Developing and estimating behavioural models for the value of time in the UK

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Abstract:

Value of travel time (VTT) research has a long tradition in the United Kingdom (UK), going back several decades to studies that were amongst the first in the world to understand the need to use choice modelling to address the issue and to use random utility or random value models to make the estimates (Beesley, 1965; Daly and Zachary, 1975). The work done in these UK studies strongly influenced subsequent studies in other countries. However, the most recent UK study was finished in 2003, with data collected in 1994. While the 2003 analysis used methods that at the time were state-of-practice in applied work, subsequent studies, notably in Scandinavia, developed and used new techniques that were at or beyond the state-of-the-art in academic research.

In Spring 2014, the UK Department for Transport (DfT) commissioned a new study, led by ARUP, with ITS Leeds being responsible for the specification and estimation of the behavioural models and the development of implementation values. This project included the first new data collection of this scope in 20 years in the UK. The project will finish in April 2015.

The present paper will focus on the behavioural model components of the work, rather than the development of values for implementation (which requires reweighting to nationally representative values). While some attention in the paper will be paid to survey design and data collection, the main focus will be on the specification and estimation of the choice model structures. The work conducted for the study is novel in several regards, including:

• the joint estimation across multiple stated choice (SC) games presented to the same respondent, where previous studies had estimated separate models for these

• the use of multiplicative error structures for all games, which is a novelty in the UK

• the further development and use of the de Borger & Fosgerau (2008) approach to reference dependence (size and sign effects) for models with more than two attributes

• the use of both analytical and simulation approaches to understand the distribution of values in the population

• the calculation of explicit error measures reflecting both error in parameter estimation and the use of a sample population for national-level expansion

Several of the above developments are a result of decisions made at the survey design stage to allow for a greater richness in behavioural patterns than was possible with the widely used Bradley design used in the previous UK and most recent Scandinavian studies.

References:

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