

# Task 2.10 Model Responsiveness to Road Pricing/Tolling Policies

## Overview

Subject to our testing of the performance of the present model we expect the new model to be suitable for the strategic appraisal of road user charging with the emphasis on the effects of road user charging on demand. Such charges will be valued according to the standard values of time, varying by trip purpose, and a peak-spreading module will be developed for congestion pricing tests and linked to the time period factors.

For specific projects which are to be partially financed by tolls on the new route, where the toll impacts are principally on vehicle routing, the unadjusted strategic model will be much less reliable. However the structure of WTSM, with separate purpose and vehicle type matrices, will facilitate the use of multi-user assignment techniques in project models developed for this purpose from WTSM.

These general points are discussed in greater detail below.

## Issues

With these policies arise a number of new issues:

- peak pricing, which causes peak-spreading,
- general sensitivity to tolls and charges (the value of time, VoT),
- segmenting the travelling population throughout the model for (i) the differences in charges experienced (eg tolls vary by vehicle type) and (ii) the differences in response to charges (essentially variations in values of time).

A distinction will be drawn between the needs of strategic and project assessments.

## Discussion of the Proposed Wellington Model Specification

A peak-spreading module will be included in the model. There will be constraints on the performance of this model:

- the strategic model operates for 3 aggregate time periods (detailed peak-spreading models divide the peak period into more time slices),
- international research on peak-spreading is still in its infancy,
- there are difficulties with the theoretical treatment of peak-spreading which cannot easily be addressed in a strategic model,
- there is little/no New Zealand research on the topic.

The average value of time for car users used for economic evaluation seems appropriate for use with road user charges as, although it does not specifically relate to tolls, it was developed from stated preference surveys which focused on increased trip-specific out-of-pocket costs (for fuel and parking).

The values of time for CVs (commercial vehicles) and cars on employer's business are based on the marginal productivity of labour (MPL). It is not clear whether this is the appropriate value of time for routing decisions and the effects of tolls on them.

Segments that need to be considered are:

- vehicle type: cars and CVs (distinguishing light CVs?);

- private car trip purpose: employers business (EB) and other (distinguishing commuting?); there are studies where income has been a segmentation variable;
- other: I am aware of studies where the tolls are geographically specific (eg local residents having the toll waived); in London, there are various types of traffic which do not have to pay the CBD cordon toll.

Responses to tolls; these are:

- for projects/individual road tolls, the major response will be re-routeing; the Wellington Transport Strategy Model (WTSM) is not designed for evaluating individual toll roads, but it is required to facilitate the development of project-specific models;
- for congestion charging policies, peak-spreading is likely to be the first response;
- more broadly, charging may impact on car demand (distribution and mode shares); we do not propose to model in WTSM the sensitivity of CV demand levels to tolls.

The presently designed model structure will allow strategic estimates to be made of responses to the broader pricing measures. We could consider multi-user assignment enabling different routeings to be attributed to CVs and EB cars. This would certainly have application to tolling projects (providing that CV routeing criteria could be confidently determined) but does not seem essential for the broader pricing strategies to which WTSM would be applied. It seems therefore that we should look at facilitating this option for project studies but not include it in the standard WTSM run.

We do however need to consider how to facilitate the WTSM interface with tolling project models:

- the model will explicitly segment in the matrices: car trips by purpose by time period and CVs by type, such that a project model could use multi-user assignments to reflect the different route choices of these categories;
- a further project model refinement would be to use a logit choice model to allocate traffic between the alternative routes; it seems possible that, within this model, allowance could be made for the income distributions of car users for the relevant segments; the parameterisation of this model would be an issue as would the assignment and iteration procedures;
- where the tolling process might be concerned with revenue maximisation, it seems plausible to want to consider prices varying by time of day and this in turn would place greater emphasis on peak spreading and the more detailed modelling of the times of travel.

In principle, all of these developments are feasible, and information from WTSM could be used to facilitate their development but, ultimately, the more the project model moves away from the WTSM specification the less feasible are detailed interfaces.

Finally, what would seem to be needed to give confidence in applying WTSM to road user charging measures, is

- a review of the performance of the present model (given that some criticisms have been raised);
- a review of what is to be expected from international experience of such schemes or of modelling such schemes, that can be used to verify the reasonableness of the WTSM forecasts.