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TECHNICAL
REPORT

Manchester Motorway Box

Post-Survey Research of Induced Traffic Effects

Model Estimation

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Prepared for the UK Department for Transport

RAND EUROPE

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Summary

Background

The 1994 report of the Standing Advisory Committee on Trunk Road Assessment (SACTRA) concluded that **induced traffic**, that is traffic that is induced because of the provision of transport infrastructure, could have important implications on appraisal of the benefits of new roads for some time:

"*…the economic value of a scheme can be overestimated by the omission of even a small amount of induced traffic. We consider this matter of profound importance to the value-for-money assessment of the road programme*" (SACTRA 1994).

This same report recommended that the Department for Transport's research programme be expanded to include in-depth before and after monitoring of schemes. This recommendation was accepted by the Department and a commitment was given to undertake an expanded programme of research, including consideration of a Before and After study of the completion of the Manchester Motorway Box. At that time, the completion of the M60 box around Manchester was the largest planned scheme in the UK for which a programme of Before and After surveys could be conceived and it was argued that, although atypical of the general scale of road schemes, its large scale would maximise the changes of detecting and quantifying induced traffic effects.

A comprehensive programme data collection of intercept-surveys with road and public transport travellers, across specified screenlines was undertaken Before and After the completion of the motorway box. In the same period, but not as part of the study, household and roadside interviews for the Greater Manchester Area Transport Study (GMATS) were undertaken.

Overview of the Study

This study set out to quantify changes to travellers' choice of mode, where they travelled to (their destination), when they chose to travel (departure time) and the probability that they made a journey, as a result of the completion of the Manchester Motorway Box. Measuring these impacts, however, is complex: because many of the responses may occur simultaneously; because the size of impact will vary for different people, depending on where they live and where they want to travel; and, because the additional capacity itself is limited. So, although data that has been collected can (and has) been used to provide an estimate of the total change in traffic levels as a result of the introduction of the Scheme, a model is required to be able to disentangle the different traveller responses. To maximise the efficiency of the modelling and to give the best chance of identifying and separating

out the changes in repose due to the different behavioural mechanisms, the models were developed using fully disaggregate data and using discrete choice methods, using all available data (both the intercept surveys, collected specifically for the study, and household surveys collected at the time).

The importance of the different traveller responses were measured in two ways: (i) the primary aim of the study as defined by the Department for Transport, was to examine the relative magnitudes of these different effects *in a parametric form*, that is to gauge the importance of different impacts from the structure of the model, and (ii) a secondary aim was to distinguish the induced effects arising from the Manchester Motorway Box scheme from other changes that may have occurred.

This report focussed on the development of models to address the first of these aims. The separate summary report produced for this study (TR-840-DFT) discusses the second of these aims.

Estimation Summary

Chapter 11 provides a comprehensive summary of the findings from the model estimations. This summary discusses the key findings.

Models were developed from before (1999) and after (2003) intercept surveys, road side interview data collected from car drivers, and en-route public transport interview surveys. Models were estimated separately by dataset, and by pooling the two datasets.

The model results demonstrated that is was possible to model destination choice from these datasets, but pooling the road side interview and public transport interview data did not support the estimation of mode choice models. Time period choice could only be modelled using the public transport data. Finally, there was little evidence for longitudinal effects, that is to say changes in sensitivity between the before and after cases.

Household interview models were developed for five home-based purposes, using 2002 household interview data collected after the M60 was completed. In contrast to the intercept models, a substantial number of socio-economic effects were identified in the household interview models, in particular terms relating to car availability.

The structural tests investigated the relative sensitivity of mode, destination and time period choices. For mandatory purposes (commute, business and education) these tests concluded that the household interview data provides little data on (macro) time period choice, and so time period choice should be dropped from the structure, and that a structure with modes above destinations gives the best fit to the data. For discretionary purposes (shopping, other) the optimum structure had modes and time periods above destinations. However, the evidence for this finding is not strong.

The final stage in model estimation was to estimate pooled models from both the intercept surveys and the household interview data, with the intercept data used to model destination choice only. The household interview data was used to model mode and destination choice for mandatory purposes, and mode, time period and destination choice for discretionary purposes.

The structural tests for mandatory purposes confirmed the findings from the household interview models, with modes above destinations in each case. The structural test for

shopping was also consistent with the household interview tests, with modes above destinations above time periods. However, it was not possible to identify a plausible structure for other travel, and thus a multinomial structure was adopted for the final model specification.

The pooled models were validated by examining the implied values of time (VOTs), comparing observed and predicted tour length distributions, and examining the model elasticities.

The commute VOTs are slightly low compared to the values in WebTAG. The business VOTs are substantially higher, but not as high as the employer's valuations given in WebTAG. For shopping and education, the VOTs are consistent with WebTAG. Finally, for other travel the car VOTs are slightly low, and the public transport VOTs slight high, compared to WebTAG.

The comparison of observed and predicted tour length distributions for car demonstrated an excelled match for all purposes except business, where short tours are underpredicted. For public transport, the match is excellent for commute, and good for other purposes, with a tendency to under-predict short tours.

The fuel cost elasticities were judged to be reasonable in the final models, with the lowest value for business as would be expected. The car time elasticities were also judged to be reasonable.