Valuing Recreational Attributes of the National Forest Parks Using Tourist Satisfaction Data

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Keywords: Using individual life satisfaction data to value public goods has been burgeoned in recent years. However, no attempt has been made in valuing tourism resources based on the information of tourist satisfaction. To fill out the gap, in this paper we attempted to adopt a novel approach by using a tourist satisfaction data to value the National Forest Parks. In the process, we began by establishing functional relationship between the tourist satisfaction and the park attributes, including the rate of vegetation coverage, sanitation condition, infrastructure, as well as factors related to the recreational services, etc. in the China National Forest Parks system. The results indicate that those attributes being considered and evaluated are able to play statistically significant role in explaining the level of tourist satisfaction, thus, to generate a tremendous economic value to the park visitors. However, among the others one of the most important attributes appears to be the level of congestion in the park which can make the most significant contribution to the tourist satisfaction. Reducing the park congestion in most Chinese forest parks could be potentially to create ￥623.18 per person per trip.

1. Introduction

In recent years, a fast development of the nature-based tourism has triggered a great concern to the research community, resource management authority as well as the general public. Recently, a novel approach based on life satisfaction (LS) has been considered as of being promising technique which has a potential to supersede those conventional nonmarket valuation approaches. The model results can be used in computing the average marginal rate of substitution between household income and the public good being evaluated to derive the respondents' marginal willingness to pay (WTP) for the public good in question (Frey et al. 2010). Compared with the conventional valuation techniques, to some extend the LS method is able to get around with the weaknesses attached to those traditional approaches. Specifically, the LS does not need to directly ask people's willingness to pay for the public goods of being valued, instead, it simply asks respondents to rank their life satisfaction. As such, the survey process greatly reduces respondents' cognitive burden and most importantly this type of survey question can effectively assuage the strategic bias problem

commonly connected with the contingent valuation method. In it we can simply use the term of tourist satisfaction (TS) as an explained variable.

The TS method we proposed here has a potential of making contribution to the current literature in the following aspects: (i) exploring the underlying theory of using tourist satisfaction data to estimate tourism welfare. The established theoretical framework could be then be used in assessing the economic value of the forest park resources. In the process, it is insightful to address the advantages of the TS method over those conventional ones. (ii) From a tourism marketing perspective, this study also intends to examine the value differences between the different tourist groups including local travellers and nonlocal travellers. To the best of our knowledge, this is the first attempt ever for measuring the effect of tourists with different demographic and social economic traits on the economic value of the national park resources.

The remainder of the paper is organized as follows. Section 2 provides reviews on the existing literature with a primary focus on valuing the recreation activities in National Forest Parks and the evolution of the life satisfaction approach used in non-market valuation studies. Section 3 discuss the theoretical basis of the tourist satisfaction (TS) method and establish an empirical model framework. Section 4 outlines questionnaire design and data collection process. In section 5, we will address the model results which are then followed by Section 6 of the study summary and conclusions.

2. Literature Review

The economic value of air quality gained the most attentions in the early attempts of using satisfaction data for valuing public goods. In this regard, Welsch (2002) was the first researcher who used the cross-section data of life satisfaction gathered from 54 countries across over the world. Their study discovered that improved air quality exhibits a tremendous economic value. Since then, there has been a burgeoning number of studies concerning the valuation of air quality under different circumstances from different countries, geographical locations, as well as various economic development stages across over the entire world based on the measurement of the life satisfaction indices (Ambrey et al. 2014; Matthew et al. 2018). Besides the air quality study, the LS has gradually gained its popular momentum in the field of valuing environmental good studies in recent years. For example, Ambrey and Fleming (2011) evaluated scenic amenity in the southeastern Queensland; Tsurumi and Managi (2015) estimated the environmental value of green space in Japan; Krekel and Zerrahn (2017) quantified the negative externalities of wind turbines; Del Saz-Salazar et al. （2019）assessed the value of cultural goods.

All in all, previous studies have paid a close attention to valuing national forest parks primarily using either RP or SP methods. Meanwhile, their limitations and shortcomings as being mentioned above have also been well recognized by the research community. Thus, it is meaningful to explore an alternative method to be used in valuing forest park resources, but of course the newly proposed method should be able to either partially or completely get away with the problems attached to the conventional approaches. Although several researchers have demonstrated the feasibility of using life satisfaction data in estimating economic values of various environmental goods, no one has tried this method to value national forest park resources, which warrants our interest of initiating this study. We strongly encourage authors to use this document for the preparation of the camera-ready.

3. Methodological Framework

3.1. Connection between Tourist Satisfaction and Economic Value

The value measures based on substitutability can be expressed either in terms of willingness to pay (WTP) or willingness to accept compensation (WAC). WTP and WAC measures can be defined in terms of any other good that the tourist is willing to substitute for the good being valued. In valuing the national forest park resources, we use travel cost as the numeraire in which trade-off ratios are expressed. WTP is the maximum sum of money that individual would be willing to pay rather than do without an increase in some good such as amount of rubbish reduction in a national forest park site (Tisdell 2006).

More formerly, a tourist's utility function can be formulated as the following:

$$u = f(r, t, \theta)$$

where u denotes tourist's utility, r, t and θ denote respectively, the level of recreational attributes, amount of the travel costs, and tourist's personal traits.

3.2. Empirical Model

A typical tourist satisfaction model depicts the relationship between the parks' attributes, tourist's travel cost and other control variables. Concretely, these can be expressed in Eqn. (1) below:

$$U_{ij} = \alpha_0 + \beta_i' RA_{ij} + \mu_i' OA_{ij} + \gamma_i' C_{ij} + \delta_i' S_{ij} + \varepsilon_{ij} \tag{1}$$

where U_{ij} is a true but unobservable indirect utility of tourist i as he or she travels to the park j; $RA_{ij} = (RA_{ij1}, RA_{ij2}, \dots RA_{ijk})'$ is a vector representing the recreational attributes of the park j; $\beta_i' = (\beta_{i1}, \beta_{i2}, \dots \beta_{ik})'$ is a vector of the park attribute coefficients. Similarly, $OA_{ij} = (OA_{ij1}, OA_{ij2}, \dots OA_{ijk})'$ is a vector of the control variables associated with the park j, which could involve factors such as park land size, temperature, rainfall, etc.; C_{ij} represents a set of travel costs; S_{ij} is a vector denoting visitors' socio-economic and demographic characteristics；and ε_{ij} is the random errors.

As being discussed above, the key step of measuring the park attribute's value is to correctly define and formulate the marginal rate of substitution between the recreational attribute in question and the tourists' travel cost. To do so, we must first calculate marginal utility of the park attribute and marginal utility of the tourists' travel cost, and then by taking the ratio between the two, we can derive the monetary value of the attributes. Then, the MRS can be directly derived from Eqn. (1) and presented in Eqn. (2):

$$MRS = \frac{\Delta \text{Cos} t}{\Delta \text{Re} creation\ attribute} = -\frac{\partial U_{ij} / \partial RA_{ij}}{\partial U_{ij} / \partial C_{ij}} = -\frac{\hat{\beta}}{\hat{\gamma}} \Leftrightarrow WTP \tag{2}$$

In order to better manifest the model's robustness with respect to a potential role that could potentially made by the travel cost in the tourist satisfaction, we have tried alternative forms of

Eqn.(1) encompassing both a linear and non-linear forms (Bertram and Rehdanz, 2015). The travel cost variable is introduced into the models of (3) and (4) with each of being set up with natural logarithm and squared terms, respectively:

$$U_{ij} = \alpha_0 + \beta_i' RA_{ij} + \mu_i' OA_{ij} + \gamma_i' \ln(C_{ij}) + \delta_i' S_{ij} + \varepsilon_{ij} \tag{3}$$

$$U_{ij} = \alpha_0 + \beta_i' RA_{ij} + \mu_i' OA_{ij} + \gamma_i' C_{ij} + \theta_i' C_{ij}^2 + \delta_i' S_{ij} + \varepsilon_{ij} \tag{4}$$

The WTP for those non-linear models are then expressed by MRS between RA_{ij} and C_{ij}:

$$WTP = -\left(\hat{\beta} / \hat{\gamma}\right)\bar{C} \tag{5}$$

$$WTP = -\beta / (\hat{\gamma} + 2\theta) \tag{6}$$

where $\bar{C}$ is the mean value of tourists' travel costs.

4. Questionnaire Design and Data Collection

In this study, we made two versions of survey questionnaires: one is used to capture the data on quality of park attributes of the national forest parks, and the other is to collect data on tourist satisfaction and their socio-economic characteristics. The whole regression model analysis used the data collected from 22 national forest parks across over 14 provinces nationwide, which cover a wide range of conditions of the national forest parks in China as far as the park grade rankings, land size, length of establishment, rates of forest vegetation, etc. are concerned. The whole survey process lasted for about 7-months from the early April to December in 2017 with an on-and-off manner. Owing to the time and budget constraints, it was not possible for the researchers to travel to every park site being sampled to carry out complete filed survey activities. Instead, most survey activities including the data collection of site physical conditions and tourist interviews were delegated to the parks' management personnel with the mutually agreed money compensation paid to the mandatories. Thus, the tourist surveys were executed by the park managers on behalf of our research team. On average, 200-300 visitors were sampled from each selected park site and it took about 10-15 minutes to accomplish one survey form. The survey process ended up with a total of 4,531 valid questionnaires.

5. Analysis of the Results

5.1. Valuing the National Forest Parks' Attributes

In order to account for the non-linear relationship between variation of each attribute and travel cost, we computed the MRS based on various combinations of travel costs and recreational attributes (i.e., using results generated with Models of 2 and 3) according to Eqs.5 and 6. Table 1 presents the mean WTP results derived from using the whole dataset. It is clear to see the WTP results vary from one model to another, but they don't seem to differ greatly, which manifests a high degree of the robustness of the estimated model results.

In the discussion below, we will use the results generated from Model 1 to address the attribute valuation issues. This is simply because the Model 1 performs the best goodness of fit among the three models. It is interesting to see that among all the recreational attributes, tourists attached a

greatest importance to the attribute of 'Congestion+' which is evidenced by the highest value of the WTP (i.e. ￥623.18) and it is followed by the value of WTP for the attribute of vegetation coverage (￥327.26). This means that tourists much prefer to experience a lower crowding environment and a high rate of the green land coverage in the forest parks. However, as the congestion level alters from the status quo to the worst level ('Congestion--'), the WTP falls to ￥454.59. Similarly, the effect of altering 'amount of rubbish' from the status quo to 'Garbage-' makes ￥281.88 of economic value loss. Finally, an average WTP for one-level enhancement of 'Support facility' and 'Recreation facility' is ￥109.29 and ￥122.95, respectively.

Table 1: The economic values accrued to the changes of the park characteristics.

	Linear form		Semi-logarithm form		Squared form		Ordered Probit model	
	WTP	Proportion	WTP	Proportion	WTP	Proportion	WTP	Proportion
*Forest**	-	-	-	-	-	-	-	-
Forest+	180.921	0.62	198.863	0.8	180.5	0.62	270.394	0.93
Forest++	327.263	1.13	392.228	1.5	326.4	1.12	468.133	1.61
*Traffic**	-	-	-	-	-	-	-	-
Traffic+	100.846	0.35	90.451	0.2	99.15	0.34	162.410	0.56
Traffic++	110.793	0.38	105.432	0.4	110.0	0.38	112.289	0.39
Garbage-	-	-0.97	-	-	-279.069	-	-	-1.17
*Garbage**	-	-	-	-	-	-	-	-
Garbage+	356.450	1.23	411.411	1.5	356.991	1.23	333.010	1.15
Congestion--	-	-1.56	-	-	-455.102	-	-	-1.40
Congestion-	-	-0.87	-	-	-252.175	-	-	-1.02
*Congestion**	-	-	-	-	-	-	-	-
Congestion+	623.184	2.14	801.776	3.0	623.4	2.15	655.801	2.26
Congestion+	-	-0.86	-	-	-	-	-	-1.46
Support	109.289	0.38	143.525	0.4	109.2	0.37	184.980	0.63
Recreation	122.951	0.42	129.173	0.4	122.9	0.42	214.781	0.74

Note: Proportion=WTP/mean travel cost；the mean value of travel cost in the whole sample is ￥290.639. Variable with"*" stands for a baseline status.
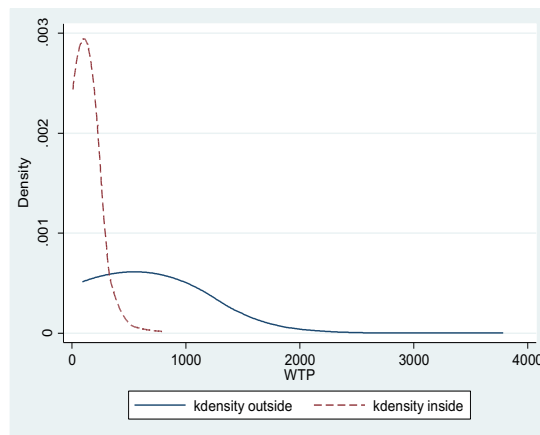

Figure 1: The distribution of the WTP under the two different datasets.

5.2. Model Results under Different Groups

To better examine difference of the tourists' WTP for various park attributes between local and nonlocal visitor groups, we conducted a separate analysis on each group using the four types of

models, i.e., linear, semi-logarithm, squared, and ordered Probit forms. Taking the recreational attribute of '*Congestion+*' as an example, the distribution of tourists' WTP for the related attributes are depicted in Fig.1. The *x* axis represents the WTP values, and the *y* axis stands for the probability distribution of WTP with its red dotted line standing for the WTP distribution for the local tourist groups and the blue solid line representing the nonlocal tourist group.

6. Conclusions

In this study, we adopted a novel approach so-called the tourist satisfaction (TS) model in valuing the non-market tourism resources with a specific focus on the attributes of the national forest parks in china. The empirical analysis using the data gathered through a large scale of field survey operation by selecting 22 representative national forest parks and giving interviews to 4,531 visitors in order to collect their tourist satisfaction information in China. The analytical results lead us to the following conclusions: (i) The quality of the park attributes is able to impose a significant effect on the tourist satisfaction. Specifically, tourists attached a greatest importance to the rate of vegetation coverage, environment condition, and facilities offered to the park sites. Furthermore, the analysis also covered issues related to the park management, which reveals that visitors are sensitive to the condition of the park's congestion since it imposes a strongly negative effect on the tourist satisfaction. Thus, tourists exhibit the highest level of willingness to pay (￥623.18) for decreasing the park congestion. (ii) Both local and nonlocal tourists display a divergent degree of preference over the National Forest Park attributes and so are their levels of willingness to pay. For instance, nonlocal tourists pay more attention to the vegetation coverage and environmental quality as well than that the local tourists do, thus these two attributes made a considerable contribution to the level of the tourist satisfaction. In comparison, the local tourists paid more attention to the traffic conditions. To be specific, the nonlocal tourists are willingness to pay as high as ￥556.03 for lowering the level of congestion on the sites while the local tourists' WTP for the same attribute is ￥117.47 only. (iii) The quality enhancement of the recreation attributes exhibits a tremendous benefit potential to tourist's travel experience and so does to their level of satisfaction.

The monetized values of the attributes of the national forest parks can not only help the policy makers to understand how much the total economic values to be potentially accrued to the tourism resources and management and in turns to the tourists' social welfare and local communities as well, but also it is able to derive some insightful implications to the future national forest park management. As such, the park management could charge outside visitors with a relatively higher price than the local visitors. Given the current digital technology prevailed in China such as instant payment made by using mobile phone sets, there is no much barriers and hassles for the park authority to implement such price discriminatory policy.

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