Dealing with large number of travel modes in stated preference surveys

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Abstract
With the increased popularity of stated preference (SP) surveys for evaluating user preferences, there has been significant research on survey design techniques and associated issues. Most of these researches have focused on the efficiency and balance of the designs as well as consistency of responses under large and complex choice scenarios (DeShazo and Farmo 2002, Rose and Hensher 2006, Louvierre et al. 2008, Bliemer et al. 2008, Rose et al. 2008). However, though there has been research on approaches to deal with large choice sets in consumer choice settings (e.g. telecom features (Ben-Akiva and Gershenfeld 1998) magazine subscription (McAlister 1979), entertainment services (Venkatesh and Mahajan 1993), auto-ownership (Hanson and Martin 1990) etc.), to our knowledge, there has not been significant research on practical approaches that can be used to deal with cases in the travel mode choice context where presenting large number of alternatives in a single survey is essential given the particular scenario of application and resource limitations.

This paper draws on the findings of the SP survey design involving large number of travel modes conducted in the context of Lisbon, Portugal. The particular focus of the study was to model the preference and willingness to pay for innovative modes as part of the SCUSSE (Smart Combination of passenger transport modes and services in Urban areas for maximum System Sustainability and Efficiency) initiative of the MIT-Portugal program. The purpose of this project is to investigate to what extent new services and transport modes - largely based on existing vehicles but with different organization models and much stronger deployment of real time information - can be attractive enough to the users. The survey design was particularly challenging given the large number of candidate innovative modes that needed to be tested and compared simultaneously with existing modes. A focus group study was conducted first with three complementary objectives, find aspects of public transport, car and the new alternative modes and services that could act as attraction or repulsion factors, identify attributes characterizing the new services that could be used in the SP experience and identify potential attitudinal aspects that should be also included in the SP survey. The new alternatives include collective taxis, express minibus, real time dispatch of buses and passengers, one-way car rentals, park-and-ride systems with tutor service to drop-off children to their schools and variable price congestion pricing. Alongside the three existing modes this yielded a choice set of up to ten alternatives per respondent.

In the proposed design, alternatives were presented to the respondents in three groups in a sequential manner and the respondents were asked to select their 'preferred' alternative in each group. Each group was built around modes and services with similarities - car based, public transport based and multimodal alternatives, thus reflecting a previous assumption about a nesting structure. The preferred alternatives from each group were then presented as a choice scenario. Each respondent was presented with three scenarios yielding twelve responses per individual (nine 'preference' and three 'choice' responses).

The specific design setting raised a number of methodological issues. In particular, we explore the following questions in this research:

- Are 'preference' and 'choice' data inherently different in the mode choice context?
- Can they be combined in a consistent manner?
In the combined data, does the a priori assumption about the nesting structure (the grouping of alternatives used in the survey) still govern?

This was done by comparing the estimates of the model with only the 'choice' responses (4th group) and only the 'preference' responses (1st, 2nd and 3rd group) against the estimates of the pooled model (where both 'preference' and 'choice' responses are considered). A 'scale' parameter was introduced in the combined model to account for the probable difference in variance. The model performance was compared against a model where separate individual specific error terms for 'preference' and 'choice' responses were tested to capture intra-respondent and inter-respondent heterogeneities.

The results from the three models are compared and discussed and conclusions are drawn.

References


