

## DOCTORAL THESIS

# Modeling households' long-term mobility and residential decisions and short-term time use/travel choices: group decision-based approaches

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# ABSTRACT

Understanding household long-term decisions concerning residential location/relocation, car ownership and short-term activity travel choices are crucial for land use and transport planning. However, when addressing these issues, multitudes of choice models applying individual or unitary household decision-making mechanisms have dominated in transport studies, ignoring the interactions among household members in consensual decision making in real situations. To promote the investigation of these issues from a group decision-making perspective, this study explores the applicability of various group decision-making approaches to investigate multiple long-term decisions and short-term choices.

Specifically, this thesis has four main research objectives: 1) adopt a utilitarian approach to develop an integrated model that links household members' consensual long-term decisions like housing, vehicle ownership and short-term activity-travel decisions like time use, explicitly capturing expenditure tradeoff for long-term decisions on housing and car ownership; 2) employ the Nash bargaining approach to model household members' consensual car ownership choice and examine this choice from the perspective of household time allocation; 3) apply an egalitarian bargaining approach (capture household members' concern for equity) to model household residential relocation choice, make a comparative study among this approach, Nash bargaining approach, and conventional utilitarian approach, and then accommodate these heterogeneous group decision mechanisms in a unified modeling framework; 4) examine the impacts of vehicle usage rationing policy on household car ownership and spouses' time allocation patterns.

The database that serves for empirical applications of the formulated models is from a two-wave household activity-travel diary survey conducted in Beijing. This thesis contributes to current literature by adopting new approaches to investigate various

group decision-making mechanisms among household members, comparing and assessing the predictive performance of different group decision approaches, as well as explicitly capturing household's long-term expenditure tradeoff. Insights and findings from this study are helpful for gaining profound understanding of spatial distribution of residence, household car ownership and individuals' activity-travel patterns, which will be conducive to the formulation of relevant policies for sustainable urban development.

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