Use of the Auckland land-Use Modelling Survey in calibrating household location model

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Abstract
This paper will report on the Auckland land-Use Modelling Survey (ALUMS) which was conducted as part of the overall project, the Auckland Transport Models (ART2) project, to develop new transportation (Auckland Regional Transport, ART 3) and land use (Auckland Strategic Planning, ASP3) models for the Auckland Regional Council (ARC), New Zealand. Sinclair Knight Merz (SKM), Beca and David Simmonds Consultancy were commissioned by ARC for this project. The ALUMS survey was carried out in order to collect data on actual moves which could be used to calibrate the household location model which is one of the main models of ASP3.

The ALUMS survey methodology was based on a Computer-Assisted Telephone Interview (CATI) survey, designed by TUTI and carried out by the I-view Head Office in Melbourne, Australia. The main target population for ALUMS was all respondents to the 2006 Auckland Household Travel Survey (AHTS), who had either recently moved house, had indicated an intention to move house in the next 12 months, or had indicated an intention to change job location in the next 12 months. In addition, a number of households with "non-movers" were selected from the Auckland Household Travel Survey (AHTS) respondents, to provide a control sample, and also a number of random respondents were recruited by telephone in regions of the Study Area that had been shown in the AHTS survey to have a higher probability of household or job movers. In total 15,133 phone numbers were attempted, and of the 4106 respondents, 2605 completed one or more sections of the questionnaire. There were 688 recent movers and 313 planning to move respondents. 1001 people answered the Stated Preference section of the survey.

A widely recognized problem in the calibration of this kind of model is the correlation between the independent variables - in particular, the best dwellings tend to be found in the most attractive areas and command the highest prices. This poses major problems in the estimation process. We adopted the standard solution to this, which is to supplement Revealed Preference (RP) data (observed choices) with Stated Preference (SP) experiments in which respondents are asked to state what choice they would make between hypothetical choices (in this case alternative locations or dwellings), the hypothetical alternatives being constructed so that the critical factors vary independently.

BIOGEME software was used for SP and combined SP and RP analysis separately for owners and renters for full sets of data and for the data subsets, more then 100 tests were conducted in total. The model tested in SP exercise is a simple binary logit model of household choices between the desired - choice location and the alternative one. The combined SP and RP analysis deals with the simultaneous estimation of a nested logit model with 2 nests from revealed and stated preference data. The estimated parameters include the choice of the number of bedrooms, accessibility, travel time to desired destinations, area quality, and rent or price of housing.
Despite the limitations of the sample size and the range of variables collected, the fact that it was possible to obtain some significant coefficients of the expected signs provides some modest endorsement of the approach taken.

The results of the RP tests for all renters, renters with children and renters without children as well as the results of the combined SP/RP test for all renters with alternatives based on those selected by households of the same size were used setting initial values for the location model cost and floorspace coefficients.