

## Task 6.1.5 Implementation of the Model

Although the model is calibrated at a household level, it needs to be applied at the zonal level. Most of the questions of implementation relate to this - how to apply a household-based model to zones.

Whatever household segmentation is adopted for the model, it will be necessary to produce zonal forecasts of the **numbers** of households in each segment (see Task 7).

Given the numbers of households in a segment, the essential task is to allow for the **distribution** of household income<sup>1</sup>. The “traditional” way has been to assume a standard mathematical form for the income distribution (eg gamma or lognormal), and given a mean zonal income (which was usually calibrated to reproduce base year zonal car ownership), integrate the car ownership function against the income distribution.

However, while distributions such as gamma may give a passable representation of the income distribution of all households taken together, they are much less well suited to specific household types.

An attractive alternative is sample enumeration. Given a household sample (of the relevant category) with their actual incomes, we can apply the car ownership model directly to each household in the sample. To make future forecasts, the income of each household in the sample can be increased (uniformly) to reflect average income growth and the car ownership model re-run for the sample to generate forecasts of car ownership. We then take the average values of car ownership for all the sampled households.

This approach is applied separately for each zone. The model will have been slaved to reproduce 2001 census car ownership, so there are some different model parameters for each zone. These zone-specific models are run, separately for each household type, using a single city-wide income growth.

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<sup>1</sup> The car ownership model essentially determines household car ownership from household income. Thus, if we know the income distribution of households in a zone we can simply accumulate the car ownership of the households at each income band to give the overall average car ownership for the zone.