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What Price Recreation in Finland?—A Contingent Valuation Study of Non-Market Benefits of Public Outdoor Recreation Areas

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Basic services in Finnish national parks and state-owned recreation areas have traditionally been publicly financed and thus free of charge for users. Since the benefits of public recreation are not captured by market demand, government spending on recreation services must be motivated in some other way. Here, we elicit people's willingness to pay (WTP) for services in the country's state-owned parks to obtain an estimate of the value of outdoor recreation in monetary terms. A variant of the Tobit model is used in the econometric analysis to examine the WTP responses elicited by a payment card format. We also study who the current users of recreation services are in order to enable policymakers to anticipate the redistribution effects of a potential implementation of user fees. Finally, we discuss the motives for WTP, which reveal concerns such as equity and ability to pay that are relevant for planning public recreation in general and for the introduction of fees in particular.

KEYWORDS: *Non-market valuation, payment card, recreation, recreation fees, taxes, user fees.*

Introduction

Finland is a sparsely populated country, and the common right of access to all natural (undeveloped) areas is a privilege deeply rooted in the Finnish outdoor recreation culture. In addition, state park services are financed directly from the government budget and provided to citizens free of charge. As long as the right of public access is guaranteed, there will be substitutes available for state-owned recreation sites. Given this institutional setting, there is no tradition whereby people would pay, for example, for access to a hiking area, be it on private or public land. The recreational experience that

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Author note: This study was carried out as part of an extensive Finnish research project entitled "A National Assessment of Outdoor Recreation Demand and Supply" while the author was at the Finnish Forest Research Institute (FFRI). The analysis builds on a survey questionnaire designed by Paula Horne, Ville Ovaskainen and Tuija Sievänen of FFRI. I am grateful for constructive discussions with Jarmo Mikkola, Eija Pouta and Esa-Jussi Viitala at the early stages of this work. Richard Foley corrected my English and improved the presentation considerably. I have also benefited from the comments of participants at the Eleventh Annual Conference of the European Association of Environmental and Resource Economists. The Journal's editors and two anonymous reviewers provided numerous helpful suggestions for revision of earlier versions of the paper. I also appreciate Enni Rönkä's help with the graphics. The responsibility for any errors is, of course, my own.

people desire and the value they attach to it should nevertheless be taken into account in public recreation planning. The present study includes the preferences expressed by citizens in an economic analysis and uses contingent valuation (CV) to estimate the value of outdoor recreation in Finnish state-owned parks.

It has been estimated that about 2 million visits are made annually to the Finnish national parks (33 in total) and state-owned recreation areas (7). (Finnish Forest and Park Service; Figure 1). The maintenance and basic services (firewood, waste disposal, etc.) in these areas are financed through state tax revenues.

An analysis of the monetary value of the use of recreation services is motivated by the need for information that will enable efficient allocation of government resources. It is equally important to determine who the cur-

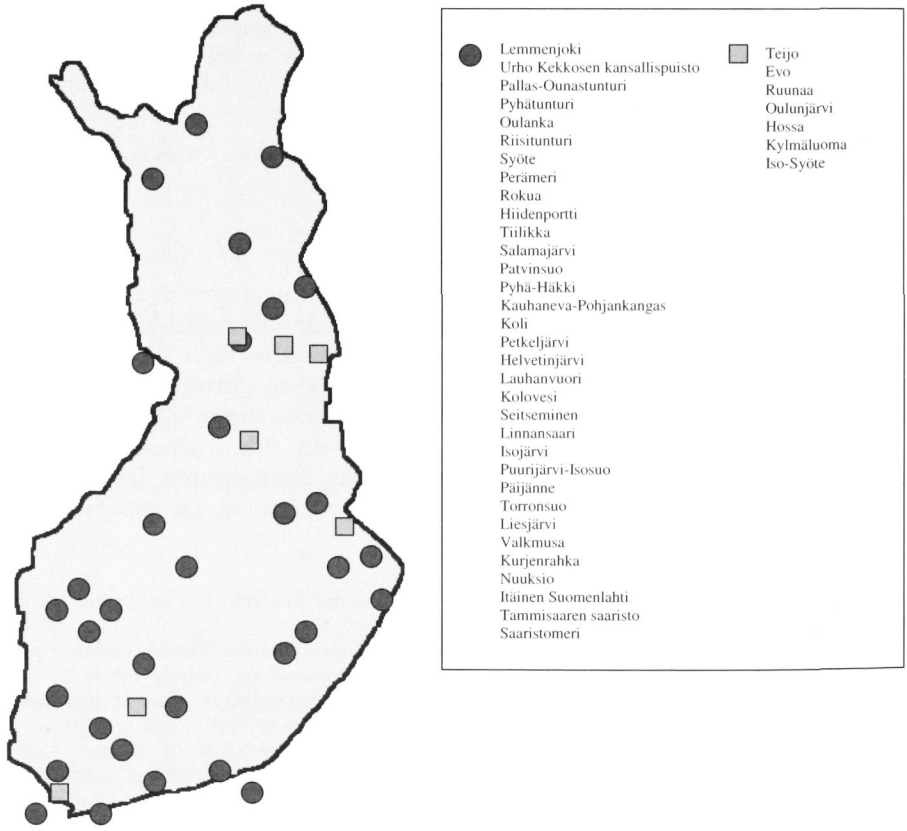

Figure 1. National Parks (33) and State-Owned Recreation Areas (7) in Finland

rent users of the recreational services are, not least for understanding the redistribution effects of a potential implementation of user fees.[1] Furthermore, enhanced quality of life and lifestyle are likely consumer trends that will increase the demand for recreation in the future (Sievänen (2001), Gray et al. (2000), Gartner and Lime (2000)). In addition, with their income and wealth steadily increasing, people will perhaps be willing to pay for improved recreation services. These factors will boost demand for establishing and managing areas specifically for recreation.

In Finland, as in the other Nordic countries, the right of public access to all undeveloped natural areas has had a major impact on the outdoor recreation traditions and culture. There have always been substitutes available for publicly maintained recreation areas. However, citizens' interest in financing recreational services is not necessarily limited to opportunities to use the state parks free of charge. There are compelling reasons to assume that non-use values, such as conservation of nature and cultural values associated with state parks, are equally important. These other values are difficult to measure, since they are not captured by statistics on numbers of visitors or visits to the areas. State parks may be considered valuable in themselves, that is, regardless of whether any visits are actually made to such areas.

Market-based demand studies cannot be applied in an analysis of recreation services, for these provide public goods that typically do not have market prices. Yet, researchers should provide information on the economic importance and management of state-owned recreation areas for the government, which must increasingly scrutinize the cost efficiency of services that it has heretofore provided to citizens free of charge. As financier, the government is interested in an appropriate allocation of tax revenues and in ensuring that the benefits of recreation are commensurate with the maintenance costs of the state recreation sites. Moreover, given that there is pressure to alleviate the general (labor income) tax burden, implementing user fees would open up a new source of government revenue.[2]

Several methods have been developed to determine a monetary value for non-market goods. Contingent valuation is one such method that can be used for the valuation of national parks and state-owned recreation areas. Given the Scandinavian tradition of the right of public access our points of departure in analyzing the monetary value of recreational services and the potential implementation of payments for these services are equity and recreation use. Our hypothesis is that even though the services are provided for free, this does not mean that they do not have a monetary value. From the point of view of equity, it is interesting to know who the current users are, and the extent to which people object to proposed payments due to their

[1]Equity issues have previously been emphasized by Adams et al. (1989), More (1999) and Richer and Christensen (1999).

[2]For discussion on pricing policies and supply-related phenomena, see Matulich et al. (1987) and Wilman (1988).

household's inability to pay. It is also interesting to investigate how citizens perceive their possibilities to switch to using other recreation areas if payments are implemented in state parks.

This paper differs from previous CV studies in that it investigates the views of the whole Finnish population (both users and non-users of recreational services in the sample), analyzes two payment vehicles (a recreation pass and a tax increase earmarked for outdoor recreation), and takes into consideration all state-owned outdoor recreation parks in the country. Particular attention has been paid to the estimation methods for data sets in which the mode of the willingness to pay (WTP) distribution is zero; this is a typical phenomenon in CV surveys.

Description of Sample, Data Collection and Statistical Techniques

The data used here are a sub-sample of the extensive Finnish Outdoor Recreation Survey, which was obtained along with the weekly Labor Force Survey (LFS), a continuous panel survey based on census data. The data collection was carried out by Statistics Finland. The size of the LFS sample is 12,000 persons per month, corresponding to about 0.3 percent of the population aged 15-74 years. The randomly selected sample size of the Finnish Outdoor Recreation Survey was about 1,000 persons for every second month during 1998-2000, resulting in 12,649 interviews. Ninety-eight percent of the interviews were conducted by telephone and two percent in person. All those interviewed were asked whether they would be willing to fill in a separate questionnaire on different themes having to do with recreation. The questionnaire was sent to about 8,500 individuals, and responses were elicited on four themes: 1) valuation of outdoor recreation, 2) fishing, 3) health and well-being, and 4) nature-related tourism. (See Table 1 for the data collection procedure.)

The sub-survey on the valuation of outdoor recreation was sent to the 2,912 individuals who had indicated their willingness to reply to the questionnaire in the telephone interview; 1,871 questionnaires were returned, yielding a response rate of 64%. The representativeness of the sample was confirmed by comparing the statistics on the survey sample to the census data for the parent population. The sampling, data collection, pre-testing and the particulars of the mixed-mode survey (piloting, telephone and mail) are described in more detail in Virtanen (2000). Table 2 describes the socio-economic and other variables which were elicited on the questionnaire and compares these with census data.

About 60% of the respondents had at some time visited one of the state parks shown on the map in Figure 1. Almost one-third of the respondents had visited the area during the last year, and over 40% considered a visit to one or more of the areas very likely in the future.

In building statistical models for our analysis of recreation behavior, we employ random utility models throughout. These econometric models allow a simple estimation of preferences for commodities that are considered by

TABLE 1
Sampling and Response Rates during the Data Collection Process

Month/year	08/98	10/98	12/98	02/99	04/99	06/99	07/99	09/99	11/99	01/00	03/00	05/00	Total
Total sample	942	1005	997	1103	1005	1084	1073	1109	1125	1104	1098	1004	12649
	Theme 1				Theme 2			Theme 3			Theme 4		1-4
	942+1005+997+1103=4047				3162			3338			2102		
Telephone interview sample	3563				2495			2768			1825		
Telephone interview response rate	88%				79%			83%			87%		
Permission	82%				78%			78%			79%		79%
Mail survey sample	2912				1955			2166			1433		8466
Mail survey respondents	1873				1324			1418			937		5552
Mail survey response rate	64%				68%			66%			65%		66%

Note: Theme 1 = valuation of outdoor recreation, Theme 2 = fishing, Theme 3 = health and well-being, and Theme 4 = nature-related tourism.

TABLE 2
Description of the Variables in Sample and Comparison with Census

Variable	Mean	Std.Dev.	Minimum	Maximum	Cases	CENSUS*
DHIGHSC	.30	.46	.00	1.0	1871	.35
DFEMALE	.55	.50	.00	1.0	1871	.52
DCHILD	.33	.47	.00	1.0	1871	.28
DOLD	.07	.26	.00	1.0	1871	.10
DYOUNG	.18	.38	.00	1.0	1871	.17
INCOME	14486.26	9887.41	1500.00	30000.0	1638	12908.33
LOGINC	2.46	377.82	0.41	3.4	1638	
DPAYTAX	.48	.50	.00	1.0	1871	
DNONUSER	.73	.44	.00	1.0	1871	
DACTUSER	.20	.40	.00	1.0	1871	
DPAYER	.67	.47	.00	1.0	1871	
WTP	93.92	304.48	.00	2000.0	1767	

Note:
DHIGHSC = 1 if respondent's basic education is high school; = 0 otherwise
DFEMALE = 1 if respondent is female, = 0 male
DCHILD = 1 if household has children; = 0 no children
DOLD = 1 if respondent's age is 65-74 years; = 0 otherwise
DYOUNG = 1 if respondent's age is 15-24 years; = 0 otherwise
INCOME = household gross income per month in FIM
LOGINC = logarithm of INCOME
DPAYTAX = payment vehicle used: 1 = general tax increase; 0 = recreation card
DNONUSER = 1 if respondent does not use recreation services; = 0 otherwise
DACTUSER = 1 if respondent uses recreation services actively; = 0 otherwise
DPAYER = 1 if respondent's WTP is greater than zero; = 0 otherwise
WTP = willingness to pay in FIM (sum of money chosen on the payment card)

*Source: Statistical Yearbook of Finland 2001. Note that household gross income per month is a crude approximation from annual disposable income per household (or FIM 154,900/12 months)

the consumer but are not necessarily chosen. For example, when a consumer considers several alternatives with a variety of characteristics, information is gained about the consumer's preferences regarding an alternative from the fact that he or she rejects that alternative in favor of another (for further reading, see, e.g., Kolstad and Braden, 1991). We use multiple regression analyses to gain insight into the characteristics (if any) of the respondents that make them active users of recreation services, or willing to pay for public provision of such services. Qualitative response models are used in the econometric analyses (for these models, see a basic textbook in econometrics, e.g., Gujarati, 1995).

Results

Who Are the Most Active Visitors to Finnish State Parks?

Previous studies have found that a number of factors affect the visitation of recreation areas (e.g. Carson, 1991; Herriges and Kling, 1999). To investigate first how the different attributes of those surveyed affect their participation in recreation we sampled out from the data set relatively frequent visitors to state recreational sites or national parks, and formed a corresponding variable, DACTUSER, that can receive the values 1 or 0. In our analysis, individuals are considered active users (DACTUSER = 1), if they have visited a site during the last 12 months and have visited a site earlier (more than 12 months ago), i.e., they have made more than one visit, and state that it is very/quite likely that they will also visit a site in the future (otherwise DACTUSER = 0). Hence, we investigate the probability that the individual is a "recreationist", or P[DACTUSER = 1]. The dependent variable is dichotomous, and the distribution assumed for the random error determines the type of qualitative response model specified. Here we assume that the errors follow a logistic distribution, which has slightly heavier tails than the cumulative normal distribution and yields a logit model.

Table 3 reports the coefficient estimates for the variables used in the logit estimation. High income (INCOME) and higher education (DHIGHSC)

TABLE 3
Logit Model for Active Users of Recreation Areas (N = 1638)

Variable (X)	Coefficient (b)	Std.Error	*b*/Std.Er.	*P*-value	Mean of X
Constant	−1.71	.16	−10.888	.0000	
DHIGHSC	.27	.13	2.069	.0385	.33
INCOME	.31E-04	.78E-05	3.970	.0001	14486.23
DOLD	−.90	.36	−2.496	.0126	.06
DFEMALE	−.20	.12	−1.579	.1143	.55

Dependent variable:
= 1, respondent uses recreation areas actively; = 0, otherwise

Independent variables:
DHIGHSC = 1 if respondent's basic education is high school; = 0 otherwise
INCOME = household gross income per month in FIM
DOLD = 1 if respondent's age is 65-74 years; = 0 otherwise
DFEMALE = 1 if respondent is female, = 0 male

Log likelihood function	−832.75
Restricted log likelihood	−853.66
Chi-squared	41.82
Degrees of freedom	4
Significance level	.0000

increase the probability of participation in recreation activities. Another expected result is that elderly people (DOLD) participate less actively in recreation. Recreation seems to be more attractive for men than for women, but the *p*-value of the gender dummy variable, DFEMALE, does not support a statistically significant difference in recreation behavior between men and women.

The coefficient estimates and means of the explanatory variables make it possible to calculate a predicted probability of participation in recreation. Predictions based on the coefficients derived from the Finnish survey data and the mean values of the model variables from census data (representing an "average resident") yield a probability of 20% that a person is an active "recreationist".

What Are the General Attitudes Towards Recreation Fees?

Before the valuation questions proper, a separate item in the questionnaire inquired whether the respondent could think of paying for certain recreation services (Table 4). The purpose of this attitudinal question was to prepare the respondents for the willingness-to-pay question by reminding them of their own use of the recreational opportunities and services available. The respondents indicated that they were least willing to pay for the opportunity to pick berries (86% would not pay for this possibility), to use hiking trails (73% would not pay) and to use ski tracks (65% would not pay). Some respondents said they would pay something for guide services (38%), lodging/huts (29%) or campfire sites (24%).

We want to emphasize that the responses illustrated in Table 4 should not be seen as an indication of potential demand for "nature-based tourism" or other marketable products based on provision of outdoor recreation. Al-

TABLE 4

Attitudes towards Payment for Certain Recreation Services (N = 1746)

The respondents would be willing to pay for. . .

	Definitely	Perhaps	No	Do Not Use
		%		
Nature guide services	38	38	13	11
Use of wilderness huts	29	40	16	15
Use of campfire site (firewood, waste disposal)	24	43	23	10
Admission to nature center	20	44	26	10
Opportunity to fish	21	31	35	13
Opportunity to hunt	22	16	24	38
Admission to recreational area	8	37	46	9
Opportunity to use ski tracks	4	17	65	14
Opportunity to use hiking trails	3	16	73	8
Opportunity to pick berries/mushrooms	2	7	86	5

though the respondents seem to be extremely unwilling to pay for the opportunity to pick berries, it does not mean that they are unwilling to pay anything for more service-oriented products such as guided trips with an opportunity to pick berries. Still, it is interesting to observe that ski tracks or hiking trails cannot readily be turned into marketable products if they are not coupled with other services such as guiding.

Next, the respondents indicated whether they agreed or disagreed with certain statements concerning the provision of recreation services such as trails, parking, and campfires. Table 5 shows strong support for public funding of recreation sites and services and quite negative attitudes towards recreation fees. It is interesting that the "user pays" principle is accepted a bit more readily for new than for existing services. A majority of respondents seem to be happy with the current system, in which the costs of recreation services are paid through taxes by society as a whole. This may well be explained by the status quo bias recognized by psychologists: individuals prefer the current state to an alternative one (Kahneman et al. 1991).

Analysis of the WTP Responses

The contingent valuation (CV) method was initially developed for the valuation of environmental resources and, interestingly, the very first applications focused on the valuation of recreational services in the United States (Delaware River Basin area, US National Park Service in 1958, Maine woods in 1961; see Hanemann, 1992).[3] Contingent valuation is a unique valuation method in the sense that it can measure non-use values.

People's willingness to pay (WTP) for provision of public recreation services was elicited using the "payment card" method (see, e.g., Mitchell and Carson, 1989), i.e., each participant was asked whether he or she would pay some amount ("bid") from an array of sums of money given in the question. As Cameron and Huppert (1987a,b) point out, respondents choose the sum that comes closest to their valuation. Consequently, the true value lies in an interval that is limited by the chosen bid and the closest higher bid given on the payment card, and these bids form an upper and a lower bound on the respondent's unobserved true WTP (see also Hanemann 1978). Determining a bid vector for the payment card requires careful design, and we drew on experience from a previous study of Finnish national parks (Ovaskainen et al. 1999b) using the following break points (annual payments) for the present bid curve: FIM 0, 50, 100, 200, 300, 500, 1000, 1500, 2000, over 2000 (1 € = FIM 5.94[4]).

The exact wording of the questions that elicited respondents' WTP is

[3]Since then a wide range of economic research has been done by using CV to study demand for recreation (e.g. Menz and Mullen, (1981), Christensen et al. (1993), Walsh et al. (1984)). See, e.g., McConnell (1985), Bockstael et al. (1991), and Rosenberger and Loomis (2001) for surveys of the extensive literature, and Sievänen et al. 1992, Mäntymaa 1997, Tyrväinen 1999 for some recent Finnish CV studies on recreation.

[4]On January 1, 2002, Finland switched to the Euro (£); the Finnish mark was the official currency of Finland at the time of the survey.

TABLE 5
Attitudes towards Funding of Recreational Services

Argument	Completely Agree	Partly Agree	Cannot Say	Partly Disagree	Completely Disagree
			%		
"Recreation sites and services must be provided by public funding"	45	39	7	6	3
"Because of the social benefits of recreation, the services should be provided through tax revenues"	37	42	11	7	3
"I would pay for outdoor recreation if no recreation sites were available free of charge"	9	28	26	20	17
"Outdoor recreation is everyone's own business and no special recreation sites or services should be maintained by public funding"	8	11	11	37	33
"There should be charges on outdoor recreation services just as there are fees on many other leisure time activities"	3	7	10	30	50
Argument	". . . more trough tax revenues."		". . . as they are currently."		". . . more by users."
			%		
"The existing recreation services should be paid for. . .	25		62		12
"New recreation services should be paid for. . .	25		50		25

given in Appendix 1. The answers to the valuation questions reflect an individual's total annual WTP for recreation services in state-owned parks. Since the respondents were asked about their willingness to contribute to financing the same range of services as is currently provided by the government free of charge, we have a quantity-constrained regime. WTP is a measure of equivalent variation, because the ex post level of utility will potentially be lower if payment is charged for recreation services. The welfare measure is the equivalent variation (or surplus) and expresses the maximum sum of money that must be charged an individual to make them as well off as they would be with a reduction in recreational services (see, e.g., Johansson 1987, 64).

Two interesting observations can be made from the raw distribution of WTP responses in Table 6:

1. A considerable number of respondents indicated a zero WTP.
2. The payment card response is not an exact statement of WTP but, rather, an indication that the WTP lies somewhere in the interval between the chosen sum of money and the next highest option. These issues require further investigation and will be analyzed next.

Who Are and Who Are Not Willing to Pay and Why?

In our sample, 616 individuals out of 1,871 (about 33%) expressed a zero WTP for recreation services. In order to identify those individuals who actually are willing to pay something for recreation services on state-owned sites, we again apply random utility modeling and the logit model. Accordingly, the dependent value associated with WTP is a dichotomous variable, DPAYER: if the respondent has indicated a WTP greater than zero, DPAYER is 1, whereas if WTP is zero DPAYER is 0. Individual respondent/household

TABLE 6
Willingness-to-Pay Distributions in Survey Sample by Elicitation Method

WTP	Recreation Pass (N = 918)	Tax Increase (N = 851)
FIM per year	%	%
0	28.2	41.8
50	27.0	20.1
100	26.3	20.6
200	10.5	7.5
300	4.2	4.4
500	2.5	4.6
1000	0.9	0.6
2000	0.2	0

Note: FIM = Finnish mark, € 1 = FIM 5.94.

characteristics (e.g., age, income, gender, number of children), and payment vehicle are used as explanatory variables in the logit analysis (Table 7). It seems that the different payment vehicles used in the two sub-samples had a significant effect on attitude towards payment. As many as 42% of the respondents were unwilling to contribute anything when the payment medium was a general tax increase earmarked for public outdoor recreation, whereas only some 28% of those answering the questions on an annual recreation card opposed such a payment. The statistical significance of the dummy variable DPAYTAX, which indexes the two payment vehicles used in the questionnaire (=1, general tax increase; =0, recreation card), was confirmed in the logit model (see Table 7). The generally negative connotation of taxes is perhaps not the only reason why a tax was unpopular as a payment vehicle. A recreation pass is much more clearly associated with actual personal use of recreation sites: the decision to buy a pass can be made individually, when the services actually are used, whereas taxes must be paid collectively, regardless of whether one desires the services annually or not.

The negative attitude towards taxes was identified when focusing on those respondents who had visited state parks at least once. About 34% of these "users" did not want to pay higher taxes, and 24% did not want to pay for a recreation card. However, when these percentages are compared to the figures for the entire sample, it seems that users are more willing to contribute to the maintenance of public recreation services than non-users are. Consequently, the dummy variable DNONUSER has a negative sign in the logit analysis (Table 7). Of course, the users of the services may have their self-interest in mind when they state that they would support the maintenance of the recreation services in monetary terms. On the other hand, the higher expressed average WTP of users as compared to non-users could be interpreted as counterevidence to the often cited tendency towards free riding.

Finally, people with a minimum of high school as their basic education and younger people had a more positive attitude towards payment generally. The variable INCOME has an expected positive sign; i.e., as income increases, so does WTP for recreation services. The *p*-value of INCOME is relatively high, however. Based on the model presented in Table 7 and the corresponding average values of the selected variables, the predicted probability that a Finn is willing to pay something for recreational services in state-owned parks is 68%.

To get a comprehensive picture of the value of recreation services, it is important to consider the respondents' motives for their stated WTP. A debriefing question asked why people would be willing to pay for recreation services (Table 8). About 60% of the respondents stated altruistic reasons for their WTP: they wanted to promote the conservation of nature and cultural values for future generations as well as preserve nature and wildlife in general. Only 7% of the respondents indicated that they wanted to ensure themselves an opportunity to use the recreation services, and only 12% wanted to safeguard this option for potential future use.

TABLE 7
Logit Model for Identifying Potential Payers (N = 1638)

Variable (X)	Coefficient (b)	Std. Error	*b*/Std. Er.	*P*-value	Mean of X
Constant	1.12	.17	6.529	.0000	
DPAYTAX	−.55	.11	−5.084	.0000	.48
DHIGHSC	.33	.12	2.709	.0067	.33
INCOME	.12E-04	.72E-05	1.728	.0839	14486.23
DNONUSER	−.61	.13	−4.650	.0000	.73
DYOUNG	.48	.16	2.993	.0028	.15

Dependent variable:
= 1, the respondent's willingness to pay (WTP) is greater than zero; = 0, the respondent's WTP=0.

Independent variables:
DPAYTAX = payment vehicle used: 1 = general tax increase; 0 = recreation card
DHIGHSC = 1 if respondent's basic education is high school; = 0 otherwise
INCOME = household gross income per month in FIM
DNONUSER = 1 if respondent does not use recreation services; = 0 otherwise
DYOUNG = 1 if respondent's age 15-24 years; = 0 otherwise.

Log likelihood function	−996.12
Restricted log likelihood	−1031.90
Chi-squared	71.56
Degrees of freedom	5
Significance level	.0000

TABLE 8
Motives for Willingness to Pay (N = 1183)

	%
I use the recreation sites and I want to guarantee myself an opportunity to use the sites	7
I want to ensure the preservation of the recreation sites for potential future use	12
I want to support the provision of recreation services to all citizens	20
I want to support the preservation of cultural and natural values for future generations	30
I want to support the protection of undisturbed nature	30
Other reason	1

In the debriefing questions that elicited reasons for unwillingness to pay, about 40% of the respondents said that taxes were already so high that they should not be increased (Table 9). Another 20% of the respondents said that they could not afford a tax increase. Interestingly, only 6% of those responding to the question concerning an annual recreation card said that they could not afford a fee. Instead, about 25% said that they would use other recreation areas that could be used free of charge. All in all, the negative connotation of taxes may only partially explain the large number of zero WTP responses.

It seems that people are not so interested in paying for the use of recreation services but that conservation and cultural values are at least as important. This should be borne in mind when considering the implementa-

TABLE 9
Reasons Why the Respondent Is not Willing to Pay

. . . *for a recreation pass* (*N = 281*)	%
Visiting the sites is not important enough to me	29
I would use other sites; I don't need these services	25
I cannot afford additional payments/taxes	6
Basic services should be provided through tax revenues	18
I do not accept any charge since I have a right to use the recreation sites and services	17
Other reason	5

. . . *for a tax increase* (*N = 386*)	%
Visiting the sites is not important enough to me	19
I cannot afford additional payments/taxes	21
Taxes are already high enough	39
The maintenance costs should be covered by user fees	18
Other reason	3

tion of fees for public recreation services to cover maintenance expenses. Such measures might only cause a shift to the use of recreation areas to sites where no fees are charged; the possibilities to control the environmental burden caused by recreation would then become limited, because most visits would not occur in managed areas. Since there is evidence that measures to limit visitor activities to certain areas and thus reduce harm to the environment have been highly successful (Marion and Farrell, 2002), a shift to the use of uncontrollable sites would be totally contradictory to the goal of preservation of nature, which citizens indicated as their principal motive for wanting to maintain state parks.

Estimating WTP—a Tobit Model for Grouped Data

Since the WTP responses were elicited using payment card data, the accuracy of the monetary values stated are known up to a certain money interval, and this should be taken into account when checking the consistency of the WTP responses with respect to certain explanatory variables. According to Cameron and Huppert (1989), a naive ordinary least squares procedure employing interval midpoints as proxies for the true dependent variable (WTP) can yield biased parameter estimates as well as biased estimates of the overall resource value. Instead, they suggest the use of an efficient maximum likelihood (ML) interval estimation method, a variant of the Tobit model in which the data are completely censored. The method is currently a standard procedure, included, for example, as part of the LIMDEP software package (Greene, 1998).

The basic idea of the method is to take into account that payment card data are reported only by category (see GROUPED DATA p. 703 in Greene). The model maximizes the likelihood that an individual's lnWTP lies between the log of the amount chosen on the payment card, and the log of the next higher amount. In our survey, the WTP variable, y, reports ranges:

$$
\begin{aligned}
y = \quad & 1 \text{ if} && y^* && < \text{FIM } 50, \\
& 2 \text{ if} && \text{FIM } 50 \leq y^* && < \text{FIM } 100, \\
& \cdot \\
& \cdot \\
& J \text{ if} && y^* && \geq \text{FIM } 2{,}000.
\end{aligned}
$$

The model reported in Table 10 has been estimated assuming a log-normal cumulative density function, and LIMDEP 7.0 was used to maximize the likelihood function for a Tobit model for "grouped data". (For a description of the statistical model and maximum likelihood function used in the econometric analysis, see Appendix 2.) The model reveals which variables have a statistically significant impact on WTP for recreation. Income is included as an explanatory variable in logarithmic form (LOGINC). WTP for recreation seems to increase with household income, but it should be noted that its p-value is as high as 0.1058. It is logical that those who do not use recreation services (DNONUSER = 1) are less willing to pay for the

TABLE 10
Tobit Model for Grouped Data WTP (N = 1582)

Variable (X)	Coefficient (b)	Std. Error	*b*/Std. Er.	*P*-value	Mean of X
Constant	4.00	.15	27.268	.0000	
LOGINC	.08	.05	1.617	.1058	2.47
DPAYTAX	−.24	.07	−3.410	.0007	.48
DNONUSER	−.31	.08	−3.870	.0001	.74
	Disturbance standard deviation				
Sigma	1.31	.03	41.711	.0000	

Dependent variable: logarithm of WTP

Independent variables:
LOGINC = logarithm of INCOME
DPAYTAX = payment vehicle used: 1 = general tax increase; 0 = recreation card
DNONUSER = 1 if respondent does not use recreation services; = 0 otherwise

maintenance of those services. The negative connotation of taxes seems to hold in this model specification: the use of a general tax increase as a payment vehicle (DPAYTAX = 1) has a statistically significant negative impact on WTP.[5]

The results suggest that there are statistically significant and theoretically justified relationships between WTP responses and certain explanatory variables, and the analysis thus gives us more confidence in using the estimated coefficients from Table 10 to calculate the average mean WTP measures. The data indicate that people would pay roughly FIM 111 (€ 19) on average per person per year for public recreation services. Another thing to be noted is the well-known robustness of the median as a WTP measure: it is less sensitive to the specification of the distribution function, especially its tails. With one-third of the WTP answers zero, the distribution is so skewed that the median should be lower than the mean estimate. Indeed, this is the case: the calculated average median WTP measure is FIM 47 (€ 8).

The two welfare measures computed above should be compared with the summary statistics derived directly from the raw WTP distribution (Table 6). The robustness of the median measure is confirmed, whereas the mean estimate based on the ML interval estimation is about 20% higher than the sample average, FIM 93 (€ 16). As there are a considerable number of zero WTP observations in our sample, we wanted to study more carefully how sensitive the estimates are to the upper bound of the first interval. Since

[5]However, the marginal impact of DPAYTAX on the level of WTP proved to be low. In fact, the model was estimated separately for the two payment vehicle "treatments" (tax and user fee), but LOGINC became a statistically insignificant explanatory variable for the user fee sub-sample. Separate estimations produced a mean WTP of FIM 115 (median FIM 39) for a tax treatment and a mean WTP of FIM 108 (median FIM 54) for a fee treatment.

Cameron and Huppert (1989) did not pay any particular attention to this issue, even though their data set also had a high number of zero responses, we had to examine whether a potential sensitivity of the WTP estimates was intensified by the estimation method chosen.

We systematically changed the upper bound of the first payment card interval and compared the resulting welfare measures (mean, median) for three different estimation methods. The estimation methods were maximum likelihood interval estimation of a Tobit model, as used here (Table 10); ordinary least squares midpoint estimation (the methods that Cameron and Huppert (1989) compared); and the maximum likelihood BoxCox transformation for midpoint. The last is, in essence, a maximum likelihood estimation of a logarithmic form of the WTP midpoint.

We found that interval estimation of a Tobit model generated a wider range for welfare estimates than the other two methods; i.e., the average median varied from FIM 11 to FIM 47 and the average mean was FIM 111-627.[6] The other two methods seemed to generate slightly more stable values: FIM 34-83 (FIM 36-82) for the average median and FIM 138-308 (FIM 135-319) for the average mean from the OLS (ML BoxCox) computations. An evident conclusion is that the variation in the average mean when using interval estimation is particularly high, perhaps even unacceptable.

This is not a surprising result given that the interval estimation introduces an inherent uncertainty in the data set by widening the WTP responses from "exact" midpoint estimates to intervals. This will be reflected in the increasing disturbance standard deviation and the term $\exp(\sigma^2/2)$, which is used for derivation of the average mean WTP (see Appendix 2). However, it is important to recognize that interval estimation does not necessarily alleviate the problem of the sensitivity of the analysis to the payment card used: if the payment card is not well designed, interval estimation cannot save the analysis. Our results suggest that the logarithmic form of the dependent variable (WTP) in maximum likelihood estimation may have a more significant impact on the welfare measures than the interval estimation. The lesson to be learned for future research is that the impact of assumptions concerning the distribution of the dependent variable (WTP) on the benefit measures should be investigated more carefully, and regularly, in CV applications.

Discussion and Conclusions

The sample analyzed in this study indicates that a majority of Finns value even in monetary terms recreation services that are currently provided free of charge through public funding. The predicted probability of the "average citizen" paying something (more than FIM 0) for these services was calculated to be 68%. The maximum likelihood interval estimation of a Tobit model resulted in a WTP for recreation of FIM 111 (€ 19) per year per

[6]The alternative estimation results are reported in more detail in Huhtala (2001).

person on average. An aggregate welfare measure can be derived by multiplying the mean WTP by the total number of Finns aged 15-74 years. The result indicates that Finns are willing to pay FIM 444 (€ 75) million annually in total for recreational services provided in state-owned parks.

If the provision of recreational services were based on a simple majority vote, the behavior of a median voter would take on particular interest. In our case, 50% of the respondents would support a recreation payment system with a WTP of FIM 47 (€ 8) or more per individual per year. Based on this decision of a simple majority, taxpayers would pay a total of FIM 188 (€ 32) million per year for recreation services in the country's state-owned parks. Thus, there should be no doubt that recreation is worth a considerable sum of money to Finns. The estimated monetary benefits clearly exceed the annual expenditures of about FIM 80 (€ 13) million on maintenance expenses. (Ovaskainen et al. 1999a)

Our results show that the payment vehicle used affects the WTP: a general tax increase received more zero responses than a personal recreation pass. Both payment vehicles nevertheless generate WTP distributions which are strongly skewed, since one-third of the respondents indicated a zero WTP for recreational services. We used the lognormal distribution for the dependent variable in our estimations, and the benefit measures derived using maximum likelihood interval estimation seem to be very sensitive to the upper bound of the first interval for the payment card. An overall conclusion for future studies is that the sensitivity of the results to the distribution assumed for the dependent variable should be carefully tested and reported in CV applications.

Finally, we must ask how we should interpret the welfare measures derived. Have we succeeded in determining the total value of national parks and state-owned recreation areas in Finland? To answer this question, we should make a distinction between the value of recreation services and people's willingness to voluntarily contribute to the maintenance of these services. In principle, these measures should be equal, but this is not necessarily the case in practice. If some services are provided free of charge, it is quite natural that fees are opposed and many respondents indicate a zero WTP. However, this does not mean that the services are without value. In order to gain a more comprehensive idea of the recreation services, we studied motives for unwillingness to pay.

In the debriefing questions that elicited reasons why the respondent was not willing to pay, about 40% of the respondents said that taxes were already so high that they should not be increased. The most common reason for not wanting to pay for a recreation card (28%) was that visiting recreation areas was not that important to the respondent. The next most common reason (25%) was that the respondent would use areas where no fees had been implemented. The motives given by respondents for willingness to pay should also be emphasized. Perhaps surprisingly, a majority of the respondents (60%) indicated that conservation of culturally and ecologically important areas was a major reason for their willingness to pay. Fewer than 20% of the respondents stated that the positive WTP that they indicated was mo-

tivated by an interest in guaranteeing themselves an opportunity to use the areas. Despite these altruistic motives, those who are actual users of state-owned parks seemed to be more willing to pay for recreational services. On the other hand, there appears to be room for "new recreation products", since people seem to be very unwilling to pay for traditional services such as hiking trails and ski tracks.

The most active users of state-owned recreation areas seem to be relatively well-educated and wealthy individuals. The study yields an interesting finding regarding the redistribution effects of implementing entrance fees for state parks. A relatively small proportion of the respondents, about 6%, stated that they could not afford a recreation card, while as many as 20% said that they could not afford a general tax increase which would be used for provision of recreation services. Since average income is about the same in the two sub-samples in which different payment vehicles were used, the general negative connotation of taxes might explain what respondents considered affordable. The results indicate that the intensity of preferences measured in monetary terms (or in total WTP) differs according to the payment vehicle used.

In sum, a majority of respondents seem to be happy with the current system, in which the costs of recreation services are paid by society as a whole through taxes. The provision of recreation services through tax revenues seems to be justified by the social benefits of recreation. The implementation of fees for public recreation might only lead to a shift in the use of recreational areas to sites where no charges are implemented; the possibilities to control the environmental burden of recreation would then become limited, because most recreation visits would not occur in managed areas. Such a development would conflict with the goal of preservation of nature, which citizens indicated as their major motive for maintaining state parks.

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Appendix 1: Willingness to Pay Questions

"The maintenance costs of recreation areas are publicly financed. The purpose of the following questions is to get some insight into HOW MUCH YOU VALUE THE OPPORTUNITY TO USE STATE-OWNED RECREATION AREAS AND NATIONAL PARKS."

The wording of the question on WTP in the form of an entrance fee, *Subsample (a),* read:

"Suppose that the users of recreation areas and national parks had to buy a personal *recreation pass,* the sales revenues from which would be used for maintenance of these areas. The pass would entitle one to access to the recreation areas and the use of basic services such as campfire sites, firewood, and waste disposal.

How much would you be willing to pay *at most* for an *annual* recreation pass which would allow you to use state-owned recreation areas and national parks?

The wording of the question on WTP in the form of taxes, *Subsample (b),* was similar:

"Suppose that *a general tax increase* would be needed to maintain the basic services in recreation areas and national parks and their provision free of charge. The basic services include the use of campfire sites, firewood, and waste disposal and other basic facilities.

How much more tax would you be willing to pay *per year at most,* if it were guaranteed that the additional tax revenues would be used for maintenance of recreation areas?"

Appendix 2: A Tobit Model for Grouped Data

Formally, the model is

$$\begin{aligned} y^* &= \beta\mathbf{x} + \varepsilon,\ \varepsilon \sim N[0,\sigma^2], \\ y &= j \text{ if } A(j-1) \leq y^* \leq A(j), \\ j &= 1, \ldots, J,\ A(0) = -\infty,\ A(J) = +\infty. \end{aligned} \tag{1}$$

The difference between this and an ordered probit model is that the threshold values are known here, and we have information on the scale of y^* in the data. Hence, an estimate of σ is produced.

Let L_i and U_i denote the lower and upper limits of the payment card interval. Thus, if y_i equals 1, L_i is $A(0) = -\infty$ and U_i is $A(1)$, the first limit value given.

The log-likelihood function for this model is

$$\ln L = \Sigma_{(i=1,N)}\{\ln[\Phi(\eta U - \gamma\mathbf{x}_i) - \Phi(\eta L - \gamma\mathbf{x}_i)]\} \tag{2}$$

where $\gamma = \beta/\sigma$ and $\eta = 1/\sigma$ and Φ is the standard normal cumulative density function.

Once the optimized β and σ have been attained, the conditional mean of y^* for any given vector of variables will be $\beta\mathbf{x}$. Since Cameron and Huppert (1989) use a lognormal conditional distribution for valuations, or $y_i = \ln(\text{WTP}_i) \sim N[0,\sigma^2]$, the mean of the untransformed WTP variable is $\exp(\beta\mathbf{x} + \sigma^2/2)$ and the median is $\exp(\beta\mathbf{x})$. (See, e.g., Dudewicz and Mishra, 1988). In other words, the mean as a welfare measure is more sensitive to the disturbance standard deviation, σ.