

Modelling the recreation demand for natural areas in the Czech Republic

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The contribution aims at modelling of recreation demand for large natural areas in the Czech Republic using a discrete choice model based on McFadden's random utility framework. Our application encompasses 27 recreation areas, including national parks and large protected landscape areas. The main interest of the analysis is to determine which environmental attributes of recreation sites (such as land cover, type or structure of vegetation or forest type) drive the demand for outdoor recreation; employing the recreation demand model, it is further possible to disentangle the implicit recreation value that visitors associate with particular sites and particular environmental characteristics of the area.

Data and methodology

The source of data is a cross-sectional micro data set obtained within the scope of project funded by the Ministry of Agriculture of the Czech Republic "Monetary valuation of recreational and aesthetical function of forest in the Czech Republic". The data have been supplemented with natural characteristics of the recreation areas, employing geographic data on Corine Land Cover categories for year 2006 by the European Environment Agency. Also, data on the travel cost have been collected using an objective measure of distance and time (see Kaprová, 2015). Since trip costs are also included as one of the characteristics of the trip, the model implicitly captures trade-offs between money and levels of natural characteristics (Parsons, 2003).

To model the recreation behavior, we use a travel cost model based on McFadden's random utility framework (McFadden, 1974). Random utility modelling in travel cost method aims at estimation of probability that the visitor chooses one recreation site among other substitute areas.

Results

The following table shows the results of a multinomial travel cost random utility model using a set of 884 observations.

Table 1. Results of the multinomial travel cost random utility model

| Variable | Estimate | Std. err. | Est./s.e. | Prob. |
|--------------------|----------|-----------|-----------|-------|
| Short-trip utility | | | | |
| TC | -1.037 | 0.020 | -52.451 | 0.000 |
| Artif_% | -0.145 | 0.021 | -6.934 | 0.000 |
| Pasture_% | 0.002 | 0.004 | 0.534 | 0.593 |
| Forest_br | 0.692 | 0.151 | 4.584 | 0.000 |

| Variable | Estimate | Std. err. | Est./s.e. | Prob. |
|---------------------|----------|-----------|-----------|-------|
| Forest_con | 0.517 | 0.063 | 8.241 | 0.000 |
| Forest_snat_% | 0.016 | 0.002 | 7.553 | 0.000 |
| Wat_body | 0.344 | 0.057 | 6.038 | 0.000 |
| Ln_area | 0.177 | 0.041 | 4.347 | 0.000 |
| No-trip utility | | | | |
| Constant | 9.236 | 0.393 | 23.489 | 0.000 |
| University | -0.993 | 0.052 | -18.960 | 0.000 |
| Fulltime | -0.374 | 0.043 | -8.806 | 0.000 |
| Family_no | 0.131 | 0.024 | 5.448 | 0.000 |
| Family_1 | -0.531 | 0.075 | -7.075 | 0.000 |
| Age | 0.002 | 0.001 | 1.447 | 0.148 |
| Hours | -0.127 | 0.004 | -30.607 | 0.000 |
| Hiking | -0.459 | 0.043 | -10.661 | 0.000 |
| Mean log-likelihood | -20.09 | | | |
| No. of cases | 884 | | | |

As expected, the travel cost is negatively related to the probability of visiting the site. The coefficient is significant even at 1% significance level. Most of the variables describing the site that are used to model the short-trip utility are also highly significant determinants of the choice; only the percentage of pastures in the area does not have any effect on the probability of visiting the area. All variables have expected signs - the only variable with a negative coefficient is percentage of artificial areas in the recreational area, which is also intuitive. The variables explaining the no-trip utility (i. e. the decision to stay at home and not to participate in any short trip to nature) are also almost all significantly related to the probability of choice; only age does not seem to matter.

Summary and conclusion

The article presents modelling of recreation demand for large natural areas in the Czech Republic using a discrete choice model based on McFadden's random utility framework. The application is based on a cross-sectional micro data set gathered off-site from Czech population and information on past visits of respondents to 27 large recreation areas.

Most of the variables in both parts of the random utility model are successful in explaining the choice of the respondent. As the next step, we would like to employ the results of the recreation demand model to analyze the impacts of marginal changes in the model parameters on the recreation utility of visitors to Czech natural areas. The results of the welfare analysis may be further implemented in the decision-making on the natural areas and for evaluation purposes of changes in the areas.

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