AN ABSTRACT OF A DISSERTATION

ECONOMETRIC MODELING OF TOTAL URBAN TRAVEL DEMAND USING DATA COLLECTED IN SINGLE AND REPEATED CROSS-SECTIONAL SURVEYS

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An important phase of the planning process for developing transportation systems in metropolitan regions is the travel forecasting phase in which the demand for travel region-wide is estimated. The majority of U.S. metropolitan regions use the four-step urban transportation modeling system (UTMS) to develop their travel forecasts. The first step of UTMS is trip generation in which the expected demand for travel in a region is predicted. Two methods are commonly used in planning practice for trip generation namely, cross classification analysis (CCA) and linear regression analysis. There are concerns with both these methods. Cross-classification, because of the often small size of sample available for model development, results in some model-categories having no data at all and thereby eliminating the possibility of forecasting travel for some household types. The method of linear regression analysis uses a single cross section of data only for model development, which ties the resulting travel-forecast model to the economic environment prevailing at the time of data collection. In application contexts with economic conditions significantly different from those in the estimation context, the single cross-sectional model is likely to yield travel forecasts with significant error.

Therefore, this research had two objectives. First was to develop alternative methods for predicting the household trip-rate for cross-classification cells with no data and to investigate their forecast performance. Second was to investigate the development of trip generation models with repeated cross-sectional data collected in the same urban region but at different times representing different economic environments. Data used in the research were collected in the Greater Toronto Area, Canada.

For the research on cross classification analysis, the results show that a model developed in this study, which estimates the household trip-rate for a cell with no data through a linear combination of the predictions yielded by row and column models, respectively, gives the best performance in forecast of travel demand. It performs better than Multiple Classification Analysis, the current industry standard for addressing the shortcomings of CCA. With respect to modeling trip generation with multiple cross-sectional datasets, the results support the hypothesis of models estimated on pooled data being better than single cross-sectional models in predicting travel demand in both the short and long term.