Personal indebtedness, spatial effects and crime: a comparison across the urban hierarchy

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Overview

1. Motivation
2. Literature
3. Data
4. Modelling strategy
5. Results
6. Conclusions & future research
Motivation

- Recent economic conditions, and debt and it’s consequences.


- Extending Becker (1968)-esq analysis to consider the role of personal indebtedness in explaining crime.

- Utilising spatial econometric methods to demonstrate that ‘...crime has a geography’ Andresen (2006)[1], and to show the insights from this modelling approach.

- Exploit small area data on crime to better understand the ‘neighbourhood’ dimension of crime.

Innovations of this paper:

- Extending McIntyre & Lacombe (2012) to compare across the urban hierarchy taking the case of the North East England region.
Economics literature

Selected papers:

- Ehrlich (1975)[9] focussed on role of education in determining opportunities for entry/participation in illegal activities.
- Buonanno (2012)[4] a recent spatial crime analysis for Italy using panel methods for 103 provinces for a wide range of crimes. Focus on effect of 'social sanctions' on crime proxied for by a measure of small and isolated communities.
- ...and many others.
Sociology Literature

Selected papers:

- Schmid (1960)[12] focus on range of different crimes (economic/violent):
  - Variables that may be important include: population change, age profile, gender, race, income, married population, education, employment variables, housing variables...


- Cantor & Land (1985) [5] empirical analysis of the crime unemployment relationship in post WWII USA, emphasising:
  - Criminal motivation effect; i.e. the motivation for people to commit crimes.
  - Criminal opportunity effect; i.e. the victim proneness of targets.


- ...and many others.
Danziger (1976) [8] notes the important role played by population density in increasing the potential victims in an area.

Kvalseth (1977)[10] reviews criminology lit concluding that evidence suggests that U-C relationship is positive for some crimes and pop. density is negative if significant at all.


- Uses spatial analysis and data on ambient population (to address a common source of bias in p/c crime measures) to explore crime in Vancouver, Canada.
- SD theory variables to control for: ethnic heterogeneity, social/economic deprivation, family disruption and population turnover, population 15-29 years old.
- RA theory focuses on potential for victimisation. Need to control for population density (monitoring), property values/condition (security), income, % rental properties etc.
Summary of literature

- Common themes:
  - Two main effects that need to be considered in trying to understand observed crime: motivation and opportunity.
  - Important to control for a range of economic, socioeconomic and spatial variables.
  - Relationship underpinning observed pattern of crime is complex and there can be important causality and/or endogeneity issues.
Data #1

- Small area data provided at the ‘neighbourhood’ level by the UK ONS.
- Fixed geography areas were used.
- Minimum of 5000 people, and an average of 7200 people, in each Middle Super Output Area (MSOA).
- In London there are 982 areas (equates to a population of over 7m people).
- In the NE region there are 342 areas (equates to a population of over 2.5m people).
- Focus here on the year 2004-05.
Crime measures considered: theft from the person, robbery, theft of a motor vehicle, theft from a motor vehicle, burglary of a dwelling, burglary other than of a dwelling, and an aggregate of these ‘theft’ crimes.

All theft crime data were converted into rates per 1000 people usually resident.

Explanatory variables: value of CCJs, population turnover, % pop 0-15, % pop 16-24, houses in poor condition, income, and population density (people usually resident per square hectare).
Some maps! Pop. density NE
Some maps! Pop. density NE
Some maps! CCJ Value NE
Some maps! Income LDN
Some maps! Pop. density LDN
Three main spatial models: SAR, SEM, & SDM.

- **SAR** - spatial autocorrelation is exhibited in the dependent variable (biased and inconsistent):

  \[ y = \rho Wy + X\beta + \epsilon \]  

- **SEM** - spatial autocorrelation is found in the error term, omitted spatially correlated, (unbiased but inefficient):

  \[ y = X\beta + u \]  
  \[ u = \lambda Wu + \epsilon \]
Three main spatial models: SAR, SEM, & SDM.

- SDM - extends the SAR model by including spatially weighted explanatory variables, omitted variables that follow a spatial process and are correlated with included explanatory variables.

\[ y = \rho Wy + X\beta + WX\theta + \epsilon \]  

(4)
Results

- Gibbs sampler run for 5000 draws with a ‘burn-in’ of 500 draws.
- Proper, but relatively uninformative priors were used in all cases.

Different sets of results.

- 7 crime types
- 3 different spatial models
- 2 different regions
Conclusions & future research

- As Cherry & List (2002)[7] and others have found, the covariates that are important vary across crime type.
- Spatial dimension insightful.
- Personal indebtedness may play important role, varying by crime.

- Extending to other regions (NE was the first of these)
- Extending to use previous year data in panel analysis
References

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T.L. Cherry and J.A. List. 
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References II

S. Danziger.
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J.O. Kvalseth.
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Urban crime areas: Part i.

H.L. Voss and D.M. Petersen.
*Ecology, crime, and delinquency.*
### Table: Variable details

<table>
<thead>
<tr>
<th>Variable</th>
<th>Variable description</th>
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<tbody>
<tr>
<td>Value of CCJ</td>
<td>Total value of CCJ’s granted in each area in 2004 in (£).</td>
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<tr>
<td>Population turnover</td>
<td>Net change in internal migration per 1,000 persons 2004/05.</td>
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<tr>
<td>% pop 0-15</td>
<td>Percentage of population aged 0-15 (mid-2004 model based estimates).</td>
</tr>
<tr>
<td>% pop 16-24</td>
<td>Percentage of population aged 16-24 (mid-2004 model based estimates).</td>
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<tr>
<td>Houses in poor condition</td>
<td>The modelled probability that a house in the area will fail to meet the UK Government Decent Homes standard. Data used are averages of lower super output area values for 2004.</td>
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<tr>
<td>Income</td>
<td>Average weekly household total income (ONS model based estimate) 2004/05.</td>
</tr>
<tr>
<td>Pop. Density</td>
<td>Number of persons usually resident per hectare (based on 2001 census data).</td>
</tr>
<tr>
<td>All crime variables</td>
<td>Recorded crimes in 2004/05 per 1000 persons usually resident.</td>
</tr>
</tbody>
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All variables were obtained from the Neighbourhood Statistics service operated by the UK Office of National Statistics.