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Intercept and recall: Examining avidity carryover in on-site collected travel data

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ABSTRACT

This study estimates trip demand and economic benefits for visitors to recreation sites when past season trip information is elicited from travelers intercepted on-site. We use a weighting function for past season counts that is different from, but nests, the standard on-site correction appropriate for current season counts. We find that for our sample of lake visitors relatively stronger preference or "avidity" for the interview site carries over across seasons. We further show that the appropriate weighting of past trip counts is critical in deriving meaningful estimates of travel demand and economic benefits.

1. Introduction

Two important characteristics of destinations for recreational travel are accessibility and the type and quality of on-site amenities. To assure an adequate provision of these public goods agencies need to maintain access roads and on-site infrastructure. For sites gaining in popularity investments that enhance the capacity and quality of roads may be required to provide dependable access, reduce congestion, or protect environmentally sensitive areas from vehicular encroachment.

Naturally, from a social efficiency perspective these investments ought to be commensurate to the economic gains enjoyed by the users of a given site. These welfare gains are theoretically conceived as monetary equivalents of upward changes in an individual's utility function, and traditionally interpreted as "willingness-to-pay" (WTP) to enjoy a given site visit or a series of visits over an entire season. The knowledge of site-specific welfare effects is also important when considering the optimal length and timing of planned road closures, as they may be required for maintenance operations and capacity expansions. While pure traffic volume associated with a given destination can be measured by automatic devices such as electronic vehicle counters, the assessment of economic benefits requires surveying visitors.

An important input to the estimation of such welfare effects is information on the number of trips per season made by visitors. General population surveys of recreation activities are difficult to implement, may have poor response rates, and are generally much more costly to administer than surveys conducted at a recreational site. In this study we consider sampling via direct interaction with visitors intercepted at the interview site and possibly other nearby sites that can be considered close substitutes. This raises the issue of the appropriate timing of such on-site polling. Specifically, any sampling before the end of a visitation season or planning year imposes the risk of forecasting errors on part of the respondent when asked to report the estimated number of trips for the current season. These errors can be especially large for sites with pronounced quality changes during a given season. For example, as is the case for the application underlying this study, water levels at reservoir destinations may change dramatically even over the span of a few weeks. This may hamper motorized water sports, but possibly enhance beach recreation or fishing access. Another example would be unexpected weather events that may affect site quality or shorten a recreational season, especially at higher elevations.

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To avoid forecasting errors the researcher may thus opt for end-of-season sampling. However, this carries the risk of sample selection if end-of-season users are systematically different from other users in the wider population of visitors. Intercepting visitors throughout the season is likely to generate a more representative sample of the underlying population of recreationists.[1] Therefore, if the researcher has strong concerns regarding the accuracy of forward-looking trip reports but at the same time desires to sample visitors throughout the season to avoid selection problems and to assure a reasonable sample size within the limits imposed by constrained survey budgets, an attractive option might be to ask respondents about visits during past seasons in addition to or instead of projected visits for the current or future seasons.[2] This information on past visits can then form the basis for the assessment of current and future travel demand and the estimation of economic welfare gains.

This study focuses on the appropriate statistical framework to process such data. Ultimately the researcher desires to derive welfare estimates that apply to the "prototypical" individual in the underlying population of visitors. It has been empirically shown numerous times that on-site collected trip reports for the interview site are generally inflated compared to the number of visits to that site taken by the typical user. This discrepancy arises because intercepted respondents are likely to have a relatively stronger preference for the examined site than the prototypical user in the underlying population. The enhanced avidity of the respondent for the site of interception must be explicitly captured in the modeling framework to avoid biased trip and welfare estimates (Englin and Shonkwiler, 1995a, Moeltner and Shonkwiler, 2005).

It is understood how to implement statistical corrections for on-site trip counts associated with the current season (Egan and Herriges, 2006). The question now arises if this "avidity" correction is also necessary for trip reports associated with past seasons. On the one extreme if recreational travelers randomly re-order their preferences for different destinations at the beginning of each season, the intensity of past season visits for the current interview site will have no systematic bearing for preferences for the same site this season. At the other extreme, if site preferences are perfectly stable over time a full-fledged on-site correction as has traditionally been employed for current season counts may be required. The first scenario of random preference-reshuffling appears somewhat unlikely for the prototypical on-site respondent, especially in absence of pronounced changes in site quality or availability of substitute sites over adjacent seasons. The second scenario of "complete avidity-carryover" is equally questionable as it rules out even subtle changes in user preferences or any kind of variety-seeking behavior (Moeltner and Englin, 2004).

This study derives a flexible statistical estimator for processing on-site collected information on past trips that accommodates both of these extremes, but also allows for the more likely outcome of "attenuated avidity-carryover". While our model is applicable to any type of recreation destination or activity we focus in this study on jet skiers intercepted at various High Sierra lakes in the Tahoe Region. For this sample we find that avidity carryover is very pronounced, but far from complete. Using the appropriate econometric model has substantial implications for the estimation of travel demand and economic welfare.

2. Model formulation

2.1. Utility-theoretic framework

We stipulate that person i derives aggregate utility in season t from taking trips to the $j = 1 \cdots J$-site recreation system collected in vector $\mathbf{y_{it}}$ and from consuming a numeraire composite commodity b. Specifically,

$$U_{it} = U(\mathbf{y_{it}}, \mathbf{q_t}, \mathbf{h_i}, b) \tag{1}$$

where $\mathbf{q_t}$ denotes site attributes, and $\mathbf{h_i}$ is a vector of person or household characteristics. In theory, season-specific utilities could be linked over time in several ways. For example, as in Adamowicz (1994), and Moeltner and Englin (2004), one could allow for measures of state dependence, such as habit formation or variety seeking, to directly enter seasonal utility.[3] Alternatively, one could induce forward-looking rationality in a fully dynamic model of recreation behavior (Provencher and Bishop, 1997). However, the implementation of state-dependence approach requires substantially more recorded choice occasions than are traditionally available for the type of recreation demand data considered in this study. The fully dynamic modeling strategy is computationally involved, especially given the econometric adjustments to site demands proposed in this study. In addition, as argued in Swait et al. (2004) consumers' recreation behavior is somewhat unlikely to flow from a fully dynamic optimization framework as mental processing costs would likely outweigh the gains in utility associated with (correctly) anticipating the effect of current decisions on future benefits.

[1] As pointed out by a reviewer, an attractive compromise would be to intercept users on-site throughout the season to collect their contact information, and then administer a mail or phone survey after season closure. Naturally, this would require a research budget than can accommodate the added cost of an end-of-season survey.

[2] Naturally, asking visitors about past trips raises the issue of recall problems. We assume that recall problems are considerably smaller than potential forecasting errors. The relative magnitude of these two types of measurement errors remains to be subjected to empirical examination.

[3] Since we consider only aggregate seasonal demand, we believe that the role of habit forming and other state-dependent behavior is minor for our application. In addition, given the long gap between seasons (at least 7–8 months), it appears reasonable to assume that such effects, if relevant *within* a given season, will have largely eroded by the start of a new season.