

An empirical assessment of strategies to model opponent effects in crash severity analysis

Antonio Paez^a, Hany Hassan^b, Mark Ferguson^a, Saiedeh Razavi^a

^a*McMaster Institute for Transportation and Logistics, McMaster University, 1280 Main Street West, Hamilton, Ontario, Canada L8S 4K1*

^b*Department of Civil and Environmental Engineering, Louisiana State University, Baton Rouge, Louisiana, USA 70803*

Abstract

Road accidents impose an important burden on health and the economy. Numerous efforts to understand the factors that affect road collisions have been undertaken. One stream of research focus on modelling the severity of crashes. Crash severity research is useful to clarify the way different factors can influence the outcome of an event. The objective of this paper is to assess different strategies to model the interactions between participants in a crash in the context of crashes involving two parties. Towards this objective, a series of models are estimated using data from Canada's National Collision Database. Three levels of crash severity (no injury/injury/fatality) are analyzed using ordered logit models and covariates for the participants in the crash and the conditions of the crash. Modelling strategies include different ways of introducing the covariates (e.g., in a single-level or multi-level form), as well as by subsetting the dataset. The models are assessed using predicted shares and classes of outcomes, and the results highlight the importance of considering opponent effects in crash severity analysis. The study also suggests that hierarchical (i.e., multi-level) specifications and subsetting do not necessarily perform better than a relatively simple single-level model with opponent effects. The results of this study provide insights regarding the performance of different modelling strategies, and should be informative to researchers working with crash severity models.

Email addresses: paezha@mcmaster.ca (Antonio Paez), hassan1@lsu.edu (Hany Hassan), fergumr@mcmaster.ca (Mark Ferguson), razavi@mcmaster.ca (Saiedeh Razavi)