Sample selection and taste correlation in discrete choice transport modelling - DTU Orbit (09/12/2018)

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The subject of this thesis is discrete choice analysis in transport modelling. Many situations within transportation research may be modelled as a choice from a discrete set of alternatives. The framework of random utility maximisation is well-established to model such choices but there are still many issues that deserve attention. This thesis investigates how sample selection can affect estimation of discrete choice models and how taste correlation should be incorporated into applied mixed logit estimation. Sampling in transport modelling is often based on an observed trip. This may cause a sample to be choice-based or governed by a self-selection mechanism. In both cases, there is a possibility that sampling affects the estimation of a population model. It was established in the seventies how choice-based sampling affects the estimation of multinomial logit models. The thesis examines the question for a broader class of models. It is shown that the original result may be somewhat generalised. Another question investigated is whether mode choice operates as a self-selection mechanism in the estimation of the value of travel time. The results show that self-selection can at least partly explain counterintuitive results in value of travel time estimation. However, the results also point at the difficulty of finding suitable instruments for the selection mechanism. Taste heterogeneity is another important aspect of discrete choice modelling. Mixed logit models are designed to capture observed as well as unobserved heterogeneity in tastes. But just as there are many reasons to expect unobserved heterogeneity, there is no reason to expect these tastes for different things to be independent. This is rarely accounted for in transportation research. Here three separate investigations of taste correlation in willingness-to-pay estimation are presented. The first contribution addresses how to incorporate taste correlation in the estimation of the value of travel time for public transport. Given a limited dataset the approach taken is to use theory on the value of travel time as guidance in the specification of the correlation. The second contribution examines how different distributional assumptions are affected by the inclusion of taste correlation. The third contribution investigates the correlation patterns between willingness-to-pay measures for different public transport modes and how to capture them in the simplest possible way. A general feature of the three investigations is that we find scale heterogeneity. Since this induces correlation it is an important aspect of taste correlation to specify the scale correctly. We see that scale heterogeneity may be partly explained by background variables. Looking at the three contributions on taste correlation there seems to be the general conclusion that significant taste correlation is often present and that it sometimes has an effect on willingness-to-pay evaluation. A conclusion for applied work is that it should allow for correlation if this has not been sufficiently captured by the remaining specification of the model.

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