

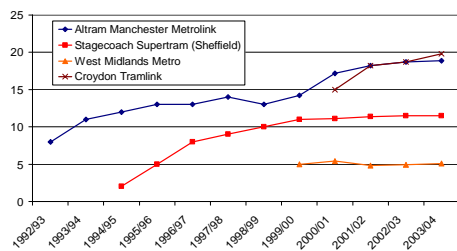
Exploring Travel Behavioural Dynamics with Panel Surveys

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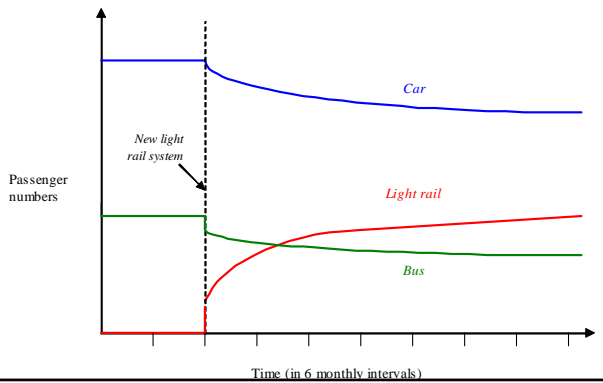
Dynamic response profiles for Light Rapid Transit systems



Outline

- Motivations for dynamic analysis
- Travel behaviour dynamics
- London congestion charging panel survey
- Crawley panel survey

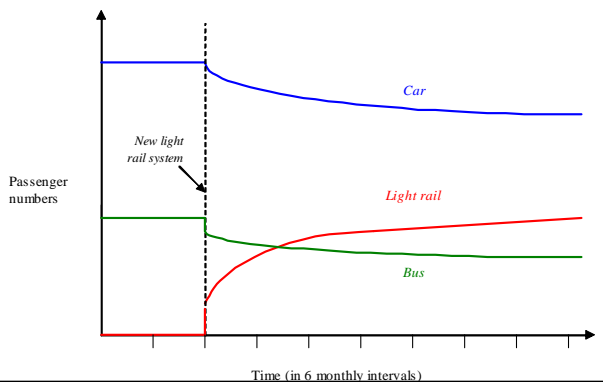
Dynamic response profile



Static versus dynamic modelling

- Conventional static modelling assumes travel demand moves from one state to another
- Dynamic methods of analysis (based on longitudinal data) required to model transition process

Dynamic response profile



Dynamic models

- Recognise time as a dimension
- Require longitudinal data

$$D_t = f(X_t, X_{t-1}, \dots, X_{t-N}, D_{t-1}, \dots, D_{t-M})$$

D = demand (e.g. bus journeys)
X = explanatory variables (e.g. bus fares)
The t, t-1, ... subscripts show model is dynamic

Examples of dynamic models

- Behavioural relationships
 - Mode choice models (Bradley, 1997)
 - HOV lane attitudes and usage (Golob et al, 1997)
 - Timing of toll road switching (Hensher, 1997)
 - Modal commitment and use (Simma & Axhausen, 2002)
 - Car ownership and commute mode (Dargay & Hanly, 2004)
- Modelling systems
 - MASTER & MIDAS dynamic microsimulation models (Mackett, 1990 / Goulias & Kitamura, 1992)
 - Dynamic Urban Model systems dynamics model (Swanson, 2004)

Motivations for dynamic analysis

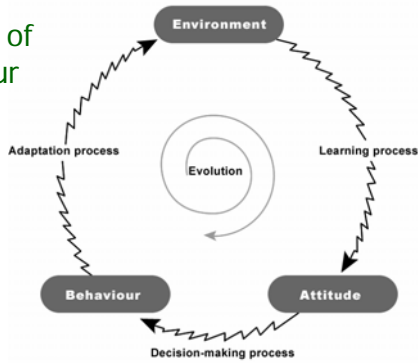
- Policy
 - Paths of change
 - Disentangling cause and effect
 - Timing and sequencing
 - Winners and losers
- Statistical
 - Handling bias due to omitted factors
 - Recognising influence of past history
 - Based on direct measurements of change

Behavioural explanations for dynamic response profiles

- Time to become aware of a change in the environment and to acquire and process information about it.
- Experimentation with alternative behaviours
- Gradual modification of behaviour towards preferred behaviour
- Long-term commitments towards existing travel behaviour
- A new travel option may only be used after a positive attitude towards the option is developed
- Habit may prevent any conscious deliberation about behaviour

Need for greater understanding of these and to recognise these in models

Evolution of behaviour



Our understanding of travel behaviour dynamics is weak

- Conceptual understanding
 - Theory of Interpersonal Behaviour (habit)
 - Drivers' decision making process (information & learning)
- Empirical evidence
 - Day-to-day and year-to-year travel choices
 - Intermediate time-scales rare
 - Before-and-after studies often conducted but multiple after periods needed to provide more insight

Need for more detailed tracking of behaviour after interventions

Central London Congestion Charging



Congestion Charging panel survey

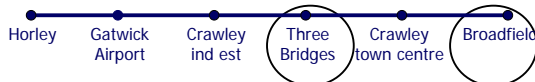
- Households in central/inner London
- Individuals from outer London and beyond
- Information:
 - Selected activity (e.g. commute) which took place within Central London in Sept 02
 - Travel to Central London
 - Overall travel and household decisions



Congestion Charging panel survey – some results

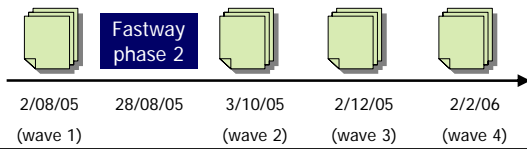
- 48 out of 343 car drivers expected to change mode for selected activity
- 36 out of 343 car drivers actually changed mode for selected activity, but only 11 of these had expected to
- This demonstrates limitations of stated preference surveys
- Analysis to be carried out exploring what factors influenced car drivers to change mode but there are limits on what can be learnt from this survey

Fastway guided busway – route 20



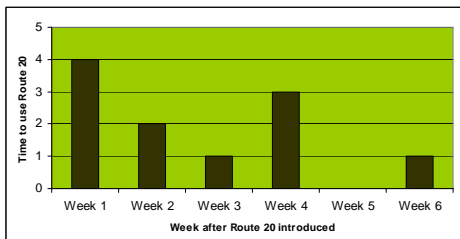
Crawley panel survey

- Households in Broadfield and Three Bridges
 - Views on transport
 - General travel
 - Travel to work / shopping travel / leisure travel
 - Route 20 awareness, use, perceptions, intentions
 - Individual/household information



Crawley panel survey – some results from wave 2 (85 respondents)

- 16 sought information about Route 20
- 11 used Route 20
- 18 intend to use Route 20 (non-users)



(74 not used Route 20 yet)

Project stages

1. Identification of modelling requirements. ✓
2. Review of dynamic methods of modelling travel behaviour. ✓
3. Development of dynamic relationships of travel behaviour from longitudinal data.
4. Application of dynamic relationships of travel behaviour in the Dynamic Urban Model system.
5. Preparation of guidelines on incorporating dynamics in travel demand models.

Example - recognising response lags

