Evaluating the Impacts of Parameter Uncertainty in Transportation Demand Models

Natalie Mae Gray[a], Gregory S. Macfarlane[a,*]

[a] *Brigham Young University, Civil and Construction Engineering, 430 EB, Provo, 84602*

Abstract

The inherent uncertainty in travel forecasting models — arising from potential and unkown errors in input data, parameter estimation, or model formulation — is receiving increasing attention from the scholarly and practicing community. In this research, we investigate the variance in forecasted traffic volumes resulting from varying the mode and destination choice parameters in an advanced trip-based travel demand model. Using Latin hypercube sampling to construct several hundred combinations of parameters across the plausible parameter space, we introduce substantial changes to implied travel impedances and modal utilities. However, the aggregate effects of of these changes on forecasted traffic volumes is small, with a variance of approximately 1 percent on high-volume facilities. It is likely that in this example — and perhaps in others — the static network assignment places constraints on the possible volume solutions and limits the practical impacts of parameter uncertainty. Further research should examine the robustness of this finding to other less constrained networks and to activity-based travel model frameworks.

Author Contribution Statement

Gregory S. Macfarlane: Conceptualization, Methodology, Writing - review & editing, Supervision **Natalie M. Gray:** Methodology, Software, Formal Analysis, Investigation, Writing - original draft, Visualization

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*Corresponding author
Email addresses: nmgray@byu.edu (Natalie Mae Gray), gregmacfarlane@byu.edu (Gregory S. Macfarlane)