

Urban Area and Hinterland: Defining Large Cities in England, Scotland and Wales in terms of their constituent neighbourhoods

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Background

This is one of a series of short papers which explain conceptual or methodological approaches underpinning analysis undertaken in CASE's research programme [Social Policy in a Cold Climate](#) (SPCC). SPCC is designed to examine the effects of the major economic and political changes in the UK since 2007, particularly their impact on the distribution of wealth, poverty, inequality and social mobility. It also examines geographical variations in policy, spending, outputs and outcomes, with a particular focus on London. The analysis includes policies and spending decisions from the last period of the Labour government (2007-2010), including the beginning of the financial crisis, as well as those made by the Coalition government since May 2010. The programme will conclude in 2015, with publication of a final volume. Interim reports will be published in 2013/14, and made available online at <http://sticerd.lse.ac.uk/case>.

Social Policy in a Cold Climate is funded by the [Joseph Rowntree Foundation](#) and the [Nuffield Foundation](#), with London-specific analysis funded by the [Trust for London](#). The views expressed are those of the authors and not necessarily those of the funders.

Introduction

This note describes a method for defining the 'core urban area' and 'hinterland' of large and metropolitan cities in Britain. The definitions are made in terms of small-area ('neighbourhood') geographies used in standard Census and administrative statistics in each country (Lower Super Output Areas in England and Wales, Datazones in Scotland).

The purpose is to provide a base for analysing intra-urban changes in the distribution of poverty over the 2000s, and assessing, for example, changes in segregation, concentration and centralisation. We look at the 22 largest cities in Britain: four in Scotland, two in Wales, and the rest in England (Lupton & Power 2004). The largest in population in 2001 (based on local authority boundaries) is London, and the smallest Dundee.

For each city, the 'core urban area' is conceived of as the estimated current continuous built-up area of each city. This is primarily derived from the automated classification applied by ONS to define each Census Output Area as 'urban' or 'rural' on the basis of its morphology and density. The 'hinterland' of each city is conceived as places outside this 'core urban area' whose primary economic orientation is towards that city. Living in the 'hinterland' is taken to be a reasonable substitute for living in the urban area itself for someone working in that city. They are thus defined by 2001 Travel-to-Work Areas. Together, the core urban area and hinterland comprise the 'wider city region'.

Method

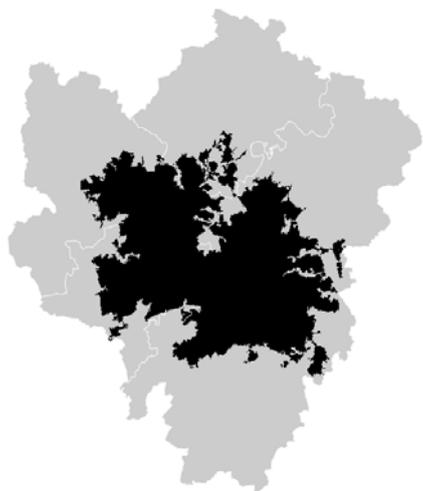
The following procedure is used to define an 'urban area' for each city in terms of neighbourhood-level geographies (LSOAs or Datazones). The numbered steps are shown visually at the end of the note.

1. The starting urban areas for each city are the 2001 Urban Areas (Settlements, in Scotland) for the primary city or cities concerned. Some cities (for example, Tyneside) are made up of two Urban Areas (for example, Tyneside and Sunderland), but were a single contiguous urban area. Note that these urban areas do not reflect administrative boundaries.
2. A buffer of fixed distance (currently 500m) is applied to the 2001 Urban Area to approximate **urban extension in the 2000s**.
3. Any other **built-up settlements that now intersect** with this extended urban area are attached to it, and the 500m extension applied to them in turn.
4. This gives the '**core urban area**'.
5. The **wider city region** is the union of all TTWAs whose largest urban area is the city concerned. The **hinterland** is the remaining parts of the wider city region that are not in the core urban area.
6. LSOAs (Datazones, in Scotland) are assigned to the core urban area and wider city region by a standard point-in-polygon technique, using the population centroid of each LSOA/Datazone.
7. The results are saved in a file containing the LSOA/DZ codes, showing the city they lie in, and whether they are core urban or hinterland.

Illustrated Example: Birmingham

STEP 1

The 2001 Urban Area (black) and the 2001 TTWAs (grey) that together comprise the wider city-region



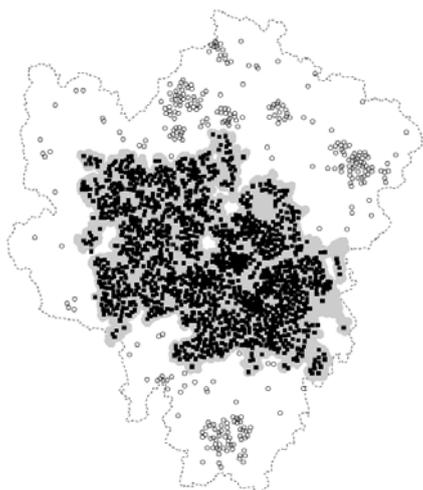
STEPS 2,3,4

The wider city-region (dotted line), and the core urban area - with the 2000s extended buffer, and the new built up settlements (in black) now attached.



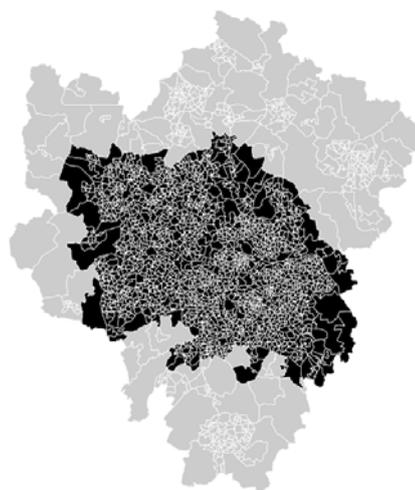
STEPS 5,6

The population centres of small areas are assigned to either the hinterland (empty circles) or the core urban area (black squares); the core urban area is shaded grey.



STEP 7

The core urban area (black) and hinterland (grey) comprised of small-area boundaries.



The urban definitions are produced by a R-statistics script, using the *rgeos*, *rgdal* and *sp* extensions (R Development Core Team 2012; Bivand & Rundel 2012; Keitt et al. 2012; Pebesma & Bivand 2005). The code is available on request.

Notes

1. London has been given a large hinterland covering all contiguous and proximate TTWAs, to reflect the density of transit links
2. Scottish cities are defined in terms of Datazones rather than LSOAs. Datazones have roughly half the average population of LSOAs, and were generated from output-level Census data using a different algorithm that measured homogeneity differently. Measures of segregation and difference are thus not directly comparable between Scottish and non-Scottish cities.
3. Aberdeen is currently given a smaller urban extension (150m rather than 500m). This is merely expedient to avoid a technical problem with the shapefile processing.
4. There were two pairs of cities which are so close to each other that some LSOAs lay in the core urban area for both. These were Derby/Nottingham (20 overlapping LSOAs) and Portsmouth/Southampton (6 overlapping LSOAs). These were allocated to the city of the TTWA in which they lay.

References

- Bivand, R. & Rundel, C. (2012) *rgeos: Interface to Geometry Engine - Open Source (GEOS)*, Available at: <http://CRAN.R-project.org/package=rgeos>.
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- R Development Core Team (2012) *R: A Language and Environment for Statistical Computing*, Vienna, Austria. Available at: <http://www.R-project.org/>.