Willingness-To-Pay and Consumer Versus Citizen Values: Evidence From Ireland

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Abstract

Environmental decision-making compares market and non-market outputs, often in terms of willingness to pay. In addition to personal, private 'consumer' preferences, individuals may adopt a citizen perspective, judging matters from the point of view of society as a whole. Under such circumstances estimated willingness to pay using contingent valuation may not be an appropriate or reliable way to capture public preferences. This paper offers evidence of such a distinction in preferences and investigates the effect on respondents' willingness to pay. Visitors to an Irish forest were asked about willingness to pay for conservation forest, and about preferences for general forest attributes from both a personal/consumer and a social/citizen viewpoint. Forest managers were also interviewed. Results support the view that individuals express different preferences when adopting a personal or a social perspective. In comparison with the personal perspective, the social perspective gives greater weight to attributes with less direct and obvious visual appeal. Personal willingness to pay is found to vary with forest type (producing the same ranking as forest mangers) and to accord with personal views on forest attributes. This contrasts with social willingness to pay which is effectively the same for all conservation forest types and is also less related to the importance that respondents accord to forest-specific attributes. These results indicate that the private/consumer versus social/citizen distinction is important, but suggest that social willingness to pay may reflect respondents' views on society and public goods in general rather than providing a social valuation of the specific public good under consideration.

Keywords: Willingness-to-pay, preferences, citizen, forest management

JEL Classification: Q0

1 Introduction

In the economics literature, it is generally assumed that rational public decision making on financing multiple-use-forestry requires that the process be founded on economic efficiency criteria reflecting consumer preferences as revealed through willingness to pay and that economic benefits should be clearly identified and valued. Since non-timber benefits are not revealed in markets, this has encouraged an interest in the non-market valuation of these outputs. However, concerns over the accuracy of non-market valuations - particularly those associated with contingent valuation studies - have been raised.

Contingent valuation has at times been claimed to be ethically wrong in procedure and/or insufficiently accurate (see, for example, Peterson, 1992; Stephens et al., 1991). Within this larger debate, the work reported in this paper draws particularly on the personal/consumer versus social/citizen distinction introduced by Sagoff (1988; 1994) and others (Margolis, 1982; Kohn, 1993; Vadjnal and O'Connor, 1994; Blamey *et al.,* 1995; Curtis and McConnell, 2002; Goksen et al., 2002; Nyborg, 2000; van Rensburg *et al.,* 2002).

Sagoff (1988) suggests that whereas individuals act as consumers adopting a personal perspective when confronted with personal or self-regarding wants and interests, when faced with difficult decisions about the environment individuals instead act as citizens, adopting a social perspective. This issue is dealt with by Blamey et al., (1995) who suggests that contingent valuation provides useful information that can inform the political process when the focus is on public goods, but not information that should be used in cost-benefit analysis. Nyborg (2000) presents a formal model in support of the above in which individuals have two distinct preference orderings: personal well-being functions for consumer-like contexts and subjective social welfare functions for citizen-like contexts. Nyborg (2000) cautions that contingent valuation survey design needs to be carefully framed in a manner that explicitly makes a distinction between social/citizen and personal/consumer preferences. On the other hand, Curtis and McConnell (2002) describe the results of an empirical model of neoclassical preferences with altruism in which they find no difference between the willingness to pay of respondents who profess 'citizen' or altruistic preferences and that of respondents professing private or personal preferences.

Van Rensburg et al. (2002) offer empirical support for Sagoff's position, finding clear evidence of a personal/consumer versus social/citizen distinction in stated preferences for forest attributes amongst visitors to a UK public forest. However, somewhat similarly to Curtis and McConnell (2002), they find that

median willingness to pay (MWTP) estimated using visitors' stated personal preferences differs little from MWTP estimated using social preferences. The van Rensburg et al. (2002) study used a single dependent variable for willingness to pay, distinguishing personal willingness to pay and social willingness to pay according to which set of forest attribute preferences (personal or social) were used as explanatory variables in the estimation of MWTP. This led to three main points of interest. Firstly, both personal and social MWTP for conservation forest were positive, but varied little across different conservation forest type options. Secondly, for a given conservation forest type, the difference between estimated personal and social MWTP was not large. Thirdly, the ranking of forest types according to MWTP was unaffected by whether personal or social forest attribute preferences were used.

The study of Irish forest visitors reported below builds on van Rensburg et al. (2002) using an otherwise similar survey that now explicitly asks each respondent to adopt either a personal perspective or a social perspective when replying to the willingness to pay question. One might perhaps expect this use of two distinct dependent variables would more reliably distinguish between personal/consumer and social/citizen willingness to pay. It is of interest then, that the results that follow below differ from those of van Rensburg et al. (2002) on all three points.

The research reported here is based on data from a survey of visitors to Portumna Forest Park located on the northern shore of Lough Derg, Co. Galway, Ireland. The park was acquired in 1948 by the Irish government and is now owned by Coillte Teoranta, a private limited company established in 1989. Coillte is responsible for the management of the Republic of Ireland's public forests, managing an estate that has increased in area from 376,000ha in 1989 to 441,000 ha in 2001.

2 The Portumna Forest Survey

Portumna forest is made up of four distinct forest types. In the following descriptions, characteristics for the three 'conservation' stand classes are considered relative to "profitable Sitka spruce forest", described first.

Sitka spruce conifer forest is managed as a commercial crop where trees are clear felled at the economic optimum of 45 years. Comprises a single coniferous species of uniform age, height, texture and colour with no open space or open vegetation patterns provided and no deadwood retention. Has a pronounced impact on fauna and flora. Trees are clear felled in large coupes (2 x 125 ha) with no naturalisation of patch or clearcut shape. Landscape design principles are not applied. Young crops

support populations of plants, insects and reptiles but understorey diversity diminishes after 7-10 years with decreasing below-canopy light levels. Public access, trails and picnic areas and facilities are not provided within the forest matrix.

Mixed conifer and broadleaved forest ('Mixed') is dominated by coniferous species (90% of species include sitka spruce, lodgepole pine, norway spruce, larch), although a broadleaf margin (ash, birch, hawthorn) is included along corridors and stream edges. Has mixed species and diversity of age classes (heights) and felling is delayed 30 years for approximately 10% of the norway spruce and larch. Landscaped to harmonise with landforms and trees are clear felled in small coupes (10 – 50 ha). Open areas and glades near streams, rivers and ponds give the site a very open appearance. No timber is left for deadwood (standing or on forest floor). A few years after establishment maintains high numbers of rodents which support kestrels and provide seasonal grazing for deer. Older crops produce cones which maintain small mammals and song birds such as crossbills and siskins. A range of facilities including an amenity car park, picnic sites, disabled access, footpaths and forest drives are designed to encourage public access and facilitate wildlife viewing.

Native semi-natural forest ('Natural') is composed mainly of naturally regenerated native broadleaved species (80% of forest matrix is ash, oak, birch, hawthorn, elder, holly, hazel) and native pine. Tree species and age diversity is high, and a proportion (20%) of very old tall trees with old growth characteristics as well as deadwood, snags, logs and woody debris is retained. Felling is restricted to small coupes (10 ha) and the forest complex includes some open areas particularly on river and roadsides corridors. This is the best class of site for ground flora, deer, small mammals (including bats), moths, butterflies and many insect species and reptiles. Broadleaves and standing deadwood provide good habitat for raptors, woodpeckers, redstarts and spotted flycatchers. Aquatic features enhance habitat heterogeneity, support wildlife and naturalise the site. An amenity car park is provided with picnic tables, although public access is restricted for 40% of the site to conserve its flora and fauna. No forest walks are provided and disabled access is not included.

Native pine forest ('Pine') is managed as a commercial crop with no openings such that there is a single age class (uniform tree heights) of forest with a rotation age of 45 years but which includes 5% of the crop retained as deadwood. The un-fragmented forest matrix has a very open appearance due to moderate tree stocking. This promotes the shrub and forb understorey and gives improved seasonal grazing for deer and small mammals and a marginal improvement for bats. There is a small increase in some songbirds,

and in reptiles, amphibians and fungi. The main benefit is greater diversity of insects, particularly moths and butterflies. Native pine forest provides cones which support squirrels and small mammals and several songbird species. An amenity car park is provided with picnic tables, although public access is restricted for 10% of the site to conserve its flora and fauna. No forest walks are provided and disabled access is not included.

A survey of visitors to Portumna Forest was undertaken on behalf of Coillte by staff of the National University of Ireland, Galway. An initial pilot survey was conducted over five days in March 2003. The full interview sample was taken at Portumna forest between the months of June to December 2003.

In addition to informing general survey design, the pilot was used to gauge the likely range of respondents' willingness to pay in order to inform the bid design of the main survey. An open-ended bid design was used in the pilot survey as recommended by Boyle et al. (1998) and Langford et al. (1998), followed by a single bounded dichotomous choice design in the main survey. Alternatives to this bid design have been discussed in the literature, however so long as bids are chosen with care and the sample size is reasonably large, it is not clear that the alternatives offer any real advantage (see Langford et al., 1998; McLeod and Bergland, 1999; Calia and Strazzera, 2000). The use of pilot data to choose bids in the main survey was informed by Kanninen (1995), Hanemann and Kanninen (1998), Creel (1998) and Boyle et al. (1998). Description of the main survey now follows.

Each interviewee was told:

> "You will be given a list of forest characteristics and asked how important they are. You will be asked about these forest characteristics twice. Firstly, you will be asked which forest characteristics <u>you personally</u> feel are important. You will then be asked to consider the same forest characteristics again, but this time from the viewpoint of <u>society as a whole</u> – including characteristics that are important for the functioning of forests and including future generations of people yet to come. As you answer these questions, please consider whether what <u>you personally</u> find important about forests is the same as, or different to, <u>society as a whole</u>."

All interviewees were presented with the following list of 19 forest characteristics: birds ('Bird'); mammals ('Mammal'); broadleaf trees in addition to conifers ('Broad'); well-marked walkways ('Walk'); public car parking ('Park'); old and tall trees ('Old'); attractive to look at ('Attract'); has widely spaced trees admitting light ('Light'); helps reduce global warming ('Warm'); information for visitors ('Info');

dead wood and dying trees ('Dead'); some clearings without trees ('Clear'); picnic tables ('Picnic'); fungi ('Fungi'); reptiles and amphibians ('Reptile'); insects ('Insect'); flowers and other plants ('Flower'); mixture of conifer species ('Conifer'); helps reduce flooding ('Flood').

Interviewees were then told: "We are interested in your personal opinions about forests in general. Please indicate which statement you most agree with by circling the appropriate number". Each of the 19 attribute statements was of the form: "To me personally, that a forest has a mixture of conifer species is…". The numbers and descriptors offered as responses were:1 - unimportant to me personally; 2 - neither important or unimportant to me personally; 3- somewhat important to me personally; 4 - very important to me personally; 5 - most important to me personally; 99, don't know personally. The use of this unusual asymmetrical response scale was informed by the pilot survey, in which almost no respondents said that a given attribute was 'unimportant'.

It will be apparent that interviewees were repeatedly reminded that the initial questions are concerned with their personal preferences. Following the initial 19 questions, interviewees were told "Thank you for telling us your personal opinions".

All interviewees were then asked:

> "Would you now think about the same characteristics from the point of view of society as a whole, including characteristics that are important for the functioning of forests and keeping in mind the interests of future generations. Please indicate your assessment of the importance of the characteristics from that perspective."

The same attribute list and response options were repeated except that now in every instance the statement "me personally" was replaced by "society as a whole".

In addition to providing useful data in their own right, these initial 38 questions on both personal and social forest attribute preferences provide an opportunity for all interviewees to reflect on their preferences in particular instances, and to consider in a context-specific way whether or not their preferences exhibit the personal/consumer versus social/citizen distinction noted above. This process aims to assist respondents to respond meaningfully to the questions on willingness to pay that follow.

Each respondent was then told:

> "Portumna forest includes a number of different forest types. At times these are cleared and replanted. Coillte has a site of 250 acres (100 ha or 100 football pitches, 15% of

> Portumna forest) which is about to be replanted and is deciding what type of new forest to have. There are two options: profitable Sitka spruce forest and this *x* site."

where *x* was one of the three 'conservation' types of stand described above.

The interviews were conducted in the Portumna forest car park located in the centre of the forest. Respondents were shown two showcards, one illustrating profitable Sitka spruce forest and the other illustrating *x* and reference was made to stands of profitable Sitka spruce forest and the *x* site located within Portumna forest. All respondents were interviewed at the end of their visit after they had spent time in the forest but just prior to departing from the forest car park. Respondents were also shown a map of the area in question and details for each option were read out by the interviewer.

Immediately after being presented with this information, respondents were asked: "Which of these options do you prefer?" Respondents were also asked to briefly explain why they selected their preferred option. Those who preferred the Sitka spruce option were asked a series of questions covering general information including household characteristics, their attitudes to the environment, membership of environmental groups and participation in forest nature reserves and other protected areas. These respondents were not asked about-willingness-to-pay. Respondents who preferred *x* were asked about willingness-to-pay before going on to the same series of general questions.

The willingness-to-pay question took the following form. Respondents were first told:

> "Planting this less profitable *x* site at Portumna costs Coillte money compared to profitable Sitka spruce forest. This cost could be paid for by the general public from increased annual taxes so it is important to find out how much if anything the public would be willing to pay to have 250 acres of this *x* site instead of profitable Sitka spruce. Bear in mind however your total budget and how much you can afford to spend just on Portumna. Remember also that 250 acres is not a very big area and that paying too much on Portumna may mean that you cannot afford other worthwhile conservation schemes – for example there are other forests."

All respondents who preferred conservation site *x* were then asked: "Are you willing to pay something toward the extra cost in order to have 250 acres of *x* rather than profitable Sitka spruce forest?" Respondents answering "No" to this question were asked which of several statements best described why they were not willing to pay anything. Respondents answering "Yes" were asked one of two willingness to pay questions.

Half of the interviewees were randomly assigned the personal/consumer willingness to pay question:

> "You have now considered the importance of forest characteristics to you personally and also the importance of forest characteristics for society as a whole. Bearing in mind the importance or unimportance of forest for you personally, are you willing to pay €*y* per year in increased taxes towards the cost of 250 acres of this forest instead of profitable Sitka spruce forest?"

The other half of all respondents were assigned the social/citizen willingness to pay question, which was identical to the above except that "Bearing in mind the importance or unimportance of forest for you personally" was replaced by "Bearing in mind the importance or unimportance of forest for society as a whole".

Using data from the pilot survey and aided by discussion in the literature (see above) bids of €10, €30, €70, €100, and €150 were chosen, assigned equally and randomly amongst interviewees.

Thus, contingent valuation was used to estimate the value of a marginal change in the supply of forest. In order to minimise respondents' expression of preferences not truly reflecting their willingness to pay on account of 'embedding', respondents were reminded that this was only one of a variety of ways of conserving biodiversity and improving landscape views. To minimise hypothetical bias, respondents were reminded also about their budget − what they could afford to spend just on this site and particularly what they were actually paying for - the size and features of this site. Respondents were told that Coillte was using this information in order to decide which forest types to use. They were told also that their answers might actually result in income tax payments. Where a zero willingness to pay was reported, a reason was sought. Protest bids were thus identified and omitted from further analysis.

180 respondents were asked to choose between profitable Sitka spruce and each of the three conservation site types, i.e. around 18 individuals were asked about their willingness to pay from a personal/consumer perspective at each of the five prices and around 18 individuals were asked about their willingness to pay from a social/citizen perspective at each of the five prices, totalling 540 individuals overall. Each interview lasted approximately 15 minutes and followed a set format. Interviewers were rotated around each conservation option each day.

The survey also included questions covering general information such as frequency of visits, distance travelled, membership of environmental/countryside organisations, and various other household characteristics.

3 Contingent Valuation Results

As is usual in the literature given the dichotomous choice format of the data, logistic regression – with dependent variable log-odds ratio of WTP - is used (for an introduction see, for example, Gujarati 2002). A notable feature of this study is that there are two dependent variables. Firstly there are 246 respondents who were asked to consider paying the bid price "bearing in mind the importance or unimportance of forest for you personally". A further 225 respondents replied "bearing in mind the importance… for society as a whole". In what follows these two dependent variables are referred to as 'personal WTP' and 'social WTP'.

Two logistic regressions were run, one for each of the two dependent variables. Thus the initial regression for dependent variable (log-odds of) personal WTP included all 19 personal forest attribute importance variables plus the other descriptive independent variables, and similarly for social WTP and social attribute importance variables. In the initial regressions, as expected, most explanatory variables were not statistically significant at the conventional 5% level, many with $p>>0.05$. Insignificant explanatory variables were stepwise omitted and the regressions rerun, giving results shown in Tables 1 and 2.

Table 1: Personal WTP logistic regression results

Table 2: Social WTP logistic regression results

In Tables 1 and 2 the dependent variable is log-odds ratio $\ln(P_i/(1 - P_i))$, where P_i is the probability of a 'yes' response to the willingness to pay question by the i^{th} respondent (i.e. the probability of willingness to pay). This is equivalent to modelling the probability of WTP as a logistic curve with function $P_i = 1/(1+\exp(-Z_i))$ where Z_i is a linear combination of explanatory variables - the estimated regression line. Use of ordinary least squares estimators would be expected to introduce bias due to heteroscedasticity , thus the method of maximum likelihood is used to avoid this (for further information see any good econometrics text for example Patterson, 2000, or Johnston and DiNardo, 1997).

Survey questions corresponding to the independent variables in Tables 1 and 2 regarding forest attribute importance were described in the previous section (e.g. 'Reptile' in Table 1 is the personal importance score for "has reptiles and amphibians"). Variable Price is the bid price presented to respondents in the WTP question. Variables Frequency (number of visits to Portumna in the last year),

Income (from 1 = less than 20,000 euros per year to 5 = 80,000 euros or over), and Visit (Do you regularly visit any other forests, nature reserves or wilderness areas? 1 = yes, 0 = no) provide simple socio-demographic information and data on engagement in environmental activities. Other general information questions asked were not found to be statistically significant in estimating log-odds of willingness to pay. 'Mixed', 'Natural' and 'Pine' are site dummy intercept variables for each conservation forest type.

In both Table 1 and 2 the Price coefficient is highly statistically significant and negative indicating that the probability of willingness to pay falls as price rises – as expected. The magnitude of the Price coefficient is somewhat similar in each table.

Regarding personal willingness to pay, Table 1 indicates that individuals who personally consider the presence of reptiles and amphibians to be a relatively important forest attribute are more likely to be personally willing to pay for conservation forest, while other forest attributes have been found not to be statistically significant. Site dummy variable coefficients in Table 1 are not statistically significant from zero at the conventional 5% level, as indicated by the p-values ("Prob.") much greater than 0.05. However, whether these dummy intercept coefficients are equal to or different from zero is (relatively unusually) not of great interest here (unlike the slope coefficients, where this is an important question). Whether they reliably differ from each other is of interest. Information on this question is provided by the estimated standard errors, considered in more detail below.

Regarding social willingness to pay, Table 2 indicates greater probability of social willingness to pay for individuals who consider that, for society as a whole, flowers and other plants are relatively important. The probability of social willingness to pay is also greater for individuals with higher frequency of visits to Portumna, higher income and greater regularity of visits to other nature areas. Site dummy variable coefficients are statistically significantly different from zero ($p < 0.05$), but again the comments above apply.

In comparing Tables 1 and 2 it is notable that apart from Price and the three site dummy variables, personal WTP is explained by only one other variable, Reptile, in comparison to social willingness to pay with four: Flower, Frequency, Income and Visit. It seems reasonable to interpret this as indicating that social willingness to pay is less narrowly dependent on the price of the good under consideration than is personal willingness to pay.

Social willingness to pay appears also to be more influenced by factors not directly linked to, or wider in scope than, the good under consideration. Whereas the 'Reptile' variable for personal willingness

to pay in Table 1 clearly relates to attitudes about forests, social willingness to pay results in Table 2 include variables that are much less forest-specific: frequency of visits to Portumna (depends on various personal circumstances in addition to one's attitude to forests), income (not al all forest-specific) and whether the respondent regularly visits any other forests, nature reserves or wilderness areas (again, not only forests). This dependence of social willingness to pay on broader, non-forest-specific, factors may help to explain why it seems to vary little from site to site, as we discover below.

In contingent valuation applications, it is conventional to compute and report median willingness to pay (MWTP), the price at which the probabilities of answering 'yes' or 'no' to the willingness to pay question are equal, i.e. at which probability of willingness to pay P_i equals 0.5, making dependent variable $\ln(P_i/(1 - P_i)) = 0$ since the natural logarithm of 1 equals zero. MWTP is thus the price at which the estimated regression equation equals zero, given appropriate values of the other explanatory variables (the mean values are generally used). Here we are interested in MWTP in respect of each of the three conservation sites, which we calculate with the aid of the three site dummy variables Mixed, Natural and Pine. We can compute, for each site, personal MWTP using the parameter estimates of Table 1 and social MWTP using those from Table 2.

In the case of the Mixed site, for example, using the personal WTP results from Table 1, we solve

$$0 = 0.64071 - 0.01127 \text{ Price} + (0.28065 \times 3.19101)$$

for Price, where 3.19101 is the mean value of variable Reptile over those respondents who were asked the personal WTP question for the Mixed site. The solution for price here is 136.31 euro: the estimated personal MWTP for a marginal increase in this type of forest at Portumna. Continuing in this way gives the MWTP results shown in Table 3.

As is common in single-pass referendum models of the type considered here, we focus mainly in what follows on median willingness to pay (MWTP). However, it is of interest that the mean value of willingness to pay calculated as the average of the bids to which respondents said 'yes', also reported in Table 3, produces the same ranking of forest types. It should be noted that these mean and median values in Table 3 do not relate to the same measured quantity: one is a simple arithmetic mean of respondents' bids while the other estimates the price level at which 50% of respondents will say 'yes' or 'no'. That the same ranking is produced by both is reassuring.

Table 3: Estimates of visitors' willingness-to-pay and managers' ranking

In Table 3 it is noteworthy that firstly, for a given site type personal and social MWTP can differ greatly. Secondly, differences between personal and social MWTP are large and can be in either direction, with no obviously discernable pattern (personal MWTP is almost twice social MWTP for native semi-natural forest, while the reverse is true for native pine). Thirdly, use of personal or social MWTP produces quite different rankings of the site types. These three points are in contrast to the results in van Rensburg et al. (2002) noted above.

Forest managers were also asked, as a separate exercise, to rank the three site types for conservation and recreation value, and the result is shown in the final column of Table 3. It is of interest that forest managers produce the same ranking as respondents' personal MWTP, but the social MWTP ranking is quite different from each of these.

Not only is the social MWTP ranking different from that based on personal MWTP and that produced by forest managers: closer investigation reveals that the site ranking by social MWTP is 'less robust' than it appears. This is not only because in comparison to the variation in personal MWTP, social MWTP is rather similar for each site. MWTP as conventionally reported is the central estimate of a simple function of parameters (the regression coefficients in Tables 1 and 2) that are themselves estimated with sampling error. The standard errors shown in Tables 1 and 2 are the estimated standard deviation associated with the mean coefficient estimate of each of the independent variables Price, Reptile, etc, that are conventionally used to calculate MWTP. Using well established techniques of error analysis it is possible from this information to estimate the resulting standard error associated with each MWTP estimate.

A possible difficulty is that one might expect a quantity calculated as a function of 6 parameters estimated with error (as is the case for social MWTP: 5 slope coefficients plus one of the intercept dummies) to 'accumulate more error' than a quantity calculated as a function of only 3 parameters (personal MWTP: 2 slope coefficients plus one of the intercept dummies). To be sure of comparing like with like, the error analysis results shown in Figure 1 take account only of the error associated with each intercept dummy, treating the slope coefficients (the number of which differs between personal MWTP and social WTP) as being error-free. The analysis was also done taking account of the standard error of all slope coefficients, producing very similar results with slightly larger standard errors in each case (not shown).

Figure 1: Error analysis of personal MWTP (left) and social MWTP (right)

In Figure 1, personal MWTP for the three conservation forest types is shown to the left, and social MWTP to the right. MWTP estimates, as conventionally reported, are shown by a short horizontal bar, and the associated standard error is shown by a vertical line. It is apparent that not only are the social MWTP estimates more closely grouped than those for personal MWTP, but also social MWTP standard errors are very much larger (around 80 euros as opposed to around 40 euros for personal MWTP). This reflects the fact that the social dummy variable coefficients in Table 2 have standard errors over twice as large as the personal dummy variable standard errors in Table 1.

It seems reasonable to conclude that personal MWTP provides some basis for ranking the forest types. Social MWTP, on the other hand, is effectively the same for each site, and thus does not in this instance form a reasonable basis for ranking of the sites. This also has further implications regarding the interpretation of social willingness to pay, discussed below.

4 Forest Attribute Importance Results

Rather than (as above) treating the forest attribute importance variables as explanatory variables in the estimation of MWTP, we now examine these in their own right. We find that there are systematic variations in personal and social forest attribute importance scores between subsets of respondents with zero, low or high willingness-to-pay and that this also varies depending on whether stated willingness to pay was personal or social.

Recall that all respondents were asked to select from a 5-point scale from 1 = 'unimportant' to 5 = 'most important' for each of 19 forest attributes, firstly from a personal viewpoint, and then "bearing in mind the importance or unimportance of forest for society as a whole…". To investigate how attribute importance scores vary with willingness-to-pay, respondents were partitioned into three groups of approximately equal size (124, 143 and 145 respondents, respectively).

"non-payers": responded "no" to "are you willing to pay something towards the extra cost";

"low payers": responded "yes" to a bid price of 10 or 30 euro;

"high payers": responded "yes" to a bid price of 70, 100 or 150 euro.

In each group approximately half of the respondents were asked regarding personal willingness to pay and half regarding social willingness to pay. For example, of the 143 in the low willingness-to-pay group, 70 were asked about personal willingness to pay and 73 about social willingness to pay. Figures 2 and 3 show mean forest attribute importance scores for these two subsets of respondents (for brevity, only social importance scores are shown in Figures 2 and 3; personal importance scores exhibit similar patterns but with generally somewhat lower magnitudes).

In Figure 2 the gap between the social importance scores of personal non-payers and of personal payers (both low and high) is pronounced (most notably for 'picnic', 'fungi' and 'insect'). As expected, t-tests reject equality of means of non-payers in comparison with both low-payers and high-payers ($p < 0.01$) while mean scores of low- and high-payers are similar (equality of means not rejected with $p = 0.158$).

Figure 2: Mean social importance scores for zero, low and high personal WTP

In Figure 3, in contrast, importance scores for the three groups of social payers and non-payers appear closer together. Hypothesis testing reveals that the mean scores of social payers (both high and low) are significantly different from non-payers at the conventional 5% significance level ($p = 0.028$ and $p = 0.020$, respectively), but not at the 1% level as was the case for personal willingness to pay in Figure 2, and of course the magnitude of this difference is smaller.

Figure 3: Mean social importance scores for zero, low and high social WTP

Interpreting Figures 2 and 3 it appears, reasonably enough, that respondents who are willing to pay for conservation forest from a personal perspective attach more importance to forest attributes than do those who are not willing to pay. This is true whether they are judging forest importance from either a personal or social perspective. However, Figure 3 suggests that variation in willingness to pay from a social perspective is much less clearly related to the importance attached by respondents to forest itself; this accords with the results above in Tables 1 and 2.

In what follows we find that higher social willingness to pay appears to be reported by those who attach higher social than personal importance to forest, i.e. those who appear to discriminate clearly between personal and social importance. This is examined further in figures 4, 5 and 6 illustrating social and personal mean forest attribute scores for non-, low and high payers, respectively, across all respondents

(i.e. those asked about personal willingness to pay and those asked about social willingness to pay).

Figure 4: Mean importance scores for non-payers
Figure 5: Mean importance scores for low payers
Figure 6: Mean importance scores for high payers

While individual points of interest arise in Figures 4, 5 and 6 (such as the consistent high importance attached to forests' role in reducing global warming, and the consistent relatively low importance attached to ecologically-important dead wood retention), the main point is seen by comparison with each other. The markers on each figure illustrate the results of a series of paired t-tests of the null hypothesis of equality of personal and social mean scores. An open circle marker indicates that, for that particular forest attribute, a paired t-test of equality of personal and social mean scores returns a p-value less than or equal to the conventional 5% level, while a cross marker indicates a p-value above 5%. Put simply, an open circle indicates a statistically significant difference between personal and social scores for an attribute. Figure 4 (non-payers) shows significant personal/social differences for 6 attributes, while in Figure 5 (low-payers) this is true of 5 attributes. In comparison, high-payers in Figure 6 have significantly different personal and social importance scores for 11 out of 19 attributes – twice as many.

Across all respondents, high willingness to pay appears to be associated with a divergence between personal and social importance scores i.e. with respondents who attribute greater social than personal importance to forest.

Other points of interest relate to Figure 6 in particular. Attributes to the left of Figure 6 such as birds, mammals and good walkways generally have high scores with small, insignificant, personal-social differences. Attributes listed to the right of Figure 6, with significant personal-social differences, include a number for which the personal score is relatively low perhaps due to personal aversion (fungi, reptiles, insects) or to personal indifference (dead wood, mixed conifer species). This appears to be further evidence of the 'snake effect' observed by van Rensburg et al. (2002), whereby recognition of the potential socially useful role of reptiles or other forest attributes may coexist alongside personal aversion or indifference. Interestingly, the present study finds the 'snake effect' for high payers but not for low or non-payers.

Turning now to Figures 7 and 8, we once again distinguish between those low or high payers who replied regarding personal willingness to pay (Figure 7) and social willingness to pay (Figure 8). Every respondent (whether asked about personal or social willingness to pay) provided both personal and social

forest attribute importance scores, and Figures 7 and 8 show the difference between these (social minus personal).

Figure 7: Social minus personal importance score: personal WTP

Broadly speaking, in Figure 7 (personal willingness to pay), attributes for which personal low payers have a low (or high) divergence between personal and social importance scores tend also to be attributes for which personal high payers have a low (or high) divergence (i.e., both lines increase broadly from left to right). However, no other systematic pattern is immediately apparent. The social-minus-personal score divergence is greater for personal high payers than for low payers around half of the time (8 of 19 attributes: mammal, broad, attract, etc.), and unsurprisingly the hypothesis that personal low and high payers have the same mean social-personal difference across attributes is not rejected, with $p = 0.567$.

Figure 8: Social minus personal importance score: social WTP

In contrast, Figure 8 (social willingness to pay) exhibits a marked difference between high and low payers. For 16 of 19 attributes social high payers have a greater divergence between social and personal attribute scores than do social low payers, with an overall mean difference just outside the conventional 5% statistical significance limit with $p = 0.064$ (compare $p = 0.567$ for personal payers in Figure 7). In interpreting this result it is perhaps relevant to consider the reduced sample size (and thus statistical power) entailed by splitting respondents into sub-groups: Figures 7 and 8 compare two groups each consisting of only around 70 respondents each, whereas comparisons made in Figures 4, 5 and 6 compare groups of around twice this size.

We have evidence here that high social willingness to pay is found among respondents who have a systematic tendency to score forest attributes as more important from a social perspective than a personal perspective. This tendency is not found, on average, among those with lower social willingness to pay, or among those with high personal willingness to pay.

5 Conclusion

With respect to conventionally calculated median willingness to pay (MWTP), the contingent valuation method used in this study produces what appear to be reasonable results. Willingness-to-pay is price-sensitive and income sensitive (in the case of social willingness to pay). Personal MWTP results vary plausibly across conservation site types, producing a ranking of forest types identical to the ranking provided by managers of the forest. This correspondence between personal MWTP results and ranking by forest mangers was also found in van Rensburg at al. (2002), suggesting that since the shift to multiple use forestry from the 1970s onwards, public forest agencies have become reasonably effective at managing forests so as to reflect visitors' personal willingness to pay. However, given concerns in the literature noted above, and in particular the personal/consumer versus social/citizen distinction, it is questionable whether personal willingness to pay is a sufficient or even an appropriate guide to public preferences, and thus whether it should be the main basis of forest management policy.

On the evidence here, individuals do express different preferences when adopting a social or citizen viewpoint to those expressed when adopting a personal or consumer viewpoint, with forest attributes generally considered more important from a social than the personal perspective. The main divergence between personal and social importance scores is found amongst forest attributes with lower personal importance scores, such as reptiles and deadwood - the 'snake effect' observed by van Rensburg et al. (2002) whereby the potential socially useful role of some forest attributes is recognised and coexists alongside personal aversion or indifference. The evidence presented here indicates that this tendency is greatest amongst those with high social willingness to pay.

There has been some concern in the literature that whereas meaningful contingent valuation depends on positioning respondents in a context whereby they are basing their responses on the benefits of a specific hypothetical good, respondents may instead refer to environmental public goods in general (e.g. Thaler, 1990; Kahneman and Knetsch, 1992; Svedsäter, 2003). In the present study, personal willingness to pay differs depending on the conservation forest site type offered and personal high payers have notably higher forest attribute importance scores (both personal and social) than do personal non-payers – as one might expect. This contrasts with social willingness to pay which is effectively the same for all conservation forest types and also corresponds less with the magnitude of respondents' forest attribute importance scores.

Rather than being associated with a particular forest type or being found amongst respondents who consider forest attributes to be highly important, the present study suggests that high social willingness to pay is found amongst respondents with a tendency to consider <u>any</u> given forest attribute as more important

from a social than from a personal perspective. This suggests that respondents' social willingness to pay reflects their views on society and on public goods in general, rather than reflecting their valuation of the specific public good to which the survey seeks to refer. If so, then given random sampling of respondents, one would expect each conservation site to have respondents with a broadly similar mixture of views on such matters, leading to little variation in social willingness to pay from site to site – which is what we find.

These results suggest that in a given context where choosing between alternative public goods is the aim, personal willingness to pay will provide clearer decisions than will social willingness to pay. On the other hand, the existence of a distinct set of social preferences raises uncomfortable questions regarding the status of decisions so made. It might, for example, be argued that it is reasonable to make decisions affecting society as a whole in accordance with preferences that bear in mind society as a whole as opposed to personal preferences which by implication may not do this.

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Table 1: Personal WTP logistic regression results

Variable	Coefficient	Std. Error	z-Statistic	Prob.
Price	-0.011275	0.002884	-3.908710	0.0001
Reptile	0.280649	0.107221	2.617480	0.0089
Mixed	0.640711	0.459151	1.395425	0.1629
Natural	0.717805	0.466648	1.538215	0.1240
Pine	-0.268144	0.439836	-0.609647	0.5421
Mean dependent var	0.600823	S.D. dependent var		0.490740
S.E. of regression	0.462803	Akaike info criterion		1.252114
Sum squared resid	50.97642	Schwarz criterion		1.323988
Log likelihood	-147.1319	Hannan-Quinn criter.		1.281064
Avg. log likelihood	-0.605481			
Obs with Dep=0	97	Total obs		243
Obs with Dep=1	146			

Table 2: Social WTP logistic regression results

Variable	Coefficient	Std. Error	z-Statistic	Prob.
Price	-0.012765	0.002950	-4.326659	0.0000
Flower	0.477353	0.189757	2.515600	0.0119
Frequency	0.248117	0.088568	2.801434	0.0051
Income	0.587651	0.152470	3.854202	0.0001
Visit	0.863722	0.361860	2.386893	0.0170
Mixed	-3.552711	1.100160	-3.229266	0.0012
Natural	-3.739244	1.122924	-3.329918	0.0009
Pine	-3.460564	1.089627	-3.175915	0.0015
Mean dependent var	0.556000	S.D. dependent var		0.497851
S.E. of regression	0.461566	Akaike info criterion		1.259850
Sum squared resid	51.55651	Schwarz criterion		1.372537
Log likelihood	-149.4813	Hannan-Quinn criter.		1.305203
Avg. log likelihood	-0.597925			
Obs with Dep=0	111	Total obs		250
Obs with Dep=1	139			

Table 3: Estimates of visitors' willingness-to-pay and managers' ranking

	Personal			Social			Managers'
	MWTP	Mean	Rank	MWTP	Mean	Rank	Rank
Mixed	136.31	38.43	2	94.46	32.44	2	2
Natural	147.74	46.46	1	83.26	31.08	3	1
Pine	52.02	27.78	3	94.84	35.29	1	3

Figure 1: Error analysis of personal MWTP (left) and social MWTP (right)
(Microsoft Word Picture plus two superimposed text boxes with labels in Arial 10 Font)

Figure 2: Mean social importance scores for zero, low and high personal WTP
(Microsoft Word Picture)

Figure 3: Mean social importance scores for zero, low and high social WTP
(Microsoft Word Picture)

Figure 4: Mean importance scores for non-payers
(Microsoft Word Picture)

Figure 5: Mean importance scores for low payers
(Microsoft Word Picture)

Figure 6: Mean importance scores for high payers
(Microsoft Word Picture)

Figure 7: Social minus personal importance score: personal WTP
(Microsoft Word Picture)

Figure 8: Social minus personal importance score: social WTP
(Microsoft Word Picture)

Figure 1: Error analysis of personal MWTP (left) and social MWTP (right)

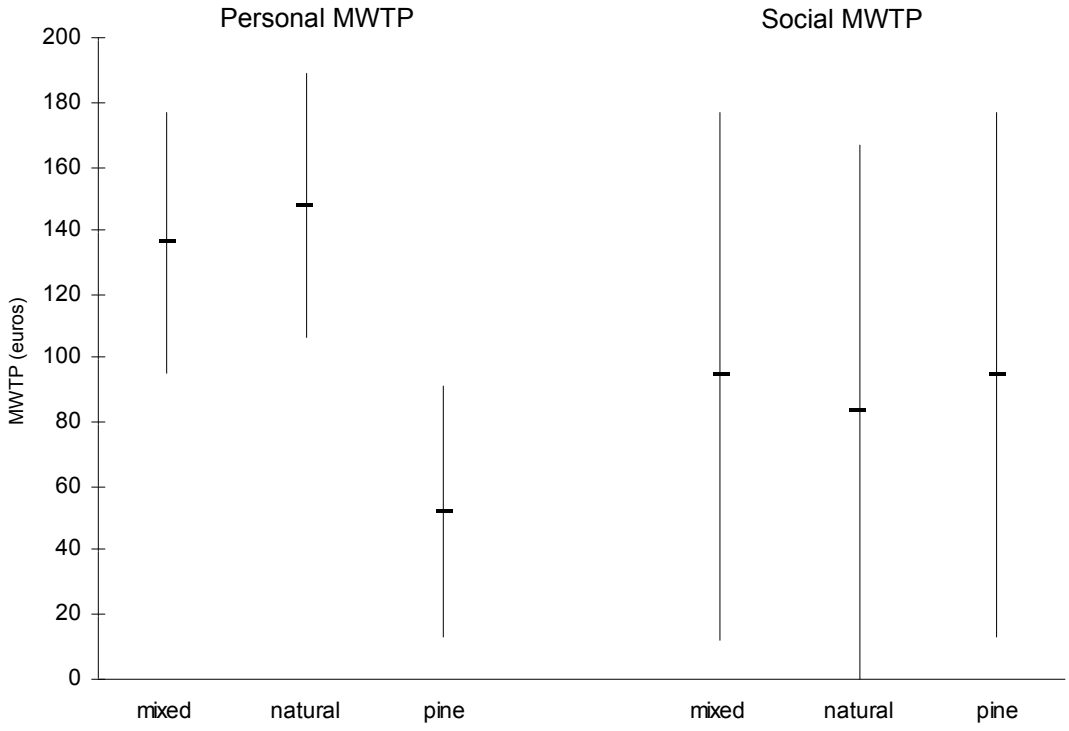

Figure 2: Mean social importance scores for zero, low and high personal WTP

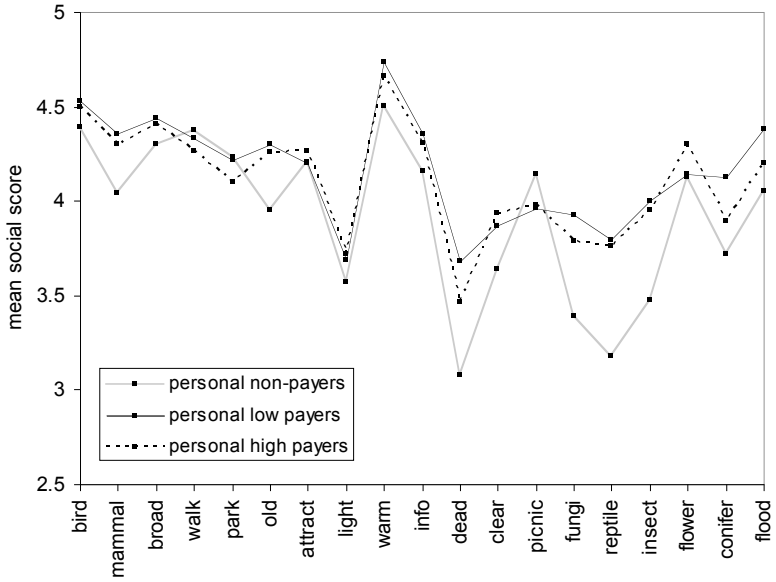

Figure 3: Mean social importance scores for zero, low and high social WTP

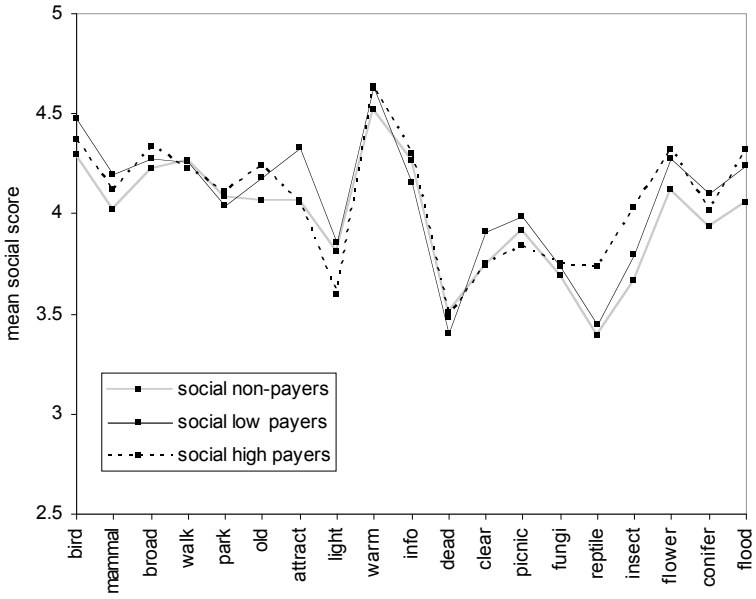

Figure 4: Mean importance scores for non-payers

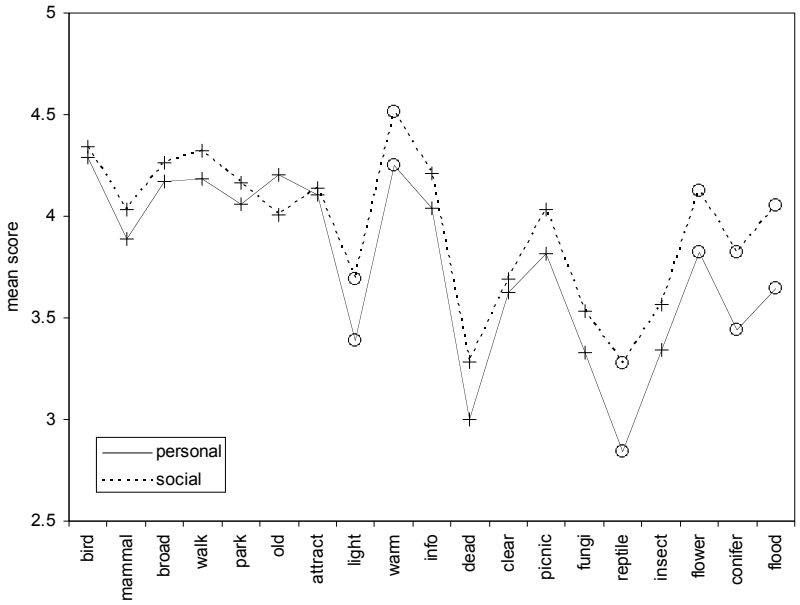

Figure 5: Mean importance scores for low payers

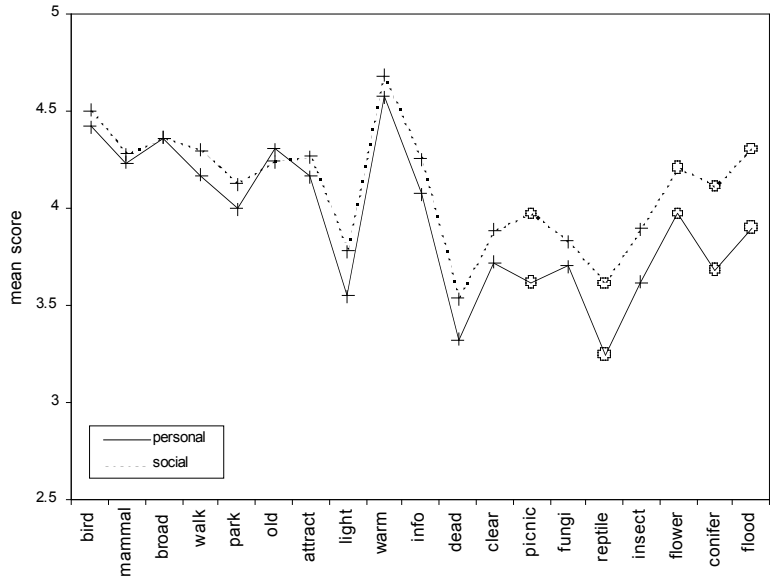

Figure 6: Mean importance scores for high payers

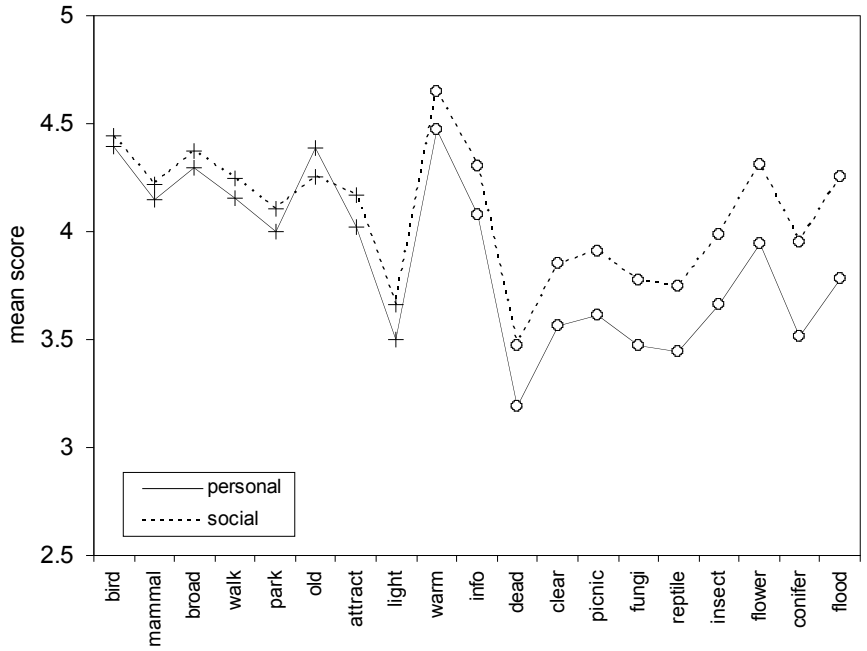

Figure 7: Social minus personal importance score: personal WTP

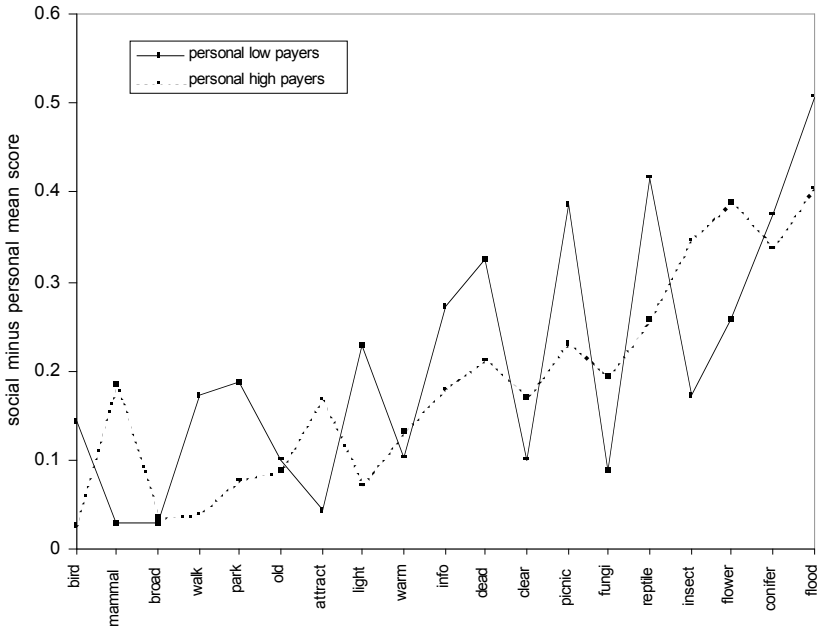

Figure 8: Social minus personal importance score: social WTP