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Huhtala, Anni and Pouta, Eija

MTT Agrifood Research Finland

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USER FEES, EQUITY AND THE BENEFITS OF PUBLIC OUTDOOR RECREATION SERVICES

Anni Huhtala and Eija Pouta

MTT Agrifood Research Finland
E-mail: anni.huhtala@mtt.fi
eija.pouta@mtt.fi

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ABSTRACT

The paper addresses the question of who benefits from public recreation areas. Employing a set of survey data from users and nonusers of state-owned recreation and conservation areas in Finland, we derive two measures for distributional analysis. The first, the income elasticity of willingness to pay for recreation services, indicates that public provision of recreation benefits lower-income groups more than higher-income groups. The second, a welfare measure including efficiency loss, reveals ambiguous impacts depending on the level of the fee implemented. Low fee levels decrease recreation visits among lower-income users, whereas high fees reduce the welfare level of higher-income users in particular.

JEL Codes: D63, H4, Q26

INTRODUCTION

Economists have long been concerned about whether government provision of public goods benefits other than high-income groups despite the initial political intention of serving the needs of all citizens (Besley & Coate 1991). Interestingly, recreation services in national parks provided by the government have both a private good component – captured by the use of the services – and a public good component – seen, for example, in users' preferences with regard to nature conservation. Previous studies that have estimated conventional income elasticity measures for the private good demand for outdoor recreation facilities categorize recreation as a luxury good (Borcherding & Deaton 1972, Bergstrom & Goodman 1973). More recent studies have shown that at least the use of recreation services seems to be biased towards relatively wealthy people (e.g., Cordell et al. 2002, Pouta & Sievänen 2001). An intuitive explanation is that when there are costs involved in the use of recreation services, e.g. travel and equipment, higher-income households can better afford to enjoy public recreation services. Countering this, of course, 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 the income elasticity for changes in recreational consumer surplus is less than one (Morey et al. 1993).

There is some evidence, however, that other than user values, e.g. conservation and the cultural values associated with national parks and wilderness areas, are as important as opportunities to use these areas (Aldy et al. 1999, Huhtala 2004). Like use of recreation services (a private good), nature protection or other programs to improve the quality of the environment (public goods) are often classified as luxury demand (e.g., Baumol & Oates 1989), even though few studies have actually considered the environmental equity issues associated with conserving unique ecosystems (as pointed out, e.g., by Aldy et al. 1999). In fact, the income elasticity of willingness to pay (WTP) for ecosystem services provided by the

environment (clean air, water purification, pollination) is typically found to be less than one in contingent valuation studies, indicating that ecosystem services are to be considered normal goods (Kriström & Riera 1996, Hökby & Söderqvist 2003, Horowitz & McConnell 2003).

Given the mixed evidence, financing public recreation services becomes a puzzling task at least where equity is concerned. Major motives for governments to subsidize recreation services are the positive impact of outdoor recreation on health and well-being and the environmental education promoted by nature conservation areas. Implementing user fees for state-owned recreation areas would shift the financial burden from all taxpayers to the actual users. Here the fundamental question becomes how alternative funding schemes (taxes or user fees) affect the distribution of net benefits of public recreation services. In order to translate benefits into welfare gains, we need to measure how different individuals (users/nonusers; "the rich"/"the poor") value public recreation services.

We study the relationship between income and WTP for collectively provided state-owned recreation and conservation areas in Finland to determine the distribution of benefits from the current recreation services financed by all taxpayers and the potential impacts of implementing user fees. Previous studies, particularly those in the US, have extensively examined issues of equity and the appropriateness of the fees charged (for a review, see Williams & Black 2002). The research indicates that higher fees would have a discriminatory impact on low-income users and that revenue-maximizing fees would price a considerable proportion of the present users of national forests out of the market (e.g., Reiling et al. 1992, Teasley et al. 1994). Nevertheless, in 2004 the US Congress passed the Federal Lands Recreation Enhancement Act, which authorizes federal land management agencies to charge recreational use fees and retain the revenues. For example, the United States Forest

Service (USFS) has introduced fees at about 60% of its forests and has more than doubled its total recreation fee revenues in ten years (Espey 2005).

The Nordic countries differ fundamentally from the US, however, in that their institutions include a common right of access to all natural (undeveloped) areas where the latter has a certain tradition of charging for recreational access to public lands (Espey 2002). Given this difference, we investigate a representative sample of the Finnish population that includes both users and nonusers of the recreation services provided by all of the state-owned outdoor recreation parks. The data used are a sub-sample of the extensive National Survey of the Finnish Outdoor Recreation (Sievänen 2001). The survey included questions eliciting people's willingness to pay for recreation services in state-owned recreation and conservation areas.

The few studies that have determined the income elasticity of WTP from stated preference surveys have mainly used meta-analysis (Schläpfer 2006) and paid less attention to survey-specific factors such as respondents' familiarity with the good valued, payment vehicle used, and distribution of income in the parent population. As we are not trying to settle definitively the issue of income effects in contingent valuation surveys, we focus instead on a single data set; however, we go beyond the income elasticity of WTP and, for comparison, investigate the consumer surplus by income group non-parametrically - free from specification of functional forms, estimation methods, etc. First, we derive the income elasticity of willingness to pay for recreation services for several respondent categories of the survey sample. The categories were determined by use behavior (user/nonuser) and by the fee payment scheme suggested in the WTP questionnaire (recreation pass/tax). The payment scheme is interesting in that fees are considered regressive while at least some forms of taxes (income) used for financing recreation services are viewed as progressive (see discussion in

More 1999). The income elasticity of WTP tells us whether the share of WTP allocated to recreation services decreases or increases with income in each category. Second, we estimate a consumer surplus measure from marginal WTP curves for two income groups (lower-/higher-than-median income). These consumer surplus measures are illustrative for addressing questions such as who benefits most from the recreation services. Interestingly, the point estimates of the income elasticity of WTP show that current policies favor the lower-income group and fees would reduce welfare, whereas consumer surplus measures give a more detailed and mixed picture. Welfare changes depend on efficiency losses, which in part depend on the fee level implemented.

The paper is organized as follows. The section to follow discusses the hypotheses 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.

CONCEPTUAL BACKGROUND AND STATISTICAL METHODS APPLIED

In order to analyze the distributional impacts of public provision of subsidized recreation services, it is necessary to estimate the incidence of benefits from these services. Obvious indicators for determining 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 for environmental goods and a welfare measure consisting of a monetary measure of utility change based on a hypothetical contingent valuation scenario.

The income elasticity of WTP for environmental goods

The theoretical literature has emphasized that a clear distinction should be made between the income elasticity of demand and the income elasticity of WTP (Hanemann 1991, Flores & 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 WTP is of the form $\varepsilon_w = d(ln\ WTP)/d(lnM)$, where M is income. The income elasticity of WTP, ε_w, indicates whether the share of WTP allocated to the recreation services in question 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 & Söderqvist 2003.)

Given that a payment card was used for eliciting WTP responses, we derive the income elasticity of WTP from demand functions estimated by interval regression (see, e.g., Greene 1998, Maddala 2001, Woolridge 2002). The essence of the estimation procedure is to take into account the fact that WTP responses cannot be considered deterministic point estimates but are known only for the intervals, i, used in the bid vector (Cameron & Huppert 1989). (See Appendix 1 for the econometric model and the log-likelihood function.) We 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 sensitive to the disturbance standard deviation, σ. Following Kriström and Riera (1996), we use income, M, in a logarithmic form as the only explanatory variable such that $\beta\mathbf{x} = \alpha+\beta_M \ln M$. The income elasticity of mean WTP calculated from the model is then $\varepsilon_w = \partial E[\ln WTP]/\partial \ln M = \beta_M$.

Consumer surplus measures

As regards our second indicator of distributional impacts, 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 (quantity-constrained) 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 individuals should be charged to make them as well off as they would be with a reduction in recreational services (Johansson, pp. 62-64).

To illustrate the distributional impacts of fees on the equivalent variation (consumer) surplus, we apply a marginal willingness to pay (demand) curve such as that shown in Fig. 1. Initially, consumer surplus is equal to the area $0aQ_1$, referring to trip quantity level Q_1 and price level 0. Implementing a fee raises the price to P and reduces consumer surplus to the triangle Pab such that the welfare loss for the consumer is $0PbQ_1$. As revenues accruing to the managing agency are equal to the area $0PbQ_2$, the social cost of implementing the fee is the efficiency loss (deadweight loss) Q_2bQ_1. From an equity standpoint, it is important to compare welfare losses and the associated efficiency losses for consumers in different income categories. The size of the efficiency loss is essential since it gives a monetary estimate of the loss for previous users discouraged from using services due to the fee.

In the empirical analysis, we adopt a nonparametric iterative procedure which generates a survival function. The survival function is directly estimated 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.

Objectives

The point estimates for mean and median WTP will be estimated parametrically, which makes it possible to derive the income elasticity of WTP. Non-parametrically 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 two income groups of the population to illustrate the distribution of the burden of fees, or the incidence of benefits from currently subsidized recreation services. As we hypothesize that not only income but also whether recreation services are perceived as private or public goods (or both) affects their perceived benefits, we identify the respondents' use of the services as well as their reactions to alternative funding schemes. Consequently, we derive the WTP measures and the income elasticity of WTP separately for four subgroups characterized by use (nonusers/users) and the payment vehicle used in the survey sample (general tax/recreation pass). In addition, welfare changes are calculated for different fee levels reflecting whether the government considers all taxpayers (independent of use) or only users in determining the actual fee level.

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 public outdoor recreation services ultimately yielded 1,871 questionnaires, constituting a response

rate of 64%. The sample is representative of the Finnish population and includes both users and nonusers of state-owned recreation and conservation areas. Sampling, data collection, pre-testing and details of the mixed-mode survey (piloting, telephone and mail) are described in more detail in Virtanen et al. (2001). (See also Huhtala 2004.)

The sub-survey data used here included answers to contingent valuation questions that were intended to reflect the respondents' total annual WTP for recreation services in state-owned national parks and hiking areas. 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. A recreation pass and 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 & 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 from the payment card responses including zero responses, 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 between income groups 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 a tax (a recreation pass) was used as the payment vehicle. This clearly runs contrary to the assumption

[1] Finland adopted the euro (€) as its currency on January 1, 2002; the Finnish mark was the country's official currency at the time of the survey. The exact wording of the questions that elicited respondents' WTP is given in Appendix 2.

of taxes being perceived as pro poor yet is a rational outcome if there are proportionally more low-income than high-income respondents who do not use the services at all.

[Place Table 1 about here]

The considerable number of respondents indicating a zero WTP could of course be a concern, but the answers to debriefing questions in the questionnaire import certain credence to our data set. Only 17% of the zero-WTP respondents (4% of the total sample) opposed any charge, because they felt that they had a right to use the recreation sites and services. On the other hand, 39% of the zero respondents (16% of the total sample) opposed a tax, because they considered taxes high enough already. The predicted probability of respondents being willing to pay something for recreation services (WTP>0) was about 70 % in the whole sample, which we consider a relatively realistic figure; especially so as about one-fifth (22%) of population actually uses these areas annually.

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 was significantly higher among respondents with higher-than-median incomes where the payment vehicle was a general tax. Mean WTP was also compared between all nonusers and users. The difference was significant, with users of state recreation and conservation areas 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 a tax was used as the payment vehicle. A mixed rationale for the lower-income group is consistent when their use behavior is taken into account: nonusers do not necessarily want additional taxes, and users benefit if taxes are progressive.

[Place Table 2 about here]

According to these comparisons, income is an important variable for benefit considerations, but WTP is also affected by interactions with personal use of recreation services and payment vehicle. As both of these variables are in part related to whether recreation services are perceived as private and/or public goods, the picture of benefit distribution becomes richer and more challenging to analyze. The benefits for nonusers come exclusively from public good considerations, and altruistic motives are likely to play a role. In a similar manner, tax payments, in contrast to fees, dissociate willingness to pay from own use only. Willingness to pay taxes then expresses a general interest in allocating resources to recreation regardless of the ultimate beneficiaries.

RESULTS

To calculate the income elasticity of WTP, we need to evaluate the function relating WTP to income. While interval regression was used to correct for the range of values displayed on the payment card, we followed Cameron and Huppert and used midpoint of reported income category in estimations without attempting to compensate for the measurement error inherent in the income variable. Interval regressions were carried out separately for five sub-samples: a sample including all respondents, a sample including only nonuser (user) respondents, and a sample including respondents who had received a questionnaire presenting a general tax increase (recreation pass) as a payment vehicle. Table 3 summarizes the estimation results.

[Place Table 3 about here]

In every sample, the estimate of the income elasticity of WTP, ε_w, receives a value considerably below one, indicating that policies providing recreation areas favor "the poor". However, it is appropriate to focus on samples where the income variable is statistically significant (samples "All", "Nonusers", and "Tax" in Table 3). This comparison suggests that a tax has the largest income effect ($\varepsilon_w = 0.20$). Hence, the low-income groups would not necessarily favor tax financing of the current policy if a user fee were an option. This result is in line with a previous empirical finding on progressive payment vehicles (Schläpfer 2006). However, an economically more intuitive explanation for our finding here could be the sensitivity of the payment vehicle to use behavior. Recall that the tax option generated a statistically significant difference in WTP between nonusers and users in the low-income group (Table 2), suggesting that nonusers who dislike tax financing may dominate the responses of those with a low income. This inference is also consistent with the finding that the income effect is slightly larger for nonusers ($\varepsilon_w = 0.12$) than for all respondents ($\varepsilon_w = 0.10$), but as the difference is minimal one should be careful to avoid overinterpretation. We cannot say anything definite about the respondents who had actually used the recreation services, because the income coefficient was not statistically significant. Accordingly, we analyze empirical WTP distribution non-parametrically in the following. If one were to draw conclusions from the point estimates presented in Table 3, the most conservative overall assessment would still be that current policy does not discriminate against those with lower incomes, because the income elasticities turned out to be low.

To get a more comprehensive picture of the distributional impacts between income groups, we examine the entire empirical WTP distribution and observed use. In what follows we will use the Ayer estimator, because it describes the empirical distribution without parametric constraints. The estimator generates a median WTP of FIM 84, which is a

considerably higher estimate than the parametric ones reported in Table 3. However, the differences in the distribution of WTP as such are important for a comparison of welfare changes between income groups. To compare the impacts on high-income and low-income user respondents, we derive WTP survival distributions by income group to estimate the loss of consumer surplus for alternative policy scenarios involving fees.

Using the empirical distribution generated by the Ayer estimator we can now approximate the "true" demand schedule by calibrating the number of visits at the zero fee level to the current number of visits by the population as predicted by the sample of users, i.e., over 6.2 million per year. As the demand is expressed in terms of total number of visits, the WTP must be adjusted for the number of visits reported by the respondents.

Fig. 2 gives a first impression of the differences in demand for recreation between the income groups. The demand curve seems to be more elastic for the lower-income than for the higher-income group at low fee levels, but high fees produce a considerable effect for higher-income groups as well. This indicates that there are differences in the demand elasticities by income group, and we get an important insight into the welfare impact of a chosen fee level.

Normally it is assumed that the median voter in the overall population determines the level of the user fee, should one be implemented. Both users and nonusers would participate in any putative referendum and our findings indicate that these groups together would support a median WTP of FIM 84. As the government would collect fee revenue only from users, however, it might use different estimates of visit frequencies when considering the appropriate fee level. The average number of visits per year is 1.35 for the whole population, including nonusers, and 7.08 for users only. Table 4 summarizes the results for the welfare changes for two fee scenarios using the Ayer estimator: Scenario I) An annual

fee of FIM 63 (about € 11) per visit, which is the WTP accepted by a median voter (FIM 84) divided by the average number of visits for the whole population (1.35); and Scenario II) An annual fee of FIM 12 (about € 2) per visit, which is the WTP accepted by a median voter (FIM 84) divided by the average number of visits per year for users only (7.08). To allow more reliable comparisons between groups we calculated both upper and lower bounds for the welfare measures for four separate income groups (see Boman et al. 1999). We report the changes per person as averages of upper and lower bound estimates in Table 4.

[Place Table 4 about here]

The results of Scenario I suggest that current policy favors "the rich". In other words, a policy reform implementing a fee of FIM 63 per year would generate a larger welfare loss for those with a higher rather than a lower income. This suggests that a policy reform implementing a fee of FIM 63 per year would be more beneficial for the lower-income than for the higher-income group. Interestingly, this result contrasts with the results of our elasticity estimates.

If we focus on welfare change, we find similar results in the case of Scenario II. The higher-income groups would seem to suffer a larger welfare loss if the fee policy were implemented. However, the results of benefit incidence become more ambiguous when we look at the efficiency loss in the case of a small fee. In the case of a small increase in recreation fee (from zero to FIM 12, or €2 in Scenario II), the lower-income group would suffer a larger efficiency loss than the higher-income group. This effect is the opposite of that seen in the case of a large increase in fee (from zero to FIM 63 or €11 in Scenario I). As the size of the efficiency loss gives a monetary estimate of the loss for previous users discouraged from using services due to a fee, the result shows that for the lower-income group even a low

fee would discourage the use of services by those who had previously taken advantage of them.

The ratio of efficiency loss and welfare loss (EL/WL) is reported in Table 4, illustrating the magnitude of the efficiency loss for the two income groups at the two fee levels. At a low fee level the share of efficiency loss is higher in the lower-income group (44%) than in the higher-income group (28%). As the fee increases, the efficiency loss becomes relatively more important for the higher-income group. This effect is illustrated in Fig. 3, which depicts the welfare and efficiency losses and fee revenue at various fee levels for the two income groups. The figure also shows that the fee revenue remains relatively stable for the lower-income group, because no matter how small the fee might be, it affects the demand immediately by decreasing the use of recreation services. Those with a higher income would tolerate low fees, but the fee revenue would decrease at high fee levels.

These results reflect a phenomenon commonly observed when estimating the demand elasticity of consumption goods: demand is more elastic for lower-income groups from zero fees to low fee levels, but high fee levels produce a considerable effect for higher income groups as well. Our findings underscore the importance of analyzing the welfare effects along the whole demand curve instead of focusing on point estimates of income elasticity.

DISCUSSION

We have investigated the patterns of distribution of benefits associated with recreation services. The results of our analysis indicate that nonusers also gain considerable benefits from public recreation services. The estimates of income elasticity of WTP show that provision of recreation services seems to benefit those with lower incomes more than those

with higher incomes. However, our analysis illustrates the problems associated with the use of point estimates of income elasticity in distributional analysis. From our case study we can conclude that analyzing welfare changes in components on various parts of the demand curve gives a more versatile picture of the distributional effects of a policy than can be had from point estimates of income elasticity.

The results of our case study make it possible to evaluate the efficiency of alternative financing mechanisms for the agency providing recreation services. They show that the efficiency loss of a fee compared to fee revenue depended crucially on the fee level. At a lower level, the fee revenue was almost twice as high as the efficiency loss, but at a higher level the efficiency loss was approximately three times the fee revenue. By way of comparison, the efficiency loss of taxation in Finland (including commodity taxes) has been estimated at between 40 and 65 % depending on the supply elasticity of labor (Prime Minister's Office 2002). In conclusion, our results indicate that financing using fees leads to higher efficiency if the fee level is low enough but that low fees would hurt those with lower incomes relatively more. In other words, there seems to be a certain trade-off between efficiency and equity.

The paper also yields an interesting policy implication regarding use values, i.e., that the current policy of publicly provided free recreation services may in fact benefit those with higher incomes. Implementing fees would mean a welfare loss particularly for higher-income people. However, even a modest fee decreases use of recreational areas by lower-income individuals. This implies that if the policy goal is to impose a fee that has equally distributed welfare effects, the fee should be "high enough", although this would necessitate a policy that recycles revenues from fees back to lower-income users. If the decision on a fee were made by the users only, they would vote for a fee that would be too low from an equity

point of view. Indeed, our results indicate that a majority voting in a referendum might yield the information necessary to establish the required fee level.

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APPENDIX 1

Formally, the econometric model is

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

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 $A(0) = -\infty$ and U_i is A(1), the first limit value given. The log-likelihood function for this model is

(2) $$\ln L = \sum_{i=1}^{N} \ln\left(\Phi\left(\frac{U - \beta x_i}{\sigma} \right) - \Phi\left(\frac{L - \beta x_i}{\sigma} \right) \right),$$

where 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 $\beta\mathbf{x}$. The model estimation is a standard procedure included in several computer packages.

APPENDIX 2

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 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 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?"

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Huhtala and Pouta, Figure 1

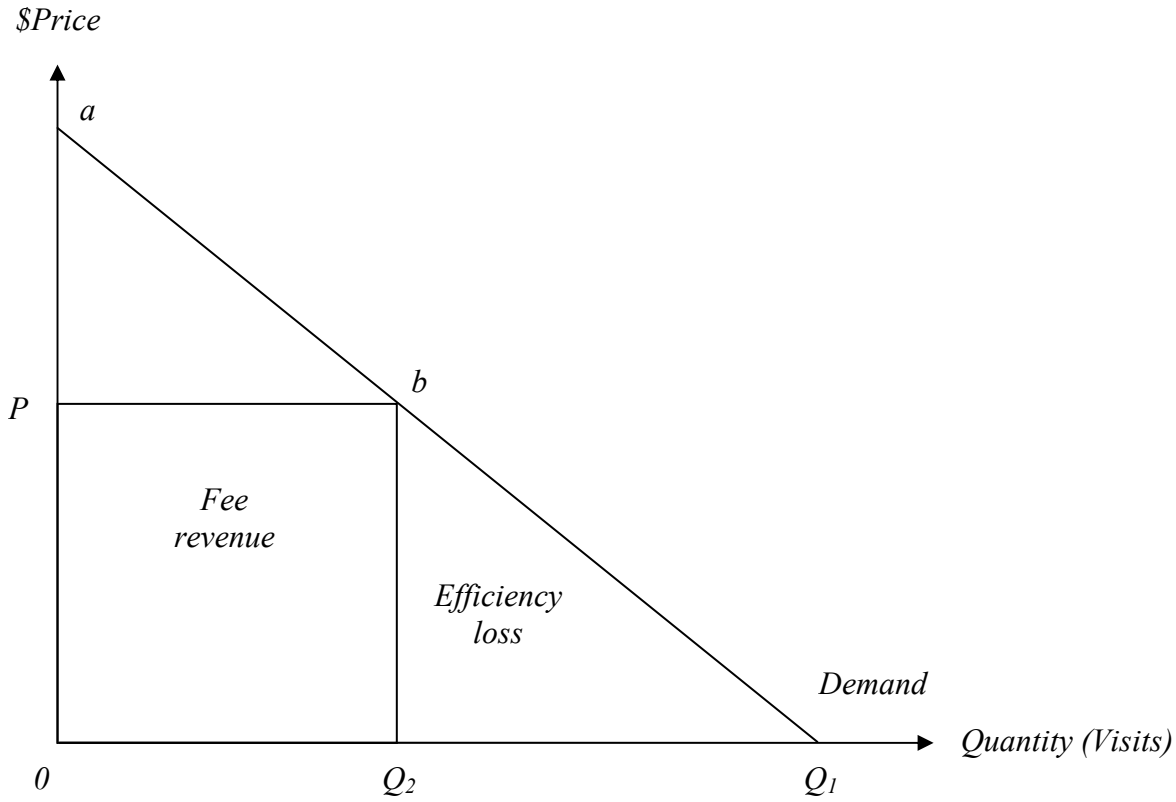

Figure 1. Impact of fee, *P*, on consumer surplus by components of welfare loss.

Huhtala and Pouta, Figure 2

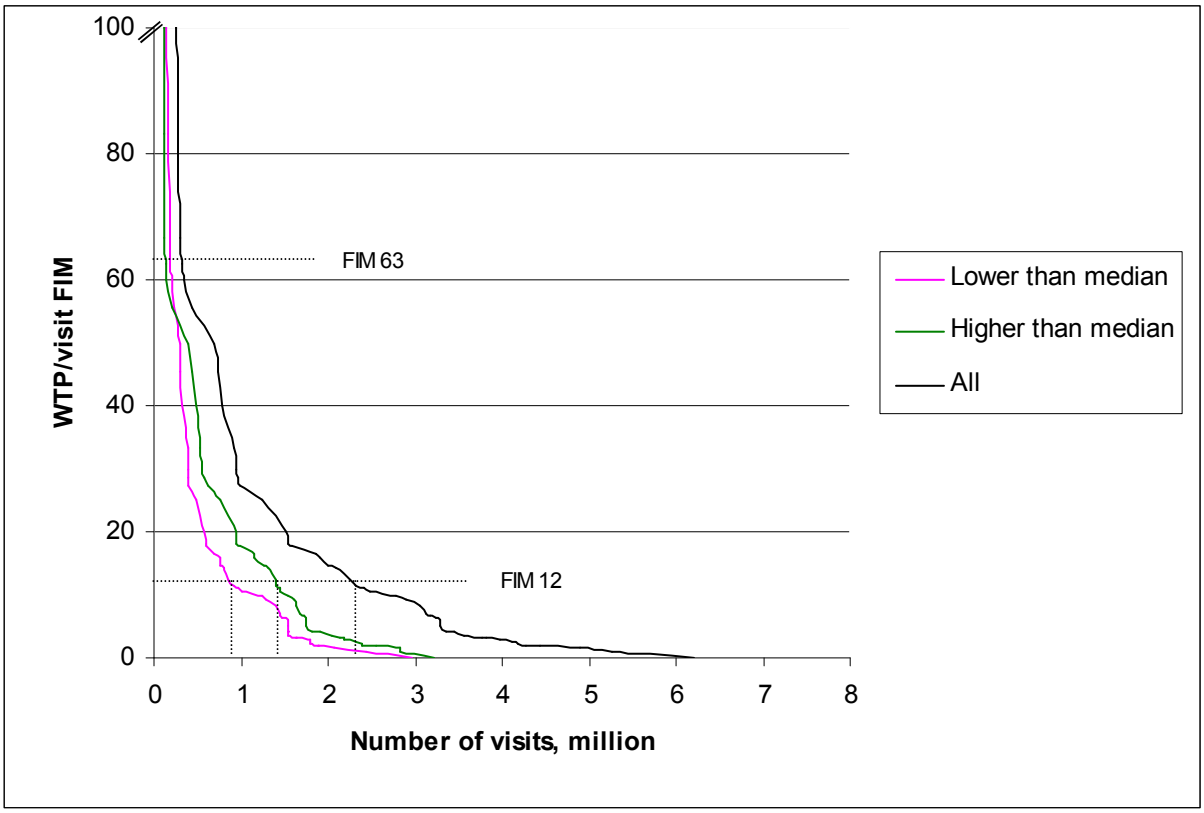

Figure 2. WTP distribution per visit by income group (lower-/higher-than median income, all).

Huhtala and Pouta, Figure 3

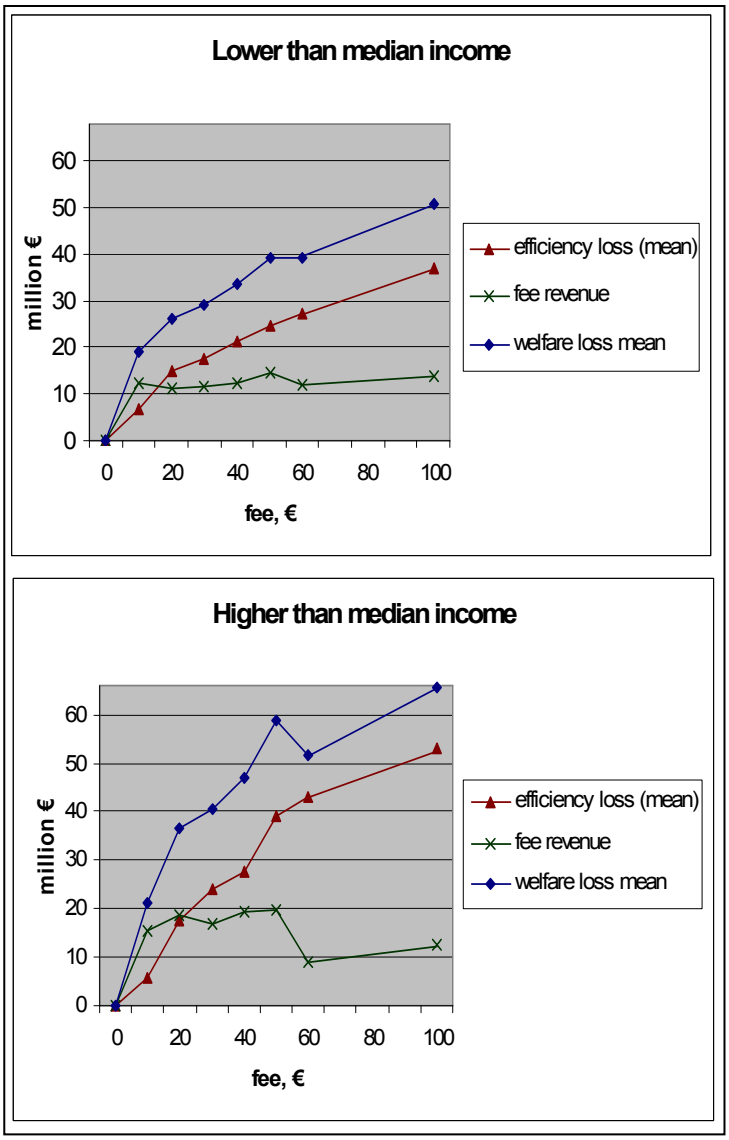

Figure 3. Fee revenue, efficiency and welfare loss by fee level in the income groups.

Table 1 Mean WTP per year (FIM) based on responses in the payment card, and proportion of zero WTP (%) by income group and payment vehicle in the data set (N=1582).

Mean 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%

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

Mean WTP(FIM) per year		**Nonuser**		**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.

Table 3. Interval regression results, WTP and income elasticity of WTP.

	All	**Nonusers**	**Users**	**Payment vehicle**	
				Tax	*Recreation pass*
	coefficient (p-value)	coefficient (p-value)	coefficient (p-value)	coefficient (p-value)	coefficient (p-value)
α	3.60 (.0000)	3.46 (.0000)	3.97 (.0000)	3.19 (.0000)	3.97 (.0000)
β_M	0.10 (.0378)	0.12 (.0343)	0.06 (.4923)	0.20 (.0137)	0.01 (.8685)
σ	1.32 (.0000)	1.36 (.0000)	1.21 (.0000)	1.49 (.0000)	1.18 (.0000)
WTP FIM per year:					
Mean	113	107	128	119	109
Median	47	42	62	39	54
ε_w	0.10	0.12	0.06	0.20	0.01
N	1582	1272	396	753	829

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

Table 4. Fee revenue, efficiency and welfare loss for two fee scenarios.

	Income		
	Lower than median	*Higher than median*	*All*
Scenario I: Fee FIM 63[1)]	FIM		
Fee revenue	11 500 000	9 300 000	20 800 000
Efficiency loss (EL)			
- lower estimate	25 500 000	40 400 000	65 900 000
- upper estimate	28 900 000	45 300 000	74 200 000
- mean	27 200 000	42 900 000	70 100 000
Welfare loss (WL)			
- lower estimate	37 000 000	49 700 000	86 700 000
- upper estimate	40 400 000	54 600 000	95 000 000
- mean	38 700 000	52 200 000	90 900 000
EL/WL	0.70	0.82	0.77
Scenario II: Fee FIM 12[2)]			
Fee revenue	10 700 000	16 200 000	26 900 000
Efficiency loss (EL)			
- lower estimate	7 900 000	5 900 000	13 800 000
- upper estimate	9 300 000	6 800 000	16 100 000
- mean	8 600 000	6 400 000	15 000 000
Welfare loss (WL)			
- lower estimate	18 700 000	22 100 000	40 700 000
- upper estimate	20 000 000	22 900 000	42 900 000
- mean	19 400 000	22 500 000	41 800 000
EL/WL	0.44	0.28	0.36

Notes:

[1)] WTP (FIM 84) divided by average number of visits of all respondents per year (1.35)

[2)] WTP (FIM 84) divided by average number of visits of users per year (7.08)