Can People Respond to Complex Pricing Signals?

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Presentation

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Structure of Presentation

- Background
- Evidence
- Conclusions and Implications

First Best solution (1)

- Price should vary dynamically according to costs imposed by user
- Implies variation by
  - time of day
  - level of traffic
  - type and condition of vehicle
  - weather conditions
  - location (capacity available, riparian use, topography …)

First Best solution (2)

- But First Best solution requires users to know the price in time to make a considered response to it!
- Requires some simplification
  - reduce variation by vehicle type?
  - reduce link with weather conditions?
  - reduce local variation?
  - reduce degree of dynamic variation?

Existence of a Trade-off

- There is a trade-off between
  - complexity of the pricing signal
  - likelihood of it being predicted by users in time
- Need to understand what users can cope with
- Need for modelling to find optimal trade-off
- UK DfT interest (NRPFS)
- EU funded research on “fair and efficient pricing”

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UK DfT study

- One of several contributing to NRPFS
- Seeking evidence on people's abilities to deal with complex prices
  - from academic literature
  - from commercial and 'grey' reports
  - from luminaries

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Research in Decision Making (1)

- There is a limit to people's ability
  - about 7 items of information?
  - varies with personal characteristics
    - experience, intellectual ability, education …
  - also depends on context
    - presentation of information
- Even when they have the ability some people **choose** not to act analytically
  - varies with personality type
  - depends on context
    - "obviousness" of solution
    - whether the situation involves a gain or a loss
    - the amount of any gain or loss
    - whether the decision is 'routine'

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Research in Decision Making (2)

- When people cannot analyse, or choose not to, they use heuristics
- Heuristics often involve simple rules of thumb
  - require much less intellectual effort
  - require less data/information
- Accuracy of heuristics
  - varies
  - low if heuristic is weak or inappropriately applied
  - high if situation is amenable
  - can increase with feedback

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Existing Applications of Road Pricing (1)

Singapore

- ERP
- price varies by time of day and is periodically revised
- some initial concern but complexity no longer an issue
- responses suggest widespread understanding

Switzerland/Austria/Germany

- distance-based charges for trucks
- some initial concern but complexity not an issue
- no evidence of failure to understand

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Existing Applications of Road Pricing (2)

I-15 San Diego HOT Lane

- dynamically adjusted toll reflects congestion
- current toll posted upstream of decision point
- initial concern about complexity has evaporated
- commercial firms more concerned than private motorists?
- price signal being interpreted as an indicator of current congestion?

SR91 Orange County HOT Lane

- pre-published schedule of charges
- now 11 per day
- complexity not an issue

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Other Transport Evidence (1)

French motorways

- Cofiroute 1996
- introduction of peak period tolls near Paris
- public objection (unfair, ineffective, complicated)
- withdrawn

French Railways

- SNCF's yield management pricing
- price dependent on capacity, pre-booking required
- public objection (unfair, complication, inconvenient, inefficient)
- withdrawn

Germany Railways

- Deutsche Bahn 2003
- capacity-related discounts and advance booking incentives
- public objection (unfair, complicated, inconvenient)
- withdrawn

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Other Transport Evidence (2)

UK Train Fares

- great variety of tickets, prices and restrictions
- SRA consultation (in 2003) concluded that this was a major problem
- evidence of loss of patronage
- Virgin Trains' simplification has been welcomed
- acceptance of need for peak period premium

"No frills" airline ticket pricing

- prices vary dynamically in response to demand
- most customers use internet or phone to find price immediately before purchase
- rational for variation seems to be accepted
- public object to "hidden" charges but no longer demand equity

Bus Fares

- acceptance of rationale for peak period premium

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Other Contexts

Taxi fares

- metered fares depend on distance, duration and time of day
- people seem able to cope with this
- but are their estimates accurate?
- and are choices rational?

Phone charges, internet charges etc.

- niche marketing creates a range of tariffs
- but marketplace recognises preference for simplicity
- hence suppliers offer simple pre-payment options and simple pay-as-you-go options
- general retreat from capacity-related tariffs
- the question of equity or fairness rarely arises

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Preferences and Attitudes

- General aversion to complexity affects choice between options
- Acceptance of price variation in private sector
- Acceptance of price variation in public sector provided that it is fair and efficient
- Acceptance of need for peak premium when demand is high

Prediction of Prices

- The ability to analyse/predict prices varies between individuals and contexts
- …as does the willingness to conduct full analysis
- Many decisions will be based on heuristics
  - particularly as people gain familiarity
- The accuracy of heuristics will depend on various factors, including
  - the obviousness of the price structure
  - the availability of cues
  - the availability of feedback

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Implications for Design and Performance of Road Pricing Systems

- Unwarranted complexity would be a target for criticism
- The rationale for complexity should be obvious
- Complexity would discourage usage (but not efficiently)
- After the initial phase most people will use heuristics to estimate prices
- The price structure should be obvious and well cued
- Feedback on prices should be given
- Planning aids should be encouraged

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Can people respond to complex price signals?

Yes,….. but only if they are not very complex!

……and……