A Test for the Presence of a Purely Altruistic Motive in Non-market Valuation

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Abstract

An important assumption underlying non-market valuation is that it is not the environment but the human preferences that is valued. A decades-old question keeps arising: Can individual consumer behavior be influenced by altruistic citizen preferences? The environmental economics literature discerns six conceptual forms of altruism. They are genuine altruism, pure altruism, paternalistic altruism, impure altruism, individualistic altruism and intrinsic altruism. Despite a rich collection of stated preference experiments with respect to altruistic responses, little attention has been paid to pure altruism in empirical terms. This paper tests for the presence of pure altruism, i.e. whether an individual derives utility from other people's utility in the context of non-market valuation. To this end, this paper investigates the attitudes of hikers and skiers towards the hypothetical removal of the Muju ski resort from the Mt Togyu National Park in South Korea (hereafter Korea). Data were collected from samples of hikers and skiers who visited the national park. Each respondent was given a copy of choice modelling questionnaire, in which it was assumed that skiers from the southern region would have to travel for a longer time. Therefore, respondents were forced to consider trade-offs between the recovery of the lost environmental assets in the Muju ski resort area, skiers' additional travel time and willingness-to-pay amounts for the hypothetical environmental improvement. The estimates of the implicit value for the attribute 'skiers' additional travel time' were used to determine whether hikers were motivated by pure altruism in their valuation, given that the time cost was only incurred by people who were willing to travel to new ski fields. It was found that hikers did not

take into their account the disutility of skiers' additional travel time or did not care about the removal of the ski resort.

Key words: citizen role, altruism, consumer preference, point estimate of willingness-to-pay

1. Introduction

This paper focuses on the 7.3km^2 Muju ski resort developed in 1991 within the 219km^2 Mt Togyu National Park, located in North Cholla Province in the central region of Korea. The development of the ski resort in the national park was a local government initiative to promote the regional economy of North Cholla Province. The *Natural Parks Act* was revised to allow ski resorts to be built in national parks. The 1997 World Winter University Games were held at the ski resort and at Chonju, the capital city of the province. The provincial government had hoped to bid for the 2010 Winter Olympic Games at the same venues.

The paper deals with the hypothetical removal of the Muju ski resort from the Mt Togyu National Park, resulting in a hypothetical environmental recovery of the ski resort area, and conducts an economic analysis of the recovery option. Whether it is proper to accommodate ski resorts in national parks has been questioned by a number of environmental movement organizations in Korea. Mountains in the southern region of Korea can be covered with snow for a maximum of three months from December to February each year. The yearly total snowfall in Korea is less than 100cm, whereas a ski resort in the Rocky Mountains in the USA averages about 1,000cm of snowfall a

year (Ruffin 2000). Owing to the shortage of winter snowfall even in recent years, the resort has had to rely on snow-manufacturing machines.

Skiing and hiking taking place on separate tracts at different times may not create use conflicts. However, snow-covered Korean mountains attract as many hikers as green mountains. Mountain hiking and climbing are traditional outdoor recreation activities while skiing is relatively new in Korea. Skiing in Korea has recently become a popular leisure sport. In this circumstance, artificial ski facilities may interfere with activities of the traditional recreationists. Those hikers who have climbed to the peak area of the Mt Togyu National Park to enjoy the surrounding natural scenery might be displeased with the unexpected man-made structures in a secluded area. Traditional recreationists may not even wish to interact with skiers whose recreational skiing experience is made possible due to the construction of artificial facilities in an otherwise pristine forest.

This paper investigates whether hikers take into account the disutility of skiers' with the recovery of the lost environmental assets in the Muju ski resort area. From a different angle, this research question examines how skiers react to the removal scenario when they are asked to trade-off the environmental recovery and their loss of recreational opportunity in the area.

There is much discussion in the literature about the presence and influence of altruistic motives associated with non-market valuation of environmental goods. The environmental economics literature (Madariaga and McConnell 1987; Andreoni 1989, 1990; McConnell 1997; Johansson-Stenman 1998) discerned six cases of altruistic motives. These are genuine altruism, pure altruism, paternalistic altruism, impure altruism, individualistic altruism and intrinsic altruism, as defined below:

(1) *genuine altruism*: The notion of genuine altruism is used to characterise actions motivated solely by the utility for others without deriving any personal utility from the altruism.

(2) *pure altruism*: each individual derives utility from the other individual's utility.

(3) *paternalistic altruism*: the general public care about the consumption of services from a particular resource by others, but not about others' utilities *per se*.

(4) *impure altruism*: people derive altruistic yet egoistic benefit in the form of a 'warm glow' by making donations to the provision of public goods.

(5) *individualistic altruism* (*non-paternalistic altruism*): individuals gain value by knowing that other people enjoy benefits from resource uses, without regard to the manner in which the gains of other people were achieved.

(6) *intrinsic altruism*: people care about the state of the world, without regard to the welfare of human beings.

A number of studies have tested whether altruistic motivations influence the responses in stated preference studies. For example, Madariaga and McConnell (1987) experimented on the motives that are believed to give rise to preservation value. The experiment mimicked the dichotomous contingent valuation method (CVM), but without eliciting quantitative WTP bids. A sample of respondents was asked if they prefer the cleanup project of public beaches surrounding the Chesapeake Bay in the USA under each of following scenarios: (a) with no additional information; (b) if the project is undertaken, taxes would be raised for individuals; (c) access to the beaches by the public is permanently denied even if they become clean. Responses to the question under Scenario (a) were used as a control to be compared to responses under Scenarios (b) and (c). This study was meant to detect the influence of individualistic altruism by

Scenario (b). On the other hand, Scenario (c) was thought to reflect the presence of intrinsic altruism. By experimenting with institutional contexts, Madariaga and McConnell (1987) concluded that when individualistic altruism is the prevailing motive, the measurement of preservation value is expected to be unchanged. In contrast, the value expression that may stem from intrinsic altruism would clearly influence the measurement of benefits. McConnell (1997) extended the scope of this experiment to paternalistic altruism and found that this type of altruism would also lead to higher benefit estimates. Blamey *et al*. (1995) investigated whether or not attitudinal variables influence WTP responses regarding forest management in Australia. Data on these variables were obtained from routine supplementary questions. For example, a question that was posed to the respondents in the study was whether or not governments should do more to protect the environment even if this sometimes leads to higher taxes for everyone. The answers to this question were coded as a dummy variable. Blamey *et al*. (1995) found that such citizen explanatory variables strongly affected responses to the CVM questions in the study. Further, Morrison *et al*. (1999) and Blamey *et al*. (2000) found that values of nature unrelated to current uses were affected by socio-economic characteristics as well as attitudes. For instance, Morrison *et al*. (1999) included a dummy variable showing whether respondents with children value improved wetland quality in Australia differently. There was *a priori* expectation that bequest motives would induce higher WTP. In contrast to these findings, evidence from Curtis and McConnell (2002) suggested that there is no difference in WTP concerning the deer control in the USA between altruistic citizen judgments and consumer preferences.

Despite a rich collection of stated preference experiments with respect to altruistic responses, little attention has been paid to pure altruism. This paper reports a test for the presence of these types of altruistic motives within a choice modelling application. The

next section of the paper reviews continuing debates on citizen versus consumer behavior and describes how the choice modelling technique can be utilized. The choice modelling questionnaire used for this study and survey implementation process is then described. A methodology for detecting the altruistic motivation is next presented. Findings from the analysis of choice modelling data are then provided and interpreted.

2. Reflections on the conflicts between citizen-consumer motivations and the choice modelling method

Skiers may not empathize with hikers' lost benefits caused by ski resort facilities (Senge, 1974; Straaten, 1992). Sagoff (1988) pointed out that once a ski resort is built, skiers visit the location to use the facilities, even if they are environmentalists. In other words, artificial ski facilities in a national park provide benefits to skiers at the expense of hikers. However, most skiers may agree in principle with the view of conservationists that the ski resort has an environmental dis-benefit.

Smith (1790) was optimistic about the mutual sympathy with which people would concentrate on the benefit for society rather than only that of individuals. In contrast, Mill (1877) argued that the feeling that there should be harmony between one's feelings and aims and those of other fellow creatures is, in most individuals, inferior to the strength of their selfish feelings. As Sen (1995) noted, Edgeworth (1881) viewed the conflict of principles in the determination of individual behavior as one between egoism on the one hand, and altruistic utilitarianism on the other.

Sagoff (1988) renewed this view in the context of non-market valuation. He reported on experiments with his students, in which they were asked whether or not they would like to visit the Mineral King Valley if it were developed in the way Disney

planned: many responded in the affirmative. But when the students were asked whether or not the ski resort development should be permitted, students unanimously dissented. The key implication of these experiments is that respondents take the citizen role when they are asked to decide with regard to environmental protection. It was, therefore, concluded that it is a mistake to expect individuals to behave as consumers rather than citizens. Sagoff (1988) emphasised that the conflict between the citizen role and consumer role is ethical because individuals might be concerned to resolve the conflict between how they satisfy their interests and how they live by their beliefs. It was also noted that the conflict occurs 'within' individuals and not 'between' individuals, because it is common to every individual.

The debate on the citizen-motivated bidding is still ongoing in particular with respect to the estimation of preservation value. Randall (1986), Diamond and Hausman (1993), Diamond *et al*. (1993), and Blamey *et al*. (1995) shared the view that preservation value, motivated by altruistic citizen preferences, is not compatible with neoclassical economic theory; preservation value ethically motivated should be excluded in cost–benefit analysis because it does not represent individual happiness or well-being of a rational economic person. Dore (1996) claimed that it is not appropriate to determine the value of a forest by consumers' WTP for visits to the forest, because it is not possible for consumers to have all information on the innumerable ecological functions that forests fulfil.

Johansson-Stenman (1998) stated that the issues raised in environmental economics are often of an ethical nature, and therefore the choice is not whether ethical values should be imposed, but whether ethics should be dealt with explicitly or implicitly. By the same token, Söderbaum (1999) contended that a valuation that is free of value judgment is not a credible one because it is impossible to imagine a person who

is not primarily motivated by ideology and ethics. Kahneman and Knetsch (1992) argued that there is no reason to doubt people's sincere and serious willingness to contribute to preserving many public goods. Rolfe and Bennett (1996a, p. 130) contested that altruism does not create double-counting: 'If a child enjoys a birthday present, that enjoyment is a benefit. If the parents enjoy seeing a child's enjoyment, that is a further benefit'. These authors questioned how it can be known that expressed bids are individual consumption preferences and are not tainted with citizen values.

Amidst the debate, a view emerged that citizen and consumer roles are not necessarily mutually incompatible. Keat (1994) argued that people do not value consumption as consumers and nature as citizens; rather, they value both as both. With regard to the Mineral King ski development, Keat (1994) contended that if students had been asked to consider those of other consumers, they would have had to consider a conflict between nature protection and consumption of others as citizens, and another conflict between nature protection and their own consumption as consumers.

Incorporating Keat's understanding of the nature of conflicts between citizen-consumer motivations, a choice question can be designed such that the samples of hikers and skiers are forced to trade-off between changes in attributes representing citizen interest and consumer interest. Choice modelling would be a suitable stated preference method in this regard.

In choice modelling applications, a number of hypothetical profiles are created by combining distinct levels of attributes, which represents a wide range of the characteristics of the object being valued. The number of attributes and their levels determines the total number of distinct profiles. In practice, a selected fractional factorial design is broken into a number of separate choice sets. The choice sets can be designed such that the samples of hikers and skiers are forced to trade-off between

changes in attributes representing citizen interest and consumer interest in choosing the most preferable option from each choice set.

When respondents are making comparisons between options, the indirect utility of the *j*th option can be represented by:

$$V_j = V(z_k^j) + \varepsilon_j \tag{1}$$

where z_k^j refers to the *k*th attribute of the *j*th option, $V(z_k^j)$ is the systematic component of utility, and ε_j is a random unobservable component. The systematic component is assumed to be the same for all observations while the random component is unique to each consumer. Assuming $E(\varepsilon_j) = 0$, the probability P_j that the *j*th option is observed can be expressed as:

$$\text{Prob}\,[V(z_k^j) > V(z_k^{j'})] \qquad j = 1,2,\cdots,J \qquad \text{for all } j' \neq j \tag{2}$$

The systematic component $V(z_k^j)$ can be expressed as the sum of combinations of attributes given by:

$$V(z_k^j) = b_0 + b_1 z_1^j + b_2\, z_2^j + \cdots + b_K\, z_K^j = \sum_{k=1}^{K} b_k\, z_k^j \equiv \mathrm{bZ} \tag{3}$$

where one of z_k represents the price, and b_k is the weight or coefficient associated with an independent variable z_k. It is notable that the same attributes appear in the utility function for every choice with varying levels within each attribute. This is not a

requirement of conditional logit models, but a common feature of choice modelling applications.

The ultimate goal of applying choice modelling involves estimating the coefficients from the logit model:

$$L_j = \ln(\frac{P_j}{P_J}) = V(z_k^j) = b_0 + b_1 z_1^j + b_2\ z_2^j + \cdots + b_K\ z_K^j \qquad (4)$$

3. Development of the choice modelling questionnaire and survey implementation

A survey was designed in which information provided to respondents, asking them to respond to eight choice sets. Respondents were led to believe a removal scenario for the Muju ski resort was possible: under the continuing pressure of environmental protectionists, it was required by the *Enforcement Decree of the Natural Parks Act* 1997 (EDNPA) that the resort be shut down and all non-natural facilities including buildings such as hotels and operating headquarters be removed from the resort area after the end of a specified life. Without those buildings, technically, it would be difficult to keep running the Muju ski resort, even though the ski runs themselves could have an infinite life if appropriate maintenance was provided. Two additional assumptions in the line of the removal scenario were given to respondents: the buildings at the Muju ski resort were to be demolished at the time when the survey was conducted; Sooner or later, the National Parks Authority would initiate action to recover the lost natural environment in the area and would have to raise funds from the public.

Because most other ski areas are situated in Kangwon Province, in the northeast region of Korea, skiers from the southern region would have to travel for a longer time

and need overnight accommodation. It was assumed that the quality of skiing experienced at the current site and alternatives is identical, and that charges for the use of ski facilities including lifts do not vary from the Muju resort to alternative ones.

Four attributes distilled through focus group sessions included an extra quasi-levy (LEVY), reforestation of the denuded area (REFOREST), recovery of rare environmental assets (TREES, WETLAND, TREEWET) and skiers' additional travel time for two-way trips to alternative ski resorts (TTIME). Table 1 summarizes the variation of each of the attributes.

Table 1. List of attributes and levels

Attribute	Level
Levy (Won)	Option 1: No charge Options 2 and 3: (3 levels) 5,000 Won 10,000 Won 20,000 Won
Recovery of rare environmental assets	Option 1: No recovery Options 2 and 3: (4 levels) No recovery Rare trees only (TREES) Alpine wetland only (WETLAND) Rare trees and wetland (TREEWET)
Reforestation of the denuded area (height above sea level)	Option 1: No reforestation Options 2 and 3: (4 levels) No reforestation From 1300m to 1500m From 1000m to 1500m From 600m to 1500m
Skiers' additional travel time (hours)	Option 1: 0 hr Options 2 and 3: (4 levels) 0 hr 4 hrs 10 hrs 16 hrs

The payment vehicle employed for this choice modelling application was a donation to a hypothetical conservation fund raised by the National Parks Authority. This means that the National Parks Authority is designated as a trustee on behalf of the public to recover the environment of the Mt Togyu National Park. Koreans are familiar with this type of payment vehicle.[1] Examples of quasi-levies include annual contributions to the Korean Red Cross fund, the national defense fund and a charity fund for disadvantaged people. For every residential block in Korea, rural or urban, block leaders have been nominated to contact residents and undertake some tasks on behalf of local government. One of the tasks assigned to block leaders is to collect those funds from each household living in their block. Making use of this situation, respondents were told that their donation to the trust fund is a form of one-time extra levy imposed on each household. In this case study, it is hoped that the use of a quasi-levy will reduce the degree of protest bias and avoid strategic bias.

The normal amount of a *de facto* levy for each household in Korea used to be 5,000 Won in the late 1990s.[2] Champ *et al*. (1997) argued that actual donations for protecting a particular public good be interpreted as a theoretical lower bound on the relevant Hicksian value of protection of that good. On this basis, the lower bound was set at 5,000 Won. The upper bound was marked at 20,000 Won as advised by findings from focus group meetings.

The attribute, 'rare environmental assets', refers to alpine wetland and native rare Korean trees such as the Korean fir and yew trees. In particular, the Korean firs are reported to grow in few alpine areas only in Korea, including the Mt Togyu National

[1] Chilton and Hutchinson (1999) referred to donations as 'voluntary taxes'. Likewise, quasi-levies can be called 'involuntary donations'.

[2] The value of Korean currency was converted into the US dollar at the rate of 1130 Won as of 1 March 2000.

Park. Creation of the Muju ski resort has affected the endangered animals such as Korean mountain frog and water lizard living in an alpine wetland situated on the crest of a peak. The alpine wetland, of about 0.8 ha in area, is reportedly one of only two alpine wetlands ever found in Korea. The ski resort developer has transformed the high-mountain wetland area into a golf course.

The 'reforestation' attribute represents the recovery of the green naturality on the denuded area. The altitude of the reforested belt varies between 600 and 1500 meters. This factor is expected to capture hikers' use value of the visual amenity. Malm *et al*. (1983) stated that visual amenity certainly affects visitors' experiences and enjoyment of national parks. Loomis and Greene (1983) pointed out that visual enjoyment of national parks is highly correlated with the utilization of hiking trails. If what hikers experience from a hiking trail is, in part, visual enjoyment, the use value of hiking trails can be captured by the amenity value of scenic landscape features. In turn, the welfare improvement in terms of the amenity value of a landscape can be captured by reforestation of the denuded area.

The attribute, 'additional travel time', indicates additional travel cost incurred by the skiers to use a different ski resort. Considering that the Muju ski resort is the only one of its kind in the southern region of Korea and all alternative ski fields are available in northeast regions, it was assumed that the increased travel time is imposed on every skier at the current site.

Time is a limited resource for all individuals and is regarded as a normal good equally rationed to every individual. No doubt, time can be transformed into a monetary value, although the practices of time valuation are controversial (Randall 1994). Spending additional time for traveling to ski sites would deprive the skiers of time for other activities, for example, to spend at work and earn income.

With the inclusion of the time variable in the choice modelling questions,[3] the questionnaire was designed to seek information about the willingness of the skiers to travel as well as their WTP for the proposed environmental improvement; that is, respondents were required to consider trade-offs between recovery of the lost environmental assets in the Muju ski resort area, skiers' additional travel time and the WTP amounts for the hypothetical environmental improvement. Skiers' additional travel time is expected to play a role as an expression of extra cost.

A one-forth fractional factorial experiment out of 4^4 distinct profiles, 64 profiles out of 256, was drawn to reduce the number of profiles to a manageable level. The principle of the orthogonal experimental design (Louviere 1988; Rolfe and Bennett 1996b) was followed. An example choice set used for this study is presented in Table 2. The inclusion of the 'current situation' option allows respondents to state that they would prefer not to purchase any of the hypothetical alternatives presented in the choice set.

Table 2. A sample choice format of the questionnaire

Option	Levy	Recovery of rare environmental assets	Reforestation of the denuded area (in altitude)	Skiers' additional travel time	Choice (tick one)
1 Continue the current situation	No charge	No recovery	No reforestation	0 hr	
2 Shut down the resort	W20,000	Rare trees and wetland	600m–1500m	4 hrs	

[3] Theoretically, stated preference studies designed to value environmental resources for tourism purposes should consider the geographic distance factor when describing the environmental resources, because distance plays a role in determining respondents' WTP for the resources (Pate and Loomis 1997; Heyes and Heyes 1999).

3 Shut down the resort	W5,000	No recovery	1000m–1500m	16 hrs	

Between the 15th to 17th September 1999, 24 visitors to a national park near Seoul were interviewed to test their understanding of the final questionnaire. No major change was needed after this pilot test. The context of the questionnaire was found to be clearly understood and the question format and combinations of attributes were not confusing. The labels 'continue the current situation' and 'shut down the resort' were effective in providing respondents with a clear picture of their choices.

A sample of hikers using the national park was interviewed between September 24 and October 4, 1999, including two weekends. The final dataset analysed contained 164 valid responses. A 'hand-out and mail-back' method of questionnaire administration was used for skiers. Identical questionnaires to those for hikers were handed out to skiers visiting the ski resort, on the 1st–2nd and 8th–9th of January 2000. A sample of 128 valid responses was obtained, the response rate being 24.6%.

4. Method of detecting the altruistic motives

Interpreting the logit model represented by Equation 4, the logarithm of the ratio of probabilities is an indication of the relative utility attached to a particular option, given that an individual will choose the option that provides the greatest utility. The estimated coefficients directly relate to the overall utility of the option (Rolfe and Bennett 1996b). That is, each coefficient estimated represents the marginal contribution of an attribute to overall utility. This feature makes it possible to extrapolate the coefficients estimated from choice models into implicit prices, compensating surpluses, sensitivity analysis of

changes in levels within a qualitative attribute (Bennett 1996) and the relative importance that respondents place on each non-monetary attribute (Morrison *et al*. 1999). Morrison *et al*. (1996; 1999) highlighted the analytical advantages of employing choice modelling in this context. A single choice modelling exercise can separately and simultaneously estimate the coefficients of all factors involved in choice sets.

The implicit prices are the marginal rates of substitution between the non-monetary attributes and the monetary variable. Implicit prices are also referred to as 'part-worths' or point estimates of WTP. Mathematically, let z_p represent the price factor. Holding $\Delta V_j = 0$ yields:

$$\Delta V_j = \Delta \sum b_k \, z_k^j + \Delta \, b_p \, z_p = 0 \tag{5}$$

The implicit price for a one-unit change within the k^{th} attribute is obtained by:

$$-\frac{dz_p}{dz_k} = -\frac{b_k}{b_p} \tag{6}$$

For an improvement in environmental quality, b_k is greater than zero. Thus, the ratio is expected to be positive since b_p, the price parameter, has the *a priori* expected negative sign (Morrison and Bennett 2000). Positive ratio values represent attributes that increase utility, whereas negative ratio values (i.e. $b_k < 0$) represent attributes that reduce utility.

Implicit price estimates for environmental attributes (TREES, WETLAND, TREEWET and REFOREST) represent the environmental preferences of hikers and skiers with respect to the lost environmental assets. Put another way, environmental

preferences of hikers and skiers can be inferred from observing pairs of implicit prices for environmental attributes.

TTIME is not an environmental attribute. Thus, any environmental value associated with this attribute will not be captured: one cannot identify any trace of individual, paternalistic, or intrinsic altruism influence on the implicit price of TTIME. In addition, TTIME does not constitute any form of donation, and therefore the motivation of taking TTIME into account has nothing to do with impure altruism. In short, pure altruism is a possible motivation for hikers to care for skiers' additional travel time. If hikers are altruistic and sympathize with skiers' welfare loss or derive disutility from skiers' disutility, it is theoretically expected that such a motive would be reflected in the magnitude of the point estimate of WTP for a one-unit change within the attribute 'TTIME'. Also, the implicit price of TTIME for skiers would indicate how much importance skiers attach to this attribute.

The null hypothesis for a test on altruism is that the implicit prices for TTIME for hikers and skiers do not differ. Symbolically, the hypotheses are expressed as:

$$H_0: \mathrm{IP}_{TH} = \mathrm{IP}_{TS}$$

$$H_1: \mathrm{IP}_{TH} \neq \mathrm{IP}_{TS}$$

where IP stands for 'implicit price'; the subscript *T* denotes the implicit price for TTIME; and *H* and *S* represent hikers and skiers, respectively. These hypotheses give rise to the following criterion, which facilitates identification of hikers' altruistic responses.

Criterion: If the implicit price for the attribute 'skiers' additional travel time' incurred by skiers does not differ between hikers and skiers, it can be said that choice behavior of hikers is influenced by altruism.

5. The empirical results and interpretation

Two separate nested conditional logit models were identified for each recreationist group, controlling for independence of irrelevant alternatives (IIA) violations, as presented in Table 3. The AGE of respondents was coded by the midpoints of six age intervals. STUDENT is a dummy variable; with value of 1 if a respondent is currently a student. INCOME is the gross annual income of the respondent's household before tax. Respondents were asked to indicate their household income under six categories ranging from 'less than 20 million Won' to 'more than 50 million Won'. Class midpoints were used in coding responses. NHIKING is the number of annual visits to any mountain for recreation purposes. There were a few respondents who indicated that they go to mountains at least three times a week, hence a large standard deviation occurred with regard to NHIKING. NTOGYU is the number of visits to the Mt Togyu National Park per year. Some respondents were visiting the national park for the first time on the day when the survey was undertaken. NMUJU is the number of visits to any ski resort in Korea and the Muju ski resort.

Table 3. Summary statistics for the estimated logit models for Hikers and Skiers

Variable	Hikers		Skiers		Joint estimation	
C_1	1.580	(1.328)			1.571	(1.826)
C_2			-3.666	(-3.436)	-3.107	(-4.407)
NHIKING*C_1	0.053	(1.673)			0.0528	(2.093)

NMUJU*C_1	-0.762	(-1.816)			-0.686	(-2.158)
AGE*C_2			0.0692	(3.055)	0.0482	(2.867)
STUDENT*C_2			2.290	(3.301)	1.889	(3.467)
INCOME*C_2			0.372	(2.064)	0.288	(2.209)
NHIKING*C_2			-0.030	(-1.828)	-0.0103	(-0.906)
NMUJU*C_2			-0.171	(-2.681)	-0.116	(-2.655)
LEVY (z_1)	-3.1E-05	(-3.304)	-2.6E-05	(-2.040)	-2.3E-05	(-3.385)
TREES (z_2)	0.164	(1.769)	0.377	(3.730)	0.232	(3.585)
WETLAND (z_3)	0.161	(2.196)	-0.323	(-2.235)	0.0368	(0.594)
TREEWET (z_4)	0.384	(5.455)	0.660	(5.801)	0.464	(8.073)
REFOREST (z_5)	0.00076	(5.506)	0.00056	(2.706)	0.0006	(5.195)
TTIME (z_6)	-0.0153	(-2.135)	-0.119	(-9.321)	-0.0496	(-8.318)
TREES*NHIKING	-0.00807	(-2.330)			-0.0106	(-3.473)
WETLAND*STUDENT			0.447	(2.160)	0.199	(0.974)
WETLAND*NHIKING			0.008	(2.450)	0.00792	(1.211)
WETLAND*NTOKYU			-0.231	(-2.863)	-0.272	(-3.868)
(Inclusive values)						
Status-quo (Hikers)	1				1	
Shut-down (Hikers)	0.495	(1.898)			0.551	(2.365)
Status-quo (Skiers)			1		1	
Shut-down (Skiers)			0.673	(4.356)	0.921	(4.281)
Hikers					1	
Skiers					1	
LogL	-1151.361		-869.981		-2061.949	
RlogL (no coefficients)	-1597.011		-1061.901		-4176.905	
χ^2	891.300		383.841		4230.456	
R^2	0.279		0.181		0.506	
Optimal scale factor	—		—		1.10	
N (observations)	1230		960		2190	

Note: The numbers in parentheses are *t*-statistics.
* indicates an interaction term.

It was expected that skiers would seriously take into account additional travel time imposed on them whereas hikers would be more interested in the expected change in landscape resulting from reforestation. However, the presence of altruistic responses would heavily undermine the reliability of the survey. In other words, one can arguably

suspect that hikers could altruistically be motivated and take into their account the time cost from the skiers' perspective when hikers respond to the choice sets. The trade-offs between the dollar value – i.e. the quasi-levy – and the time variable were compared across the two recreationist groups to determine whether hikers are motivated in such a way.

A combined model was then run in which the coefficients for the model parameters were restricted to be the same across populations. The Swait and Louviere (1993) procedure was followed to test whether the two model parameter vectors differ only due to the scale factors. If a straight line fits all dots representing the pairs of coefficient values on the parameter plot, it can be said that the model parameters of two datasets are equal across datasets, although the scale parameters differ. If not, it is needed to rerun the joint estimation with some parameters freed to be dataset specific. Swait and Bernardino (2000) suggested freeing particular parameters to be unequal across datasets and running models with increasingly more parameters free until the hypothesis of parameter equality cannot be rejected. This process is designed to identify which parameter is likely to be contributing to rejection.

Figure 1 plots six parameters of Hikers and Skiers reported in Table 3. A close examination of Figure 1 reveals that two parameters (TTIME and WETLAND) deviate further from the upward sloping straight line than the other points. WETLAND plotted on the southeast panel is the first candidate for freeing as the sign of the parameter is opposite across datasets. The joint model was rerun with WETALND and TTIME progressively freed to be dataset specific. Finally, the coefficients for LEVY and REFOREST only were forced to be identical across datasets while others became dataset specific. The likelihood ratio statistic is

$$-2[-2021.676 - (-1151.361 + -869.981)] = 0.668.$$

The critical value of chi-square statistic at the 5% significance level for one degree of freedom is 3.841. Hence, the null hypothesis that the two selected parameters are equal across populations cannot be rejected at the 5% significance level. In conclusion, the two particular parameters (LEVY and REFOREST) out of six can be considered to be equal across populations. In short, it can be said that the weight of evidence suggests that the overall coefficients are not identical across populations, and therefore that two separate datasets have not arisen from the same population. This result implies that it is statistically safe to compare directly implicit prices estimated from Hikers with those from Skiers.

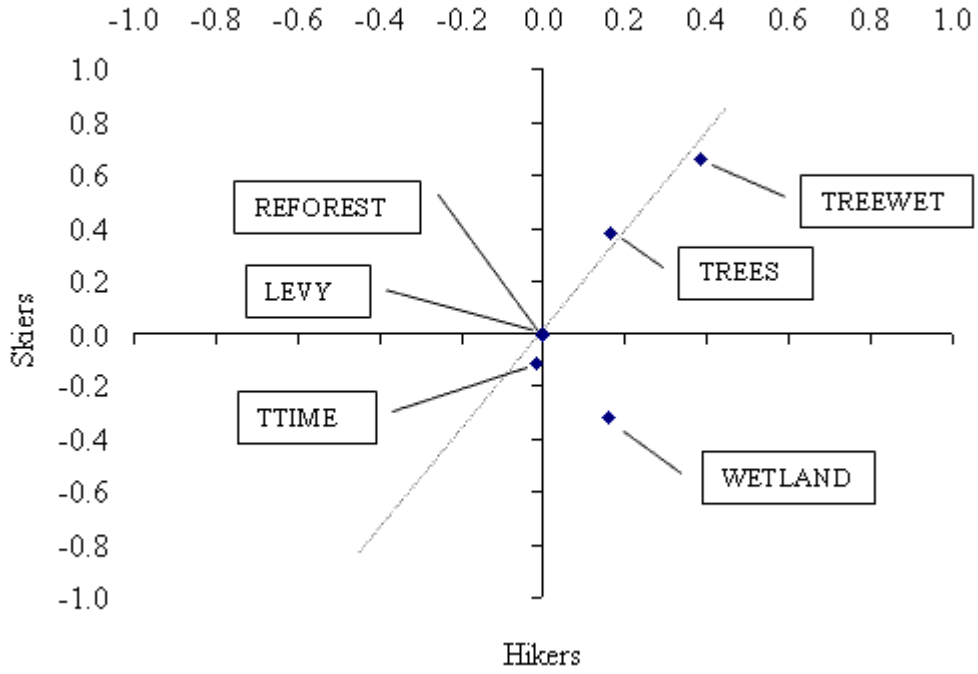

Figure 1. Plot of attribute coefficients derived from the datasets for hikers and skiers

The implicit prices of attributes for both hikers and skiers, and their 95% confidence intervals are reported in Table 4. The implicit price of TTIME for skiers was about nine times as great as that for hikers.

Table 4. Point and interval estimates of mean WTP for environmental attributes (Currency: Won)

Variable	Hikers		Skiers		*t*-ratio[a]
	Implicit price (IP_H)	95% confidence interval	Implicit price (IP_S)	95% confidence Interval	
TREES	1,667	(-7,322 to 10,656)	29,448	(-369 to 59,264)	-1.766
WETLAND	10,554	(-722 to 21,830)	-16,215	(-39,656 to 7,225)	2.208
TREEWET	25,146	(9,236 to 41,057)	51,456	(3,829 to 99,082)	-1.022
REFOREST	25	(10 to 40)	22	(-0.04 to 44)	0.230
TTIME	-500	(-1,045 to 45)	-4,652	(-8,986 to -318)	1.991

Note: [a] $(IP_H - IP_S)$ / standard errors.

t-statistics of $(IP_{iH} - IP_{iS})$ are presented in the last column of Table 4. With a two-tailed hypothesis test, H_0 is rejected at the 5% significance level if the absolute value of the *t*-statistic is greater than the critical value 1.96 for an infinite sample size. The *t*-test revealed that the gap between the implicit prices of TTIME for hikers and skiers, IP_{iH} and IP_{iS}, is statistically different from zero at the 5% level. This result supports the conclusion that the point estimate of WTP for TTIME for hikers is lower than that for skiers. The c*riterion* is applied to identify the presence of hikers' altruistic motivation in choosing options: it can be concluded that hikers did not derive disutility of additional travel time imposed on skiers, suggesting the absence of the purely altruistic motive

from hikers to skiers. On the other hand, interestingly, the estimated implicit prices for all the environmental variables except WETLAND are found to be statistically not different across the two group of recreationists.[4] This finding implies that the two groups have a similar structure of tastes in the environmental assets.

6. Summary and concluding comments

This paper tested whether hikers take into their account the disutility that would be caused by the removal of the Muju ski resort, this being the only ski resort in the southern region of Korea. The paper made use of the theoretical strength of 'choice modelling', a stated preference method, which enable its practitioners to disaggregate components of value. In the choice modeling questionnaire given to hikers and skiers, it was assumed that skiers from the southern region would have to travel for a longer time as a consequence of the disclosure of the ski resort. Each of the choice sets forced the respondents to consider trade-offs between the recovery of the lost environmental assets in the Muju ski resort area, skiers' additional travel time in addition to willingness-to-pay amounts for the hypothetical environmental improvement. The attribute 'additional travel time' was used as a control to determine whether hikers' responses are collectively influenced by altruism in their valuation, given that the time cost was only incurred by people who were willing to travel to new ski resorts.

[4] The implicit price of WETLAND for skiers is negative and differs from that for hikers. Note that the coefficients for interaction terms with WETLAND, and the mean values of SUDENT, NHIKING and NTOGYU, were input in computing the implicit price for WETLAND for skiers since these non-attribute variables modify the effects of WETLAND on the choice probability of an option. In interpreting this negative implicit price, some skiers who had frequently visited Mt Togyu for hiking might have downplayed the value of the lost alpine wetland, because they had access to and knowledge about the area where the pristine wetland used to be. In contrast, hikers, most of whom had never visited the Muju resort, did not have access to the area and placed a higher preservation value than skiers did.

It was found that the two recreation groups expressed similar preferences for the recovery of the forgone natural assets. It was difficult to say that the two recreational groups were from different populations in terms of their perceptions of environmental protection. Based on the estimated implicit prices for most environmental variables (i.e. TREES, TREEWET AND REFOREST), one could argue that the skiers' concern about the state of the land at issue was with the public interest. Despite this suspicion, the different attitudes towards the opportunity cost of the environmental recovery – i.e. increment in terms of skier's travel time – demonstrated that the two groups of samples did not come from the same population. The evidence was that hikers did not derive disutility of additional travel time incurred by skiers, against the arguable expectation that hikers might be motivated altruistically in responding to the choice sets, taking into account the time cost on behalf of skiers.

These contrasting results support Keat's (1994) position that it is inappropriate to draw a dividing line between citizen role and consumer role between recreationist groups. That is, it is not necessary that people value natural landscape or environmental assets as citizens and private consumption goods and services as consumers. Both citizen and consumer behaviour takes a role in valuing both consumption and nature.

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