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Joint estimation using revealed and stated preference data: An application using a national forest

Paula Simões[a,b,*], Eduardo Barata[b,1], Luís Cruz[b,1]

[a] Department of Management and Economics, School of Technology and Management of Leiria, Polytechnic Institute of Leiria, Campus 2 – Morro do Lena – Alto do Vieiro, Apartado 4163, 2411-901 Leiria, Portugal
[b] GEMF-FEUC (Faculty of Economics, University of Coimbra), Av. Dias da Silva, 165, 3004-512 Coimbra, Portugal

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ABSTRACT

We combine contingent behaviour with travel cost data to estimate the change in the recreational use value of a National Forest due to quality and price changes. Instead of the usual improvement scenario, a hypothetical deterioration in the conditions of the forest due to a fire is considered. A dataset containing five observations for each respondent enabled the estimation of three models for which the number of scenarios differed. The results show that visitors are sensitive to price and quality changes and that in the forest fire scenario the intended number of trips would be reduced and that respondents would experience a welfare loss. Signs of inconsistency between preferences expressed by revealed and intended behaviour were found. This research also provides some indications that strategic bias affects answers to price changes.

Introduction

This study combines contingent behaviour (CB) data with observed travel behaviour to estimate the change in the recreational use value of a forest (Bussaco National Forest, in Portugal) due to quality

* Corresponding author at: Department of Management and Economics, School of Technology and Management of Leiria, Polytechnic Institute of Leiria, Campus 2 – Morro do Lena – Alto do Vieiro, Apartado 4163, 2411-901 Leiria, Portugal. Tel.: +351 244 820 300; fax: +351 244 820 310.
E-mail addresses: paula.simoes@ipleiria.pt (P. Simões), ebarata@fe.uc.pt (E. Barata), lmgcruz@fe.uc.pt (L. Cruz).
[1] Tel.: +351 239 790 581; fax: +351 239 790 514.

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and price changes. Revealed preference (RP) data were collected by means of a survey that complied with the requirements for the application of the individual travel cost method (TCM). Additionally, hypothetical scenarios were introduced to collect data on intended behaviour. The intended number of trips if current conditions do not change was asked and this was established as the status quo scenario. Another hypothetical scenario was aimed at scrutinizing visitors' reaction to changes in the Bussaco forest entrance fee. An additional scenario was meant to ascertain how visitors' would react to deterioration in current conservation conditions caused by a forest fire damaging one fourth of the forest.

The research questions motivating this study are whether forest visitors are sensitive to entrance fee changes and how they would react to environmental degradation caused by fire. Three models and three specifications for each model are computed and compared. Models differ with respect to the observations used for each respondent and specifications differ in the way pseudo-panel information is modelled. These analyses are complementary and should contribute to a better understanding of visitor demand behaviour.

Some research has been undertaken, mainly in North American countries, to assess the economic effects of wild and prescribed fire on forest recreation (Vaux et al., 1984; Englin et al., 2001; Hesseln et al., 2004). In general, the results indicate that effects differ among activities and geographic regions and that the outcome depends on the fire intensity. Recent work suggests that recreational trips decline in the first few years following a fire and after about ten years they recover more or less to their previous levels (Rausch et al., 2010). Several studies have analyzed forest recreation demand in Europe (see, e.g., the survey conducted by Zandersen and Tol, 2009) and estimated the willingness to pay for afforestation programmes (Mogas et al., 2006), but less attention has been paid to the effects of fire on visits.

The remainder of this study is organized as follows. The next section reviews the CB method and presents a survey of TCM-CB empirical applications. The section after this presents the study case area, data-collecting procedures and provides some descriptive statistics. The next section describes the econometric approach. The results are presented and discussed in the next section. The last section sets out the conclusions.

Research on combining the travel cost method with contingent behaviour

The TCM is the oldest method and the one most often used in the estimation of use value linked to outdoor recreation in public and semi-public natural spaces (Whitehead et al., 2008). The TCM belongs to the group of RP techniques as it is based on observed behaviour. RP techniques have been considered more reliable than stated preference (SP) techniques because valuation always refers to the use of some resource in past and/or present observed conditions. At the same time, RP techniques are limited in scope because they can neither estimate passive use value nor cope with valuation outside the range of historically observed values. Nevertheless, the analysis typically involves both the observed conditions and the impact of changes in quality/price which are relevant for policy purposes but have not been observed (Rosenberger and Loomis, 1999). These impacts must be assessed using more flexible methods, based on stated behaviour.

Several benefits have been ascribed to a combined RP–SP analysis. First, more complete information improves the efficiency of parameter estimation and hence the precision of the estimated preferences pattern (Azevedo et al., 2003; Jeon and Herriges, 2010). Second, it enables the evaluation of a proposed policy that would modify site attributes or the recreational activity cost, but which is not currently or historically observable. Third, a suitable experimental design which introduces hypothetical quality and/or price levels is likely to break down the collinearity among characteristics. Fourth, convergent validity can be tested (Hanley et al., 2003; Jeon and Herriges, 2010; Whitehead et al., 2010). There are, however, some difficulties inherent to this approach. The underlying utility function must be the same in both methods for valid welfare estimates to be computed. Moreover, as extra questions must be added to the questionnaire to collect supplementary data, the combination of techniques requires a more complex survey instrument than the one required by the autonomous RP or SP framework.

A number of studies have applied two non-market valuation techniques to the same research analysis. TCM data has been jointly analyzed, mainly with data obtained by applying an SP method. In