Model development to investigate emerging transport policy issues

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Overview of presentation

current issues in transport modelling…

- detail in modelling
- uncertainty in forecasts
- more complex behaviour
- need for increased speed in model
- interaction of choice and network
- conclusion

New policy needs more model detail

- access-egress: the "door to door product"
  - raises issues of access modes and station choices for public transport modes
  - sub-mode choices (bus vs. metro vs. rail)
  - choice or assignment
- how do we deal with toll roads?
  - choice or assignment
- activity-based modelling advantageous for some policy
  - classical (steam age) transport planning deals with trips
  - improved models (since late 70s) deal with tours
    - primary purpose and detours
    - still modelling persons and tours independently
  - but there is interaction across tours and between household members

Need to escape from single forecasts

- 'known' estimation error
  - standard errors around model parameters
  - delta method or simulation
  - this is the least of our problems
- possible error in exogenous inputs
  - what is GDP in 10 years time?
  - other key variables are largely correlated with GDP
    - employment, car ownership, activity rates
  - need to consider range of plausible forecasts
- unknown error in future
  - technological revolutions
  - exhaustion of finite resources or space
  - war, pestilence and famine?

More complex behavioural paradigms

- not necessarily RUM
- often involve comparing alternatives (J^2 problem!)
  - reference-dependent choices
  - → detailed model of path through time
- minimum regret is quite well developed
  - several different definitions
  - computational short-cuts have been found
  - but still imposes computational burden
  - and doesn't explain all behaviour anyway
- essential to research these paradigms
  - but maybe equal investment in RUM models would produce greater short-term benefits

All these developments imply need for more speed in models

- of course there are hardware and software solutions
  - parallel processing
- ..and high-tech modelling solutions
  - sampling alternatives, at last advancing beyond McFadden 1978
  - indirect inference, promising but not yet fully reliable
  - simulation vs. expected demand
    - simulation generally used with activity-based models
    - but proper comparisons have not yet been made
- can we find ways of shutting off parts of models?
  - use them only when relevant to specific policy issues
    - e.g. park and ride, public transport passes

Behaviour is determined by traveller AND network

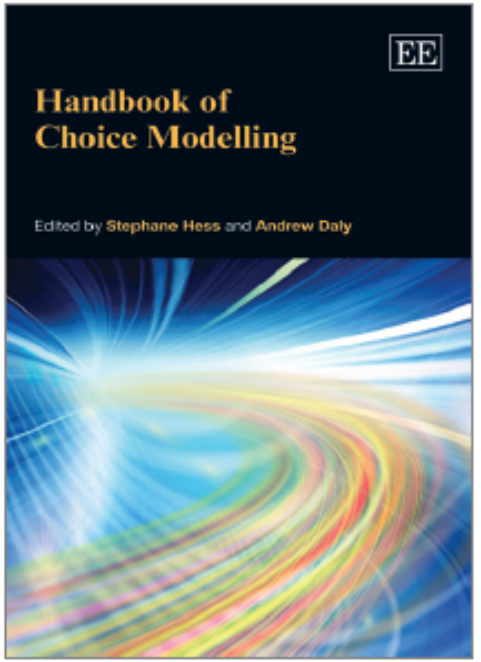
- aspects of 'choice' are not controlled by traveller
  - it's not certain which bus will come next
  - and we usually don't want to go into that much detail
  - e.g. we don't want departure time to the minute
- so the number on a bus or train will depend partly on travellers' choices, partly on network performance
  - randomness is partly individual, partly system
  - e.g. utility measure is neither logsum nor average
  - we haven't got models for this!
- similarly, road assignments focus on road capacity, not allowing for heterogenous choice
  - we avoid traffic lights, choose scenic route etc.
  - but most crucially, choose whether to pay for toll road

Conclusions

- new research is needed
- what else are we going to use?
- choice modelling is clearly the best way to obtain predictions of behaviour…
- …which are needed to plan rationally…
- …for quite important transport policy decisions
  - e.g. HS2 in England will cost £50-80 bn.

HANDBOOK OF CHOICE MODELLING

Edited by **Stephane Hess**, University of Leeds, UK and **Andrew Daly**, University of Leeds, UK and RAND Europe



'There have been some exciting developments in choice modeling, but much of this work is only accessible to those attending conferences like the International Choice Modeling Conference where researchers from many different fields can share their work. This Handbook brings the best of this new work to a wider audience. The editors have convinced many of the top researchers in choice modeling to contribute essays, and the resulting Handbook is the only reference I know that comes close to covering the current state of the art in choice modeling.'

– David Brownstone, University of California, Irvine, US

This book proposes a fantastic consolidation of these recent developments, written by the major actors in the field, including Daniel McFadden, Nobel Laureate. The good balance between fundamental topics and applied considerations, as well as the coverage of area-specific aspects, make it an exceptional reference for researchers and practitioners interested in human choices.'

– Michel Bierlaire, EPFL Lausanne, Switzerland

'A truly astonishing collection of papers. This book is the new place to go for learning the latest and greatest in choice modelling.'

– Kenneth Train, University of California, Berkeley, US