Transport research

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Labour-market accessibility patterns in UK Cities
Introduction

• We wish to study the effect of the recession on accessibility patterns in urban areas in the UK

• The temporal and spatial resolution of available data can make this difficult

• New data sources may provide possibilities for supplementing existing data sources
Accessibility

• An accessibility measure attempts to account for the fact that some locations are more central than others.

• We can use a simple measure such as the number of jobs which can be reached within 30 minutes.
Jobs within 5 minutes
Accessibility

• We can use a weighted average
• We can weight by time or distance or some measure of generalised cost
• We can adjust the weighting to account for different travelling preferences
• A very simple form of this measure would be to take: accessibility = jobs / time
Accessibility = \( \frac{10}{10} + \frac{50}{40} + \frac{5}{5} + \frac{25}{35} + \frac{20}{15} + \frac{15}{35} \)

= 5.73
Calibration

• In this example, we have made an assumption about people’s reaction to travel time
• We can do better than simply assuming a value
• The so-called distance deterrence effect can be measured
• We do this by looking at patterns of travel to work
Data sources

• The census provides residential and workplace locations at a fine spatial resolution
• It also provides information on flows between these units
• These data can be used to estimate a variety of accessibility measures
Accessibility from spatial interaction models

• One way to measure people’s reaction to distance is to use a gravity model

\[ T_{ij} = O_i D_j f(c_{ij}) \]
An extension

\[ T_{ij} = A_i O_i B_j D_j \exp(-c_{ij}) \]

\[ A_i = \frac{1}{B_j D_j \exp(-c_{ij})} \]

\[ B_j = \frac{1}{A_i O_i \exp(-c_{ij})} \]
Adjusted accessibility

• Estimating the distance deterrence effect in this modelling framework generates a useful by-product
• One of the parameters used to calibrate the model can be interpreted as an accessibility measure
• Usefully, it adjusts for the competition for jobs at different locations
Problems

• The census is only collected every ten years (and may even be abolished/scaled back)
• Data for what happens in between are patchy
• Costs of travel vary substantially e.g. by time of day, by day of week, inter-year
The recession in the UK

GDP: Q1 2001 = 100
The recession in the UK

Unemployment: Jan 2001 = 100
Data requirements and wishes

- Residential locations
- Workplace locations
- Transport network data
Traffic count data

The diagram shows the traffic count data for various cities over the years 2000 to 2014. The cities represented are Glasgow, London, Liverpool, Cardiff, and Bristol. The data indicates a decrease in traffic count for London from 2000 to 2014, with a peak in 2001 and a steady decline thereafter. Glasgow and Liverpool show relatively stable traffic counts with minor fluctuations. Cardiff and Bristol exhibit variability in traffic counts with no clear trend.
Implications

• Changes in traffic volumes may lead to changes in travel costs
• It is possible that the recession enhanced accessibility in some parts of certain cities
• Changes in working patterns may change the time-of-day people travel at
Network data

- Traffic sensor data: inductive loop detectors, automatic number plate recognition (ANPL)
- Smart card scans, automatic passenger counters (APC), automatic vehicle location (AVL) data
- Mobile phone data, Bluetooth detector data, location enables apps
- Social media data
Residential location

- Potentially derivable from network data i.e. origins of journeys
- Administrative data sources
- Data from smart energy metres
- Social media data
- Web scraping property websites
Workplace location

- Again, potentially derivable from certain network data
- Smart metre data on energy use
- High-resolution satellite imagery
- Web-scraping recruitment websites
- Social media data
Challenges

• Data availability, licensing conditions, privacy concerns
• How do we combine numerous, heterogeneous streams of data in a consistent way?
• Validating results – what is our benchmark?
The effects of economic recession on travel behaviour: Focusing on the Information and Communication Technologies (ICT) and neighborhood impacts
Economic recession
• Reductions in employment and achievable credit
• Increased home foreclosure
• Changes in people’s behaviour

Neighborhood
• Different level of accessibility to opportunities

Different impacts of ICT on mobility
• Substitution, generation, modification, neutrality
Scotland and UK Annual GDP Growth Rates
2003 Q1 to 2015 Q2


Vehicle miles travelled by selected vehicle types in Great Britain, 2003 - 2013

Source: Department for Transport (2014)
Research Questions

• What are the impacts of recent economic recession on motorized/non-motorized travel?
• What are the effects of ICT use on travel behaviour?
• Does the recent economic recession affect the use of ICT?
• How do the relationships among economic recession, ICT use and travel behaviour vary according to neighbourhoods?
Data sources

• 2003-2014 Scottish Household Survey data with geographic information (e.g., datazone or postcode)

• Urban indicators (e.g., accessibility)

• Scottish Index of Multiple Deprivation (SIMD)
Do new technologies benefit our health?
• New technologies (i.e., Internet and smartphone) have changed peoples’ lifestyle
• Young vs. old adults?

Source: Ofcom technology (2012)
• Ubiquitous access to the Internet

• More physical activity or sedentary lifestyle?

Source: Ofcom omnibus research (2012)
Research Questions

• How do new technologies (i.e. Internet & smartphone) influence the level of physical activity?
• Are there significant differences in the level of ICT use between young and old adults? Do the impacts of ICT use on physical activity differ according to age?
• How do neighborhood characteristics alter the impacts of ICT use on physical activity?
Data sources

• Integrated Multimedia City Data survey
  • Main survey
  • GPS and lifelogging samples

• Urban indicators (e.g. accessibility)
Thank you for your attention.

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