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

Stuart G. McIntyre, Fraser of Allander Institute,
Department of Economics, University of Strathclyde.

Introduction

The recent recession has made understanding the relationship between economic conditions and crime crucial to public debate. In this paper we seek to understand the spatial pattern of property and theft crimes using a range of socioeconomic variables, as well as data on the level of personal indebtedness, for two regions of the UK: London (the capital city) and the North East of England (a peripheral region).

Building on earlier published work in this area, this paper will contrast the regression results obtained in both of these regions. This allows a comparison of the factors that are important in explaining the observed pattern of theft and property crimes, including an analysis of the spatial dimension of these factors, between these two regions. Doing so will allow a comparison of the elements that are important in explaining the observed pattern of theft and property crimes across the two regions.

Background theory and motivation

The recent global recession has brought the issue of the relationship between economic conditions and crime to the fore of public and scholarly debate. There is a long and detailed history of attempts to understand what causes crime. One of the most prominent strands of this literature sought to understand the relationship between unemployment and crime. Following Becker (1968), the economic argument suggests that in an attempt to maintain consumption in the face of increased unemployment, people may resort to sources of illicit income. In a similar manner, we might expect, ex-ante, that increases in the level of personal indebtedness (which may itself be a symptom or consequence of increased unemployment or economic downturn) would be likely to provide similar incentives to engage in criminality.

In the context of the current economic downturn affecting most, if not all, parts of the world, understanding the relationship between personal debt and crime is vital to understanding the consequences of governmental action or inaction. Increases in personal debt- which the government may encourage during a recession to boost aggregate demand- may in fact prove, at least partly, counterproductive if they require additional government resources to counter an increase in crime stemming from debt default.

To understand the peripheral region aspect of this analysis, let's take just one example, an important factor in the crime level in a particular area is known to be population density. For crimes against property, higher population density is said to be negatively related by increasing the probability of detection. In contrast, for personal theft crimes, higher population density is thought to be positively related as it increases the number of potential targets.

In the case of a large city such as London, population density might show little variation, and thus population density may not have the impact that theory suggests. In contrast, in peripheral regions it will be the case that the much greater variation in population density compared to a large city, suggesting that population density may play a different role in explaining the observed pattern of theft crimes.

Literature

This work sits at the intersection of at least three literatures; economics, sociology and criminology, but there are some common themes:

- That there are two main effects that need to be considered in trying to understand observed crime: motivation and opportunity.

- That it is important to control for a range of economic, socioeconomic and spatial variables.

- That the relationship underpinning observed pattern of crime is complex and there can be important causality and/or endogeneity issues.

In terms of the economics literature the starting point is a paper by Becker (1968) which looked at the relationship between unemployment and crime, formalising this theoretical relationship. In many ways the work outlined here is a straightforward extension of this theory to account not simply for the move from a legitimate income to an illicit one, but from employment through a period of debt accumulation, ultimately debt default and then perhaps the need for illicit income streams.

There has been a reasonable literature looking at the relationship between unemployment and crime. Just in a UK context, there are two principal papers investigating this relationship: Pyle & Deadman (1994) for Scotland, and Carmichael & Ward (2001) for England and Wales. There are other papers in the economics literature on crime which warrant a mention, these include Cherry & List (2002) who demonstrated that the explanatory variables which are important in explaining the observed variation in crime rates differ by crime type, and Buonanno (2012) who looked at the role of social sanctions in understanding the observed pattern of crime.

In the Sociology literature there are a number of papers which relate to the work presented here. These include a paper by Voss & Petersen (1971) who emphasised the spatial dimension to crime, linking to the use of spatial econometric methods in this analysis. Two other papers are particularly important in the context of this analysis, The first is Cantor and Land (1985) who looked at the relationship between crime and unemployment, emphasising the *motivation* and *opportunity* effects. The key thing here is to ensure that in explaining observed crime rates we capture both of these effects.

In our analysis the level of personal debt provides a *motivation* effect, while population density captures one aspect of the *opportunity* effect. This is a point which is developed in a paper in the criminology literature (Danziger (1976)) which considers the role of population density in increasing the potential pool of victims for certain types of crime. One final paper to note is Box (1995) which examined the impact of recessions on crime. This paper again links to our analysis here in that personal debt plays a vital role in consumption smoothing by households, particularly during recessions and bouts of unemployment.

Data

The table below gives details on the variables used in this analysis. In order to capture 'neighbourhood' effects in this analysis we used data at the Middle Layer Super Output Area (MSOA) level. The UK Office of National Statistics maintains a series of administrative geographies for neighbourhood data. Super output areas (SOAs) are fixed geographies which are offered at two levels, middle and lower.

There are 7,193 Middle Layer SOAs (MSOAs) defined based on the 2001 census and released for public use in 2004[i]. These MSOAs had an average population size of 7,200 households, compared to an average of 1500 households in the Lower Super Output Area (LSOA) level. In London there are 983 MSOAs, which when we exclude the 'City of London' MSOA results in 982 areas in this analysis.

Variable	Variable description
Value of CCJ	Total value of CCJ's granted in each area in 2004 in (£).
Population turnover	Net change in internal migration per 1000 persons 2004/05.
% pop 0–15	Percentage of population aged 0–15 (mid-2004 model based estimates).
% pop 16–24	Percentage of population aged 16–24 (mid-2004 model based estimates).
Houses in poor condition	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.
Income	Average weekly household total income (ONS model based estimate) 2004/05.
Pop. density	Number of persons usually resident per hectare (based on 2001 census data).
All crime variables	Recorded crimes in 2004/05 per 1000 persons usually resident.

All variables were obtained from the Neighbourhood Statistics service operated by the UK Office of National Statistics.

Data overview
In order to illustrate some of the differences between London and the North East of England administrative regions, i.e. comparing a large city region with a peripheral region, we present a few diagrams below which

allow us to compare the spatial pattern of population density and income. Figure 1 and 2 illustrate the differences in population density across space in London and the NE region.

It is clear from Figure 1 that London's population appears to decrease in all directions from the centrewith circular bands of lower and lower population densities. Whereas from Figure 2, it is clear that in the North East region there are areas of higher population density around main cities, but no other spatial pattern, and large areas of low population density.

Methods

In this paper we utilise spatial econometric methods (outlined in LeSage & Pace (2009)). We estimate 3 spatial econometric models for each crime type[ii] and conduct posterior model comparisons to select which model is the best fit for each crime type. In McIntyre & Lacombe (2012) we only reported the results from the best fit model for each crime type. For more details on the modelling approach taken to generate the results discussed here see McIntyre & Lacombe (2012).

Figure 1: Population density London (number of persons usually resident per hectare)
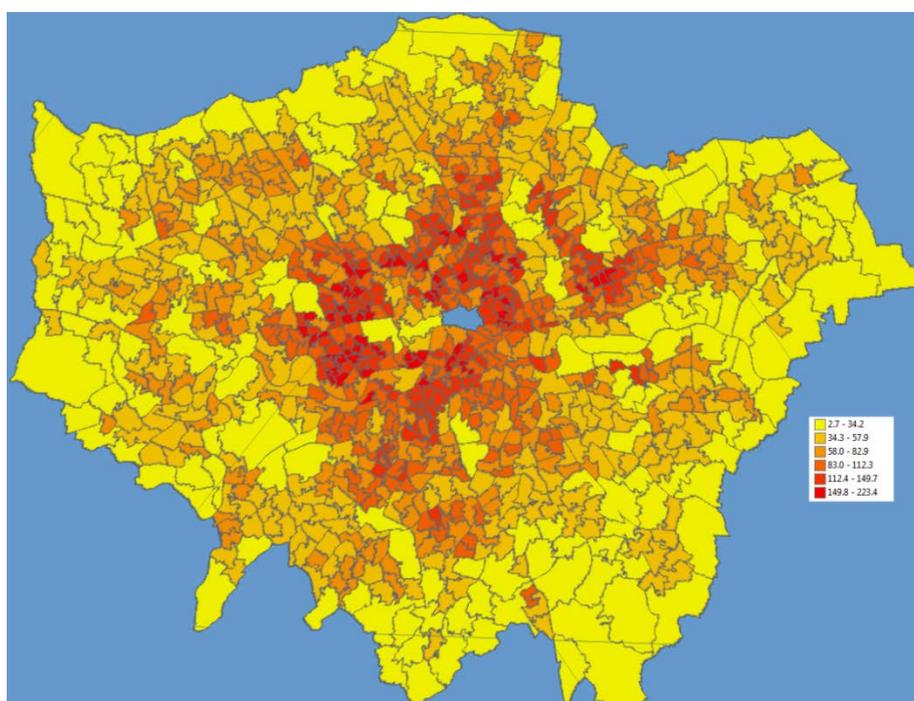
Results

In McIntyre & Lacombe (2012) we established a number of key results, principally that in London the level of personal indebtedness (measured by the total value of CCJs in each area) in a neighbourhood was positively associated with thefts from the person and robberies. A number of other results were of interest, but given the focus of this paper we restrict our discussion to the results relating to the role of population density in explaining the observed pattern of crimes.

In London we established that population density was negatively associated with all categories of crime except burglary of a dwelling where it was insignificant. For some types of crime, the literature suggests that the higher the population density the higher the number of potential victims and therefore the greater the crime rate. Crimes of this type typically include personal theft crimes. Our results for London therefore did not accord with this theory.

Our hypothesis was that this was due, at least in part, to the much greater level of population density in London compared to the NE region. The average population density of our MSOAs in London was 72.60 persons usually resident per hectare with a standard deviation of 41.16, compared to the average population density in the NE region of 24.56 persons usually resident per hectare with a standard deviation of 18.56. To put this into perspective, notice that the average population density value in the NE region is

too low (24.56) to make it into the 1st standard deviation for the London region (where 68% of MSOAs in London are to be found) which is between 31.44 and 113.76 persons usually resident per hectare.

When we generated our results for the NE region, we found that for robberies population density was insignificant, but that population density was positive and significantly associated with thefts from the person. This suggests that in more peripheral regions the lower population density and the lower variation in population density means that areas of higher population density are indeed- as theory suggests-associated with higher personal thefts owing to the greater concentration of potential victims.

Figure 2: Population density NE Region (number of persons usually resident per hectare)
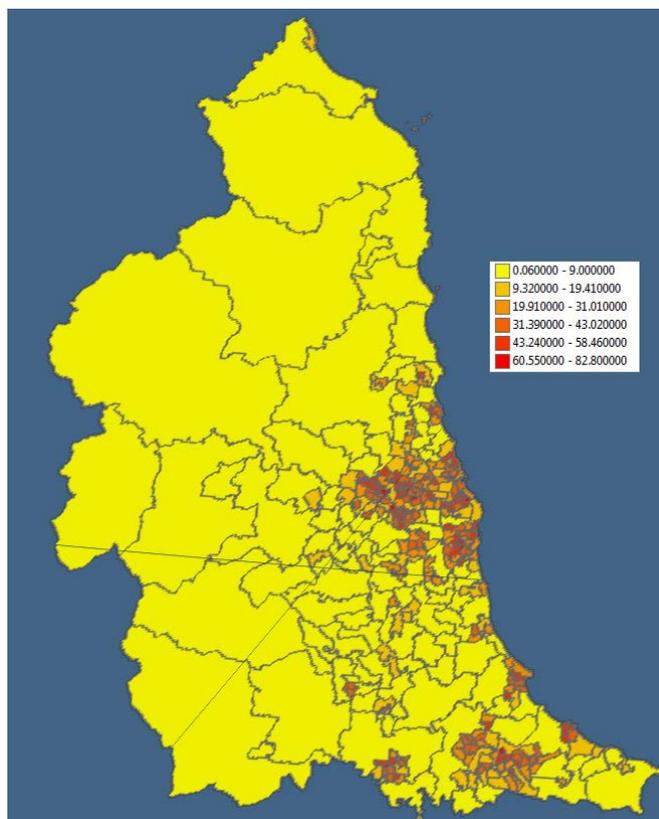
Conclusions

The work discussed in this paper has sought to better understand the relationship between different economic and socioeconomic factors and property and theft crimes, and how this changes across the urban hierarchy. The focus of the discussion here has been on the differences obtained from crime regressions for a large city-region (London) and a peripheral region of the national economy (NE England).

We focussed the discussion on the impact of population density on the crime rate in these two regions. This was partly because the results for London presented in McIntyre & Lacombe (2012) for the relationship between population density and personal theft crimes were not in accordance with theory. Our hypothesis was that this was due, at least partly, to the nature of population density within the London region, as discussed and explained above. Comparing our London and NE England results it suggests that in terms of the impact of population density on crime there are important differences with the results for the NE England region in accordance with theory.

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http://neighbourhood.statistics.gov.uk/dissemination/Info.do?page=aboutneighbourhood/geography/superoutputareas/soa-intro.htm

ii These were: the spatial autoregressive model (SAR), the spatial error model (SEM) and the spatial Durbin model (SDM). Refer to LeSage & Pace (2009) for a textbook discussion of these models.