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Welfare Incidence of Subsidized Recreation Services in Finland

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Abstract

The paper addresses the question who benefits from public funding of recreation areas. Employing a survey data set that includes both users and nonusers of state-owned recreation and conservation areas in Finland, we derive measures of the income elasticity of willingness to pay for recreation services. Our elasticity estimates indicate that public provision of these services seems to benefit more those with lower incomes. We also estimate potential welfare effects for two separate income groups (lower-/higher-than-median income) in alternative cases in which a fee acceptable to a median voter would be implemented for the use of recreation areas. The efficiency and welfare losses have ambiguous impacts on the high- and low-income groups, with the impacts depending on the actual level of the fee implemented. Finally, we discuss whether public funding of recreation services can be justified and what the optimal policies might be for implementing user fees.

Keywords: user fees, benefits, environment, income

Introduction

The positive impact of outdoor recreation on health and well-being is considered a major motivation for governments to subsidize recreation services. Nature conservation areas promote environmental education, and recreation services further conservation aims by preventing overuse and degradation of valuable sites. On the other hand, implementing user fees for state-owned recreation areas would reduce congestion and open up a new source of income for the government. Here the fundamental question becomes whether distribution considerations in the provision of subsidized recreation services should play a role in instituting user charges.

Our paper examines equity in and public funding of recreation services. We study the relationship between income and willingness to pay (WTP) for collectively provided state-owned recreation and conservation areas in Finland and discuss distributional impacts of subsidized recreation services. Economists have long been concerned about whether government provision of public goods benefits other than high-income groups despite perhaps the initial political intention of serving the needs of all citizens (Besley and Coate 1991). In this context, nature protection or other programs to improve the quality of the environment are often classified as luxury demand (see, e.g., Baumol and Oates 1989). Accordingly, even though recreation services cannot be considered rationed, pure public goods, studies on the income elasticity of the demand for outdoor recreation facilities have categorized recreation as a luxury good (Boercherding and Deaton, 1972; Bergstrom and Goodman, 1973). However, there are few

indicators that this is necessarily the case in general, although there is considerable evidence that recreation services are more often used by relatively wealthy people (e.g., Vaux 1975, Cordell et al. 2002). An intuitive explanation is that when there are costs involved in the use of recreation services (travel, equipment, etc.), higher-income households can better afford to enjoy public recreation services. Countering this is the argument that as recreation is a time-consuming activity, the opportunity cost of time is lower for households with lower incomes; for example, evidence from travel cost studies indicates that income elasticity for changes in recreational consumer surplus is less than one (Morey et al. 1993). In their study on Maine state park campers, Reiling et al. (1992) also found evidence that higher fees would have a discriminatory impact on low-income users.

A special feature of recreation services that complicates demand analysis is that they have the nature of both a private and a public good. Considered as a private good and in terms of their complementarity with or substitutability for other goods, recreation services clearly need not be viewed as luxury goods. In fact, how they are classified depends on institutional context, knowledge, etc. (Daily et al. 2000). There are strong reasons to assume that other than user values, such as conservation of nature and cultural values associated with state parks, are as important as opportunities to use state parks free of charge. In contingent valuation studies, it is typically found that the income elasticity of WTP for ecosystem services provided by the environment (clean air, water purification, pollination) is less than one (Kriström and Riera 1996, Hökby and Söderqvist 2003). An essential point of departure for our analysis is that recreation services provided by the government have not only a private good component – captured by the use of the services – but also a public good component – determined, for example, by users' preferences with regard to nature conservation.

Our study makes two main contributions. First, we derive the income elasticity of willingness to pay for recreation services for alternative sub-groups of the whole population. Second, by estimating welfare measures for two income groups (lower-/higher-than-median income) we address questions such as who benefits from the recreation services most, whether fees would be welfare enhancing, and what the optimal fee level would be.

We investigate a representative sample of the Finnish population including both users and nonusers of the recreational services provided by all of the state-owned outdoor recreation parks. The data used are a sub-sample of the extensive Finnish Outdoor Recreation Survey, which was obtained along with the weekly Labor Force Survey, a continuous panel survey based on census data. The survey included questions eliciting people's willingness to pay for state-owned recreation and conservation areas. The statistical model we employ for analyzing WTP responses is a variant of the Tobit model in which the data are completely censored. This estimation method, initially suggested by Cameron and Huppert (1989), takes into account the interval nature of payment card WTP responses. In addition, a nonparametric Ayer estimator is used for comparison of welfare measures in the alternative user and income groups.

Our results show that users' overall preferences and funding alternatives for services influence how recreation services are perceived. The estimates of the income elasticity of WTP indicate that current policy favors those with lower incomes. However, a closer look at the welfare measures estimated demonstrates that the incidence of benefits is ambiguous.

The paper is organized as follows. The section to follow discusses the theoretical considerations of the analysis and briefly describes the statistical methods used. The next two sections present the data and the results of the demand analysis, respectively. The concluding section discusses policy implications with a special emphasis on whether public funding of

recreation services is justified, and, if so, to which extent and on which grounds.

Theoretical considerations and statistical methods for hypothesis testing

Our hypothesis is that the incidence of benefits from subsidized recreation services depends on income. Obvious indicators for verifying benefit incidence are estimates of income elasticity and consumer surplus measures. Two measures can be derived from our survey data: an estimate of the income elasticity of WTP and a welfare measure consisting of a money measure of utility change based on the hypothetical contingent valuation scenario. Let us discuss these measures in more detail.

The income elasticity of willingness to pay

In the theoretical literature, it has been emphasized that a clear distinction should be made between the income elasticity of demand and the income elasticity of WTP (Hanemann 1991, Flores and Carson 1997, Ebert 2003). The income elasticity of WTP is an elasticity derived for a "virtual price" for environmental quality elicited in contingent valuation studies. The income elasticity of willingness to pay is of the form $å_w$=d(*ln t TP*)/d(*lnM*), where *M* is income.

We derive the income elasticity of WTP from demand functions estimated using a grouped data Tobit model, given that a payment card was used for eliciting WTP responses. The method is a standard procedure, included, for example, as part of the LIMDEP computer package (Greene, 1998). The essence of the estimation procedure is to take into account the fact that the WTP responses cannot be considered as deterministic point estimates but are known only for the intervals used in the bid vector. Formally, the model is

$$(1) \qquad y^* = \beta\mathbf{x} + \varepsilon,\ \varepsilon \sim N[0,\sigma^2],$$
$$y = j \text{ if } A(j-1) \le y^* \le A(j),\ j = 1,...,J,\ A(0) = -\infty,\ A(J) = +\infty$$

Let L_i and U_i denote the lower and upper limits of the payment card interval. If y_i equals 1, L_i is A(0)=-∞ and U_i is A(1), the first limit value given. The log-likelihood function for this model is

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

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 β**x**. Cameron and Huppert (1989) use a lognormal conditional distribution for valuations, or $y_i=\ln(WTP_i) \sim N[0,\sigma^2]$, whereby the mean of the untransformed WTP variable is $\exp(\beta\mathbf{x}+\sigma^2/2)$ and the median is $\exp(\beta\mathbf{x})$. This indicates that the mean as a welfare measure is more sensitive to the disturbance standard deviation, σ, as will be seen below. Following Kriström and Riera (1996),

we use income, *M*, as the only explanatory variable such that $\beta\mathbf{x} = \alpha + \beta_M M$. The income elasticity of mean WTP can then be calculated from the model as follows:

$$\varepsilon_w = \frac{\partial E[WTP]}{\partial M} \frac{M}{E[WTP]} = \frac{\sigma^2}{2} \beta_M .$$

The income elasticity of WTP, ε_w, indicates whether the share of WTP allocated to the recreation services decreases or increases with income. The distribution of environmental benefits is "pro poor" if $\varepsilon_w < 1$, proportional if $\varepsilon_w = 1$, and "pro rich" if $\varepsilon_w > 1$. (See, e.g., Hökby and Söderqvist 2003).

Consumer surplus measures

As for our second indicator of distributional impacts, i.e., the welfare measure, the wording of the WTP question determines which surplus measure is actually employed (see, e.g., Johansson 1987). Since the respondents were asked about their willingness to contribute to financing the same range of recreation services in state-owned parks as is currently provided by the government free of charge, WTP is a measure of equivalent variation. In other words, the ex post level of utility will potentially be lower if a payment is charged for recreation services. The welfare measure, equivalent variation, expresses the maximum sum of money that must be charged individuals to make them as well off as they would be with a reduction in recreational services.

To illustrate the distributional impacts of fees on the consumer surplus, we adopt nonparametric estimation techniques, which are increasingly common in contingent valuation analyses. The purpose is to estimate the survival function directly from the survey responses, taking the empirical distribution as the "true" distribution instead of imposing a parametric distribution on the data. We will use the algorithm developed in Ayer et al (1955), which was first applied in environmental valuation analyses by Kriström (1990). The method has been shown to yield a consistent maximum likelihood estimator (Cosslett 1983) that is particularly easy to compute when there are no covariates. The WTP observations are grouped in the WTP space into intervals according to the responses obtained. The nonparametric iterative procedure generates a survival function such as that shown in Figure 1. The nonparametric WTP distribution is actually a step function, but this cannot be seen from the figure as scaling has rendered the distances between observations nondetectable.

In sum, the point estimates for mean and median WTP will be estimated parametrically, which also makes possible the derivation of the income elasticity of WTP. Nonparametrically derived survival distributions are used for estimating the changes in welfare that would result from the implementation of fees. The welfare changes are calculated for different fee levels and sub-groups of the population to illustrate the distribution of the burden of fees, or the incidence of benefits from currently subsidized recreation services.

Data

We use data from an extensive national outdoor recreation survey carried out in Finland in the years 1997-2000 (Sievänen 2001). The sub-survey on the importance of outdoor recreation

services ultimately yielded 1,871 questionnaires, constituting a response rate of 64%. The sample is representative for the Finnish population, and includes both users and nonusers of state-owned recreation and conservation areas. Sampling, data collection, pretesting and details of the mixed-mode survey (piloting, telephone and mail) are described in more detail in Virtanen et al (2001).

The sub-survey data used here included answers to contingent valuation questions which were intended to reflect the respondent's total annual WTP for recreation services in state-owned parks. 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. Willingness to pay for a recreation pass and willingness to pay a general tax earmarked for the provision of outdoor recreation services were used as payment vehicles in two separate sub-samples. The respondents were asked to choose the sum that came closest to their valuation on a payment card (see, e.g., Mitchell and Carson, 1989). The following amounts of money were listed on the card: FIM 0, 50, 100, 200, 300, 500, 1000, 1500, 2000, over 2000 (1 €=FIM 5.94[1]).

Table 1 gives summary statistics for the raw WTP distribution in the data set and captures the basis for our analysis of distributional impacts by comparing the mean WTP measures between lower- and higher-income groups within both payment vehicles. Although respondents with higher incomes had a higher WTP, the difference did not prove to be statistically significant. Interestingly, the proportion of respondents indicating zero WTP was highest (lowest) in the lower-than-median (higher-than-median) income group when tax (a recreation pass) was used as the payment vehicle.

Table 1. Mean WTP per year (FIM) by income group and payment vehicle (N=1582).

Total sampleMean WTP(FIM)/Proportion WTP=0 (%)		Income Lower than median	Higher than median
Payment vehicle	Tax	FIM 90 / 40.2%	FIM 105 / 33.7%
	Recreation pass	FIM 94 / 31.2%	FIM 97 / 23.9%

To gain more insight into the mean WTP in income groups, the same comparisons were conducted among nonusers and users (Table 2). When only nonusers were studied, WTP wassignificantly higher among respondents with higher-than-median incomes where the payment vehicle was a tax increase. Mean WTP was also compared between nonusers and users. The difference was significant, as the users of the state recreation and conservation areas were willing to pay FIM 25 more on average than nonusers. The difference between nonusers and users was especially high (FIM 52) among respondents whose income was below median when tax was used as the payment vehicle. This is consistent with a stylized fact whereby fees are considered regressive while at least some forms of taxes are viewed as progressive (More 1999).

Table 2. Mean WTP per year (FIM) among nonusers and users by income group and payment vehicle.

Mean WTP(FIM) per year		Nonuser/Income		User/Income	
		Lower than median	Higher than median	Lower than median	Higher than median
Payment vehicle	Tax	FIM 78[1)2)]	FIM 102[1)]	FIM 130[2)]	FIM 110
	Recreation pass	FIM 83	FIM 95	FIM 116	FIM 103
	Both	FIM 87[3)]		FIM 112[3)]	

Notes: Superscripts indicate statistically significant differences: 1) among nonusers: between income groups; 2) among the lower-than-median income group: between users and nonusers; and 3) between nonusers and users.

According to these comparisons, income is an important variable when WTP is also affected by interactions with personal use of recreation services and payment vehicle. Both of these variables are in part related to whether recreation services are perceived as private and/ or public goods.

Results

To calculate the income elasticity of WTP, we need to evaluate the function relating WTP to income. The estimations with grouped data Tobit specifications were carried out separately for three sub-samples: a sample including all respondents, a sample including only nonuser respondents, and a sample including respondents who had received a questionnaire presenting a general tax increase as a payment vehicle. Table 3 summarizes the estimation results.

Table 3. Grouped data Tobit regression results for WTP.

Sample	All N=1582		Nonusers N=1272		Payment vehicle: Tax N=753	
Variable	Estimate	p-value	Estimate	p-value	Estimate	p-value
α	3.60	.0000	3.46	.0000	3.19	.0000
β_M	.99	.0378	.12	.0343	.20	.0137
σ	1.32	.0000	1.36	.0000	1.49	.0000
WTP FIM per year: Mean Median	113 47		107 42		119 39	
ε_w	0.09		0.11		0.21	

Notes: α = constant, β_M = coefficient for log of income (FIM 1000), and σ = disturbance standard deviation

In every sub-group, the estimate of the income elasticity of WTP, ε_w , receives a value below one indicating that policies providing recreation areas favor "the poor". Comparison of the elasticity values between sub-groups suggests that nonusers benefit less in relative terms than users from current policy and that, as perceived by the respondents, a tax would have a similar impact. These findings are consistent with the estimates of median WTP, which is

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

highest (largest benefit) when the total sample is included in the estimation. The same effect cannot be seen in the mean estimate, because it is sensitive to the tails of the WTP distribution.

If one were to draw conclusions from the point estimates presented in Table 3, the most conservative overall assessment would be that current policy does not discriminate against those with lower incomes. To get a more comprehensive picture of the distributional impacts between income groups, we have to examine the entire empirical WTP distribution, and this is done in what follows.

Using the WTP data, we derive estimates of loss of consumer surplus by income group for alternative median voter scenarios. We assume that the median voter determines the level of the user fee, should a fee be implemented. As both users and nonusers participate in a referendum, we use the following median willingness-to-pay measures:

1. An annual fee of FIM 84 per person accepted by a median voter
2. An annual fee of FIM 63 per person accepted by a median voter and adjusted for the average number of visits per year for the population, including nonusers (average number of visits: 1.35)
3. An annual fee of FIM 12 per person accepted by a median voter and adjusted for the average number of visits per year for the population, including users only (average number of visits: 7.08).

Table 4 summarizes the results for the welfare changes using the Ayer estimator; both upper and lower bounds are reported (see Boman et al. 1999).

Table 4. Ayer estimates of welfare changes.

	Scenario I: WTP based[1] Median WTP FIM 84		**Scenario II: Use based[2] Median WTP FIM 63**		**Scenario III: Use based[3] Median WTP FIM 12**	
	Low income[4] FIM	**High income[5]**	**Low income** FIM	**High income**	**Low income** FIM	**High income**
Efficiency loss						
-lower estimate	17 889 250	14 158 790	30 714 242	45 272 746	8 376 527	6 897 020
-upper estimate	69 391 244	50 152 382	34 504 554	50 825 178	9 477 245	8 091 208
Welfare change						
-lower estimate	101 495 769	95 115 764	44 675 313	56 104 604	21 707 099	25 023 803
-upper estimate	152 997 763	131 109 355	48 465 635	61 657 036	22 807 817	26 217 991

Notes: [1] Annual WTP, no adjustments for actual use of the services [2] WTP adjusted for average number of visits per year: 1.35 [3] WTP adjusted for average number of visits per year: 7.08 [4] Lower-than-median income [5] Higher-than-median income

The results of Scenario I suggest that current policy favors "the poor". In other words, a policy reform implementing a fee of FIM 84 per year would generate a larger welfare loss for those with lower rather than higher income. This result is in line with the results of our elasticity estimates. However, a comparison between users and nonusers in two income groups (not reported in Table 4) reveals that "rich" users currently benefit more than "poor" users. This suggests that a policy reform implementing a fee of FIM 84 per year would be more beneficial for low-income nonusers than for low-income users.

Interestingly, the results of benefit incidence become even more ambiguous when we look at the impact of the size of the fee on those who actually use the recreation services. In the case of a small increase in recreation fee (from zero to FIM 12= €2 in Scenario III), the low-income group would suffer a larger efficiency loss in vis-á-vis the high-income group than they would in the case of a large increase in fee (from zero to FIM 63= €10 in Scenario II). The size of the efficiency loss is important since it gives an estimate of how large a proportion of previous users will be excluded from the use of services due to a fee.

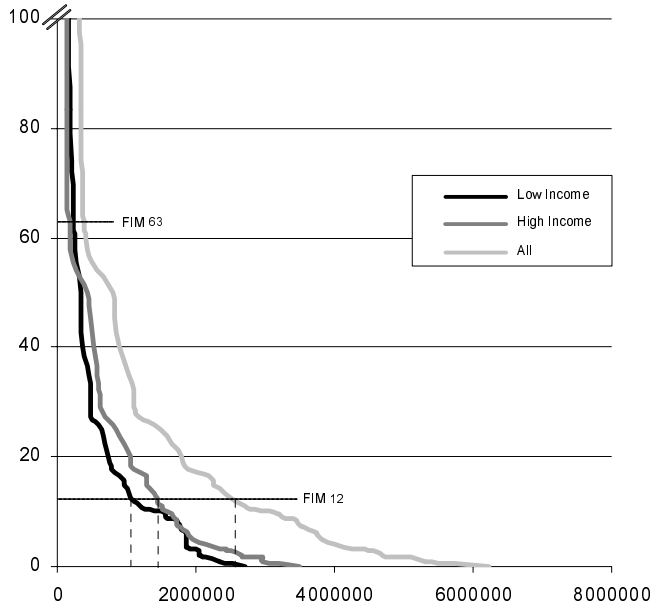

Figure 1. WTP distribution per visit by income group (lower-/higher-than median income, all).

This effect is illustrated in Figure 1, which depicts the welfare losses at a fee level of FIM 12 for two income groups. That the efficiency loss of the lower-income group would be larger in relative terms with a lower fee than that of the higher-income group reflects a phenomenon commonly observed when estimating the demand elasticity of consumption goods. Demand for recreation seems to be more elastic for low-income groups.

Conclusions

We have investigated what can be said about the patterns of distribution of benefits associated with recreation services. One of the most interesting results of our analysis is that when nonuse values are included, the loss in consumer surplus indicates that those with lower-than- median incomes would lose more than those with higher-than-median incomes. In other words, nonuse values seem to be at least equally important to both the poor and the rich. This finding contradicts a common assumption about the nature of environmental, public goods as luxury goods.

The paper also yields an interesting policy implication regarding the use values, i.e., that

current policy may in fact benefit those with higher incomes.

Finally, to make policy design an even more challenging task, we found that if a fee is to be imposed, an optimal fee should be "high enough" for distributional reasons; however, this would necessitate a policy that recycles revenues from fees back to low-income users. If the decision on a fee were made by the users only, they would vote for a fee too low from a social point of view. Actually, our results indicate that a majority voting in a referendum might yield the data necessary to establish the required fee level.

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