GLAECONOMICS

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Defining and measuring metropolitan regions

By **Alan Freeman** (GLA Economics)

Transport for London

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For more information about this publication, please contact:
GLA Economics
telephone 020 7983 4922
email glaeconomics@london.gov.uk

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Contents

This note assesses the range of options considered by GLA Economics for defining a geographic boundary for London that will permit robust comparisons with other cities for economic purposes.[1]

Why London needs a common standard

London, like many cities, requires an international standard to compare itself with other cities. At present the variation in estimates, from different suppliers, of such basic indicators as population, area, output, and employment, is greater than the variation between cities within each suppliers' estimates.[2]

London cannot just create its own standard. It therefore works bilaterally with other cities, notably Paris, multilaterally with BAK Basle and the METREX network, and through international agencies notably Urban Audit and OECD to seek an agreed harmonized standard based on sound economic and geographical principles.

There are three main approaches to defining the economic boundaries of cities, which share many features in common:

(1) The US Metro area system – the statistical system used for defining urban areas in the USA.

(2) GEMACA project – a collaborative project covering a number of European cities.

(3) Urban Audit – the approach developed by Eurostat, the EU's statistical organisation.

The common features of all three systems are:

(1) A core, which may be defined either as a densely populated area or an area with a high job density.

(2) A 'commuting field' containing people that regularly travel into or communicate with the core for economic purposes, principally work.

These two define a geographical area (the core plus the commuting field) usually referred to as a Functional Urban Area (FUR). In Urban Audit terminology it is called a Larger Urban Zone (LUZ).

There are a 'range' of options for defining the FUR as follows:

(1) The core may be defined using an employment threshold, or a population threshold.

(2) The core may be constructed from 'building blocks' (geographical units) of various sizes. Since the census is the normal source of data used in constructing the core, these units may be quite small.

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[1] We are grateful to Gareth Baker of the GLA's Data Management and Analysis Group for constructing the various Functional Urban Region (FUR) boundaries on the basis of the various definitions set out in this note and for supplying the 2001 census data for the tables.

[2] A. Freeman, 'Measuring and comparing World Cities', GLA Economics Working Paper 9, May 2004.

(3) There are a variety of criteria for deciding which units go into the commuting field.

(4) The FUR itself may be constructed from geographical units of varying size. Since statistics have to be collected using data that is available for these geographical units, they need to be at least NUTS4 (also known as LUA1) or NUTS3 units[3].

This note indicates how sensitive our own statistics are to the selection of one option in preference to another.

Size of core building block

Our initial finding is that it makes a significant difference what size of unit is used as 'building-blocks' to define the core and therefore all comparisons are constructed from a core defined in terms of the smallest practical units – NUTS5 (also known as LAU2), that is, wards.

Choice of employment or population density

We found that no significant difference arose in the final FUR definition as to whether the core was defined using population density or employment density.

Other sources of variation

The areas of variation assessed here are:

(1) What is the threshold density for the core? Five employment densities are considered: 1000, 1500, 1813, 2000 and 2500 jobs per square mile. 1813 jobs per square mile equates in imperial measures with the GEMECA project's metric threshold for employment density of 7 jobs per hectare.
(2) What size units are used for the hinterland/commuting field? Three were considered: NUTS3, NUTS4, and NUTS5.
(3) What are the threshold levels of in- and out- commuting which determine whether a unit should be included in the commuting field? We use a threshold of at least 10 per cent of the resident employed population commuting into the core.

Our research suggests that, as far as London is concerned:

(1) Although core size varies significantly with core threshold densities, FUR size itself varies by a relatively small magnitude over quite a large spectrum of densities.
(2) We have not yet investigated the sensitivity of FUR size to commuting thresholds or to the inclusion of out-commuting; that is there may be 'building-blocks' close to the current delimited boundaries where there are 'commuter-sheds' and from which more commute to some other external core than commute to London.

[3] NUTS are EU statistical areas. The NUTS system is a hierarchical classification system. The highest level (largest) regions are called NUTS1 and contain a number of NUTS2 regions which in turn contain NUTS3 regions and so on down to NUTS5. As an example, London (GLA boundaries) is a NUTS1 region while the London boroughs are NUTS4 regions. For more information: http://europa.eu.int/comm/eurostat/ramon/nuts/home_regions_en.html.

(3) FUR size and position is sensitive to some extent to whether the hinterland is composed of NUTS3, NUTS4 or LAU2 building blocks. This is a significant problem since statutory Eurostat data is available only at NUTS3 level and these are generally accepted as being too large.
(4) Nevertheless, the variation between the various possible FUR definitions is small compared to the difference between each of these definitions, and GLA London. Population estimates for the FUR fall in the range 12,250,000 to 14,000,000, compared with 7 million for GLA London.

Tables 1 and 2 present the range of data derived from adopting varying definitions of the core density.

Table 1: effect of changing core density threshold – summary table

		Employment Density Threshold Level					
Building block		1000	1500	1813	2000	2500	Lowest/ Highest Density
LAU2	LAU2 units in total FUR	1,786	1,736	1,676	1,685	1,613	90%
	Resident population of total FUR	13,310,717	13,017,914	12,766,609	12,729,043	12,407,213	93%
	Workplace employment of total FUR	6,653,364	6,495,638	6,388,281	6,349,001	6,197,473	93%
	Geographic area (sq mi)	5,230	4,913	4,757	4,716	4,355	83%
LAU1 (NUTS4)	LAU1 (NUTS4) units enclosing FUR	83	85	83	82	80	96%
	Resident population of LAU1 units enclosing FUR	12,645,988	12,868,188	12,660,293	12,454,272	12,255,906	97%
	Workplace employment of LAU1 units enclosing FUR	6,253,129	6,404,542	6,304,205	6,228,658	6,138,351	
	Geographic area (sq mi)	4,578	4,263	4,103	4,019	3,732	82%
NUTS3	Number of NUTS3 units enclosing FUR	14	14	14	13	12	86%
	Resident population of NUTS3 units enclosing FUR	13,922,024	13,922,024	13,922,024	13,737,653	12,407,935	89%
	Workplace employment of NUTS3 units enclosing FUR	6,749,705	6,749,705	6,749,705	6,665,789	6,101,368	
	Geographic area (sq mi)	5,855	5,855	5,855	5,838	4,470	76%

Table 2: Details of components of FURs

Core	1000	1500	1813	2000	2500	
Proportion of Total Population in Core	60	57	54	52	45	76%
Proportion of Total Population in Hinterland	40	43	46	48	55	136%
LAU2 units in core	801	722	648	634	521	65%
Resident population of core	7,958,285	7,398,129	6,944,252	6,667,240	5,617,435	71%
Workplace employment of core	4,278,575	4,112,970	3,958,464	3,885,234	3,505,256	82%
Geographic area (sq mi)	698	583	514	478	360	52%
Enclaves						
LAU2 units in core enclaves	17	16	19	17	22	129%
Resident population of core enclaves	100,005	176,569	199,691	172,928	236,787	237%
Workplace employment of core enclaves	21,346	35,509	36,904	31,151	50,806	238%
Geographic area (sq mi)	29	32	29	22	30	103%
Commuting hinterland						
LAU2 units in commuting area	935	953	964	980	1,017	109%
Resident population of commuting area	5,055,000	5,266,575	5,453,724	5,650,236	6,336,820	125%
Workplace employment of commuting area	2,210,585	2,154,288	2,199,241	2,200,318	2,410,102	109%
Geographic area (sq mi)	4,405	4,194	4,106	4,099	3,869	88%
Commuting hinterland enclaves						
LAU2 units in commuting area enclaves	50	61	64	71	75	150%
Resident population of commuting area enclaves	297,432	353,210	368,633	411,567	452,958	152%
Workplace employment of commuting area enclaves	164,204	228,380	230,576	263,449	282,115	172%
Geographic area (sq mi)	127	136	138	139	126	99%

Note: Enclaves are totally enclosed areas within the urban core / commuting hinterland that do not reach the employment density/commuting threshold definitions of these areas as appropriate.

Chart 1 compares the GLA region with the Functional Urban Region given by GEMACA assumptions – using a core defined on the basis of 1813 jobs per square mile, and using NUTS4 geographical units to define the hinterland. For comparison, it also provides two further definitions:

(1) the proposed Travel to Work Area for London based on 2001 census data which currently includes small non-contiguous islands outside of the main area of the TTWA.
(2) The London Metropolitan Area – GLA London, together with the 'Outer Metropolitan Area' a longstanding definition of the geographical extent of the London economy first defined in the 1960s.

Table 3 summarises the population and workforce employment corresponding to both definitions, using census 2001 data.

Chart 1: London Maps

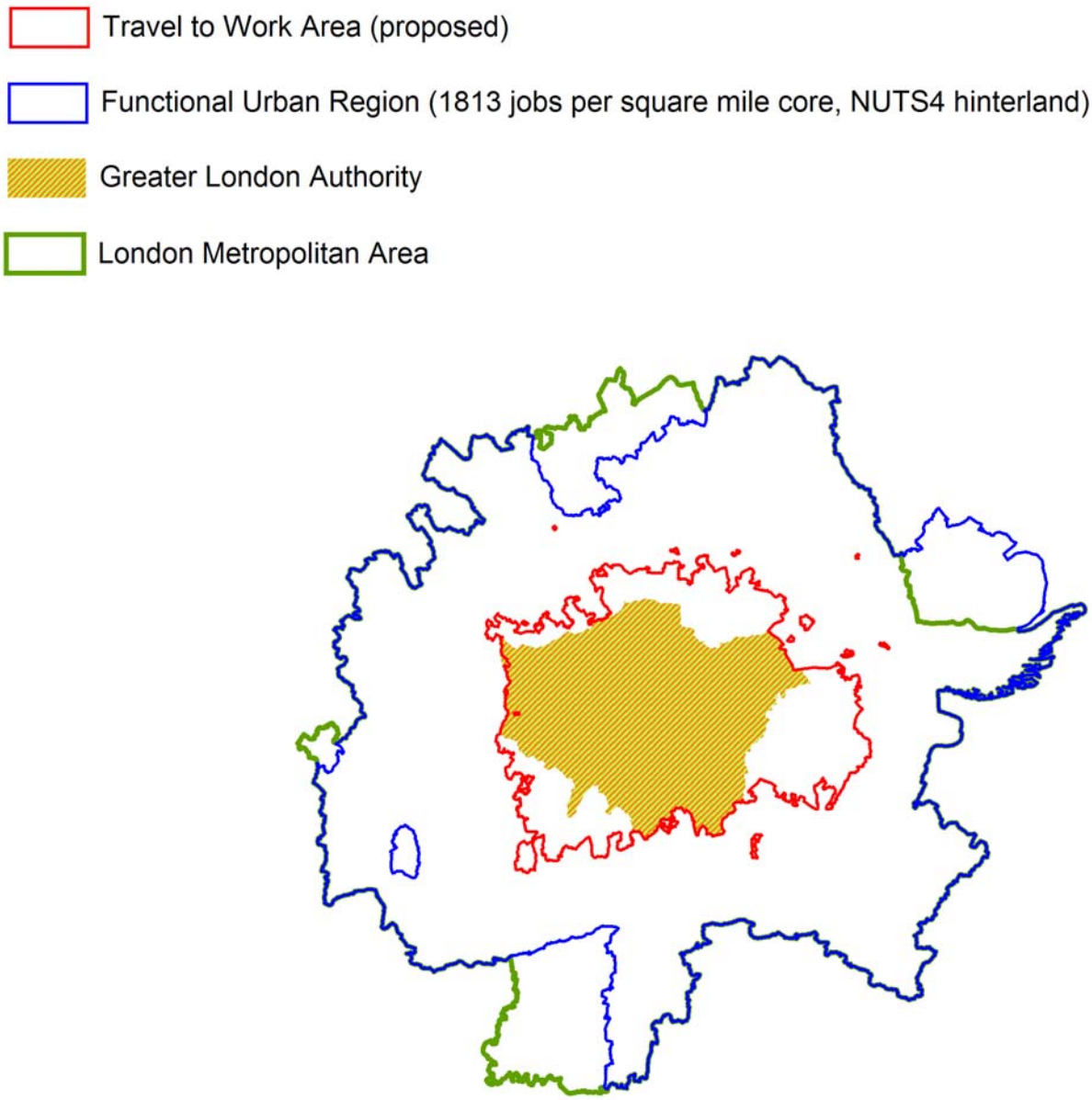

Table 3: Summary of populations and workforces

	Population	Workforce Employment
GLA London	7,172,091	3,805,655
GEMACA London FUR	12,660,293	6,304,205
London Metropolitan Area	13,073,954	6,528,116
London Travel-to-work Area	8,214,980	4,191,014

Conclusion

Our analysis indicates that London's functional urban region extends well beyond the administrative boundaries of London as given by the area covered by the Greater London Authority. This is not a surprising conclusion given what we all know about the extent of commuting into, and increasingly out of, London for work. Other approaches such as the proposed new Travel to Work Area for London and the longstanding London Metropolitan Area concept reach similar conclusions about how London's economic and social reach extends into the surrounding South East and East of England regions. Indeed, a striking conclusion is how similar are the geographic extents of our modern definition of London's functional urban region and the London Metropolitan Area concept which was first defined over 40 years ago. It is perhaps remarkable how well the London Metropolitan Area definition has withstood the passing of the years given how massive the economic and social changes in London have been over this period.

GLAECONOMICS

Greater London Authority
City Hall
The Queen's Walk
London SE1 2AA

Tel: 020 7983 4922
Fax: 020 7983 4137
Minicom: 020 7983 4458
Email: glaeconomics@london.gov.uk

www.london.gov.uk/mayor/economic_unit

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