Methods in Transportation Econometrics and Statistics (Master)

Winter semester 2021/22, Tutorial No. 1

Problem 1.1: Micro vs. macro models

Define the terms *microscopic* and *macroscopic* econometric models. Describe how to derive a macroscopic model from a microscopic model. Discuss going into the reverse direction.

Problem 1.2: Model and system equations of linear regression

Consider a linear model ("regression model") with one or more exogeneous variables in form of linear factors. Write out and explain the differences between

(i) the *general model equation*,

(ii) the system equations used for model calibration/parameter estimation,

(iii) the *estimated/calibrated model* used for analysis or prediction

Problem 1.3: Model and system equation in a binary choice situation

In most binary/binomial discrete-choice models, the choice probability depends only on the *difference*

$$\Delta V = V_1 - V_2$$

of the (deterministic) utility functions of the two alternatives, e.g., in the binomial logit model by

$$P(1) = \frac{e^{\Delta V}}{1 + e^{\Delta V}}, \quad P(2) = \frac{1}{1 + e^{\Delta V}}.$$

(a) Consider a binary mode-choice task (e.g., public transpor or car) and specify $\Delta V(\vec{x})$ as a parameter-linear function of the differences in total travel times and costs of the two modes. Additionally, with groing income, the sensitivity to price differences should be decreasing and the time senitivity increasing.

(b) In a specific situation, the model should describe the choice between public transport and other modes for the route from home to university. How do the system equations look like? Describe, for this problem setting, the task of model calibration and indicate if this is a microscopic or macroscopic model.