Task 8.4 Preliminary Calibration

Inputs
Calibration files.
Calibration software and set-up.

Processing
The first analyses are designed to establish whether we will have pre-distribution or post-distribution mode choice models. For simplicity, we shall ignore slow mode trips in the preliminary calibrations.

Post-Distribution Mode Choice

Task 1: Calibrate a public transport:car mode choice model

Key specification aspects:
- for each purpose, the calibration uses LIMDEP and the independent variables are the car and public transport generalised costs;
- it is a joint calibration for the captive/competition/choice production segments; alternative specific constants will be attached to the public transport mode and also to car captive and competition (with 'choice car' to be the base segment, because this will probably have the largest sample);
- an additional modal constant constant attached to public transport should also be considered for Wellington CBD destinations, because of the likely higher public transport use.

The disutility for each mode is the sum of the constants and parameters specific to that mode in the model:

$$U^s_{ijm} = \alpha^s_m + \beta^s_m G_{ijm} + \gamma^s_{pt}$$

Where:
G is the mode generalised cost
i,j are the zones
m is the mode
s is the segment (captive, choice etc)
α, γ are the mode and CBD constants attached to public transport

Task 2: Compute composite modal costs

LIMDEP may conveniently output the composite costs. If not the formula is:

$$U^s_{ij*} = \ln(\Sigma_m \exp(U^s_{ijm}))$$

Task 3: Calibrate a distribution model

For each purpose:
- the trip matrices are the observed all-mode matrices (public transport and car) for each of the car availability segments;
- in the calibration, trip productions are segmented by car availability, while trip attractions are not;
- the relevant cost matrices, one for each segment s, are the composite costs $U^s_{ij*;}$

- there will be a deterrence function for each segment s (fitting to the mean segment trip cost);
- also test a segmentation of the deterrence functions for trips attracted to Wellington CBD.

If the distribution model parameters are >1 then a post-distribution mode choice model is inappropriate.

Pre-distribution Mode Choice

Task 1: Calibrate public transport and car distribution models

As for the post-distribution model structure, except that the distribution segments are public transport and car users (productions) who complete for the total trip attractions, and the relevant costs are the mode-specific generalised costs There is no segmentation by car availability, only mode.

For each purpose, calibrate a single model with two segments (public transport and car):
- the trip matrices are the observed car and public transport matrices;
- trip productions are segmented (by mode); trip attractions are not;
- the relevant cost matrices are the car and public transport generalised costs;
- test a segmentation of the deterrence functions for trips attracted to Wellington CBD.

Task 2: Compute production zone composite costs by mode

The disutility derived from the distribution model calibration can be expressed as:

$$U_{ijm} = \alpha_{jm} + \beta^{s}_{m} G_{ijm}$$

Where:

G is the mode-specific generalised cost
i,j are the zones
m is the mode
s is the geographical segmentation (CBD, non-CBD etc)
β is the deterrence function, and
α is related to the attraction balancing factor and varies by mode.

The composite cost for each production zone and each mode is then simply the same formula above, summing instead over all the destination zones ie

$$U_{i*m} = \ln(\Sigma_j \exp(U_{ijm}))$$

Task 3: Calibrate a production mode choice model

As for the post-distribution model structure, but using:
- instead of the car and public transport generalised costs, use the production zone composite costs by mode, and
- mode shares for production zones.

If the mode choice model parameters are >1 then a pre-distribution mode choice model is inappropriate.

Outputs
Calibrated models.
Report.