



# TRANSPORTATION RESEARCH

*AN INTERNATIONAL JOURNAL*



## **An Exploration of the Relationship between Mode Choice and Complexity of Trip Chaining Patterns**

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*83rd Annual Meeting of the Transportation Research Board  
January 11-15, 2004, Washington, D.C.*

<https://www.sciencedirect.com/science/article/abs/pii/S0191261506000506#!>

## Abstract

This paper investigates the relationship between mode choice and the complexity of trip chaining patterns. An understanding of the causality between these two choice behaviors may aid in the development of tour-based travel demand modeling systems that attempt to incorporate models of trip chaining and mode choice. The relationship between these two aspects of travel behavior is represented in this paper by considering three different causal structures: one structure in which the trip chaining pattern is determined first and influences mode choice, another structure in which mode choice is determined first and influences the complexity of the trip chaining pattern, and a third structure in which neither is predetermined but both are determined simultaneously. The first two structures are estimated within a recursive bivariate probit modeling framework that accommodates error covariance. The simultaneous logit model is estimated for the third structure that allows a bidirectional simultaneous causality. The analysis and model estimation are performed separately for work tour and non-work tour samples drawn from the 2000 Swiss Microcensus travel survey. Model estimation results show that the causal structure in which trip chaining precedes mode choice performs best for the non-work tour sample. For the work-tour sample, the findings were less conclusive because two causal structures, one in which trip chaining affects mode choice and the other in which both are determined simultaneously, gave virtually identical goodness-of-fit measures. But the structure in which mode choice precedes trip chaining pattern choice gave significantly inferior goodness-of-fit measures for the work tour sample. These findings should be reflected in the development of activity-based and tour-based modeling systems.

*Keywords:* tours, trip chains, travel behavior, causal relationships, mode choice, simultaneous equations, econometric modeling