

BEHAVIORAL INSIGHTS TO SELECTING DISTRIBUTIONS FOR RANDOM COEFFICIENTS IN MULTINOMIAL LOGIT MODELS FOR STATED PREFERENCE VALUATION STUDIES

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Abstract:

Random coefficient (or mixed) multinomial logit models are the current state-of-the-art method used to account for unobserved preference heterogeneity in stated preference (SP) valuation studies. Modelers have a number of statistical distributions to choose from for the distribution of a particular parameter. The normal, lognormal and triangular are the most commonly used distributions, however, other distributions have been used including the exponential, dome, Erland, Weibull and uniform. In ecological economics applications of SP methods, researchers are typically most interested in welfare measures. Selecting a distribution for the random cost (or price) coefficient is of paramount importance in deriving such measures, but at the same time is the source of many problems involving implausible high willingness to pay (WTP) estimates.

The main underlying source of the problems is the possibility of a negative cost coefficient that lies very close to zero. This can happen with the assumption that the cost coefficient is normally distributed when a small part of the density is estimated to be positive and near zero and a somewhat larger part of the density is estimated to be negative and near zero. The problem though may not be in incorrectly allowing for the possibility of positive cost coefficients, as is sometimes thought, but rather in the actual presence of positive cost coefficients. For instance, the most popular alternative to the normal which excludes positive cost coefficient estimates is the log-normal (using the negative of cost as the stimulus variable). However, in the presence of true positive cost coefficients the log-normal will place substantial density near zero. Frustrated by implausible results, researchers often then specify the cost coefficient as non-random, but this is not an ideal solution if there is substantial heterogeneity with respect to cost sensitivity, which appears to often be the case.

In this paper, we use individual-level modeling of choice behavior to investigate the shape of the distribution of cost coefficients without constraining them to be negative. This provides insights on the implications of selecting various distributions to model cost and other parameters. We examine several behavioral explanations that have been advanced for why people might have true positive cost coefficients ranging from assuming a positive correlation between cost and quality when asked multiple questions to difference types of response errors relative to full optimization. Recoverability of the true WTP distribution is considered under various assumptions about the source of some respondents having positive estimated cost coefficients.

An empirical example using a discrete choice experiment involving management changes in the protection of Polish forests is provided. Emphasis is placed on determining which attributes of Polish forests are the most important to the general public. We find that the forest attributes Poles would most like to see changed are: (1) protection of the most ecologically valuable forests, (2) less litter in forests, and (3) an increasing the amount of recreational infrastructure. WTP for these attributes is examined under alternative statistical models and assumptions.