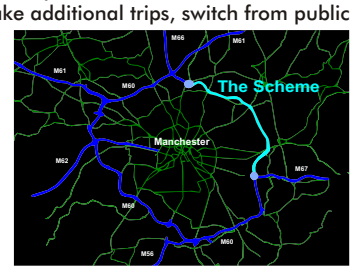
Do New Roads Increase Traffic?

How can planners anticipate new choices by road users? RAND Europe examines induced traffic effects.

BACKGROUND

It has long been known that new roads have a more complex impact on behaviour than drivers merely changing routes. Travellers may reschedule trips, make additional trips, switch from public transport to car, visit new destinations or even move home: responses collectively known as 'induced traffic'. While total traffic flows can be measured after a new road is built, post-event data cannot tell us who has changed their behaviour or in what ways. The challenge is to be able to predict the size of such impacts before new roads are planned. The completion of the M60 Motorway Box around Manchester in October 2000 provided an ideal opportunity to analyse the size and extent of behavioural changes because of new road infrastructure.

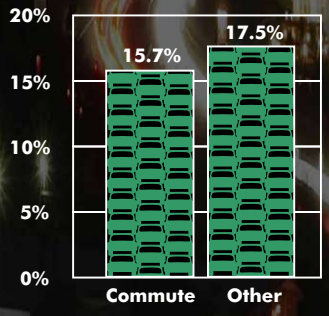


INCREASE IN CAR TRAFFIC PREDICTED

After adjusting for increases due to demographic changes such as increasing population, employment and car ownership, the model predicted an 8.8% increase in commuting and a 13.1% increase in social and recreation travel by all modes in the area of the Scheme between 1999 (Before) and 2003 (After).

Looking specifically at additional car traffic, the model predicted a 12.4% increase in induced car commute traffic and a 17.0% increase in induced social and recreation car traffic in the area of the Scheme. The bulk of this extra car traffic comes from expected increases in journey length because of improvements in accessibility, with a small predicted mode shift from public transport to car.

Increase in car traffic



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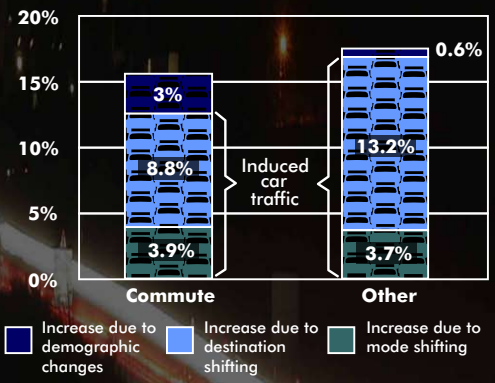
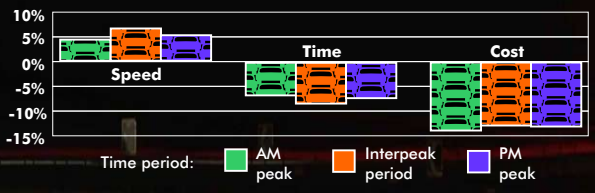


NEW ROAD BENEFITS FOR CAR DRIVERS

Analysis of Before and After travel costs and times showed completion of the motorway benefited car drivers, by increasing journey speeds and reducing average journey times. Journey costs dropped substantially, partly due to increased journey speeds, but also because petrol prices fell during the period of analysis.

Percentage changes after completion of the new road



IMPACT

The model will help policymakers assess induced traffic impact in three ways:

- **Planning:** Accurate forecasts of demand are essential to plan future transport infrastructures to meet eventual needs.
- **Economic appraisal:** There is a danger of overpredicting the benefits to the economy of travel time savings if induced traffic is not taken into account
- **Environmental impact:** Increasing concerns about limiting vehicle emissions make it more important to understand induced traffic effects.

RESEARCH APPROACH

The Department for Transport commissioned RAND Europe to develop a predictive choice model to measure the induced traffic effects resulting from the completion of the Manchester Motorway Box. The project had two aims:

- To quantify different induced traffic effects
- To quantify the total induced traffic effects

We built choice models for five travel purposes: commuting, business, education, shopping and social and recreational travel. The steps were to:

Identify potential travel choices:
- Among five modes of travel (walk, driver, car passenger, cycle, public transport)
- Across 15 time period combinations
- To a possible 559 destinations

Posit utility formulations for each choice alternative, including:
- Journey time by car
- Cost of driving, including parking
- Journey time by public transport
- Frequency of public transport services
- Public transport fares
- Walking and cycling distances

Use data on choices and services
- Intercept surveys of car drivers, train, metrolink and bus travellers, for Before and After periods
- Household interview surveys
- Network travel models

Estimate model
- Apply utility maximisation to explain choices
- Adjust model error between datasets
- Weight to allow for survey data bias
- Estimate parameters to give best explanation of observed choices

Validate model
- Ensure reasonable time-cost trade-offs
- Replicate trip distributions
- Check elasticities against published guidelines

Apply model to Before and After situations
- Use demographic data and data on network changes to predict changes in traffic flows

PREDICTIONS BROADLY IN LINE WITH MEASURED CHANGES

We judged the model to be robust on the basis of highly significant model parameters and replication of observed trip lengths. The resulting elasticities align well with UK guidelines. The key test, however, is how predictions compare with measured changes. For social and recreational journeys, the predicted 17.5% total increase in car trips in the area of the Scheme is close to the measured overall increase of 21.6%. For commuting, the model predicted a 15.7% increase in car trips compared to the observed increase of 9.9%. It's possible that commuting behaviour changes more slowly because of the more complex changes required (e.g. moving jobs or home), and the model will reflect a longer-term view. It is also possible that there are sampling inconsistencies between the collection of Before and After data. Either way, it is clear that 'route change only' assumptions are insufficient.

RAND EUROPE