Measuring public preferences for the conservation of the traditional farm landscape

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Measuring public preferences for the conservation of the traditional farm landscape

Peter Howley¹, Stephen Hynes² and Cathal O’Donoghue¹

¹Rural Economy Research Centre, Teagasc, Athenry, Galway, Ireland
²Socio-Economic Marine Research Unit, J.E. Cairnes School of Business and Economics, National University of Ireland, Galway

Abstract: This paper explores individuals’ attitudes towards the traditional farm landscape. Results from a Generalised Tobit Interval model of willingness to pay for traditional farm landscape protection suggest that individuals are more willing to pay to support agricultural activities aimed at protecting landscape features associated with the wider biological and cultural diversity of the countryside (such as woodland, bogland, wild flora and fauna, water quality and aspects associated with our cultural heritage) than what could be described as more obvious and scenic landscapes associated with farming activities (such as open grass covered fields, grazing farm animals and well maintained traditional farm buildings). More generally, the results indicate broad public support for second pillar objectives under the Common Agricultural Policy (CAP) such as the protection of the traditional farm landscape.

Keywords: Farm landscape, willingness to pay, factor analysis, multifunctional agriculture, CAP

*Corresponding author: Peter Howley, Rural Economy Research Centre, Teagasc, Athenry, Galway, Ireland, Email: peter.howley@teagasc.ie, Tel: +353 (0)91845295
Introduction

Since the early 1990s, there has been a new found interest in the multifunctional aspects of agriculture and attitudes towards the rural landscape and its conservation has changed (Mather and Nijnik, 2006; Borsotto et al., 2008). In particular, society increasingly utilises the rural landscape for a variety of purposes and its protection is now seen as much more important by modern consumers (Vos and Meekes, 1999). Increased affluence, population growth and changing values have all operated to increase the demand for environmental amenities. Agriculture, in addition to supplying market goods, jointly produces a number of public goods such as landscape elements and services that are valued by society (Vanslembrouck et al., 2002). The term ‘multifunctionality’ has been widely used to conceptualise the wider external effects of the agricultural sector.

In addition to providing us with food and other raw materials necessary for our survival and maintaining economic activity in rural areas (Kelch and Normile, 2004), farming activity has environmental (Firbank, 2005; Cocklin et al, 2006; MacMillan et al. 2004), aesthetic (Vanslembrouck et al., 2005) and social functions (Gerowitt et al, 2003). While food security was the dominant concern for consumers at the onset of the Common Agricultural Policy (CAP), concerns relating to the environment are becoming increasingly important for citizens of the EU (Rogge, 2007; Nijnik et al., 2008). Traditionally, direct payments under the CAP linked payments to production (Ackrill, 2008; Swinbank and Daugbjerg, 2006) which stimulated the intensification of agricultural production leading to the degradation of the rural landscape in many areas throughout Europe (Broewer and Lowe, 2003; Huylenbroeck and Durand, 2003). For
example, the European Community’s Fifth Environmental Action Programme concluded that “farming practices in many regions of the community have led to over-exploitation and degradation of the natural resources on which agriculture itself ultimately depends: soil, water and air” (European Commission, 1992; p.15).

Since the European conference on rural development hosted in Cork in 1996, an increasing policy emphasis has been placed on landscape preservation within the EU (Huylenbroeck and Durand, 2003; Ferrari and Rambonilaza, 2008). It was argued at the Cork conference that the public good nature of the rural landscape renders land market allocations suboptimal and therefore there is a need for policy to encourage landowners to manage land in a socially desired manner. This, in part, led to the Agenda 2000 reforms in which rural development policy was enshrined as the second pillar of the CAP. The development of the second pillar establishes a new balance between traditional support based on agricultural production and that of non-market goods such as the protection of the rural landscape.

Under the second pillar, resources are being targeted towards measures addressing the multifunctional agenda of farming activity. In particular, the Rural Development Regulation (RDR) measures aim to “help European farmers take up their multifunctional role as custodians of the countryside” (EC, 2004; p.6). More recently, under the Mid-Term Review of the CAP in 2003 the EU upgraded the status of non-agricultural objectives from ‘optional extra’ to ‘intrinsic component’ and presented a broad range of multifunctional elements as key ingredients of the future direction of agricultural policy.
Furthermore, the European institutions extended the list of objectives of the CAP outlined in the Rome treaty to stress the need for the preservation of rural public goods (Bureau and Mahe, 2008). This sends an important signal to all stakeholders that future reforms will undoubtedly place a greater emphasis on supporting the multifunctional agenda (Burrell, 2004). Estimating what the taxpayer is willing to pay for environmental objectives such as the protection of the traditional farm landscape and what factors influence willingness to pay (WTP) is an important undertaking, as ultimately it is the EU citizens who pay for the Common Agricultural Policy and related Agri-environmental schemes.

This study uses contingent valuation (CV) methods to estimate individuals’ WTP for the protection of the traditional farm landscape. The use of stated preference techniques for agricultural policy and landscape valuation has increased significantly in recent years. Some examples include Campbell et al. (2006) who report the findings from a discrete-choice experiment designed to estimate the economic benefits associated with rural landscape improvements in Ireland. Results from this work indicated that the landscape benefits associated with the Rural Environmental Protection Scheme in Ireland alone amounted to almost the entire cost of the scheme. Highest WTP values were found for preserving ‘rivers and lakes’ and ‘wildlife habitats’ which was followed by ‘cultural heritage’, ‘mountain land’, ‘farmyard tidiness’, ‘stonewalls’, ‘pastures’ and ‘hedgerows’. Rambonilaza and Dachary-Bernard (2007) also valued landscape attributes (hedgerows, moorland, farm buildings) of the Monts d’Arée area in Brittany, France. The authors conclude that there exists a divergence of preferences between the users on the one hand
and the policy makers (landscape managers) on the other. This is important given that it is much debated in the literature as to the best way to evaluate the landscape for planning purposes (see Swanwick, 2009 for a review). Many commentators assert that landscape policy should be focused on expert evaluations. The alternative view is that landscape policy should be based on public preferences as distinct from expert ratings and essentially captures the idea that experiential value is significant.

Hunziker et al. (2008) evaluated how different societal groups perceive past and future Swiss landscape changes in the Alps. Their results show a rather broad consensus among different social groups regarding major landscape developments. However, they also report significant differences between groups such as people living inside and outside the Alps, and between lay people and experts. Columbo et al., (2009) in a study in the North West of England found that the public were willing to pay €12.11 per household per year to conserve upland hill farming. Finally, Schmitz et al. (2003) used the choice experiment method to evaluate individuals’ WTP for various non commodity outputs from agriculture in a rural part of Germany. The survey included four attributes with five levels each: Water quality, richness in species, landscape characteristics and a hypothetical price per household. The authors report the WTP for selected scenarios combining different attribute levels: a scenario with no support and forestry instead of agricultural land-use, which was found to result in negative WTP. However, a scenario with balanced land-use (crop and grassland) and an increase in species diversity resulted in a positive WTP.

This paper adds to this work by examining individuals attitudes towards various physical attributes of the rural environment and their WTP for protecting the ‘traditional farm landscape’. Using factor analysis two variables representing the importance respondents
place on different characteristics of the rural landscape were derived. These variables were then utilised in a Tobit model to ascertain if individuals were more willing to pay to support the protection of particular landscapes over others. More specifically, a Generalized Tobit Interval model was estimated via maximum likelihood procedures where respondents’ willingness to pay for the protection of the traditional farm landscape is modeled as a function of their attitudes towards countryside landscape features (as disclosed in the factor analysis), the socio-economic characteristics of the respondents themselves and the location where they reside. The average WTP of individuals’ for agricultural activities aimed at the conservation of the traditional farm landscape is also estimated based on the model results. Analysis of consumer attitudes towards the countryside and their WTP for protecting the traditional farm landscape can provide information from which policymakers can ascertain if policy measures aimed at enhancing and protecting the rural landscape are in line with citizens’ views and expectations.

Methodology

Data Collection

A survey of 500 individuals living in Ireland was conducted between November 2008 and January 2009. A quota controlled sampling procedure was followed to ensure that the survey was nationally representative for the population aged 18 years and above. Quota sampling sets demographic quotas on the sample based on known population distribution figures. The quotas used here were based on known population distribution figures for age, sex and region of residence taken from the Irish National Census of Population
undertaken in 2006. Interviews were spread across different days of the week and across different times of day to ensure all population sub groups had an equal chance of being interviewed. Pilot testing of the survey instrument was conducted prior to the main survey. Along with expert judgment and observations from earlier focus group discussions, results from the pilot were used to refine the questions asked in the main survey. Respondents in the survey were asked a number of questions in relation to their personal characteristics such as age, gender, location, income, family status and involvement of themselves or relatives in the agricultural sector. In addition, they were also asked a series of questions as to their attitudes towards the environment and the countryside in general and their WTP for agricultural activities aimed at protecting the traditional farm landscape.

**Questionnaire design**

In order to ascertain respondents’ views on a variety of landscape characteristics they were presented with 9 countryside landscape attributes. They were then asked to indicate on a scale from 1 to 10 how important the protection of each particular attribute was to them with 10 being most important and 1 being least important. The selection of these landscape attributes was informed from focus group discussions along with expert judgment as to what would be the most relevant attributes to include for respondents. The CV technique was used in this analysis to capture the value of the traditional farm landscape. This technique has been used extensively in estimating the value of environmental goods (see for example Pruckner, 1995; Bateman et al., 1996; Kline and

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1 The survey company RED C Research & Marketing was hired to conduct the interviews for both the pilot and main phase of the survey.
Wichelns, 1996; Fleischer and Tsurz, 2000; Dupont, 2004; Buckley et al., 2009; Caula et al., 2009) and provides useful information to decision makers, in cases when a market for some goods is absent (Arrow et al., 1993; Bishop and Romano, 1998; Jacobsson and Drugun, 1996). The idea behind CV is to create a hypothetical market for the good being examined, in this instance the traditional farm landscape, for individuals.

Estimates of consumers’ valuation of the good are then derived contingent on a description of a hypothetical change in the particular resource being assessed (Bateman and Willis, 1999; Hanley and Splash, 1998). In terms of advantages, the contingent valuation method (CVM) is a relatively simple and flexible method for estimating the total value of non-market goods (Carson, 2001). In terms of disadvantages, critics have raised concerns relating to sampling error and hypothetical bias. These disadvantages have been discussed extensively in the literature and so are not described here (see Carson, 2001; Hanley and Splash, 1998; Venkatachalam, 2004). Nevertheless, as Carson (2001) notes many of the alleged problems associated with CV can be overcome with careful study design.

In determining if respondents were willing to pay for the conservation of the traditional farm landscape they were firstly informed that: “There are a number of possible future agricultural landscapes that may exist in 2030. An ever expanding world population, higher demand for food, and land being used to produce renewable energy and green materials to replace petroleum based products such as plastic could result in agriculture in Ireland becoming much more intensive. For these reasons, the environmental
pressures on the rural landscape in Ireland may increase. Therefore, under future Common Agricultural Policy reform it may be the case that farmers will be paid more for conservation activities rather than for the security of food production.

The traditional farm landscape is likely to be a subjective construct meaning different things to different people. In order to ensure consistency among respondents and to provide some guidance as to what is meant by a traditional farm landscape, respondents were given a showcard (see figure 1) illustrating a well maintained farm landscape and then asked the following question:

“Bearing in mind the importance or unimportance of conserving tradition farm landscapes for you personally; if you could be sure that your money would go to landowners for protecting traditional rural landscapes in Ireland only, would you be prepared to pay to support agricultural activities contributing to traditional farm landscape preservation so as to ensure the conservation of the Irish farm landscape as portrayed in Showcard 1” (see figure 1).

Insert figure 1 here

Those who answered the question in the affirmative were then presented with a payment card showing the bid amounts of €20, €35, €50, €65, €80 and €95 and were asked: ‘‘of these bid amounts which would be the maximum you would be willing to pay (€) each year into a conservation fund to support those agricultural activities contributing to landscape preservation. Following Cameron and Huppert (1989), the response is interpreted not as an exact statement of willingness to pay but rather as an indication that the WTP lies somewhere between the chosen value and the next larger value above it on
the payment card. Recent applications of the payment card method in the literature include Krupnick et al. (2006), Ryan and Watson (2008) and Hynes and Hanley, (2009).

The main advantages of the payment card format as opposed to other methods aimed at eliciting WTP are that it can provide a context to the bids and avoids ‘‘yea-saying’’ where some respondents answer yes to any single bid amount presented to them (Blamey et al., 1999). Furthermore, as Boyle et al., (1996; 1997) describes it can also help avoid starting point bias and the problem of outliers as a result of respondents reporting they would pay high bid amounts that exceed their true values (Boyle et al., 1997). Perhaps the biggest disadvantage associated with this method is that it can be subject to biases associated with the range of bids used on the card. In this questionnaire the price range used in the payment card was based on the responses to a pilot study which utilized the open-ended elicitation format (see Haab and McConnell, 2002). This should minimize any potential bias accruing from the bid amounts used on the payment card.

Model specification

Following Hynes and Hanley (2009) the WTP responses were treated in a parametric model, where the WTP value chosen by each respondent was specified as: $WTP = \mu + \varepsilon$. where $\mu$ is the deterministic component and $\varepsilon$ is the error term. It is assumed that $\varepsilon \sim N(0, \sigma^2 I)$. The Generalized Tobit Interval model employs a log-likelihood function adjusted to make provision for point, left-censored, right-censored (top WTP category with only a lower bound) and interval data. For individuals $j \in C$, we observe $WTP_j$, i.e. point data and for respondents $j \in L$, $WTP_j$ are left censored.
Individuals $j \in R$ are right censored; we know only that the unobserved $WTP_j$ is greater than or equal to $WTP_{Rj}$. Finally respondents $j \in I$ are intervals; we know only that the unobserved $WTP_j$ is in the interval $[WTP_{Ij}, WTP_{2j}]$. The log likelihood is given by:

$$
\ln L = -\frac{1}{2} \sum_{j \in R} w_j \left( \frac{WTP_j - x\beta}{\sigma} \right) + \log 2\pi\sigma^2 \right) + \sum_{j \in I} w_j \log \Phi \left( \frac{WTP_{Ij} - x\beta}{\sigma} \right) + \sum_{j \in I} w_j \log \left( 1 - \Phi \left( \frac{WTP_{2j} - x\beta}{\sigma} \right) \right) + \sum_{j \in I} w_j \log \left( \Phi \left( \frac{WTP_{2j} - x\beta}{\sigma} \right) - \Phi \left( \frac{WTP_{Ij} - x\beta}{\sigma} \right) \right)
$$

where $\Phi ()$ is the standard cumulative normal and $w_j$ is the weight of the jth individual.

Of the 273 usable responses, a total of 48 zero WTP values were treated as $j \in C$. A further 29 WTP values were considered right censored at €95 while the remaining 196 were treated as interval observations.

The functional relationship for the WTP estimation as well as the hypothesized signs can be specified as $WTP = \beta_0 + \beta_1 \text{income} + \beta_2 \text{age} + \beta_3 \text{education} + \beta_4 \text{children} + \beta_5 \text{siblings in farming} + \beta_6 \text{location} + \beta_7 \text{factor 1} + \beta_8 \text{factor 2}$.

where;

$WTP$ = total WTP landowners for agricultural activities aimed at protecting the traditional farm landscape

$\text{Income}$ = gross income of respondent, rescaled by dividing by 1000 (€)

$\text{Age}$ = age of respondent
**Education** = education level of respondent (0 = no third level education, 1 = third level education)

**Children** = whether the respondent has children (0 = no children, 1 = has children)

**siblings in farming** = whether they have siblings in a farming background (0 = no, 1 = yes)

**Location** = where the respondent lives (0 = not in the countryside, 1 = in the countryside)

**Factor 1** = importance respondents place on the protection of landscape features associated with the ‘biological and cultural diversity’ of the countryside.

**Factor 2** = importance respondents place on the protection of landscape characteristics associated with more obvious and scenic features of farming activities.

There were 472 useable responses from the survey. Just under half (47.7%) of the respondents reported that they would be willing to pay to support agricultural activities aimed at the protection of the traditional farm landscape. Respondents who stated they were not willing to pay anything were asked why not. Individuals who stated they were not willing to pay anything and gave one of the following reasons -1) the price is too much, (2) I do not value this type of agricultural landscape (3) I do not visit the countryside enough to justify it – were considered as point observations of €0. Respondents who gave one of the other reasons for not being WTP namely, (1) the government should pay from existing revenue, (2) they prefer other ways of paying other than taxes, (3) they do not have enough information to make a decision, (4) they do not believe such a scheme will be implemented, (5) they object to paying for this type of scheme – were considered as protest bids and excluded from the analysis (see table 1). Of
the €0 WTP responses, 48 were treated as legitimate bids while 199 were classified as protest bids and excluded from the estimation of the Generalised Tobit Interval model. In total a sample of 273 was used in the estimation of the preferred model.

Including the respondents who were classified as protest bids in the model estimation would have resulted in a lower overall WTP figure. However, we felt that after examining the results from the follow on question given to respondents who stated they were not willing to pay, many of these respondents had in fact a positive WTP for the traditional farm landscape. As such we felt including these in the WTP estimation as €0 bid amounts would have biased the results. For instance a large number of individuals who reported that they were not willing to pay reported that this was due to objections surrounding the method of payment rather than a lack of support for protecting the traditional farm landscape. As can be seen in table 1 the majority of respondents that were classified as making protest bids stated that they were not willing to pay as they felt either the government should pay from existing revenue, they prefer other ways of paying other than taxes or they objected to paying for such a scheme. It is likely that these respondents have a non zero valuation of the traditional farm landscape and as such likely to bias the results if included in the model estimation as zero bid amounts.

Twenty seven of the respondents’ that were classified as making protest bids reported that they did not have enough information to make a decision and again it was deemed appropriate to classify this as a protest bid insofar as it was difficult to know their true opinions regarding the traditional farm landscape. It would have been desirable to
provide further information regarding the good under examination for these respondents and this is something that will be looked at in future work. It was difficult to determine how to classify respondents who reported that were not willing to pay as they did not believe such a scheme will be implemented. On balance it was felt that respondents who reported that they did not believe such a scheme will be implemented did not feel that this valuation scenario was a legitimate exercise and as such were excluded from the model estimation.

*Insert table 1 here*

In terms of model specification, WTP was specified as a function of income, age, education, family structure, location and whether the respondent had siblings involved in farming. Finally, two variables representing the importance respondents place on the protection of various features of the rural landscape were also included in the model. These variables were derived through a factor analysis of respondents’ opinions on the importance of a variety of different landscape features. Factor analysis is a generic term for a family of statistical techniques which is predominantly concerned with data reduction. In the case of environmental preferences it has been previously used to disentangle consumers’ attitudes to various environmental characteristics and situations (see Karp, 1996; Kaiser et al., 1999; Nunes, 2002).

Factor analysis has widespread applications because of its potential to condense the information contained in a number of original variables into a smaller set of dimensions (factors) with a minimum loss of information. It is performed by examining the pattern
of correlations (or covariances) among independent variables and reveals simple underlying structures among these variables using analytical solutions from linear algebra. If some of the original variables are highly correlated, they are effectively ‘saying the same thing’ and factor analysis transforms this set of correlated variables to a smaller number of uncorrelated variables. As Chatfield and Collins (1980) point out, one of the main uses of factor analysis lies in reducing the dimensionality of the data in order to simplify later analysis. In this paper, factor analysis is employed to reduce the data pertaining to respondents’ importance ratings of a number of landscape features into a smaller set of variables for use in further multivariate analysis.

**Results**

*Factor Analysis: Attitudes towards the rural landscape*

Table 2 lists the landscape attributes that respondents were presented with and mean scores of each. Respondents rate the protection of the various landscape types as important as indicated by the high mean score for each of the attributes under examination. The highest mean score was for water quality at 9. Using a paired sample t-test the difference in the mean score between water quality and the remaining landscape attributes was found to be statistically significant at the 1 percent significance level. This was followed by grazing farm animals and open grass covered fields. The difference between respondents’ importance ratings of these landscape features and the remaining landscape attributes was also found to be statistically significant at the 5 or 10 percent significance level. With the exception of preserved bogland, the difference between the mean scores of the remaining landscape attributes was not statistically significant. The protection of bogland was rated by respondents as the least important of the landscape
attributes included here and the difference between the mean score for bogland and all of the other landscape attributes was statistically significant at either the 1 or 5 percent significance level. Although a visual analysis of Table 2 allows informal assessment of patterns in individuals’ opinions of the importance of landscape features, the analysis is complicated by the large number of features that respondents were asked to assess and the associated variation in the individual scale responses.

Factor analysis was used to estimate a smaller number of underlying variables that together account for a large percentage of the observed variation in the individuals’ responses. This technique can be thought of as identifying underlying themes that may assist in understanding observed response patterns (Variyam et al., 1990). In conducting the factor analysis a correlation matrix was firstly devised to detect any possible relationships between the 9 landscape features listed in Table 2. The matrix showed highly significant correlations between the variables. Given that the variables with high intercorrelations could reflect similar underlying themes, it was thought useful to employ a factor analysis (principal component with varimax rotation) to reduce the number of variables.

*Insert table 2 here*

The factor analysis resulted in two factors with an eigenvalue > 1, together explaining 72 percent of the variance (see Table 3). Factor 1 has a high factor loading on woodland, bogland, wild flora and fauna, water quality and features associated with our cultural heritage. Therefore this factor has been termed as ‘biological and cultural diversity’ (see Table 4). The second factor shows high factor loadings on features of the countryside
that would be associated with more obvious and scenic features of farming activity such as open grass covered fields, grazing farm animals and well maintained traditional farm buildings. Therefore, factor 2 has been termed as ‘scenic farming landscapes’. The landscape feature ‘well maintained stone walls and hedges’ has high factor loadings for both factors. It is held as representing the two factors as it logically fits both.

*Insert table 3 here*

*Insert table 4 here*

In addition to factor loadings, individual factor scores were produced which were the scores of an individual on a particular factor. The factor scores for each individual offer the possibility of their use as inputs in follow on multivariate analysis. In the following section, the individual factor scores are used in a Generalized Tobit Interval model to examine the effect of respondents’ attitudes towards various landscape characteristics on their WTP for the protection of the traditional farm landscape. Each of the respondents factor scores are relative to the sample mean, which corrects for any potential bias accruing from respondents giving positive responses “yea-saying” which could potentially inflate support for the preservation of certain landscape features (Boyle et al., 1998; Johnston et al., 2003). The factor scores have the advantage in that large numbers of highly correlated variables (in this instance respondents’ opinions on a variety of landscape features) can be reduced to a smaller more manageable number of uncorrelated variables thus eliminating any potential multicollinearity problems.
Willingness to pay: model results

The regression results from the Generalized Tobit model are presented in Table 5. The log likelihood $\chi^2$ statistic shows that, taken jointly, the coefficients in the Generalized Tobit Interval model are significant at the 1% level. In relation to personal characteristics, as expected, income was found to have a significant and positive effect on willingness to pay for the protection of the traditional farm landscape. This would be consistent with economic studies of the valuation placed by individuals on environmental goods where a significant and positive income coefficient has been widely reported (Pearce et al., 2006). Education was also found to have a significant effect on willingness to pay as the results suggest that respondents having a third level education have a higher WTP than respondents who do not have a third level education. It could be hypothesized that as individuals become more educated then their awareness of environmental issues are also likely to increase and this in turn could translate into a higher willingness to pay for measures aimed at protecting various features of the countryside.

Individuals with children also have a much higher WTP. It could be that individuals with children are more likely to use the amenity aspects of the rural landscape or be more concerned with safety aspects in relation to poor environmental quality and are thus willing to pay more than individuals who do not have children. In relation to the variable ‘siblings in farming’ it would be expected that individuals are likely to support measures such as the payment of landowners to preserve traditional farm landscapes whereby immediate family members are likely to benefit. This is evident in the results as those who have siblings involved in farming have a higher WTP than individuals who do not
have any siblings involved in farming. The location where an individual resides was also found to have a significant and positive impact on WTP as respondents who live in the countryside were found to have a higher WTP than residents who do not live in the countryside. This is in accordance with our *a priori* expectations as individuals who benefit more from a particular good (i.e. in this instance those who live in the countryside) are more likely to pay for its use.

*Insert table 5 here*

Finally the two variables ‘biological and cultural diversity’ and ‘scenic farming landscapes’ derived from the factor analysis were included in the model. Each individual was given a factor score depending on the respective attitudes to the countryside features captured within each of these variables. The coefficients for both factors are positive which indicates that unsurprisingly the importance to which individuals place on the preservation of various landscape features has a positive impact on their WTP for the protection of the traditional farm landscape. The effect of factor 2 as indicated by the size of the relative coefficients is, however, less than that of factor 1 and in addition was not found to be statistically significant at either the 1 or 5 percent significance level.

Therefore, while individuals generally attach a high level of importance to the protection of countryside features which have a high factor loading on factor 2 (such as ‘grazing farm animals’, ‘open grass covered fields’ and to a lesser extent ‘well maintained traditional farm buildings’ - see Table 1) the results suggest that this factor does not have a significant impact on individuals WTP. In other words, respondents appear much more
willing to pay to support agricultural activities aimed at protecting the wider biological and cultural diversity of the countryside such as woodland, bogland, wild flora and fauna, water quality and aspects associated with our cultural heritage than what could be described as landscape characteristics closely associated with more obvious and scenic features of farming activities captured by factor 2. Using the generalized Tobit Interval model the average WTP for protecting the traditional farm landscape was estimated at €44 per person per year. The interval based model used in this analysis takes into account that each individual may be willing to pay between his maximum stated figure and the next value up on the payment card. As such it is a more accurate method than simply using the stated value of each respondent in the sample in the modeling process.

Discussion

The rural landscape is a valuable public good that can be negatively affected by changes in landowners’ activities. Up until recently, the CAP offered subsidies and guaranteed prices to farmers, providing incentives for them to produce and guaranteeing a certain level of food production. Thus the primary aim of the CAP, originally at least, was food security for the inhabitants of the countries involved. With food, at least in developed countries, becoming more abundant, in more recent times an increasing emphasis has been placed on policy measures aimed at protecting and enhancing the quality of the environment (Kline, 1996; Bromley and Hodge, 1990; Burrell, 2004). A variety of Agri-environmental measures such as the Environmentally Sensitive Areas Scheme in Britain and the Rural Environmental Protection Scheme in Ireland have been set up with environmental protection and landscape management as its core objectives. The results
presented here would indicate that individuals feel the management of the landscape is an important objective as the protection of features of the countryside such as water quality, wild flora and fauna, woodland and bogland, grazing farm animals, open grass covered fields and well maintained stone walls and farm buildings were reported by individuals as being very important. Of the attributes examined water quality was the most valued by respondents which would be consistent with many landscape preference studies in which water related features is often reported as the most desirable landscape feature for individuals (Arriaza et al., 2004; Dramstad et al., 2006).

On its own, market forces will not guarantee the protection of desired public goods such as the traditional farm landscape. If individuals value the traditional farm landscape and are prepared to pay for it, then there may be a justification for public policy aimed at its protection. Within this context, this paper formulated a Generalized Tobit Interval model to determine respondents’ average willingness to pay for agricultural activities aimed at protecting the traditional farm landscape. Individuals were found to have a mean WTP of 44 Euro per annum which would indicate broad public support for second pillar objectives under the CAP such as the protection of the traditional farm landscape. It must be noted that this study focused on examining WTP for one of the objectives of the second pillar namely protecting the traditional farm landscape. However, the rural development objectives of the second pillar extend much further than protecting the traditional farm landscape. It is likely that if other benefits accruing from policy measures supported by the 2nd pillar of the CAP were included in any WTP analysis then
individuals would be willing to pay substantially more than the figures derived in this study.

That said, the welfare estimates derived here are lower than a number of other studies that have estimated the value of protecting traditional rural landscapes. For example, estimates from Campbell et al. (2006; 2007; 2008) of the average WTP per person per year for environmental benefits associated with specific improvements to the rural Irish landscape as a result of implementation of agri-environmental measures ranged from €90 to €210 depending on the model specification used. Elsewhere, the overall WTP for the environmentally sensitive area (ESA) policy that preserves traditional Scottish agriculture was calculated at £107.55 per household per year by Hanley et al. (1998). Finally, Visintin (2004) assessed the value that Slovenians attached to the landscape policy that protects the traditional “mosaic” landscape against the expansion of a mono-cultural rural landscape. She estimated that the average willingness-to-pay to preserve the “mosaic” agricultural landscape was €239 and €38 per household per year for residents and non-residents respectively. The difference between these welfare estimates and those in this study may in part be a reflection of the downturn in the economic fortunes of Ireland prior to the collection of the survey which would have resulted in a lower WTP additional taxation on the part of the Irish public.

Despite the potential benefits, the amount of funds currently available for Agri-environmental measures aimed at protecting the rural environment is still modest and consequently their overall effect is limited. For instance, within the EU 15 in France,
Belgium, Netherlands, UK and Denmark the share of EU receipts spent on first pillar objectives amount to 90-95%, which leaves only 5-10% for the second pillar. The situation does vary significantly across countries as other member states such as Portugal, Austria, Finland, Luxembourg, Sweden and Italy devote between 25 and 50 percent of funds towards the 2nd pillar. In Ireland 20 percent of the CAP budget is spent on pillar 1 objectives. On the whole, while there are significant differences among countries the majority of funds made available by the European Union are spent on pillar 1 objectives which are aimed at supporting agricultural markets and the incomes of farmers.

In terms of explanatory variables, results indicate that both income and education have a significant and positive effect on individuals’ WTP to support agricultural activities aimed at protecting the traditional farm landscape. Respondents who had siblings involved in farming and those with children were also much more likely to be willing to pay. In addition, those who live in the countryside were also found to have a much higher WTP for the protection of the traditional farm landscape. The analysis presented in this paper would also suggest that landscape features have a differential impact on individuals WTP for the conservation of the traditional farm landscape. More precisely, individuals have a higher WTP for measures aimed at protecting landscape features associated with the wider biological and cultural diversity of the countryside (such as woodland, bogland, wild flora and fauna, water quality and features associated with our cultural heritage - factor 1) than what can be thought of as more obvious and scenic landscapes associated with farming activities (such as open grass covered fields, grazing farm animals and well maintained traditional farm buildings).

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From a policy viewpoint this would suggest a stronger justification for Agri-environmental measures aimed at conserving the wider biological and cultural diversity of the countryside than for measures aimed at protecting the more obvious and scenic landscapes associated with farming activities captured in factor 2. It is plausible that while respondents strongly value landscapes such as open grass covered fields, grazing farm animals and well maintained traditional farm buildings, individuals may already perceive farmers as receiving payments through the CAP for these agricultural activities.

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Bateman, I. and Willis, K (Eds.) (1999) Contingent Valuation of Environmental Preferences: Assessing Theory and Practice in the USA, Europe and Developing Countries (Oxford University Press).


Visintin, F. La valutazione economica del paesaggio rurale in una zona vitivinicola della Slovenia (Brda), (2004) Tesi di dottorato, Università Ca'Foscari, Venezia.
List of tables

Table 1: Reasons given for not being willing to pay

<table>
<thead>
<tr>
<th>Reason</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>The price is too much</td>
<td>37</td>
<td>14.98</td>
</tr>
<tr>
<td>I do not value this type of landscape</td>
<td>4</td>
<td>1.62</td>
</tr>
<tr>
<td>I prefer other ways of paying rather than taxes</td>
<td>16</td>
<td>6.48</td>
</tr>
<tr>
<td>The government should pay from existing revenue</td>
<td>82</td>
<td>33.2</td>
</tr>
<tr>
<td>I do not visit the countryside enough to justify it</td>
<td>7</td>
<td>2.83</td>
</tr>
<tr>
<td>I do not have enough information to make a decision</td>
<td>27</td>
<td>10.93</td>
</tr>
<tr>
<td>I do not believe any traditional farm landscape protection scheme will be implemented</td>
<td>14</td>
<td>5.67</td>
</tr>
<tr>
<td>I object to paying for this type of scheme</td>
<td>50</td>
<td>20.24</td>
</tr>
<tr>
<td>Other</td>
<td>10</td>
<td>4.05</td>
</tr>
</tbody>
</table>

Table 2: Opinions on countryside landscape attributes

<table>
<thead>
<tr>
<th>Landscape Attribute</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>High quality water in rivers and lakes (n=486)</td>
<td>2.0</td>
<td>10</td>
<td>9.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Grazing farm animals (n=484)</td>
<td>1.0</td>
<td>10</td>
<td>8.4</td>
<td>1.9</td>
</tr>
<tr>
<td>Open grass covered fields (n=483)</td>
<td>1.0</td>
<td>10</td>
<td>8.3</td>
<td>1.9</td>
</tr>
<tr>
<td>Native woodland (n=483)</td>
<td>1.0</td>
<td>10</td>
<td>8.1</td>
<td>1.9</td>
</tr>
<tr>
<td>Well maintained stone walls or hedges (n=484)</td>
<td>1.0</td>
<td>10</td>
<td>8.0</td>
<td>2.2</td>
</tr>
<tr>
<td>Wild flora and fauna (n=483)</td>
<td>1.0</td>
<td>10</td>
<td>7.9</td>
<td>2.3</td>
</tr>
<tr>
<td>Well maintained traditional farm buildings (n=483)</td>
<td>1.0</td>
<td>10</td>
<td>7.9</td>
<td>2.1</td>
</tr>
<tr>
<td>Cultural heritage (n=482)</td>
<td>1.0</td>
<td>10</td>
<td>7.8</td>
<td>2.3</td>
</tr>
<tr>
<td>Preserved bogland (n=483)</td>
<td>1.0</td>
<td>10</td>
<td>7.6</td>
<td>2.3</td>
</tr>
</tbody>
</table>

Table 3: Factor analysis, extraction of two factors with an eigenvalue > 1

<table>
<thead>
<tr>
<th>Factor</th>
<th>Total</th>
<th>% of Variance</th>
<th>Cumulative %</th>
<th>Total</th>
<th>% of Variance</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5.5</td>
<td>60.6</td>
<td>60.6</td>
<td>3.7</td>
<td>41.0</td>
<td>41.0</td>
</tr>
<tr>
<td>2</td>
<td>1.0</td>
<td>11.2</td>
<td>71.8</td>
<td>2.8</td>
<td>30.8</td>
<td>71.8</td>
</tr>
</tbody>
</table>
Table 4: Rotated factor matrix showing factor loadings for each answer item (values > 0.5 are in bold)

<table>
<thead>
<tr>
<th></th>
<th>Factor 1: Biological and cultural diversity</th>
<th>Factor 2: Scenic farming landscapes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native woodland</td>
<td>0.81</td>
<td>0.22</td>
</tr>
<tr>
<td>Preserved bogland</td>
<td>0.83</td>
<td>0.25</td>
</tr>
<tr>
<td>Wild flora and fauna</td>
<td>0.85</td>
<td>0.27</td>
</tr>
<tr>
<td>Cultural heritage</td>
<td>0.78</td>
<td>0.36</td>
</tr>
<tr>
<td>High quality water in rivers and lakes</td>
<td>0.56</td>
<td>0.41</td>
</tr>
<tr>
<td>Well maintained stone walls or hedges</td>
<td>0.67</td>
<td>0.50</td>
</tr>
<tr>
<td>Open grass covered fields</td>
<td>0.28</td>
<td>0.83</td>
</tr>
<tr>
<td>Well maintained traditional farm buildings</td>
<td>0.30</td>
<td>0.78</td>
</tr>
<tr>
<td>Grazing farm animals</td>
<td>0.28</td>
<td>0.86</td>
</tr>
</tbody>
</table>


Table 5: Interval regression of individuals’ WTP landowners for protecting the traditional farm landscape

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Marginal effects</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Income *</td>
<td>0.22</td>
<td>0.11</td>
</tr>
<tr>
<td>Age</td>
<td>-0.10</td>
<td>0.12</td>
</tr>
<tr>
<td>Gender</td>
<td>1.48</td>
<td>3.55</td>
</tr>
<tr>
<td>Education **</td>
<td>15.09</td>
<td>4.18</td>
</tr>
<tr>
<td>Presence of children **</td>
<td>13.11</td>
<td>3.79</td>
</tr>
<tr>
<td>Siblings involved in farming **</td>
<td>17.08</td>
<td>4.88</td>
</tr>
<tr>
<td>Location **</td>
<td>11.42</td>
<td>4.32</td>
</tr>
<tr>
<td>Factor 1-Biological and cultural diversity **</td>
<td>7.18</td>
<td>1.97</td>
</tr>
<tr>
<td>Factor 2-Scenic farming landscapes</td>
<td>2.44</td>
<td>2.03</td>
</tr>
</tbody>
</table>

Log likelihood: -666.38
Likelihood ratio $\chi^2$ (9) test: 72.68
Left censored observations: 0
Right censored observations: 29
Uncensored observations: 48
Interval observations: 196

* significant at 5%, ** significant at 1%