assessed values could be in some way biased. Nevertheless, we tried to minimize this risk through the referendum format, which has more incentive-compatibility in counteracting the behaviour of free riders. The scenario might contribute to biased answers for several reasons, among them the lack of detail in the hypothetical scenario description. In order to reduce this source of error we showed the respondents photos and specified what the alternative policy would provide, how it would provide it, how much it would cost and how it would be paid for. In fact, the findings suggested that, in the Italian case, no embedding effect occurred, *i.e.* results were not affected by the part-whole-bias. Moreover, we hypothesised that the landscape is a local public good and consequently there were

[2] During the Cold War period, and still now, residents living in municipalities along the border could use the so-called "*lascia-passare*" (leave pass), for working and buying purposes (Battisti, 2004).

two different benefits for residents and non-residents. The findings confirmed the hypothesis.

From an agricultural policy point of view, economic valuation supports policy decision in different manner.

Firstly, defining the scale of subsidies. We know that there is a social preference toward some rural landscape characteristics, but we do not always know how much it is. The two case studies found that landscape conservation policies create a large social benefit, to which corresponds an economic amount representing the economic valuation of social benefit. For the social benefit produced, the farmers receive little if any remuneration. Consequently, we believe that the development and reinforcement of rural landscape conservation policies should be accepted also from a social and not only from an economic point of view. Subsidies supporting landscape conservation should also be granted to farmers in the future.

Secondly, ordering alternatives. If social benefit is known, the choice between alternative approach to urban and landscape planning takes into account preferences of local community. "Assigning value" answers to the question if landscape attributes should be conserved.

Finally, applying participative process. Policy makers tend to involve local communities in the decision process. It means that policy makers decide not only referring to economic but also to social and environmental indicators. This approach leads to draw up economic reports and more often environmental and social reports. The value that community assigns to landscape attributes represents a valid indicator in environmental and social reports.

We distributed 360 questionnaires for the Italian survey and 201 for the Slovenian one. The data collected were used to estimate the economic value connected with the conservation of specific landscape features. However, we feel that more research should be done in order to investigate the difficulties connected with the implementation of a market mechanism in CEECs, and to develop the study of cross-border landscape features.

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