Planning congestion pricing programs to achieve equitable outcomes

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2019 UCLA Lake Arrowhead Symposium
- Some empirical evidence on equity from London and Stockholm

- How are costs and benefits distributed?
  - *Spoiler: it depends on what and how you measure*

- Lessons for North American cities from the Vancouver experience
Backgrounder

London 2003

$6/day (2003)
Traffic ↓ 20%
Congestion ↓ 30%
Emissions ↓ 13-16%
Net revenue $350m/yr

Stockholm 2006

Traffic ↓ 20%
Congestion ↓ 30-50%
Emissions ↓ 8-13%
Net revenue $120m/yr

- We already paid for the roads
- It won’t work – won’t reduce congestion
- Public transport won’t cope
- Business impacts
- Unfair to suburban drivers
Why might equity have been less of an issue in Europe?

- **Time:** increasing income inequality and decreasing housing affordability since early 2000s

- **Income redistribution:** (traditionally) tax and transfer policies have aimed for greater equalisation

- **Cost of driving** before charging: gas is ~50% more expensive than US

- **Transit:** higher mode shares
What does the data say?

In Stockholm:

- Downtown residents pay twice as much as the rest of the region.
- Employed people pay three times as much as people not in employment.
- Men pay twice as much as women.
- Households with children or two adults pay 50% more than other households (per person).
- High income households pay three times as much as lower income households.

High income segments pay more...

...low income segments pay a greater proportion of household income...

Source: City of Stockholm, Samhällsekonomiska fördelningseffekter av Stockholmsförsöket, 2006.
What does the data say?

... middle income segments changed driving habits more

The lowest income people who are driving may have few reasonable alternatives

Source: City of Stockholm, Samhällsekonomiska fördelingseffekter av Stockholmsförsöket, 2006
Calculating the costs & benefits of congestion pricing

Private costs

Charges paid

Net direct effect
Calculating the costs & benefits of congestion pricing

- Societal costs/benefits
  - Private costs/benefits

- Charges paid
- Adaptation costs
- Journey time savings
- Charge revenues (and other revenue changes)
Congestion Pricing, Air Pollution and Children’s Health

Emilia Simeonova, Janet Currie Peter Nilsson, and Reed Walker

February, 2017

Abstract

This study examines the effects of implementing a congestion tax in central Stockholm on both ambient air pollution and the population health of local children. We demonstrate that the tax reduced ambient air pollution by 5 to 10 percent, and this reduction in air pollution was associated with a significant decrease in the rate of acute asthma attacks among young children. The change in health was more gradual than the change in pollution suggesting that it may take time for the full health effects of changes in pollution to be felt. Given the sluggish adjustment of health to pollution changes, short-run estimates of the pollution reduction programs may understate the long-run health benefits.
Designing effective, equitable congestion pricing

Societal costs/benefits

Private costs/benefits

Maximise these

Minimise these

Charges paid
Adaptation costs
Journey time savings
Charge revenues (and other revenue changes)
Other benefits (e.g. environment, safety, infrastructure savings)
System costs
Distribution of costs & benefits

- Private costs/benefits
  - Charges paid
  - Adaptation costs
  - Journey time savings
- Net direct effect
Stockholm: high income groups lose more than low income groups – *before revenue recycling*

Source: City of Stockholm, Samhällsekonomiska fördelningseffekter av Stockholmsförsöket, 2006
So there is potential for redistribution - modelled net effect of revenue recycling scenarios

Lump-sum refund

Source: City of Stockholm, Samhällsekonomiska fördelningseffekter av Stockholmsföröket, 2006
How do London and Stockholm use the revenues?

Did these investments lead to a progressive outcome?
Pricing is never introduced in a vacuum – we need to better understand the equity of sustainable urban mobility.

Compact cities – but how to make them affordable and inclusive?

Public transit – safe, affordable and cost effective to build and operate

Walkable and cycle friendly – but also safe, accessible and what about peripheral areas?

Manage demand for car use – but “just enough” and how to make it acceptable?
Pricing in a polycentric west coast city

- European cities are not as monocentric as you think!
- Start where you can demonstrate the impact

- Clearly define objectives
  - *What, where?*
- Design to:
  - *Maximise winners*
  - *Provide lots of alternatives (not just transit!)*
- With the right tools, systems can be designed to improve equity outcomes
Pricing in a polycentric west coast city - equity analysis tools

- Ensure those paying see time savings
- Ensure charges are related to the availability of alternatives
- Assess who pays and who benefits
  - By whatever dimensions you have data for
- Calculate the cost of correcting any imbalance (in Vancouver ~16-22% of net revenues)
Summary

- Pricing supports multiple sustainable city goals
- Evidence on equity is mixed, but
  - *There are ways to improve equity*
  - *No-one has set out with this as a primary aim*
- How you use the revenues really matters
  - *We need better methods to measure that*
- Maximising winners + lots of alternatives is key to acceptance
Thank you!

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Without demand management, pricing is "just a tax"... and not necessarily a very efficient one.

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**Societal costs/benefits**
- Adaptation costs
- Journey time savings
- Other benefits (e.g. environment, safety, infrastructure savings)

**Private costs/benefits**
- Charge revenues (and other revenue changes)
- System costs

**Charges paid**
- Without demand management, pricing is "just a tax"... and not necessarily a very efficient one.
Calculating the costs & benefits of congestion pricing

Societal costs/benefits

Private costs/benefits

Charges paid
Adaptation costs
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