

Uncertainty in the contribution of outdoor recreation to local and national economies

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There has long been interest in understanding outdoor recreation's contribution to local and national economies, and this has intensified as traditional resource industries have declined in many rural areas (Lundmark, 2005). Economic impact analyses often rely on visitor reports of expenditure, either during-trip or post-trip. However, such reports may involve uncertainty about past or expected expenditure, and this uncertainty may increase when it involves expenditure made for, or by, others.

Previous studies have evaluated the accuracy of reported expenditure, defined here as the level of consistency between actual and reported expenditure (see Stynes and White (2006) for a review). For example, Champ and Bishop (1996) found that hunters were able to accurately recall expenditure via post hoc surveys, using expenditure diaries as the reference for actual expenditure. Rylander, Propst, and McMurtry (1995) evaluated respondent self-reported accuracy in two contexts. First, accuracy was modeled as a function of response wave. Second, accuracy was modeled as a function of boater segments and associated trip complexity. They found that respondent confidence in expenditure reports decreased with trip complexity.

Evaluations of respondent uncertainty have been conducted in the non-market valuation field, especially with respect to contingent valuation (CV). In CV and related non-market valuation techniques, respondents directly or indirectly report the monetary value they place on an object. CV research has shown that stated preferences involve uncertainty with respect to intended behavior and absence of transaction experience, while research on expenditures has shown that uncertainty is a matter of recall and/or memory bias of actual behavior (e.g., Rylander et al., 1995). The two main approaches to studying respondent uncertainty in CV are the polychotomous approach, when respondents express their uncertainty during the choice task through multiple choice WTP alternatives (e.g. Akter et al., 2009), and the numerical scale approach, when the WTP question is followed by a numerical (un)certainly scale (e.g. Li and Mattsson, 1995). To our knowledge, no previously-published expenditure studies 1) provided the opportunity to correct reported amounts or 2) utilized corrections or certainty evaluations to adjust estimated expenditure.

In Sweden, as in many other modern societies, outdoor recreation occurs within more globalized, specialized, and commercialized lifestyles, and Swedes are increasingly purchasing their nature experiences. Data for this study are from an internet panel representative of the Swedish adult population (aged 16 or above) collected on three occasions during 2009. Each occasion referenced a different time period: Jan–Apr, May–Aug, Sep–Dec ($n = 3 \times 2000$ responses). Respondents were asked to report their participation in 43 different outdoor recreation activities grouped into 25

categories (based on a previous national survey on outdoor recreation participation; see Fredman et al., 2012). They then reported expenditures associated with participation by themselves and others (e.g. family members and friends). Expenditure was grouped into nine categories: transport, fuel, lodging, groceries, restaurants, equipment, clothing, entrance and related fees, and “other expenditures”.

Respondents were then prompted to correct their reports (as needed) by category and asked about their certainty regarding the accuracy of their overall report (original or corrected). Certainty was reported on a scale from 0% (not at all certain) to 100% (completely certain), converted to a 0 to 10 scale for analysis. Respondents also completed a payment card CV question measuring the total value of outdoor recreation beyond actual expenditures. This question was also followed by certainty in the reported figure (same design as for expenditure).

Three issues were evaluated. First, certainty reports for CV and expenditure were compared. As shown in Figure 1, there was commonality in the distribution of certainty reports. The Pearson correlation coefficient between the two is 0.357 and statistically significant ($p=0.000$). This indicates that respondent characteristics affect certainty reports across different tasks.

Figure 1 also illustrates differences, with the expenditure distribution being flatter and with fatter tails, especially at the lowest level of certainty. The mean certainty for expenditure was 5.74 and for CV was 6.56. The difference is statistically significant based on a paired t-test ($p=0.000$). This indicates that task characteristics also affect certainty reports. CV uncertainty is assumed to derive from the lack of a familiar market for the good being purchased, while expenditure uncertainty derives from memory limitations.

Second, three measures of total expenditure were calculated and compared:

- Naïve – original reports used, no accounting for uncertainty.
- Change – corrected reports used (when made), no accounting for uncertainty.
- Uncertainty – corrected reports used (when made), weighing for uncertainty.

Mean and median values were similar across all three measures, with a variation of five percent or less. In this case, adjustment did not substantially affect conclusions about overall expenditure.

Third, the pattern of corrections was evaluated. Seven percent of respondents corrected their reported expenditures in at least one category. The category with the fewest changes was Other expenditure; of those making changes, 10% changed their report of Other expenditure. Groceries was the most frequently changed, at 27%. The frequency of

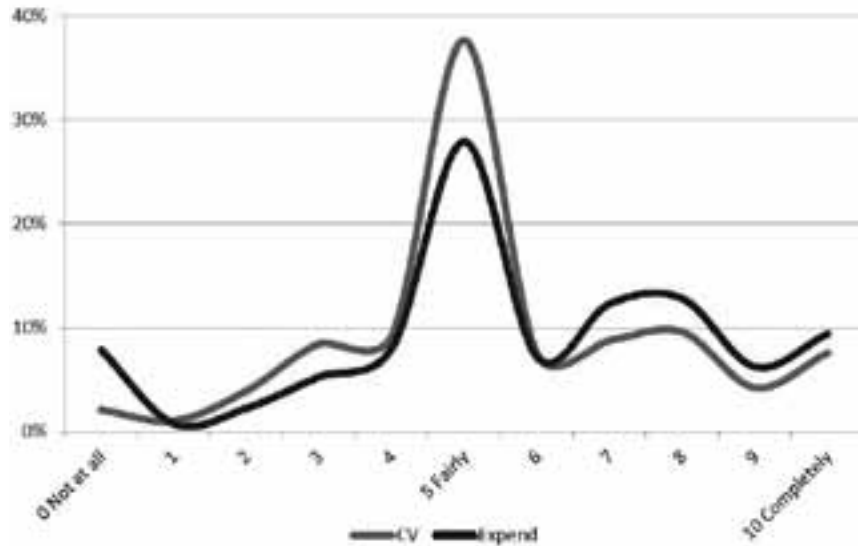


Figure 1. Respondent certainty distributions, percent within each of CV and expenditure contexts

changes to the Groceries category may reflect uncertainty about whether any given food purchase was associated with outdoor recreation rather than general consumption.

Certainty also was evaluated, using OLS regression, as a function of expenditure and demographic characteristics (model R^2 was 0.166). Certainty was positively associated with percent of total expenditure allocated to the Other expenditure category, and with higher income, being male, and age. It was negatively associated with the number of categories in which expenditure was made (i.e., complexity) and the percentage of total expenditure allocated to groceries or restaurants.

The above results reflect preliminary analysis. Further analysis of these data is warranted, including at the category-specific level (rather than the above regression of overall certainty). Replication in other contexts, notably intercept

or trip-specific post hoc surveys, would provide insight on the prevalence of current findings. Lastly, there is value in exploring relevant concepts from fields such as the psychology of certainty and survey recall.

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