

Task 6.2 Model Calibration and Implementation Procedures

Data

Set up data for model calibration (Task 6.3).

Cross-Sectional Model Calibration

The mathematical structure of the cross-sectional model is as follows (it is the same at each level in the model).

There are two models: P_{1+} the probability of owning at least one car, and $P_{2+|1+}$ the probability of owning 2 or more cars for the group of households owning at least 1 car; we refer to these as P_m where $m=1$ is the first model and $m=2$ refers to the second.

Our general model is then:

$$P_{mh} = S_{mh} / [1 + \text{Exp}(LP_{mh})]$$

where:

P_{mh} is the relevant car owning for model m for households of type h ,
 S_{mh} is the saturation level of this probability (≤ 1), and this can vary by household type;
and LP_{mh} is called the linear predictor.

and:

$$LP_{mh} = \alpha_{mh} \cdot f(I) + \delta_{mh}$$

where:

α is the coefficient of some function of household income I
 δ is a constant

Task 6.4 describes how α and δ are estimated from the household survey data.

Zonal Aggregation and Fitting to Census Car Ownership

Obtain from census data the proportion of households in each car owning category (p_0 , p_1 and p_{2+}) for each zone. Convert to the model definitions: p_{1+} and $p_{2+|1+}$.

Using this data we will extend the cross-sectional model to:

$$LP_{mh} = \alpha_{mh} \cdot f(I) + \delta_{mh} + \lambda_{mhz}$$

where:

λ_{mhz} is an adjustment which ensures that each model reproduces the current census car ownership of each zone for each household type

Task 6.5 describes how λ_{mhz} is estimated.

Time Series Analysis

In this task we update an existing time series analysis explaining the historic trend in cars/person. We then extend the above model one stage further to:

$$LP_{mhzy} = \alpha_{mh} \cdot f(I) + \delta_{mh} + \lambda_{mhz} + \gamma_y$$

where:

γ_y is a temporal trend adjustment for each forecast year to ensure that the cross-sectional model is compatible with the time series model; these will be consistently set for the two models (0/1 and 1/2+)

The time series analysis and the computation of γ_y are both described in Task 6.6.