

Task 6.1.6 Model Specification

The model concept is illustrated in the figure. The mathematical structure is the same at each level in the sequential model and for each household type.

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:

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

where:

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

and:

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

where:

α_{mh} is the coefficient of some function of household income I (either income, log income or square root of income – established through statistical analysis) for each model m and household type h ;
 δ_{mh} is a constant
(the above two sets of coefficients are statistically calibrated in the cross-sectional model)
 λ_{mhz} is an adjustment to fit each model for each household type to the census car ownership for each zone
 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

■ Task 6.1.6 Model Specification Car Ownership Model Structure

