Valuation of trips to second homes in the country: Do environmental attributes matter?

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Abstract

Although spending time in a summer home is a popular leisure activity in many developed countries, little is known about the welfare impacts of such recreation in monetary terms. We use data from Finland to provide first estimates of the extent of the recreation benefits obtained from visits to second homes. Special emphasis is placed on how environmental attributes of second homes, such as the presence of algae, the availability of a beach, and electricity, influence the recreation value of visits. The impacts are valued through revealed preferences using the travel cost method. We estimate the recreation value to be about EUR 170 – 205 per trip if a summer home is electrified, if a beach is available and if algae do not prevent aquatic recreation. The aggregate non-market benefits of the use of the current summer home stock are considerable – about EUR 500 million per annum. The presence of algae that prevent aquatic recreation decreases the value per trip by 40 percent, and the lack of a beach reduces it by 45 percent; electrification increases the value by 3–5 percent. These impacts should be balanced against the social costs of second homes when designing environmental policies on leisure-time housing.

1 Introduction

The emergence of the second home phenomenon is typically explained by increased economic wealth and leisure time in western societies. More recently, improved transportation and communications, as well as more flexible working conditions have facilitated the acquisition of "leisure homes" by a greater share of the population, particularly in aging societies.[1] The motive for owning a second home in the country and spending time there is usually a desire to escape busy, urban life, to enjoy nature and recreational opportunities, and to relax and spend time with family and friends (Gallent and Tewder-Jones 2001.)

This study provides first estimates of the extent of the recreation benefits obtained from visits to second homes in the country. Special emphasis is placed on environmental attributes that were expected to affect the frequency of trips to those homes. The economic impacts of these amenities are valued in monetary terms through revealed preferences using estimates of the travel costs of visits. In our analysis, we use survey data on trips to second homes in Finland. Spending leisure time at one's second home is a significant element of the Finnish summer and holidays, as well as a salient feature of the Finnish cultural heritage in general.

Given the extent of the second home phenomenon, increasing attention is being paid to its environmental impacts. The relationship between second homes and their environmental effects can in fact be considered multifaceted. Living in one's summer home has traditionally been perceived as an environmentally friendly way of life. However, with the growth in recent years of the number and size and of second homes and the standard of equipment in them, their pressure on the environment has increased. For example, the use of energy at summer houses in Finland has grown rapidly. Between 1970 and 2004 it increased twentyfold, whereas the energy use of detached houses in the same period rose only fivefold (Statistics Finland 2005). Further increasing the environmental impacts of summer houses is the fact that they are built in sparsely populated areas, in the middle of untouched nature and on shorelines which are sensitive to environmental impacts. In fact, together with industry, scattered and free-time settlement is the second largest phosphorous loader in Finland after agriculture (Finnish Environment Institute 2010). What is more, summer houses may limit the recreational opportunities of local residents by restricting their access to natural beaches (Vail & Hultkrantz 2000).

[1]The significance of the summer home phenomenon in rural areas is supported by the statistics of second homes. There are about 1.5 million summer homes in the Nordic Countries. In the United Kingdom, the number has been estimated to be 250,000, in Germany 230,000 and in the USA 3,580,000.

Yet, recreational use of second homes may also encourage people to protect the environment. The better the quality of the environment near a summer home is, the more enjoyable it is to spend time there. Thus, although summer houses burden water ecosystems, good water quality is important for recreation there. In fact, the surrounding environment provides many services that are crucial for outdoor recreation at summer houses, such as hiking and picking berries in forests, swimming and fishing and enjoying landscapes (Vail & Hultkrantz 2000, 229). On balance, it is plausible to presume that the owners of summer homes consider it important to keep the surrounding environment in good condition.

This study uses the travel cost method to provide estimates of the recreation benefits of second homes. As early as in the 1970s, Whitby et al. (1974) suggested that once a second home is purchased or built, travel costs and travel time are major components of the price of entry to the home. Still, to the best of our knowledge, no estimates of this price are available in the literature. In particular, due to the potentially controversial welfare impacts of the second home phenomenon, we are interested in how environmental attributes affect the recreation benefits of those homes; these attributes include, on the one hand, the availability of a beach and the presence of disruptive algae, and, on the other, electricity, a human-made amenity potentially harmful to the environment as it encourages energy consumption.

Benefit estimates on the use of second homes can be utilized in assessing environmental regulation. Typically, the procedure set out in the Land Use and Building Act for drawing up a shore plan seeks to limit the environmental impacts caused by shoreline building. (Ministry of the Environment 2010.) If, for example, shore planning were to impose restrictions on constructing second homes and their outbuildings close to water, estimates of the consequential reductions in the recreational benefits of summer homes would be needed to estimate the welfare loss. On the other hand, there is an increasing need to estimate the benefits resulting from the potentially improved water quality; this is required by European Union Water Framework Directive to show whether high abatement costs are motivated or not. In addition, estimates of the effects of energy use on recreational benefits will be essential if a comparison of the costs and benefits of increased energy consumption is required to inform the discussion of the growing environmental impacts of summer homes.

Finally, summer homes provide various social and economic benefits, such as income for the communities where the homes are located. Such direct economic impacts on local economies, as well as benefits other than those associated with recreation, fall outside the scope of this study, however. Non-use values of summer homes are not taken into account either, because the travel cost method cannot capture values of recreation facilities other than use. Accordingly, we focus on benefits obtained from recreation at summer homes.

2 Value of trips to recreational homes – travel cost analysis

Since the experience of a visit to a summer home is not a good that is traded on the markets or has a market price, the recreation value of such a visit has to be estimated using what is known as the revealed preference valuation method. Naturally, a summer house as such has a price, but when an individual owns a summer home, recreation there is free of charge. For valuation in this study, we apply the travel cost method, which is widely used in the estimation of recreation benefits. The method is based on the idea that even if there is no explicit price for recreation, individuals visiting a recreation site have to pay for transportation to and from the site and the time spent on the visit. These expenses associated with travel and time can then be used as an approximation for the price of the recreation. Consequently, the demand for summer house recreation can be determined on the basis of travel costs and other relevant variables affecting trip frequency. Because individuals live at different distances from their summer homes, and thus incur different travel costs, the data on travel costs exhibit variation, which allows one to derive and estimate the demand curve for trips. (Ward & Beal 2000, Freeman 2003.)

The recreation benefit of a visit to a summer house can be valued in monetary terms as a consumer surplus measure on the basis of the estimated demand curve for visits to summer houses. The consumer surplus represents the difference between an individual's willingness to pay and the actual expenditures for a trip. It is calculated by integrating the area between the estimated demand curve and the observed travel costs. (Loomis & Walsh 1997.)

The travel cost method is based on an assumption of weak complementarity between recreation and trips to a given recreation site. This assumption implies that there is some travel cost sufficiently high that no trips are made. Accordingly, if an individual does not visit a summer home at all, the recreational services provided by the summer house and its environment do not enhance the individual's well-being enough to justify the costs. Due to this assumption, non-use[2] values of the environment fall outside the scope of the travel cost method and thus the scope of this study. (Palmquist 2005, Martínez-Espiñeira & Amoako-Tuffour 2009.) A detailed description of the travel cost method is given in Freeman (2003), among other sources.

Our application of the travel cost method differs slightly from that found in conventional travel cost analyses. Whereas in traditional analyses the objective is usually to estimate the recreation value of a particular recreation site, for example a national park, we are interested in the summer house stock as a whole. Thus, our dependent variable is not frequency of trips to a particular site but the number of trips respondents make to their summer houses. The application of the individual travel cost method enables us to capture effects of the environmental attributes of summer houses and environmental quality on the demand for summer house trips and on the recreation value of a trip. Shrestha et al. (2007) and Englin and Moeltner (2004), among others, have applied the travel cost method in a similar way. In conventional travel cost analyses, environmental quality and other site attributes cannot be included in the analysis of a single site (Whitehead, Haab & Huang 2000).

Due to the non-negative and integer nature of trip frequency data, it is recommended that travel cost models be estimated with count data models, such as the Poisson model or the negative binomial model, instead of linear models (Hellerstein 1991). In the literature, count data models are thus widely used in travel cost analyses. (e.g. Ojumu, Hite & Fileds 2009, Blackwell 2007, Johnstone & Markandya 2006.) Both the Poisson and negative binomial models are based on discrete distributions and limit the values of the dependent variable to non-negative integers whose mean is conditioned on the independent variables. The Poisson model assumes, in addition, that the conditional mean equals variance. This is often not the case with recreation demand, however; when the variance larger than the mean, there is overdispersion. Overdispersion does not cause bias in the estimates if the mean is defined correctly, but it leads to underestimation of the standard errors of the estimated coefficients. This in turn leads to increases in the t-ratios, which causes the dependent variables to be interpreted too often as statistically significant. (Haab & McConnell 2002, 169.) Due to the problem of overdispersion, the negative binomial model is often selected over the Poisson model, since the former allows the variance to differ from the mean. (For more details on the econometric modeling, see, e.g., Greene 2000.)

Here, the econometric estimation of the model is performed using the negative binomial model, since the estimated overdispersion parameter turned out to be statistically significant in all of the estimated models. The negative binomial model provides the following exponential demand function for summer house visits:

$$y = e^{\beta_0 + \beta_{TC} TC + \beta_i x_i + \varepsilon}, \text{ where } i = 1,\ldots,n, \tag{1}$$

where y is the expected number of trips; β_{TC} is the coefficient for the travel cost variable TC; β_i are the estimated coefficients for other independent variables, x_i; and ε is an error term.

[2] Non-use values refer to values that people derive from the environment independently of any use. For example, an individual may value the environment simply because it exists. (O'Garra 2009.)

3 Data

The data were collected using a survey addressed to the people who had purchased a second home in Finland in 2004; there were some 2750 such sales during that year. A pilot survey was carried out between late October and early December 2008, and the survey proper was posted at the beginning of December 2008. The respondents could participate in the survey either by filling in a mail questionnaire or completing a corresponding questionnaire on the Internet. A reminder was sent to the respondents in mid-January 2009, with a mail questionnaire enclosed for those who had not answered the Internet survey. A total of 1350 respondents participated in the survey, representing a response rate of 49.1 percent.

Since the question about the frequency of summer house visits was included only in the mail survey, the sample to be analyzed here is limited to questionnaires submitted by mail. The final sample consisted of 343 responses. The questionnaire contained 64 questions related to the respondent's second home, its attributes and surrounding environment. There were also questions about the respondent's sociodemographic characteristics. In order to determine the travel cost variable, respondents were asked to tell how long the distance between their home and summer house was and how long it took them to travel that distance.

Comparisons with previous studies on second homes indicate that the respondents in the present survey were somewhat older and had a higher income than the Finnish population on average. Descriptive statistics on the data and their comparisons with summer house owners in Finland and Finnish population are presented in Table 1.

Table 1
Descriptive statistics of the sample of summer-house owners and Finnish averages

Variable	Summer home owners In the sample	In Finland	Finnish population[a]
Age	54	61[a]	41
Gross income per adult, euro per month	2600	Mode 2001-4000	2000
Household size, persons	2.5	2.3[a]	2.1
Number of children under 18 in household	0.5	n/a	0.45
Respondent in working life, percent	71	n/a[b]	61
University degree, percent	19	43[e]	15

[a]Sources: Statistics Finland
[b]Information not available, but in a study by Pitkänen and Kokki (2005) in 33.3 percent of the households both spouses were retired; in the rest of the households one of the spouses was working.
[e]Source: Pitkänen & Kokki 2005

4 Estimated models

We are interested in the frequency of visits to the whole stock of summer houses in Finland. Thus, the dependent variable in our model is the number of respondents' trips to their summer houses.

Our choice of independent variables, within the limitations of the survey data, is based on economic theory and experiences from previous studies on explanatory variables. According to the theory, demand for a good, in our case visits to a summer house, is determined by the price of the good (travel cost in travel cost analyses), disposable income and substitute goods and their prices (Gürlük & Rehber 2008, 1355). According to previous studies on summer houses, factors affecting visits to the homes are age, income, size of the household, type of home municipality (urban/rural), geographical region, type of permanent residence, and enjoyment of the summer house. (Sievänen 2002, Pitkänen & Kokki 2005.) In this study, in addition to travel costs, the following demographic variables have been included in the econometric analysis: income, number of children under 18 years of age in the household, and working life status. The alternative models use attributes describing the summer house and enjoyment of its use, such as electricity, well water, active use of the sauna, the existence of a beach, the presence of algae that prevent recreation in a nearby body of water, and length of stay (mean number of days). The variables used and their descriptive statistics are given in Table 2.

Table 2
Variables in the models

Variable	Mean	Std.dev.	N
Dependent variable			
Number of trips to summer house	17	13	315
Independent variables			
Economic variables			
Travel cost	78	103	302
Monthly gross income per adult	2600	1300	312
Sosiodemographic variables			
Respondent is in working life	0.71	0.45	335
Number of children in household	0.53	1.07	335
Attributes of summer house and environment			
Electricity	0.82	0.38	343
Well water	0.59	0.49	343
No beach	0.08	0.28	343
Disruptive algae	0.18	0.38	289
Life at summer house			
Average stay at summer house longer than 7 nights	0.13	0.34	302
Takes a sauna often	0.66	0.47	324

The single most important explanatory variable is travel cost, which is calculated per adult and includes round-trip travel cost per adult and the opportunity cost of time. Round-trip travel cost is calculated based on respondents' answers on a question about the length of a one-way trip from their home to summer house. The reported one-way distance has been multiplied by two to obtain an estimate of the round-trip distance. This distance is then multiplied by the kilometer allowance used by the Finnish tax administration, which was EUR 0.45 in 2009 (Finnish tax administration 2009). In order to construct as homogeneous and comparable a travel cost variable as possible, only respondents who travel to their summer house by car were included in the sample (97.5% of the respondents reported that they mainly used a car as their means of transport). The opportunity cost of time is defined as one-third of the hourly wage rate times the amount of reported time spent in travelling from home to the summer house. Consequently, the travel cost variable is calculated as follows:

TC = Round-trip distance from home to summer house * 0.45e / number of adults in household + 1/3 * net hourly wage per adult * time spent on round trip from home to summer house

Wage rate per adult was calculated from the reported monthly household gross income. Respondents were asked to identify which of the given income brackets their household's income fell within, and the final income variable was formed by dividing class averages by the number of adults in the respondent's household. The corresponding income tax was then deducted from the calculated monthly income per adult. The hourly wage rate was calculated by dividing the net monthly income per adult by an estimated 158 working hours per month.

The definition of the opportunity cost of time has been debated in the literature, and there is not necessarily a consensus on the issue. We define the opportunity cost of time as one-third of the hourly wage rate, a practice adopted in several previous studies, for example, Gürlük and Rehber (2008) and Egan, Herriges, Kling and Downing (2009). The other components of the travel cost variable have prompted discussion as well. Some researchers have included food and lodging in the variable in addition to pure travel costs (e.g. Zawacki et. al. 2000). Our data did not allow us to include expenses other than those associated with travel and time.

Finally, three alternative models were estimated; these are reported in Table 3. First, only variables justified by economic theory, travel cost and income were included in Model 1. Due to data limitations it was not possible to include substitute sites in the model, which may have led to an overestimation of the recreation values (Haab & McConnell 2002, 172). Yet, according to a recent study (Ministry of Transport and Communication 1999, 99), visits to summer houses did not reduce other long-distance journeys, defined as 100 km or more. This provides some evidence that there are not necessarily many potential substitutes for visits to summer homes and thus the lack of substitutes in the model does not constitute a significant bias.

Table 3
Estimation results for Negative Binomial travel cost models

Independent variables	Model 1 Coefficient	Model 2 Coefficient	Model 3 Coefficient
Intercept	3.2822[a] (38.846)	2.7674[a] (18.465)	2.8945[a] (22.359)
Travel cost	-0.0060[a] (-11.265)	-0.0049[a] (-8.437)	-0.0051[a] (-5.139)
Travel cost * Disruptive algae			-0.0031[c] (-1.787)
Travel cost * No beach			-0.0041 (-1.533)
Travel cost * Electricity			0.0003 (0.268)
Income	-0.0001 (-1.09)	-0.0001[b] (-2.165)	-0.0001[c] (-1.871)
Worker		0.0904 (0.895)	0.0800 (0.803)
Number of children		-0.0205 (-0.525)	-0.0119 (0.7604)
Average stay at summer house longer than 7 nights		-0.5780[a] (-4.010)	-0.5750[a] (-3.992)
Takes a sauna often		0.4187[a] (4.539)	0.4248[a] (4.593)
Well water		0.1601[b] (2.011)	0.1769[b] (2.265)
Electricity		0.1763 (1.555)	
No beach		-0.2316 (-1.207)	
Disruptive algae		-0.0269 (-0.269)	
N	276	229	229
LL (negbin model)	-995.6455	-787.6556	-786.8563
LL (restricted model)	-1644.336	-1151.583	-1146.482
χ^2 (negbin model)	1297.382	727.8556	719.251
McFadden's R^2	0.394	0.316	0.314
Alpha	0.3580[a] (10.114)	0.2466[a] (8.589)	0.2452[a] (8.586)

[a] p-value < 0.01, [b] p-value < 0.05,[c] p-value < 0.10

The second model (Model 2, Table 3) includes additional variables describing respondents' socio-demographic characteristics and the attributes of a summer house. The third model was constructed to investigate the cross-effects of electrification, the existence of disruptive algae, the possibility to use a beach on summer house visits and the value of a trip. The estimated parameters of the models are presented in Table 3.

The results show that, as expected, visits to summer houses decrease as travel costs increase. This allows us to derive an ordinary demand function for visits. The sign of the income variable has varied across travel cost analyses in the literature. In this study, in two of the three models income affects visits negatively and to a statistically significant degree at least at the ten-percent significance level. Other examples of studies where income has been found to correlate negatively with recreation trips are those by Ojumu, Hite and Fields (2009) and Gürlük and Rehber (2008). One explanation for the negative impact may be that owning a summer house and spending time there is a two-stage decision-making process; that is, income affects purchasing and visiting decisions differently. Purchasing a summer house requires a certain income level, but income does not seem to be a statistically significant variable within the group of relatively affluent households where the frequency of visits is concerned. Another potential explanation for the negative effect of income is that individuals with a higher income may have less time for recreation. (Zawacki et. al. 2000) The number of children under 18 years of age in a household was not found to have a statistically significant impact on the number of visits. The p-value of the variable is, however, relatively small, that is, 0.15. Perrels and Kangas (2007) found a negative relationship between size of household and number of days spent at the summer house.

The results suggest that individuals who are still in working life visit their summer house more often than those outside working life. The result is somewhat surprising, because increased free time would be expected to increase the number of visits. A closer examination of the data, however, reveals that individuals outside working life spend more nights in total at their summer homes than those who are still working. That is, individuals who no longer work seem to make fewer trips but visit their summer homes for a longer period at a time than individuals who work. Pitkänen and Kokki (2005) have observed the same phenomenon.

The sauna is an essential part of the Finnish summer house culture and way of life, and its importance can be seen from the results. The dummy variable indicating sauna activity takes a value of one if a respondent takes a sauna on 20 or more days during the summer. The variable turned out to have a positive and statistically significant impact on summer house visits at the one-percent significance level. For some people, taking a sauna may be even the most significant factor motivating the use of a summer home. This is easily understood: Saturday traditionally being sauna day may increase the number of weekend trips to summer houses.

The dummy variable indicating the average duration of a summer house visit takes a value of one if the respondent stays at the summer house for seven days or more at a time on average and a value of zero if the average stay is less than seven days. The variable has a negative and statistically significant effect on frequency. Gürlük and Rehber (2008) also found a negative relationship between trip duration and trip frequency. By including this variable we were able to avoid the problem whereby if the duration of the stay is not taken into account, the recreation value of a visit becomes the same for every visit from the same distance no matter how long the stay is and the value per day becomes lower for longer stays than for short stays (Yeh, Haab & Sohngen 2006, 190). A long average stay at a summer house may also reflect at some level the number of potential substitutes the owner has for visits to the house: If an individual is ready to spend a great deal of time at his or her summer house, it is likely that there are not many potential substitutes available.

The dummy variable electricity receives a value of one if the summer house in question is electrified and a value of zero otherwise. As expected, the results indicate that electricity increases the frequency of visits. The variable is statistically significant at the five-percent significance level. The better the standard of equipment in the summer house is, the more pleasant it is to spend time there. The dummy variable No beach takes a value of one if there is no beach available at the summer house and a value of zero if there is one. Our models suggest that the lack of a beach decreases the number of trips, but not to a statistically significant degree. Disruptive algae turned out to have a similar effect, that is, negative but not statistically significant.

A likelihood ratio test showed that the estimated models are superior to models with intercepts to a statistically significant degree at the one-percent significance level only. The models' goodness of fit was tested with McFadden's R^2 measure and found to vary from 0.27 to 0.39. Where estimated coefficients are concerned, the results are consistent across the models. The signs of the coefficients are the same in all three models, and the t-ratios are consistent as well.

Estimated coefficients give the sign of the effects of variables on summer house visits. Since the model is non-linear, marginal effects need to be estimated, as they cannot be directly derived from the coefficients. (Greene 2000, 437) Marginal effects[3] tell how much trip frequency changes if a variable changes one unit and the remaining variables are kept constant. According to the estimated marginal effects, a long average stay, use of a sauna, well water and electricity have the largest marginal impacts on the frequency of visits to summer homes

[3] Mathematically marginal effects are partial derivatives of the expected number of trips respect to the variables in question. Detailed information of marginal effects is available from authors.

To illustrate the magnitude of the marginal impacts, one can compare predicted average visits. Model 1 and Model 2 (see Table 2) predict about 16 and 14 visits, respectively, to a summer house when predictions are calculated at the means of the variables. Those who stay at a summer house longer than one week a time are likely to make 9-10 visits fewer than those who make shorter visits. Individuals who often take a sauna are likely to visit their summer house about 7 times more often than others. Having electricity in a summer home increases visits by 4-5 visits and the availability of well water by 3 visits. Summer houses without a beach are visited 2-3 fewer times than summer houses with a beach. The impact of disruptive algae is very limited. The marginal effects of beach availability and disruptive algae are not statistically significant.

It seems that attributes of an individual's summer house and its surrounding environment have a larger impact on visit frequency than his or her socio-demographic characteristics. One explanation could be that socio-demographic characteristics affect the decision to purchase a summer house more than they do the frequency of visits; an investigation of this effect is beyond the scope of this study, but could be conducted using a sample selection model if data on households that have not purchased a summer house were available.

5 Recreation benefit estimates

Count data models allow consumer surplus per trip to be calculated. The aggregate consumer surplus of access to a summer house is calculated by multiplying the per-trip measure by the estimated number of trips per period. (Creel and Loomis 1990.)

Consumer surplus measures are calculated by integrating the area under the estimated expected demand curve for summer house visits:

$$\text{CS} = \int_{TC^0}^{\infty} e^{\beta_0+\beta_{TC}TC+\beta x}\,dTC = -\frac{y}{\beta_{TC}}, \tag{2}$$

where y is the expected number of trips to a summer house and TC^o is the current travel cost. The choke price, at which demand is zero, is infinite, since the demand function is exponential. (Haab & McConnell 2002, 164-167.) The consumer surplus per predicted trip is thus:

$$\frac{CS}{y} = -\frac{1}{\beta_{TC}}. \tag{3}$$

This measure gives an estimate of the recreation value of a trip to a representative summer house.

Estimated consumer surplus measures are presented in Table 4. To investigate how disruptive algae, lack of a beach and electrification affect the recreation value of a visit to a summer house, an interaction variable between the corresponding dummy variable and travel cost for each case was included in the travel cost coefficient (see Table 3, Model 3). The interaction terms allow the slope of the travel cost variable to vary between summer houses by their attributes (for a similar use of interaction variables in a travel cost analysis, see, e.g., Loomis et al. (2001)). For example, where there is disruptive algae at a summer house at least one day in a typical summer, the estimate for the travel cost parameter β_{TC} in equation (3) is a sum of the parameters for Travel cost (-0.0051) and the interaction term Travel cost*Disruptive algae (-0.0031) from Model 3 in Table 3. The negative sign for the interaction variable between disruptive algae and travel cost indicates a lowered willingness to pay for a summer house trip and thus a smaller consumer surplus. Correspondingly, where there is no beach available at the summer house, the parameter is the sum of Travel cost (-0.0051) and Travel cost*No beach (-0.0041), and where a summer home is electrified, the estimated travel cost parameter is the sum of Travel cost (-0.0051) and Travel cost*Electricity (0.0003).

Table 4
Recreation benefit estimates

Consumer surplus based on alternative model specifications	Per trip (euro)	Per summer[a,b] (million euro)
Model 1[c]	167	430
Model 2[c]	203	530
Model 3[c]		
Electrified summer house (electricity = 1)[d]		
-Algae do not prevent recreation (disruptive algae exist = 0)[d]	205	530
-Algae prevent recreation at least one day per summer (disruptive algae exist = 1)[d]	125	530
No electricity (electricity = 0)[d]		
-Algae do not prevent recreation (disruptive algae exist = 0)[d]	194	500
-Algae prevent recreation at least one day per summer (disruptive algae exist = 1)[d]	121	470
- No beach available (no beach = 1)[d]	108	490

[a] Calculated on the basis of the total number of trips made to summer house (2.6 million) in Finland in summer 2008 (Statistics Finland 2010b).
[b] Algae prevent recreation at least once in a typical summer at 18 percent of the summer houses in the sample. At eight percent of the sample there is no access to a beach and 82 percent of the summer houses are electrified.
[c] See Table 3
[d] Dummy variable used in the specification; see Table 2

Our recreation benefit estimates are relatively robust between the models (reported by model in Table 4). All the values per trip (given in the first column of Table 4) are calculated using the relevant estimated travel cost coefficients of the respective model at the mean travel cost for a representative summer house. Only the estimate calculated from Model 1 differs from the other estimates; this is natural because its specification differs from the other models in that it includes fewer explanatory variables. Model 1 gives a recreation value estimate of EUR 167 per summer house visit. According to Models 1 and 3, a trip to a summer house where there is a beach available and where algae do not prevent recreation yields a recreation value of about EUR 194-205. Disruptive algae decrease the value to EUR 121-125 the lack of a beach to EUR 108-111. The reduction does not seem to differ much between summer houses with and without electricity. The percentage decrease in recreation value due to disruptive algae is around 40 percent, and the decrease due to the lack of a beach about 45 percent. Electrification increases the recreational value of a visit by about five percent if there is a beach available and algae do not prevent recreation; otherwise the increase is about three percent. The impact per trip of electrification thus seems to be quite limited.

Since marginal changes in welfare losses per trip due to disruptive algae and lack of a beach seem to be much larger than marginal welfare gains per trip from electrification, environmental attributes appear to affect recreation at summer homes more than the standard of equipment. This supports the general conception that to a large extent people go to summer houses to enjoy nature. Yet, the marginal changes in the attributes do not necessarily induce similar impacts on the benefits of the whole summer stock, as we will discuss below.

To calculate the aggregate consumer surplus of summer house visits in Finland per summer season, an estimate is needed of the frequency of visits for the period. According to Finnish Travel statistics compiled and published by Statistics Finland, Finns made 2.6 million trips to summer houses in the 2008 summer season (May-September). However, due to the definition of "traveling" used, the figure may exclude some of the trips made. Traveling includes trips that are made outside one's accustomed habitat, which refers to an individual's immediate surroundings, home, workplace, school and other places that are visited often. Even a summer home relatively far from the primary home can be considered to be part of a person's accustomed habitat if it is visited regularly. As the statistics do not reflect these visits, the figure does not necessarily include all summer house visits made, and thus provides a conservative estimate of the total number of trips.

On the basis of the total trip frequency provided by Statistics Finland we obtain EUR 430-530 million per summer as the aggregate consumer surplus for visits to an electrified summer house where there is a beach available and no detriment to recreation from algae. That amount is much higher than the estimated amount of money spent on summer homes annually. According to travelling accounting, in 2007 Finns spent a total of EUR 11 billion on traveling, of which 3 percent, or EUR 330 million, was spent on summer homes (Statistics Finland 2009). This amount includes transportation, groceries and other expenses, including catering services (Statistics Finland 2004).

Now we can consider the aggregate impact of environmental attributes. Algae blooming prevents recreation at least once in a typical summer at about 18 percent of the summer houses in the sample. Recalling that harmful algae reduce the value of a trip by about 40 percent, the decrease in the aggregate consumer surplus due to presence of such algae is six percent, or about EUR 30 million annually. In other words, even if the per-trip effect of harmful algae is very significant, the aggregate harm affects recreation to a lesser degree, because relatively few homes encounter the problem. In contrast, even though the benefits of electricity are very limited on a per-trip basis, the aggregate benefits are at about the same level as those obtained from better water quality, that is, EUR 20-30 million annually, since about 82 % of summer houses are electrified.

A final caveat needs to be considered when interpreting our results. The benefit estimates can be considered as a lower bound for the benefits provided by summer homes in the sense that the benefits counted are those obtained solely by the owner of a summer house, not by friends and relatives who may be visiting. Moreover, the estimate excludes non-use values of summer homes as well as direct economic benefits obtained by the municipalities in which the summer homes are located.

6 Conclusions

This study uses the travel cost method to provide first estimates of the extent of recreation benefits obtained from visits to second homes. We have used survey data from Finland, a country where about 60 percent of the population have access to a summer house. Predictions from a negative binomial model show that about 15 trips are made to a representative second home per summer (during May - August). The benefits, or consumer surplus, are estimated to be about EUR 170-200 per trip on average.

Benefit estimates on the use of second homes can be utilized in evaluating the impacts of environmental regulation and policies. Here, we have examined in particular how the quality of the environment affects the benefits of a recreational experience; the indicators we use are availability of a beach and presence of disruptive algae. It turned out that lack of a beach reduced the recreation value of a visit by 40 percent and presence of disruptive algae about 45 percent. However, as over 90 percent of Finnish summer houses are located on the shore of a water body and about 80 percent have not been affected by algae, the aggregate reduction in welfare caused by these attributes is more limited, namely, five percent of the aggregate benefits measured by the annual visits to summer houses, or about EUR 30 million.

Since summer houses are often built in sparsely populated areas and in the middle of untouched nature, there is a growing concern about the environmental impacts of the increased number of such homes. In contrast to old cottages, which did not even have electricity, today's well-equipped second homes may burden the environment by increasing the externalities related to energy consumption. Interestingly, we found that an electrified summer house increases the recreation value of a trip by only five percent. Yet, as 82 percent of second houses are connected to the national grid, the annual aggregate benefits of the convenience of having electricity are about EUR 20-30 million.

In future research, the non-market benefits estimated here could be compared with the potential social costs of the summer house stock. Since the provision and use of electricity may increase the social costs of second homes, these costs could be estimated and compared with the benefits estimated here. Moreover, public funds are often allocated to the improvement of water quality. For example, the European Union Water Framework and Marine Strategy Directives require that the costs of abatement be balanced against the benefits achieved by abatement to justify protection measures. The recreation benefits estimated here can contribute to assessing compliance with this purpose.

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