

# **Adding Car Occupancy to the Calgary Travel Demand Model Using Combined RP/SP Data**

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## **Abstract**

The existing EMME/2 four-step travel demand model of Calgary has been extended to include explicit representation of car occupancy.

The previous version of the model included 'car', 'transit' and 'walk' as the model alternative in a nested logit mode choice model for home based work trips, and it performed the conversion from auto person trips to auto vehicle trips using an exogenously-specified car occupancy factor.

In response to a desire to make this car occupancy factor endogenous to the model, a survey was designed and conducted to obtain revealed preference (RP) and stated preference (SP) observations of choice of mode and choice of car occupancy in particular for home to work trips. These observations together with the observations used to develop the previous version of the model provided three data sets:

- a set of 3349 RP observations of choice among 'car', 'transit', 'walk' and 'cycle' from year 1991;
- a set of 659 RP observations of choice among 'car drive alone', 'car with 2 people', 'car with 3 or more people', 'transit', 'walk', and 'cycle' from year 1995; and
- a set of 33365 SP observations of choice among different auto occupancy alternatives from year 1995.

These three data sets were used together in a combined estimation process to develop a nested logit model with 'transit', 'walk' and 'cycle' as mode alternatives along with car split into 'car drive alone', 'car with 2 people' and 'car with 3 or more people' as further alternatives. This was done using ALOGIT, with separate tree structures, scaling factors and alternative specific constants among the different data sets as appropriate.

The resulting coefficient estimates seem reasonable, and indicate that the appropriate nesting structure has the 'car with 2 people' and 'car with 3 or more people' alternatives in a nest with 'transit', not with 'car drive alone'. The resulting mode choice model is implemented in EMME/2, with the alternative specific constants adjusted to match aggregate mode shares observed of reach mode and car occupancy alternative. The results of the mode choice model are now used to allocate people to cars directly, thereby providing an endogenous treatment of car occupancy as desired.

This paper outlines what was done in this work and discusses the issues encountered. As such, it presents a process for developing an updated model with new features that is appealing because it draws on the strengths of both RP and SP data and it reduces the size of the new data requirements by employing previously collected data.