Complex individual choice behaviour: heterogeneity of preferences among freight operators

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This research aims to analyse the factors determining choice behaviour of Sicilian road-based freight transport operators when faced with intermodal alternatives and identifies possible obstacles. To achieve these objectives, a data set of choice observations resulting from a mixed RP/SP survey is used. It registers the choice behaviour of Sicilian carriers in real and hypothetical scenarios, with respect to 3 alternatives: road transport, road transport with transhipment at a logistic terminal, road-sea ro/ro transport. In particular, to simplify the choice task within the SP experiment a choice game based on two explanatory variables – travel time and carrier monetary cost – was built. The RP section of the survey asked the respondent to describe his current mode choice set (road versus sea-road ro/ro), in terms of cost, travel time, frequency, percentage of delays, percentage of shipments with damages for goods.

Taking up from the work of Amoroso et al. (2009) we simulate carrier behaviour, referring to random utility theory (Domencich and McFadden, 1975; Ben-Akiva and Lerman, 1985) which provides econometric models for the empirical estimation of the demand function in a context of discrete choices. In particular, in order to allow for heterogeneous responses of carriers to travel time (depending upon several factors such as fleet size, perishability of freight, etc.) and correlations among alternatives (correlation between the “road” and “road with transhipment” options and the correlation between the “road with transhipment” and “ro/ro” alternatives), the empirical analysis is carried out thought the mixed logit framework. As it is well known, this is a very flexible model (McFadden and Train, 2000) which can, by the specification and estimation of stochastic parameters, “capture” the complexity of individual choice behaviour in terms of taste heterogeneity, correlation across alternatives, alternative specific variances and correlation over time/choice situations. In particular, to model taste heterogeneity of hauliers, we assume a random nature for the travel time marginal utility and compare the most commonly used continuous distribution functions with two approaches that have recently appeared in the scientific literature. The first approach, described by Fosgerau and Bierlaire (2007), extends any continuous distribution by means of a series expansion based on Legendre polynomials in such a way that any true continuous distribution can be approximated at the limit. The second technique employs a discrete mixture of continuous distributions with different means and variances that are to be estimated, attaining the same result (Fosgerau and Hess, 2006). The results yield interesting insights for policy valuation both at local context and in comparison with results obtained in other geographical areas.

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References