Task 6.6 Time Series Analysis

Input Data
Vehicle registration statistics
Population data

Processing
(i) Calibration of Time Series Model

The analysis is of cars/person.

Explanatory variables in the original model were:
- GDP (in constant prices)
- average real car purchase prices (new and secondhand)

We have a model of the form:

$$\Delta C = \Delta GP^{\alpha} * \Delta P^{\beta} * (1 + \gamma.\exp(-t*\eta))$$

where:
Δ refers to year on year change
C is cars/person
GP is GDP/person
P is car price
α β are elasticities
γ η are time trends and incremental reductions[1] respectively
t is the number of years from the start of the period.

A non-linear solver is required to calibrate this model.

Notes:
- the car ownership values from this data will not be precisely consistent with the census or WTSM data, so we need the trend not the absolute values,
- this model is for cars (not cars, vans and utilities); we should explore whether we can get historic data to include vans and utilities but otherwise will use the car trend;
- this is a national car ownership model (the data is not available at the regional level), but Wellington Region's car ownership is very similar to the national average.

(ii) Computation of γ_y.
This is essentially a manual process whereby, for a given year y, the overall regional forecasts of the cross-sectional and time series model are calculated and the adjustment γ_y determined which ensures that, overall, the cross-sectional model trend matches that of the time series analysis.

Output
Updated time series model.
Adjustments to cross-sectional model.
Note.

[1] In this particular model the time trend is set to decay to zero over time.