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The Economic Value of Hiking: Further Considerations of Opportunity Cost of Time in Recreational Demand Models

James F. Casey, Tomislav Vukina and Leon E. Danielson*

Abstract

The paper tests two alternative specifications for the opportunity cost of time in travel cost models. The standard travel cost survey design is enriched to include a contingent valuation type question about peoples' willingness to accept compensation to forgo a precisely defined recreational experience. It is hypothesized that individually revealed value of time more appropriately reflects the opportunity costs of time associated with a particular aspect of recreation than the wage rate which measures the trade-off between work and leisure generally. The results seem to indicate a better overall fit for the models with the elicited value of individual consumer's time than for the models with the more traditional hourly earnings (wage rates). The importance of the correct measurement of the opportunity cost time is illustrated by showing that estimated consumer surpluses based on two different value of time measurements differ significantly.

Key words: recreation demand, travel cost model, value of time

Introduction

The optimal allocation of land to alternative uses is that which provides the greatest net benefit or the largest return to the initial investment (Ward and Loomis, 1986). When a certain land use (e.g. preservation) has no market, its value cannot be compared to those for other land uses. Recreational benefits from natural environments are often elusive and difficult to measure. Many of the numerous uses (hiking, sightseeing, boating, fishing) typically are unpriced by the market, except for small access fees or licensing restrictions (Durden and Shogren, 1988).

To quantify some of these benefits, economists have developed non-market valuation techniques. This study uses the travel cost model (TCM) to measure the net benefits of recreational services from the Grandfather Mountain Wilderness Preserve (GMWP) in Linville, North Carolina. The net benefits are measured by the consumer surplus that accrues to hikers at GMWP. The consumer surplus estimate is the dollar value of recreation services (hiking) to an individual hiker. It can also be interpreted as the compensation that would be required to keep the hiker at the same utility level, given the closure of the hiking trails.

Central to modeling of demand for recreation has been the problem of how to handle the time people spend in the enjoyment of the recreational activity at a site. Spending more time at a site enhances the benefits of recreational activity, so time becomes an argument in the utility function. But time is also costly and hence should be treated as component of the cost of the trip. Traditionally, in the travel cost literature, time on-site has been exogenously imposed as a constraint and becomes a part of the price. This study uses

*J.F. Casey is a graduate student, T. Vukina is assistant professor and L.E. Danielson is professor in the Department of Agricultural and Resource Economics, North Carolina State University.

J. Agr. and Applied Econ. 27 (2), December, 1995: 658-668
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the approach developed by McConnell (1992) where the dual role of on-site time is resolved by specifying the traditional TCM with the appropriate argument for the cost of on-site time, allowing the estimation and interpretation of the demand curve to remain the same.

The main focus of this study is another problem in estimating recreational demand, namely how to measure the opportunity cost of time. The estimates of recreational benefits based on the TCM are known to be highly sensitive to the magnitude of the time cost used[1], and yet there is no broad consensus in the literature to support a proper procedure for valuing time in travel cost studies. The most widely cited approach for placing a value on time cost comes from McConnell and Strand (1981). They argue the opportunity cost of time is some proportion of the individual' s market wage rate, and that it can be empirically estimated from sample data. In their application to sport fishing, this proportion was estimated to be 0.6. The same technique was tested by Smith, DesVousges and McGivney (1983) and the estimates of the opportunity cost of travel time ranged from 80 to -9 times the wage rate depending on the site and the sample, thus seriously undermining the usefulness of the recommended procedure.

An alternative approach employed in this study is based on the assumption that the value of an individual's time can be found by asking that question directly. This approach, proposed earlier by Shaw (1992), suggests the TCM survey design include a contingent valuation type question to elicit the opportunity cost of time. The comparison of the elicited opportunity cost of time with the traditional wage rate approximation is an important part of this paper. The remainder of the paper is structured as follows. The next section discusses the methodology followed by the description of the survey data. In the fourth section, the empirical results are presented. Finally the conclusions and the suggestions for future research are outlined.

Methodology

The objective of the TCM is to estimate a structural demand equation for a recreation site using the participation rate corresponding to varying travel costs. Visitors to a recreation site pay an implicit price, that is, the cost of travelling to and from the site, including time costs (Smith, 1993). The travel-time costs, out-of-pocket expenses, and on-site time costs are used to estimate the price of visiting the recreational area. Thus the TCM helps establish on-site recreation values that can be weighed against the values of commodity outputs (for example, timber, agriculture) from alternative management strategies.

The theory behind the travel cost method comes from traditional demand theory. Demand, as applied to outdoor recreation, is a schedule of volume (visits, user-days) in relation to a price (cost of the experience). If the opportunity for outdoor recreation exists and people are free to choose, many will spend time and money participating in outdoor recreation. Persons who choose to visit outdoor recreation areas presumably weigh the costs of doing so against the costs of other goods and services that may be purchased with the same time and money. It is important to remember that economic analysis deals with physical and other characteristics of goods and services only to the extent that they affect human decisions. The decision to hike is made in ways fundamentally similar to the decisions made about whether to buy a new car or new clothes.

Standard travel cost method assumes that the consumer plans activities for a period of time, typically a season or a year. She chooses x, the number of trips to a specific site. Each trip to the site lasts t hours (days), where t is the time spent on site participating in the recreation activity (hiking). Recreationist is assumed to maximize utility subject to both time and budget constraints. On-site time contributes to utility in its complementary role with the number of trips chosen. It is the combination of t and x that makes up total utility, and increasing t, ceteris paribus, will increase total utility. If $t=0$, then x provides no utility to the consumer. However, on-site time is also part of the cost of a trip. If the consumer spends more time on site, time is taken away from opportunities to work or consume other goods and services. On-site time, then, has a dual role as both a provider of utility and a constraint to the consumer. This dual role complicates the estimation of the recreational demand models.

One of the possible solutions to the problem was provided by McConnell (1992) who demonstrated that the non-linearity of the budget constraint (introduced by endogenous on-site time) does not manifest itself in the demand for trips, but rather in the demand for on-site time. Consequently, one can specify the standard travel cost model with an appropriate argument for the cost of on-site time, and the estimation and interpretation of the demand curve for trips remain the same. In the McConnell's (1992) two-step procedure, the first step is to determine whether the on-site time is endogenous by estimating the demand for on-site time:

$$t = f(p_x, p_t, p, y) \tag{1}$$

where:

$$p_x = c_x + \gamma w; \quad p_t = c_t + w; \quad p = c_z + \theta w \tag{2}$$

p_x is the money cost per trip (c_x) plus the product of travel time for each trip (γ) and the opportunity cost of time (w); p_t is the on-site cost per unit of time on site (c_t) plus the opportunity cost of time; and p is the price of Hicksian bundle (c_z) plus the product of time spent on consuming a Hicksian bundle and the individual's opportunity cost of time; and y denotes money income.

If the coefficients of (1) are significantly different from zero, one can conclude that on-site time is endogenous, and proceed with estimating the demand function for trips of the following form:

$$x = f(p_x, p_t, p, y) \tag{3}$$

If the coefficients in (1) are not significantly different from zero, one may conclude that on-site time is exogenous, and proceed with the estimation of another demand function for trips with slightly different specification:

$$x = f(p_x + tp_t, p, y, t) \tag{4}$$

Alternatively, one may simply assume the endogeneity of t and entirely bypass the estimation of the demand function for on-site time (1) and instead directly estimate equation (3). Since equation (1) is not needed for welfare analysis, ignoring it will not bias the coefficients in the demand for x.

The definitions of costs needed to estimate demand functions (1), (3) and (4) are given in expression (2). The total cost for a trip (p_x) consists of the out of pocket expenses and the opportunity cost of travel time obtained by multiplying the travel time with either the wage rate or the individual's revealed value of time. The out-of-pocket expenses are the sum of gas, food, hotel and other expenses such entertainment and souvenirs and hiking fees. Once on the mountain the hikers have nothing to spend their money on, hence p_t in (2) consists only of either the wage rate or the elicited value of individual's time.

A traditional assumption made in most of the early recreation demand literature assumed that the value of an individual's time in a recreation activity is equal to his wage rate or some fraction of this wage rate (see: Cesario, 1976). This result stems from the standard labor supply model which implies that the marginal rate of substitution between labor and leisure equals the wage rate. In a more recent study, Shaw (1992) elaborates instances when this relationship between wage rate and the value of time breaks down and within a travel cost framework suggests an exploration into opportunity cost of time along the lines of contingent valuation method. The suggested approach is empirically tested in our research. The exact wording of the question formulated as the willingness to accept compensation to forgo hiking experience is: *"If someone offered you an opportunity to work overtime instead of visiting Grandfather Mountain, at what hourly rate would they have to pay you for you to accept the offer?"* Notice that the emphasis was placed on the trade-off between work and a particular aspect of leisure, i.e. hiking at the Grandfather Mountain, and should more appropriately reflect costs of time associated with hiking at a particular site than the wage rate, or some arbitrary fraction thereof.

The formulation of the question where hikers are being asked how much they would need to be compensated if they were working overtime instead of hiking seems appropriate in cases where individuals do not have much discretionary power over work time. The idea reflects institutional obstacles in scheduling activities (see: e.g., Bockstael, Strand and Hanemann, 1987) since it is well known that many jobs are only offered on a conventional 40 hours a week basis and choosing between working and recreating can materialize only at the overtime (more than 40 hours a week) level.

When the recreation site being investigated is part of the larger regional recreation system, such as the case with GMWP, there is a difficult question of deciding which other sites are substitutes whose prices should be included in the site demand equation. The comprehensive approach of including all alternative sites is cumbersome and may require more data than are available. An alternative approach used in designing this survey is to ask each individual what other site that person visits most frequently, and include only that site's price as the relevant substitute price (see: Freeman, 1993, p.454). The total expenditure for a preferred substitute site is the sum of the average expenditure per trip (question 22) and the product of the roundtrip travel time and the value of time. In order to homogenize numerous alternative hiking sites that people selected as their preferred sites, the total expenditures were divided by the times spent on preferred substitute sites. The so constructed total expenditure for a preferred alternative site per unit of time on site serves as an approximation for the total cost (p) of consuming the Hicksian bundle in (2).

Once the demand function in (3) is estimated, the standard interpretation of the area under the Marshallian demand function continues to hold. The welfare cost of a change in p_x from p_x^0 (observed price) to p_x^* (choke price) is given by the area under the demand for trips:

$$CS_x = \int_{p_x^0}^{p_x^*} x(p_x, p_t, p, y)\, dp_x \tag{5}$$

This is the money measure of the value of use of the hiking site, i.e. CS_x compensates the individual for all changes that would occur as a result of a price increase that eliminates (chokes off) the access to the site (McConnell, 1992). The welfare measures critically depend on the individual's cost of time. To explore the impact of various assignments of the opportunity cost of time on welfare measures, two different models are estimated using the calculated wage rate and the revealed opportunity cost of individual hiker's time.

Survey Data

Grandfather Mountain is a privately owned mountain, part of the Blue Ridge Chain in northwestern North Carolina. Grandfather Mountain supports sixteen distinct habitat types for thirteen rare and endangered animals and thirty endangered species of plants. Part of the mountain has been developed as a tourist attraction, but most of the mountain has been preserved in its natural state and is under the permanent protection of The North Carolina Nature Conservancy. The Grandfather Mountain Wilderness Preserve (GMWP) has a thirty-mile network of alpine hiking trails which makes the site a popular hiking destination.

A mail survey was conducted to gain information about hikers at the GMWP. Names and addresses of visitors to the site from October 1993 through June 1994 were obtained from hiking permits. Questionnaires were mailed to 453 households, and 185 of them returned the survey. Households surveyed were those for which legible entrance permit slips collected from several locations that sell permits were available. For 112 survey respondents, hiking at the GMWP was the sole purpose of their visit. For the remaining 73 respondents, the trip to GMWP was part of a larger vacation or business plan. This paper deals only with the single purpose trips. Out of 112 single trip surveys, 80 respondents provided answers about their annual household income (question 20), and 48 of them provided answers about the valuation of their time (question 27)[2]. However, there were only 42 completed surveys with overlapping responses to both income and revealed value of time questions.

Survey questions were designed to obtain information about travel plans, costs associated with travel, quality of experience, substitute hiking areas, and general socio-economic characteristics of the respondents. Since all costs in the survey instrument were reported on the per party basis, the cost figures were divided by the number of persons in the party. A copy of the survey mailed to each hiker is found in the Appendix. Table 1 contains the summary of the relevant survey questions. Fox example, the revealed values of individual hiker's time could be compared with the average hourly earnings obtained by dividing the total annual household pre-tax income with 2,080 hours (260 days x 8 hours a day). For the group of single purpose visitors the average revealed value of individual hiker's time was $46.83 an hour, while the average calculated wage rate equals $26.27 an hour.

Estimation Results

The functional forms for the on-site time demand (eq. 1) and trip demand (eq.3) were selected from among the four most common functional forms: linear, log-linear, semi-log and inverse semi-log. In both wage rate (Model 1) and the revealed value of time model (Model 2), the best results were obtained with the inverse semi-log specification. Estimates of the on-site time model are presented in table 2 with the following notation: p_x is the total cost of trip (monetary costs plus time costs), w is the pre tax hourly earnings, vt is the perceived value of time, p_s is the average total cost related to the most preferred substitute site (trip cost plus travel time cost) per unit of time spent on a most preferred substitute site, and NC is the dummy variable equal to one if the person was aware of the Nature Conservancy's involvement in the GMWP protection, and zero otherwise. The F-statistics are used to test the null hypothesis that all coefficients are simultaneously equal to zero. The null that time is exogenous is rejected at 99% confidence level. The individual parameters from this equation are not needed and therefore their low significance levels cause no problems. The conclusion that on-site time is endogenous implies that equation (3) rather than equation (4) be estimated.

The parameter estimates for the inverse semi-log functional form of the visitation equation (3), their t-statistics and significance levels are summarized in table 3. As one can see income variable is notably absent from the estimation results despite the fact that it was part of the theoretical model specification in (3). The reason for this is its high correlation with the opportunity cost of time variable. Also, as noted by Bockstael, McConnel and Strand (1991), income levels are more likely to distinguish participants in recreational activity from nonparticipants than they are to affect the number of trips a participant takes in a season.

In both wage rate model and the revealed value of time model all estimated coefficient have expected signs. The total cost of trip (p_x) and the opportunity cost of time variables (w and vt respectively) are significant at 5% level. The average total cost related to the most preferred substitute site (p_s) per unit of time spent on a most preferred substitute site is not significant. Poor performance of substitute prices in recreation demand regressions is not unusual even in cases where substitute sites are not aggregated (see, e.g., McConnell, 1992). The dummy variable for hikers' awareness of the Nature Conservancy role in protecting the GMWP acts like a season pass or a proxy for their attitude towards environmental protection. As anticipated, people's awareness of the Nature Conservancy is positively related to the number of hiking trips.

The estimated results seem to suggest that the demand for recreation (hiking trips) is more appropriately specified by using a contingent valuation type of question for the value of time variable rather than by using the more traditional hourly earnings. Model 2 (revealed value of time) outperforms Model 1 (wage rate) in terms of higher adjusted R^2, and the revealed value of time variable is more significant than the wage earnings variable[3].

The central concern of this paper is the impact of various measurements of the opportunity cost of time on the consumer surplus estimates. Given the inverse semi log demand function, using (5) the consumer surplus can be calculated as follows:

$$\begin{aligned} CS_x = {} & \hat{\beta}_0(p_x^*-p_x^0) + \hat{\beta}_1[(p_x^*\log p_x^*-p_x^*) \\ & -(p_x^0\log p_x^0-p_x^0)] + \hat{\beta}_2\log p_t(p_x^*-p_x^0) \\ & + \hat{\beta}_3\log p_s(p_x^*-p_x^0) + \hat{\beta}_4 NC(p_x^*-p_x^0) \end{aligned} \tag{6}$$

where p^*_x is the choke price (the price when visits go to zero) and superscript zero denotes current (observed) values of other variables. The consumer surplus is evaluated for each of the 42 survey participants for both wage rate and the revealed value of time models. Then, the analysis of variance was performed to test whether trip demand estimates based on different approximations of the opportunity cost of time produce significantly different consumer surplus measurements. The mean of the estimated consumer surplus for the wage rate model (Model 1 in Table 3), equals

Table 1. Descriptive Statistics of Surveyed Hikers at GMWP: Single Purpose Trips Summary

VARIABLES N=42	Mean Value	Standard Deviation	Range
Number of Visits (5)[a,b]	5.64	9.52	1-50
Round-trip Travel Time(10)[c]	4.51	4.03	0.25-24.0
On-Site Time (12)	21.93	17.41	9-96
Total Costs for a Trip (11)[d]	22.10	29.23	4.5-184.5
Revealed Value of Time (27)	46.83	55.63	10-300
Calculated Wage Rate (26)	26.27	13.70	4.81-48.08
Substitute Site Travel Time (20)[e]	4.55	6.39	0.1-40.0
Substitute Site On-Site Time (21)	34.14	30.18	6-156
Substitute Site Total Costs (22)	60.17	125.61	0-800
Nature Conservancy Awareness (28)	43%	-	-

[a] The numbers in parentheses indicate the underlying survey question.
[b] Visits are expressed on an annual basis.
[c] All costs (in dollars) and times (in number of hours) are expressed on a per person per trip basis.
[d] Total costs for the GMWP trip include the admission fees in the amount of $4.50 for a daily pass or $9.00 for an overnight pass.
[e] Round trip travel time to the preferred substitute site was estimated by dividing the roundtrip distance from Question 20 with 50 Mph.

Table 2. Parameter Estimates for the Time-On-Site Equation

Dependent Variable: On-Site Time	Parameter	t-statistic	P-value
Model 1: Hourly Earnings (N=42):			
log p_x	10.016	2.889	0.006
log w	-14.629	-2.409	0.021
log p_s	-3.8309	-1.197	0.239
NC	2.614	0.482	0.633
constant	25.228	1.633	0.111
	Adj.R^2 = 0.1965	F(5,37) = 19.388	0.000
Model 2: Revealed Value of Time (N=42):			
log p_x	6.9383	2.008	0.052
log vt	-6.7427	-1.316	0.196
log p_s	-4.8972	-1.398	0.170
NC	-0.40979	-0.0759	0.940
constant	19.379	1.189	0.242
	Adj. R^2 = 0.1243	F(5.37) = 17.179	0.000

Table 3. Parameter Estimates for the Visitation Equation

Dependent Variable: Visits	Parameter	t-statistic	P-value
Model 1: Hourly Earnings (N=42):			
log p_x	-4.3383	-2.273	0.029
log w	6.6025	1.975	0.056
log p_s	-1.8613	-1.057	0.298
NC	4.5004	1.508	0.140
constant	5.447	0.6404	0.526
	Adj. R^2 = 0.1844	F(5,37) = 6.278	0.0003
Model 2: Revealed Value of Time (N=42):			
log p_x	-3.8553	-2.134	0.040
log vt	6.6735	2.489	0.017
log p_s	-2.1128	-1.153	0.256
NC	5.0403	1.785	0.082
constant	2.438	0.286	0.776
	Adj. R^2 = 0.1973	F(5,37) = 6.498	0.0002

$1,206.50 per person per year with the standard deviation of $1,532.60. The average consumer surplus for the revealed value of time model (Model 2 in Table 3) is $2,892.80 per person per year with the standard deviation of 5,128.70. Under the null hypothesis of equal means the test statistics has an F distribution with (K-1,N-K) degrees of freedom, where K=2 denotes the number of variables whose means are compared and N=84 is the total number of observations in all series. The F-statistics of 4.17 indicates significantly different consumer surplus estimates between the two models at 5% level of significance[4].

For illustration purposes, we can also calculate the aggregate consumer surplus derived by all hikers on the Grandfather Mountain in one hiking season. The TCM imputes only the recreation value of a site, but does not include many other on and off-site values. The total value of a wilderness preserve would include benefits from watershed protection, educational resources, values of biological diversity and ecological services on local, regional, and global scales. No attempt was made in this study to evaluate any benefits other than recreational (hiking) ones. For 1993/1994 approximately 1,700 permits were sold to hikers. The single purpose travelling parties averaged 2.6 persons per group. Assuming that all trips were single purpose trips (in fact the ratio in our sample was 60% single purpose, 40% multi-purpose trips), the estimated aggregate consumer surplus derived by all participating hikers within one season amounts to $5,332,730 for the wage travel cost model and $12,786,176 for the revealed value of time travel cost model.

Conclusions

The main objective of the paper was to test alternative specifications for the opportunity cost of time in travel cost models. The standard travel cost survey design was enriched to include a contingent valuation type question about peoples' willingness to accept compensation to forgo a precisely defined recreational experience. Since the emphasis is placed on the trade-off between work and a particular aspect of leisure, i.e. hiking at a specific locality, the revealed value more appropriately reflected opportunity costs of time associated with this particular activity than the wage rate which measures the trade-off between work and leisure generally. The results seem to indicate a better overall fit for the models with the elicited value of individual consumer's time than for the models with the more traditional hourly earnings (wage rates). The importance of the correct measurement of the opportunity cost time has been illustrated by showing that estimated consumer surpluses based on two different value of time measurements differ significantly.

Simplifications made in this study are numerous and opportunities for future research are abundant. First, the analysis was performed with the single purpose trips data only. Dealing with the multi-purpose trips can be extremely complicated especially with regards to extracting the cost shares specifically related to the recreational activity under investigation. Second, an improvement of the survey instrument regarding the treatment of the substitute site may be beneficial. Since the number of preferred substitute hiking sites identified by respondents turned out to be large, effectively preventing the aggregation into some manageable number of localities, specifying only one substitute site may prove to be a superior alternative. However, this approach exposes the practitioner to risk of losing a significant number of observations in cases where respondents had no experience with the specified site. Finally, possibilities for different formulation of contingent valuation question regarding the elicitation of the opportunity cost of time are numerous. Survey design might include willingness to pay question as well as the combination of the willingness to pay and willingness to accept questions by designing different versions of the survey to be given to a different random sample of individuals.

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Appendix:

GRANDFATHER MOUNTAIN SURVEY

HIKER/CAMPER PLEASE FILL OUT ALL QUESTIONS CAREFULLY. YOUR HELP IS GREATLY APPRECIATED AND ALL INFORMATION THAT YOU SUPPLY WILL BE TREATED CONFIDENTIALLY. ANSWER ALL QUESTIONS AND RETURN PROMPTLY.

1) Was the sole purpose for your trip to visit
Grandfather Mtn? (circle one)
YES / NO

IF YES, PROCEED TO QUESTION 5. IF NO, PROCEED TO QUESTION 2.

2) For what other reason(s) did you leave home?

3) How many days were you away from home?

4) What was the round trip distance you travelled on your entire trip?

5) How many times have you visited Grandfather Mountain in the past 12 months?

6) How many trips do you normally make to Grandfather Mountain annually?

7) Composition of your travelling party?
(please check only one category)
Alone ____
Friends ____
Family ____
Friends & Family ____

8) Total # of people in your party? ________

9) For how many people in your party did you cover all expenses? _______

PLEASE ANSWER QUESTIONS 10 AND 11 FOR YOUR ENTIRE TRIP.

10) Total round trip travel time? ________

11) Total round trip expenditures on:
food (at restaurants only) ________
Gas _______
Hotels _______
Souvenirs ______
Entertainment ______
Other (please specify) _______.

12) Duration of your stay at Grandfather Mountain?
Days______ Nights_____

13) Using a school grading scale, with A being the best, C being average and F being the worst, please rate the following attributes of Grandfather Mountain:
Trail system_____
Campsites_____
Scenery and views_____
Wildlife encounters_____
Diversity of plant life _____.

14) Using the same scale, how would you rate your overall hiking/camping experience at Grandfather Mountain?

15) How many other parties did you encounter while hiking/camping at Grandfather Mountain?

too few perfect amount too many (circle one)

IN ORDER TO BETTER UNDERSTAND YOUR OVERALL HIKING EXPERIENCES, WE NEED TO KNOW SOMETHING ABOUT THE OTHER PLACES YOU HIKE.

16) Do you hike other areas?
YES / NO

17) How many times have you hiked other areas in the past 12 months?

18) Aside from Grandfather Mountain, what is your preferred hiking area?

19) How many times have you hiked this preferred site in the past 12 months?

20) How many miles is the round trip drive from your home to this preferred site and back?

21) How long do you typically stay at this site?
Days______ Nights______

22) What are your average total expenditures per trip to this preferred site?

23) Using the A to F scale, please rate your overall hiking/camping experience at this preferred site.

IN ORDER TO GAIN COMPLETE INFORMATION ON THE USERS OF GRANDFATHER MOUNTAIN ADDITIONAL INFORMATION IS NEEDED. YOUR ANSWERS ARE COMPLETELY CONFIDENTIAL AND VERY HELPFUL TO OUR STUDY.

24) Your hometown: City_______________
State_______________ Zip__________.

25) Your: Age______ years
Gender M / F
Occupation ____________
Highest level of education completed __________

26) Total pretax household income (circle one)
$1,000 - $10,000
$10,001 - $20,000
$20,001 - $25,000
$25,001 - $30,000
$30,001 - $35,000
$35,001 - $40,000
$40,001 - $45,000
$45,001 - $50,000
$50,001 - $60,000
over $60,000

27) If someone offered you an opportunity to work overtime instead of visiting Grandfather Mountain, at what hourly rate would they have to pay you for you to accept the offer?

28) Before receiving this questionnaire, were you aware of The Nature Conservancy's role in protecting Grandfather Mountain?
YES / NO

THANK YOU FOR TAKING THE TIME TO FILL OUT THIS QUESTIONNAIRE!
ANY COMMENTS OR QUESTIONS?

Endnotes

1. McConnell and Strand (1981) found that the total consumer surplus can be nearly four times as large when time costs are added at one-half the wage rate as when time costs were set at zero.

2. Among those 48 responses to question 27, in three cases the revealed value of time was $1,000 an hour or more. Those were interpreted as protest votes and deleted from the sample.

3. Estimating the revealed value of time trips demand (Model 2) with all 45 available observations instead of only with the 42 overlapping observations also produces more significant opportunity cost of time coefficient than estimating the wage rate trips demand (Model 1) with all 80 available observations.

4. The table value of F distribution for (1, 83) degrees of freedom at 5% critical value is 3.96.