The GLA's interim metro area dataset

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Abstract

This paper reproduces, in citable form and, for scholarly purposes, the report of the same name produced by the author for the Greater London Authority. This may be accessed on http://www.london.gov.uk/mayor/economic_unit/docs/wp_21.pdf

GLA Economics prepared its interim dataset on the output and population of 35 European cities, for use within the GLA group when London is benchmarked against these cities.

The need for this dataset arose because there is no agreed standard, either worldwide or in Europe, for measuring a city, or even for defining where it begins or ends. Existing estimates differ widely. In a previous working paper, we compared estimates of city productivity growth available from three sources, and found that the differences between these sources were greater than between the cities themselves. These differences affected such basic questions as, for example, whether German cities were growing faster, or slower, than British cities. Economic conclusions about cities in Europe, in short, depend on who provides the data.

Although a number of international agencies are working on this problem, with whom GLA Economics works closely,at the time of publication no agreed standard exists. The GLA therefore prepared this dataset for its own purposes, as a standard against which to judge others and as the basis for its own decisions.

Keywords: City; global city; Functional Urban Region; Larger Urban Zone; Territorial Indicators; Metropolitan Region; pluralism

The GLA's interim metro area dataset

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Introduction

GLA Economics has prepared this interim dataset on the output and population of 35 European cities, for use within the GLA group when London is benchmarked against these cities. Other data indicators are also available on request.

The need for this dataset arises because there is no agreed standard, either worldwide or in Europe, for measuring a city, or even for defining where it begins or ends. Existing estimates differ widely. In a previous working paper[1], we compared estimates of city productivity growth available from three sources, and found that the differences between these sources were greater than between the cities themselves. These differences affected such basic questions as, for example, whether German cities were growing faster, or slower, than British cities. Economic conclusions about cities in Europe, in short, depend on who provides the data.

GLA Economics has taken initiatives to try and rectify this situation. However no single city or country can achieve harmonisation unilaterally. International agreement and co-operation is required between cities and between agencies, to determine an agreed standard for measuring cities based on their economic reality.

A number of international agencies are working on this problem, with whom GLA Economics works closely, notably Urban Audit (UA) which compiles city data for Eurostat from Europe and the accession countries; the territorial indicators group of the Organisation for Economic Cooperation and Development (OECD); and METREX, an urban planning network spanning many European Cities.[2] We also work bilaterally with statistical agencies in other cities, notably Paris, through the programme established by GEMACA (Group for Metropolitan Areas Comparative Analysis), an international project which has published economic boundaries for a number of *Functional Urban Regions* (see Section 3) corresponding to major European cities.[3]

Some progress has been made. Urban Audit II, the second phase of the Urban Audit programme, has produced a dataset covering 258 cities and three years – 1991, 1996 and 2000.[4] However UA has adopted city definitions which render this data unsuitable for economic comparisons (see Box 1). It uses, in general, the current administrative-political boundary of each city. This does provide policy-makers and citizens with measures that they can use to assess the economic situation, and trends, of their own particular administrative entity. However these boundaries were frequently, if not always, established many years ago,

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[1] *Measuring and Comparing World Cities*, Working Paper 9, London: Greater London Authority, May 2004. <www.london.gov.uk/mayor/economic_unit/docs/workingpaper_09.pdf>

[2] See for example appendix 2 of this paper which reproduces GLA economics' submission to Urban Audit.

[3] http://www.iaurif.org/en/doc/studies/cahiers/cahier_135/index.htm

[4] http://www.urbanaudit.org/. See particularly "Cities and the Lisbon agenda: Assessing the performance of cities" http://www.urbanaudit.org/Cities%20and%20the%20lisbon%20agenda.pdf for comparison with the conclusions of this report.

in some cases in the nineteenth century, and no longer correspond to the economic reality of the city.[5]

Box 1: NUTs and FURs: defining city limits

In the forties film *Passport to Pimlico*, a London Street finds it is part of Burgundy by ancient treaty, and sets itself up as an independent country. The residents set up border controls and customs and eventually even lend the UK money to pay off its debts.

In reality the boundary of a city is not defined by a political decision or a treaty. A city is defined by what people do in it. Many live there – but others travel there, to work, to eat, to shop, or just visit. As time goes on, they travel farther and farther. Economically, a city is an interlocking network of places connected by travel, work, and leisure. This makes it harder to define where it starts and ends.

In the USA, where a more consistent approach to the definition of a city has been adopted, the boundaries of cities or, as is technically termed, a Metropolitan Area, are defined essentially as an urban *core* – a densely settled area – together with all the neighbouring areas from which people travel into the core, or to which people travel from out of the core. The combination of core and commuter zones is known as a *Functional Urban Region* (FUR)

The city definitions in the GLA Economics dataset attempt to reproduce this conception of a city, but do not apply the degree of statistical exactitude used in the USA. They are a first approximation to what will in future be possible, when statistical resources are available and consistent definitions are adopted, at a European Level. The cities are defined in terms of groups of 'building blocks' known as NUTS (Unified Territorial Nomenclature) areas which provide this first approximation.[6]

Urban Audit recognises the necessity for a city definition based on economic reality and has begun to collect data for what it terms the *Larger Urban Zone* (LUZ) of a city. However in practice, so far, the LUZ remains a hybrid mixture of administrative and economic definitions of a city. [7] The availability of LUZ data is also still patchy at the time of writing. In summary, the weaknesses in this data, although Urban Audit is working to correct them, render them unsuitable for comparing city performance.

For this reason it remains the case that there is no single consistent and comparable source of data on cities in Europe which permits valid economic comparison or benchmarking. The GLA city dataset has been commissioned as an interim measure because the GLA group itself must take decisions based on the best available information at the time. A subset of this data,

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[5] Thus, for example, the definition of Birmingham adopted by Urban Audit is the City of Birmingham, which is now only one of seven of the local authority districts (contained in five NUTS3 areas) which make up our definition of Birmingham. This latter consists of the West Midlands Metropolitan county, which previously existed as an administrative entity until the 1980s.

[6] NUTS is a hierarchical system covering the whole of Europe in which successively smaller sub-areas have successively larger numbers – thus London is a NUTS1 area, Inner and Outer London are NUTS2 areas, and the boroughs are NUTS4 areas. Eurostat, the official statistical agency of the European Union, provides harmonized statistical information for all European and Accession countries at NUTS3 level.

[7] For a more detailed discussion of these questions see GLA *Towards a Common Standard: Measuring and Comparing European and American Cities,* Working Paper 13, London: Greater London Authority, July 2005 http://www.london.gov.uk/mayor/economic_unit/docs/wp13_towards_a_common_standard.pdf

in conformity with copyright restrictions, is made available to the public so that the basis of these decisions can be transparent and so that others can use this data for their own purposes if they so wish.

Box 2: What are Purchasing Power Parities?

Are London workers more productive than Geneva's? This is not such a straightforward question as it seems. Productivity is measured, in the GLA dataset, by dividing the output (GDP) of each city in any given year by the number of hours worked in that year – that is output per hour.

London's output is sold in pounds sterling, and Geneva's in Swiss Francs. In 2000 the pound was worth 2.55 Swiss Francs and in 2005, 2.26 Swiss Francs. As a result, even if there had been no change in what was actually produced in either city, Geneva's GDP was worth 12 per cent more pounds. This does not mean, however, that Geneva's workers became 12 per cent more productive.

A similar problem is that prices in Barcelona, for example, are lower than in London. The same product therefore sells for less. If output is measured purely in the money that it fetches in the market, Barcelona's output will be understated, relative to London's.

In order to correct for such effects, international economists calculate what are called *Purchasing Power Parity* (PPP) measures of output. The simplest example is the *Economist's* 'Big Mac' Index, that measures the relative cost of a Big Mac in every major world city. If we wanted to use this to correct nominal prices, we would divide the output of each city by its Big Mac Index. The output of low-price cities would be corrected upwards (because the index is low) and that of high-price cities would be corrected downwards (because the index is high).

Life is more complicated because cities, fortunately, do not only produce Big Macs. PPP's are calculated using a basket of commodities, with a separate price index for each element of the basket, and with weights that correspond to the amount of that commodity that is usually found in a 'typical' consumer basket. The problem is then to define what should actually be placed in such a basket, and how much of it.

The GLA dataset uses what are called *Producer-based* PPP's, and these differ from the PPPs supplied by Eurostat because the 'basket' is defined by what a city *produces*, not what it consumes. This ensures that if a City specialises in a particular product and sells it at keen prices – as, for example, with business services in London – this competitiveness is recognized and the city is not recorded as having a low output, simply because its products are cheap.

The dataset is not proposed for use as an alternative standard to Urban Audit or other datasets, because it is not itself a fully consistent solution to the problem of city definition. The city boundaries used for this dataset have been determined in discussion with regional and metropolitan agencies and authorities who collaborate with each other through the agency of BAK Basle, the provider of the data. These boundaries represent, in our view, the best judgement currently available.

However, compromises have had to be made: for example, in defining London and Paris. 'Political' or administrative Paris – the central region within the Boulevard Périphérique, which most tourists know contains only three million inhabitants and does not really reflect Paris's true economic weight. It covers only the central part of the wider built-up urban area,

and is more comparable economically to Inner London. Paris is defined in this dataset as Isle-de-France, which contains both administrative Paris and a 12,000 Kilometre-square commuter belt around it. This is a compromise making the best use of the available data. London is defined however as the 1,500 Kilometre-square zone given by the boundaries of Greater London, one-eighth the size of the 'Paris' in this report. As a result London's population is reported here as just over half that of 'Paris' which, on the definition used in this database, is home to 11.4 million people.[8]

The dataset does however have further advantages, which make it useful for benchmarking and comparing cities. Although it covers a more restricted range of indicators than Urban Audit, it provides a continuous dataset covering all years from 1980 to the present for every city, which for the first time has made it possible for us to make some assessment of the way in which Europe's growth trends have changed both over time and space. The Urban Audit dataset is available for three years only and still contains significant gaps.

This dataset also offers a specific measure of output and productivity for better comparisons between cities, which compensates for the effect of both inflation and exchange rate movements in such a way as to allow properly for the specific structure of production and specialisation in each city in the database.

What's in the GLA's dataset?

The GLA dataset includes 34 European cities, ranging in size from Basle, with a 2005 population of 552,000, to Paris with 11.4 million. It currently provides data on 13 demographic and economic indicators, but more are available via our extranet.

The cities, together with the 2005 values of the indicators currently included in the database, are given in appendices 2 and 3. Data covering all years after 1990 are available from the GLA on request.

Population, area and density

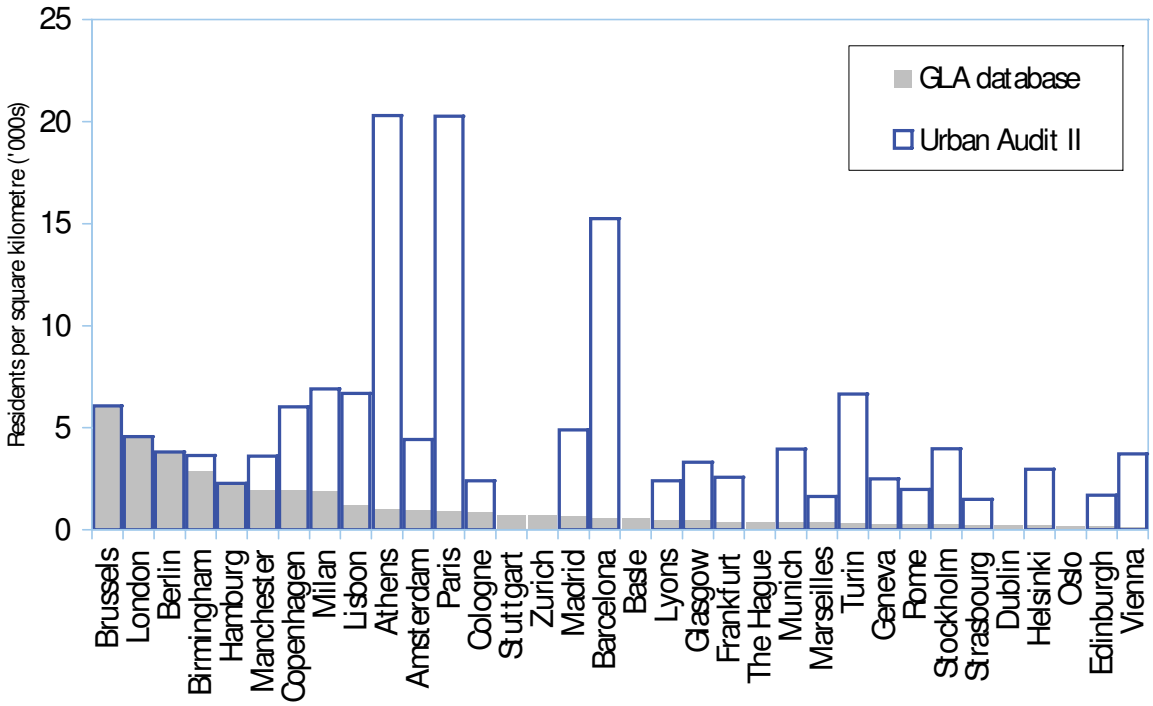
Perhaps the most basic indicator of a city's overall structure is the density of its population. Europe's cities vary enormously in their density of settlement, with London and Brussels at the top of the league.

However, this indicator illustrates just how important it is to define the city in a consistent manner.[9] Within cities, there are areas of very dense settlement and other areas where the population is spread out or is even absent, as with parkland, water or indeed farmland which exists in many cities, including London itself. For this reason, if a city is defined on the basis of its administrative centre within a wider conurbation, the density appears to be completely different, as can be seen from the Urban Audit densities that are included in Chart 1 alongside our own figures.

[8] See Table 1 and the accompanying text for more detail on Paris-London comparisons.

[9] Indeed, another study has concluded that London has a lower population density than Paris, New York, and Tokyo.

Chart 1: Residents per square kilometre in 2001



In general, the wider a city's boundaries are defined, the lower the population density. As an example, as explained in the introduction, Paris is defined by Urban Audit as the administrative city of Paris, which consists essentially of the densely settled area within the 'Boulevard Périphérique'. This contains, however, just over a quarter of the population of the 'Isle de France' used for our own dataset, an enclosing region whose jurisdiction includes Paris itself. Isle de France's 11 million residents are widely recognised as economically strongly linked to that of Paris itself but the area contains a significant extent of rural territory with low population density. In consequence, Urban Audit's 'Paris' has a far higher population density than the GLA's, essentially because it contains much less green space in proportion to the population. Similar discrepancies exist for other cities, most notably Athens and Barcelona.Table 1 illustrates this. This compares the populations of various parts of the Functional Urban Regions of Paris and London, calculated on a comparable basis by GLA Economics using the method evolved by GEMACA.[10]

It can be seen that the FURs of both cities have comparable populations and workforces. Moreover, the density of the London FUR at 912 per square kilometre is much closer to that of Paris at 670 per square kilometre than is suggested by the interim dataset, in which the boundaries of the two cities are not economically comparable.

[10] These figures are provisional and may be subject to revisions: for this reason they should not at present be used for benchmarking purposes but are supplied here to illustrate the impact which city definitions have on benchmarked indicators. In particular they are calculated using Eurostat data which can differ from other sources because of the timing of revisions to the data.

Table 1: Year 2002 population and workforce employment in the London and Paris FUR

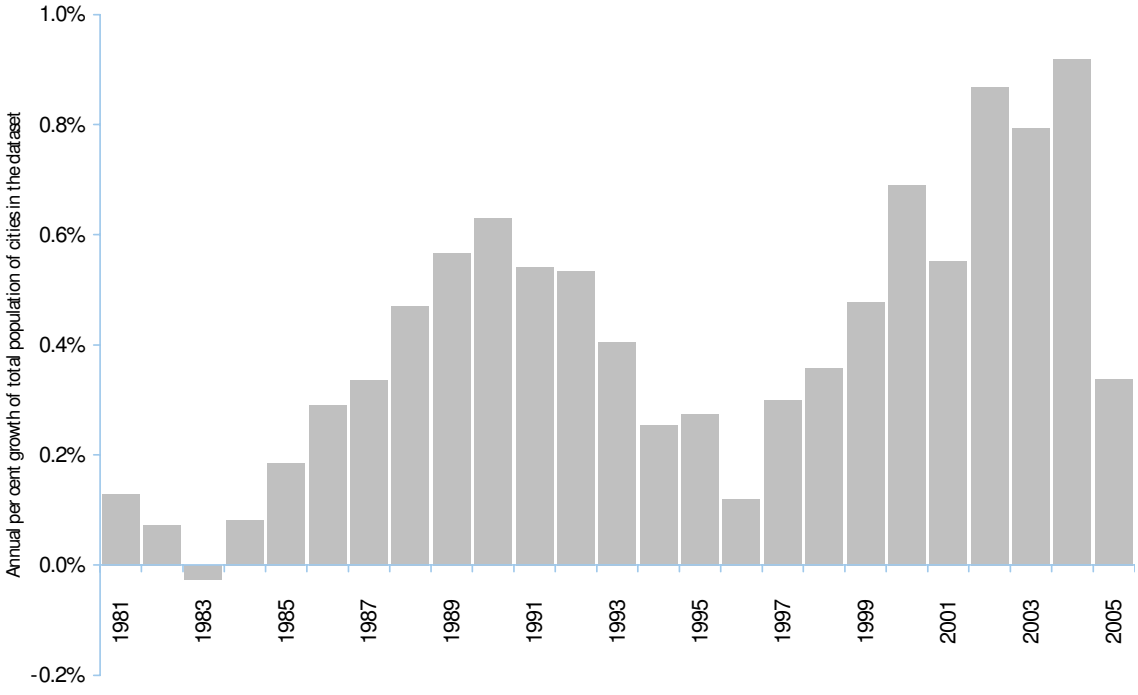
	Resident Population (000s)		Workforce Employment (000s)		Area (Square Kilometres)	
	London	Paris	**London**	Paris	**London**	Paris
Inner London/City of Paris	2,892	2,166	2,485	1,656	321	105
GLA area (No Paris equivalent)	7,371		4,431		1,584	
Hinterland	6,617	9,872	3,358	3,961	13,761	17,768
Functional Urban Region	13,988	12,038	7,789	5,616	15,344	17,873

Source: Annual Business Inquiry and Labour Force Series (London employment), Eurostat (all other data), GLA Economics calculations

Growth figures, studied in the next section, diverge less. This suggests that the inner and outer regions of many of Europe's cities are developing at a similar or related pace. More reliance may therefore be placed on growth data than on absolute numbers, although differences inevitably remain and place limits on the robustness of all our conclusions.

Population and employment

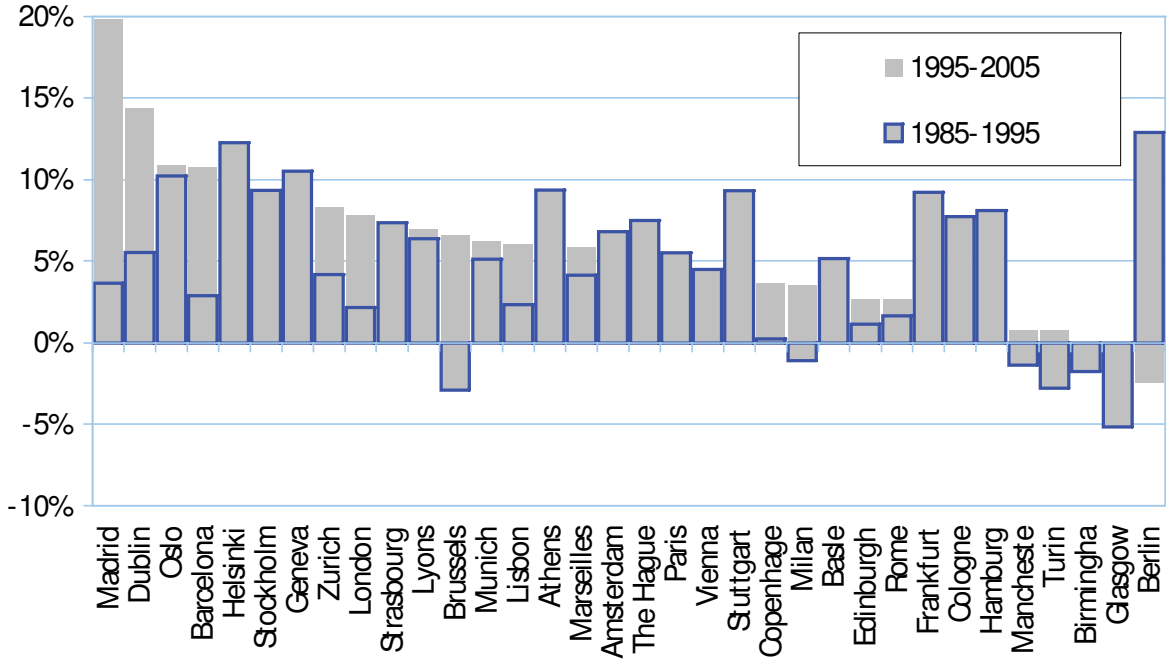
Chart 2: Total city population growth



The population of Europe's cities[11] is growing – in some cases very quickly – and its growth has accelerated in the last decade. Madrid, for example, has grown by approximately 1.3 million people since 1981, a growth of nearly 30 per cent and equal to the population of Edinburgh. The total population of our sample of cities has grown by 10 million since 1980.

The expansion was however far from uniform, either in time or space. Chart 2 shows the annual growth of the total population of the cities in our database. This is rising, and these cities have gained a total of 10 million inhabitants since 1980. But the pace has ebbed and flowed, with peaks in 1990 and 2004 and troughs in 1983 and 1996. However growth has also clearly accelerated. It has been positive since 1983 and was above 0.3 per cent in every year since 1996. Half the population growth has taken place in the eight years since 1997.

Chart 3: Population growth

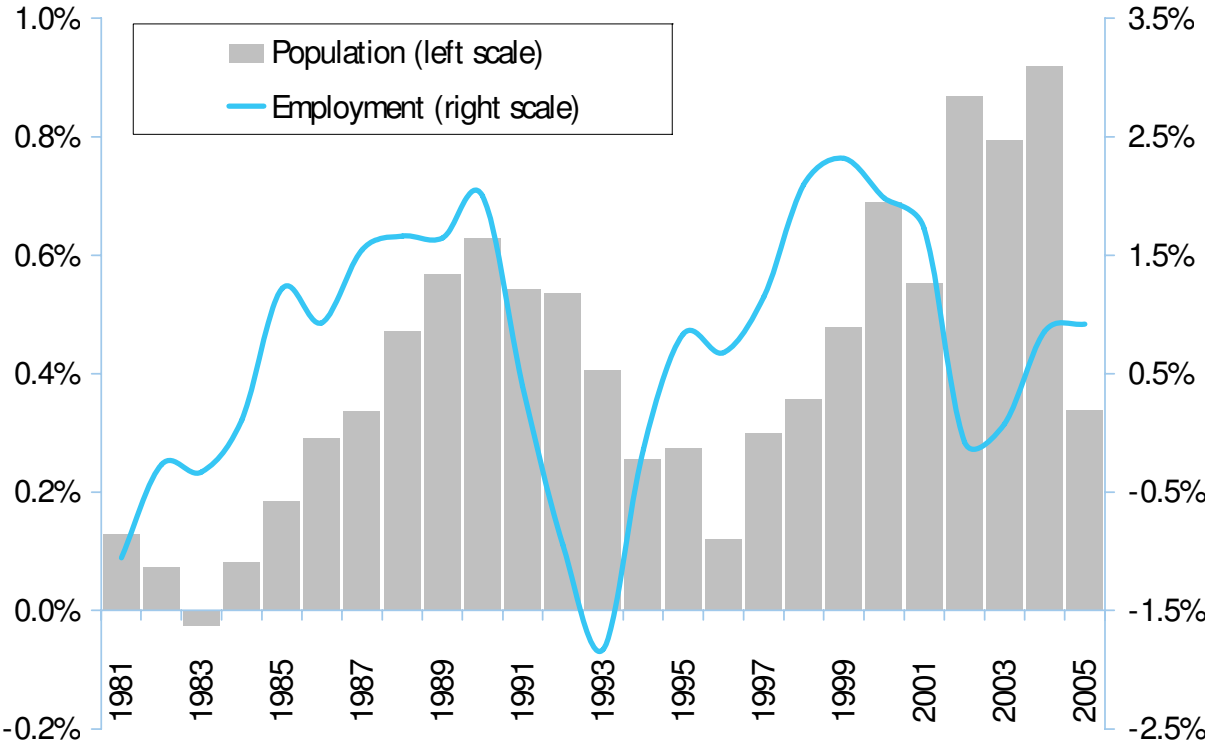


London's vigorous population growth since 1992 is now well known, but the data makes it clear that this growth forms part of a general trend. This trend is, however, geographically uneven, and in the 1990s its geographical locus has shifted, moving decisively away from Germany which led the expansion of the 1980s. Between 1985 and 1995 Berlin, Hamburg, Cologne, Frankfurt and Stuttgart all grew by seven per cent or more. Between 1995 and today none of them exceeded three per cent. France remains a centre of dynamism with Paris maintaining a steady five per cent population growth. The new growth leaders, however, are mainly to be found on the edges of Europe: Madrid and Barcelona, Oslo, Stockholm and Helsinki, Zurich and Geneva, Athens and Dublin. The growth in these cities has been truly prodigious since 1995 with Madrid's population, for example, growing by 20 per cent in ten years.

[11] The 'Europe' of our dataset consists of the European Union countries, excluding the accession countries, but with the addition of Norway and Switzerland.

Employment

Chart 4 Annual per cent growth in population and employment in European cities



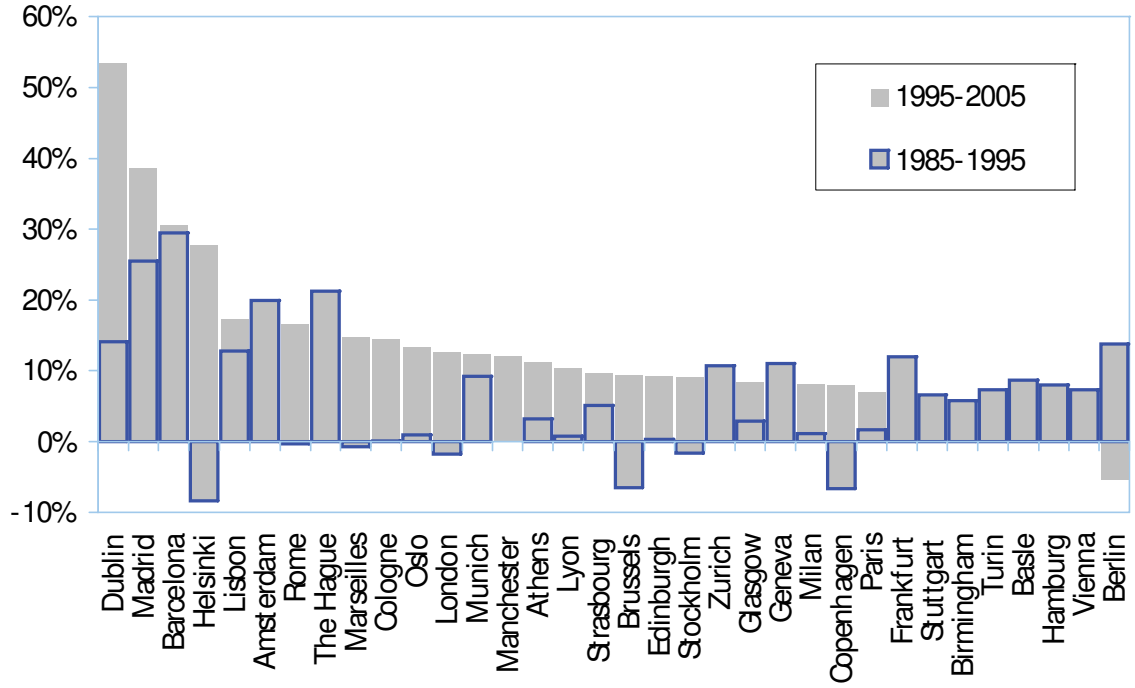
Population growth is linked to job growth, but jobs have generally grown faster than population. Chart 4 shows how employment has changed, set against the background of population growth that was shown in Chart 3. Population growth appears to lag about four years behind job growth. This is confirmed by Table 2, which shows the correlation coefficient between population growth and employment growth for the years 1985-2005, when employment is lagged by 1,2…5 years. There is an 85 per cent correlation between population growth, and employment growth four years earlier.

However some caution is required in interpreting the results. The lagged relation between population and employment appears at the level of aggregate population and aggregate employment, but is not so strong for any individual city. For London, for example, the correlation coefficient is relatively weak for any lag, and for Helsinki it is negative.

Table 2: Correlation between population and lagged employment growth, total all cities in dataset

Correlation coefficient	2-year lag	3-year lag	4-year lag	5-year lag
Total population	69.3%	82.2%	85.4%	70.7%
London	44.5%	41.5%	14.3%	0.7%
Vienna	80.0%	66.5%	37.4%	34.7%
Helsinki	-27.1%	-48.5%	-58.5%	-64.4%

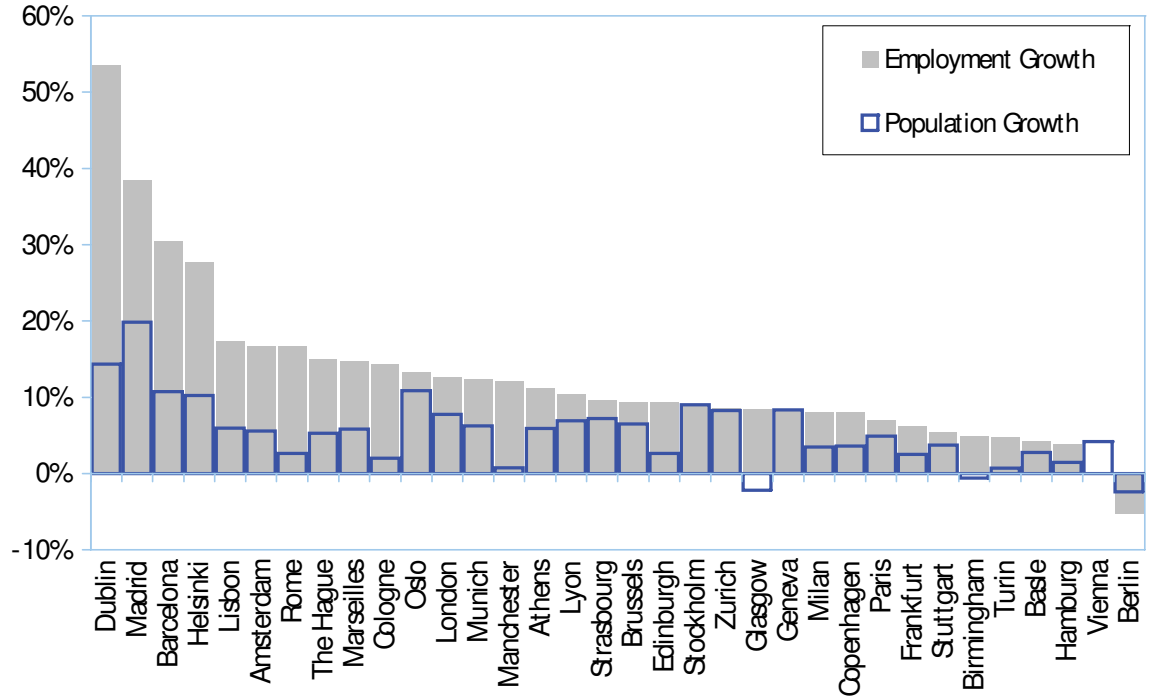
Chart 5: 10-year percentage growth in workforce employment



The geographical pattern of employment growth is not identical to population growth, as Chart 5 shows. On the one hand, several of the high-population growth cities have also seen high employment growth, notably Dublin, Madrid, Barcelona and Helsinki. But relative to their population growth, in comparison with other cities, job growth in Oslo and Stockholm has been relatively slow.

Chart 6 considers this in more detail by comparing employment and population growth. For the highest-growth employment centres (Dublin, Madrid, Barcelona, Helsinki, Lisbon, Amsterdam, Rome), employment growth outstrips population growth, even though this growth includes the period of economic downturn (2000-2002). Where employment growth was less than 12 per cent the picture is mixed. In Stockholm, Zurich and Geneva, population growth is equal to employment growth and in Oslo it is close. At the other extreme, Manchester and Glasgow, which have been losing population, have however been creating jobs. This does not necessarily mean, however, that worklessness is decreasing, since the jobs may be taken by non-residents. It simply means that the city is becoming more of a workplace and less of a residential centre.

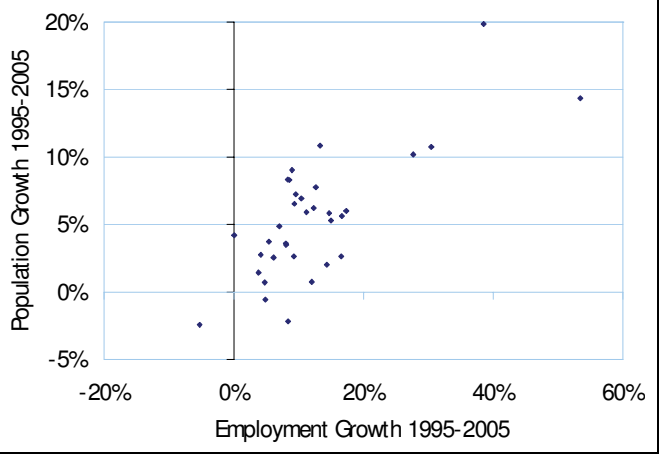
Chart 6: Employment and population growth 1995-2005



The pattern of growth of employment and population has changed structurally during the period. Charts 7 and 8 are scatter-plots showing the relationship between employment growth and population growth during two periods: 1985-1995 and 1995-2005. It can be seen that the two are much more strongly related from 1995 onwards, as is confirmed by the fact that the correlation coefficient between the two over the second period is 75 per cent compared to 16 per cent over the first period.

Chart 7: Employment and population growth 1985-1995

Chart 8: Employment and population growth 1995-2005



These differences have consequences for the jobs ratio – the ratio between the number of people that work in the city, and the number of people that live there.[12] For cities where population is growing faster than jobs, the jobs ratio is falling; for the others it is rising. Clearly, those cities for which the jobs ratio is rising face different sets of problems than those for which it is falling.

Chart 9: Changes in the jobs ratio

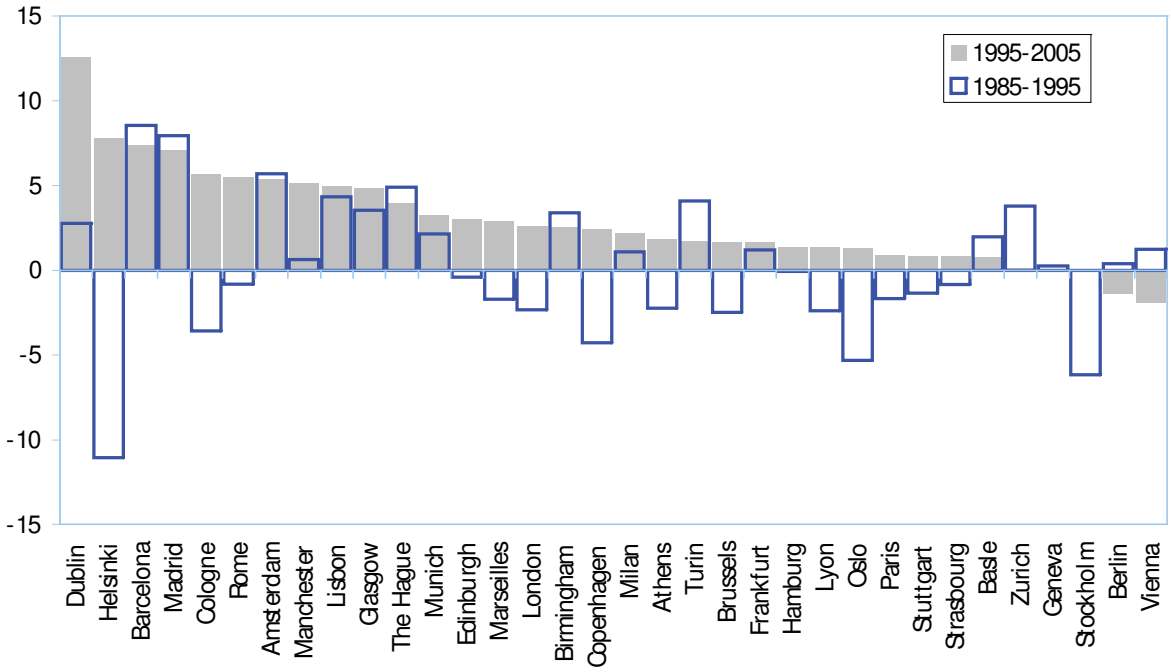


Chart 9 shows that the jobs ratio is in general growing fastest for the same group of cities that are showing the fastest population growth (Dublin, Helsinki, Barcelona, Madrid). Hence although both population and employment are driving the expansion of these cities, employment is growing ahead of population – suggesting that the expansion, at least of these cities, is employment-led. In all cities except Berlin and Vienna, the jobs ratio grew over the last decade.

Chart 9, like Chart 6, suggests that there was a structural break in the pattern of growth of the cities in our sample, somewhere between 1990 and 2000. Thus over the previous decade (1985-1995), the pattern of change of the jobs ratio was quite different, the growth in the jobs ratio being negative for 15 of the 34 cities in our sample. For 14 of these, this trend was reversed – the reversal being particularly strong in some cases, for example Helsinki.

In terms of the absolute level of the jobs ratio[13] more caution is required since again, the city definition strongly affects who is considered as a 'commuter' and who is considered as a 'resident'. However it is worth noting that London at 61 per cent in 2005 was one of the

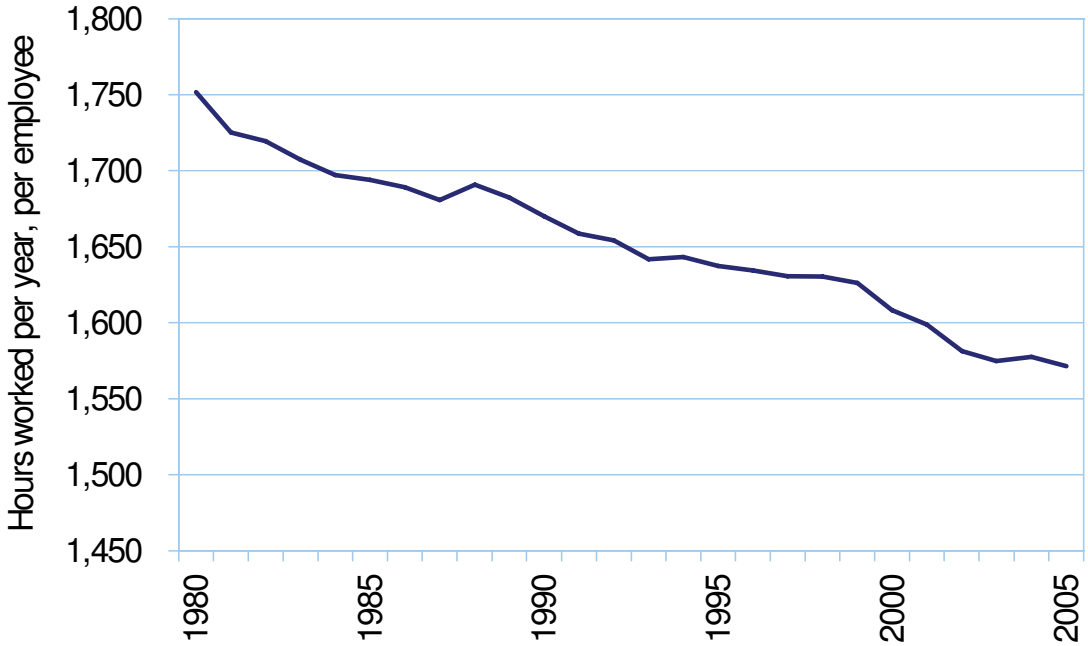
[12] Note that the populations in this ratio are not the same. The figure for workforce jobs includes commuters. This ratio can be thought of as a measure of the 'use' that is being made of the city. If it is high, that means that relatively more of the city's resources are being used for working and relatively fewer for residing.

[13] Not shown as a chart but can be calculated from the data in appendix 3, as the ratio of tables 3 and 4

highest, behind only Brussels and Zürich. This confirms that 'economic London' – including the area covered by the GLA's commuter belt – is significantly larger than the GLA boundary.

Working hours

Chart 10: Hours worked per employee



People in Europe's cities are working less – at least on average. As Chart 10 shows, the total number of hours per employee, on average in the cities in this study, has fallen modestly but steadily from 1,752 to 1,571, a reduction of 10 per cent over 25 years. The data does not tell us the extent to which this reflects working hours, holidays, or changes in the proportion of people working part time.

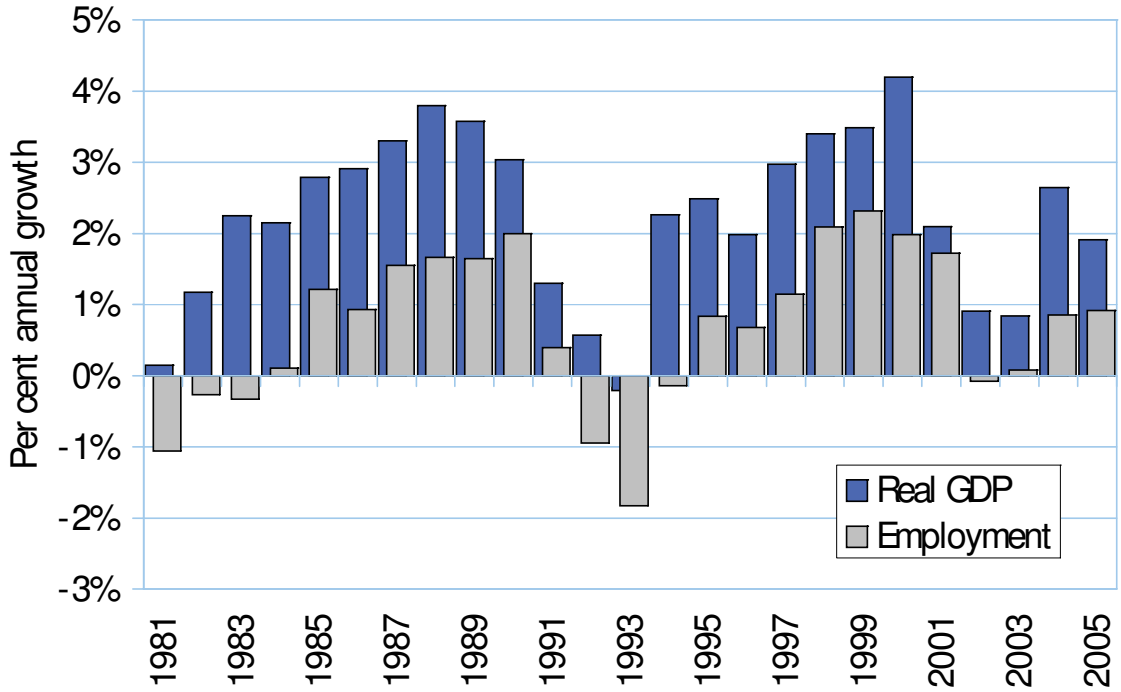
Output

Cities produce. The total output of the cities in our dataset in 2005 was three trillion Euros,[14] equal to 15 per cent of the output of the countries containing them. This proportion has remained remarkably stable over the period of our study, rising from 14.9 per cent in 1980 to 15.2 per cent in 2005 and never rising above or falling below these levels.

However output has fluctuated in time, as Chart 11 shows. The growth rate of output – along with employment – has seen two major periods of expansion and contraction during the period of our study, from 1981 to 1993 and from 1993 until a low point of 2002 for employment and 2003 for output – somewhat later than the low point of London's economy. The difference in growth rates between output and employment (measured in number of employees) is slightly less than the rise in productivity per hour – dealt with in the next section – because of the decline in hours worked per employee, dealt with in the last section.

[14] Throughout this document, output (GVA) is measured in 1997 PPP Euros at constant 2000 prices (see Introduction, Box 2: What are Purchasing Power Parities?)

Chart 11: Annual growth in total output (GVA) of cities in the dataset



Output is obviously concentrated in large cities, as Chart 12 shows. The top seven cities in 2005 were Paris, London, Madrid, Frankfurt, Milan, Rome and Barcelona, and between them these produced 51 per cent of the output in our dataset. Some caution must be exercised for the reasons given in the Introduction, the output of a city is very dependent on the area that is included in its definition.

Nevertheless Chart 12 highlights the significance of the two major Spanish cities, and, more subtly, demonstrates that France and Britain have a more unipolar structure than the other large economies of Europe. In these two countries a single large city greatly exceeds the output of any one other city in the same country whereas in Germany, Italy and Spain, urban output is more evenly distributed between two or more large conurbations.

Output growth has also varied considerably between cities as Chart 13 shows. Like employment, it has followed a different course for some cities in the last decade than in the one preceding it. As with employment and population growth, many of the leaders in growth are to be found on the edges of Europe with the Scandinavian cities Oslo, Helsinki and Stockholm leading the pack after Dublin, followed by Madrid and then London.

Chart 12: 2005 output (GVA)

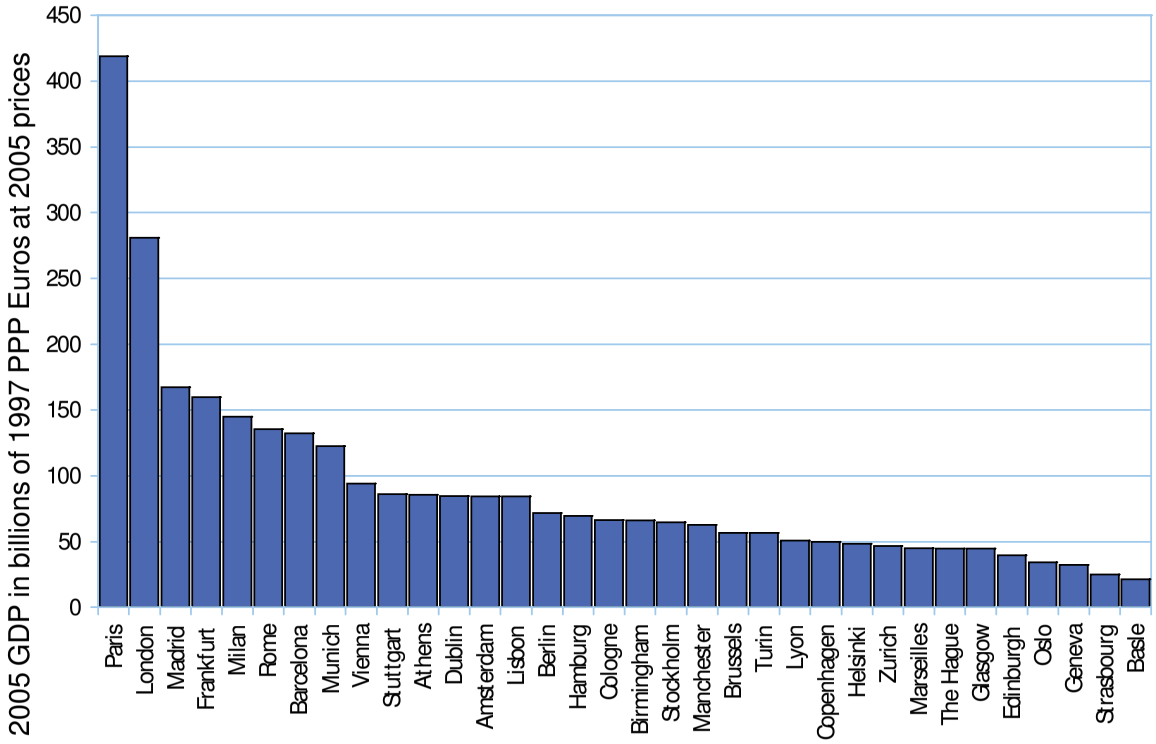
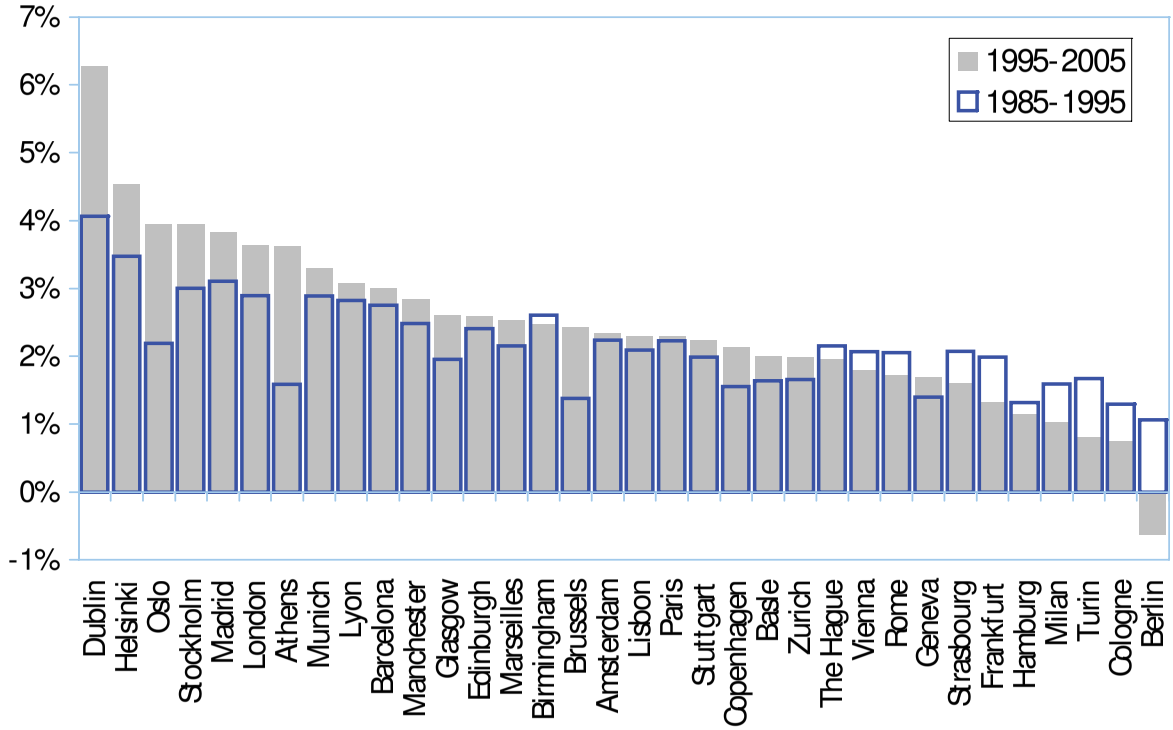


Chart 13: Annual per cent change in output (GVA)

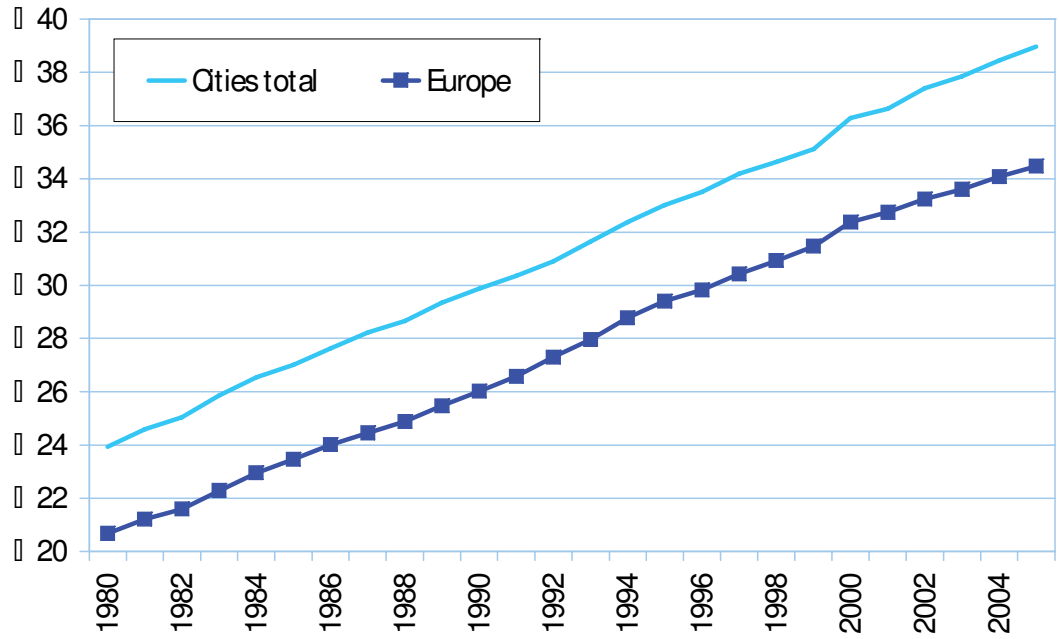


Productivity

Cities are assets: productivity is systematically higher in the cities of our dataset than that of the countries containing them, both collectively and individually. Chart 14 shows productivity overall for the cities in the dataset, measured as throughout this report in 1997 PPP Euros at constant 2000 prices.[15] As the chart shows, productivity is 13-16 per cent higher overall for the cities than for the countries containing them, rising by 2005 to an average of €38.97 for the cities in the dataset and €34.98 for those European countries that contain them.[16] This ratio has been very consistent over the period covered by our data, during which productivity has risen by almost exactly two per cent per year, on average over all the cities, and over all the countries containing them. Productivity has also grown at a relatively steady rate, with annual growth (for all cities considered) never falling below 1.4 per cent and only once rising above three per cent.

However, this does not hold for all cities. In the UK for example, London's productivity is 13 per cent higher[17] than the national average whereas that of Manchester is 12 per cent lower and that of Birmingham is seven per cent lower.

Chart 14: Output per hour in 1997 PPP Euros at constant 2000 prices



[15] This rather difficult phrase (see Introduction, Box 2: What are Purchasing Power Parities?) means that price comparisons between cities were carried out in 1997; in allowing for inflation, however, the prices have been adjusted across the board to show the purchasing power of output in the year 2000.

[16] As previously noted, 'Europe' in this report consists of the European Union countries, excluding the accession countries, but with the addition of Norway and Switzerland.

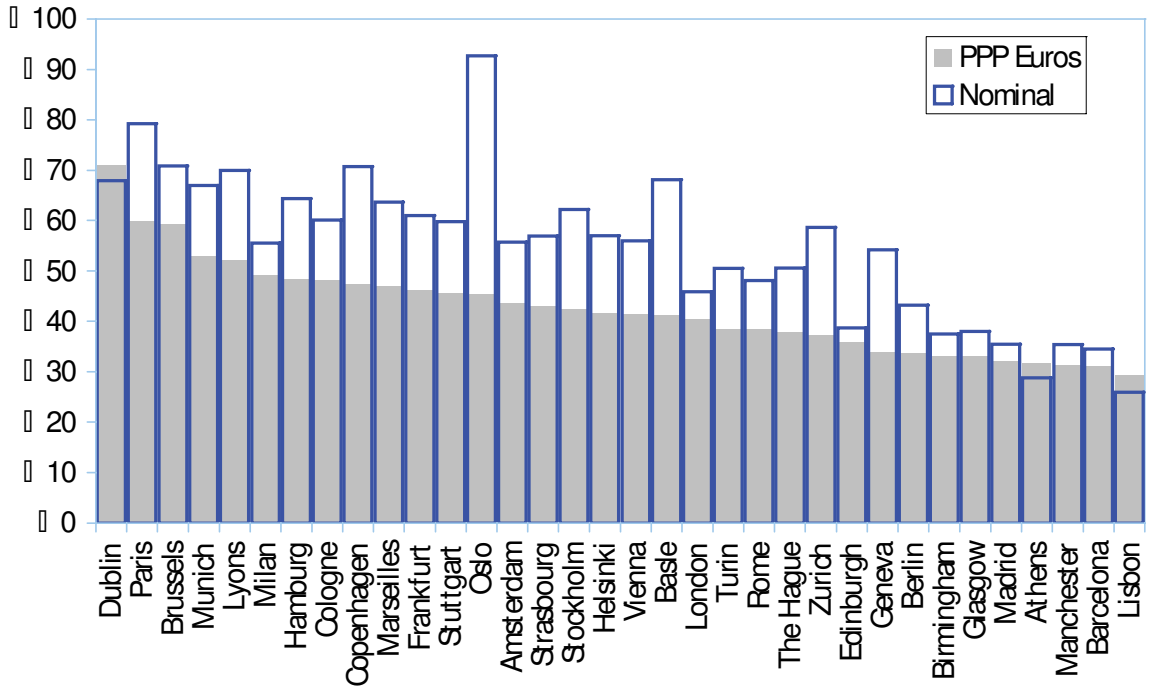
[17] This estimate is lower than other estimates of London's productivity premium based on purely national sources and in terms of non-parity-adjusted output per worker. Such estimates normally fall in the range 25-30 per cent.

This illustrates that it is necessary to interpret the productivity figures with care. It should be recalled that the measure of output we have used in this report is different from the normal one in being adjusted both for variations in local prices, and in using a measure based on the composition of output, rather than the composition of the consumption basket (see Box 2: What are Purchasing Power Parities?)

However as Chart 15 shows there is great variation in productivity levels across the cities within our dataset, ranging from €71 per hour to €29 per hour – respectively 69 per cent above, and 31 per cent below, the average. Europe's most productive city is Dublin, whose output of €71 per hour is over twice that of the least productive city, Lisbon. Paris is the second most productive at €60 per hour and London at €40 per hour is about in the middle of the distribution of cities in our dataset.

Given the lack of completely comparable city definitions in our interim dataset, productivity level comparisons should be treated with extreme caution. However, estimates of productivity growth are probably more reliable (see Chart 16).

Chart 15: Productivity

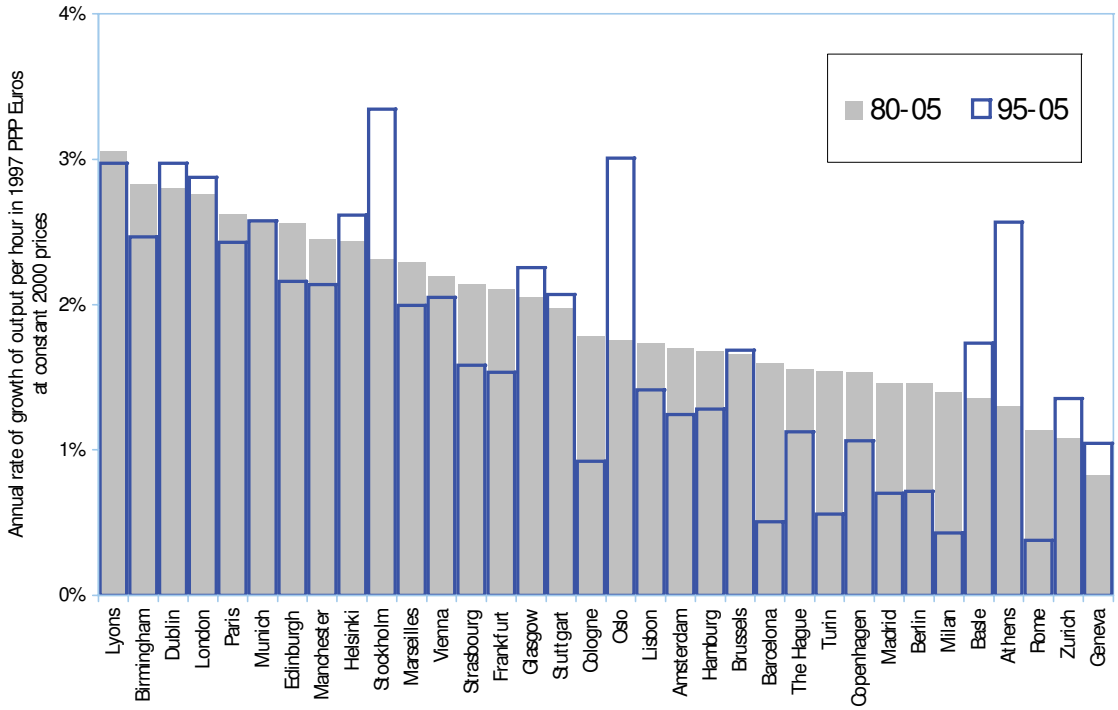


To give some idea of the effect of this PPP adjustment, the second series (outlined in blue) gives output in nominal Euros. It can be seen that nearly all nominal outputs are higher than real output, and this reflects the fact that prices have risen between 2000 and 2005. On top of this, for some cities such as Oslo, the difference between nominal and real output is clearly bigger than for most others. This should be interpreted as showing that the prices of producer goods in Oslo are higher than in other cities.

Productivity level figures as such should be treated with caution because they are sensitive to the definition of the city boundary. Our previous study[18] showed that Inner London, for example, is more productive than London as a whole because it contains a concentration of highly productive industries. Using the boundaries established in Table 1, we find that productivity in Inner London is (to the nearest thousand Euros) €65,000 per worker per year whilst that for GLA London is €59,000 and for the London FUR €56,000, all in year 2003 Euros.

A more important measure, which is less sensitive to the definition of the city boundary, is productivity growth, shown in Chart 16.

Chart 16: Real Productivity Growth



It should be noted that the ranking of productivity growth is not identical with employment or population growth. Four UK cities in this dataset are in the first eight performers in terms of productivity growth, with Birmingham in second place and London in fourth place. Significantly, a number of high-productivity cities such as Brussels and Hamburg, are showing relatively slow growth rates, which suggests that they may have adapted less well as time goes on, or that the previously low-productivity cities are 'catching up'.

[18] *Invest in London: Invest in Britain – Why the 2007 Comprehensive Spending Review must deliver for London, London*: GLA, December 2006, p5. This reports a premium in productivity for London as a whole of 27 per cent, and for Inner London of 38 per cent, which is consistent with the figures reported above for London and Inner London.

What next?

This interim dataset will inform the work of the GLA group as regards city comparisons until superseded. It will however be updated annually through the work of BAK, and at these times it is possible also that there will be retrospective revisions, as improved data becomes available.

References

EEC (2005). *Cities and the Lisbon agenda: Assessing the performance of cities. Brussels: European Economic Commission.* <www.urbanaudit.org/Cities%20and%20the%20lisbon%20agenda.pdf>

Freeman A. (2004), US counties and European NUTS areas: some comparisons: GLA Economics internal note, GLA, London

Freeman, A (2005). *Working Towards a common standard: Comparing European and American cities*. GLA Economics Working Paper 13, London:GLA. <www.london.gov.uk/mayor/economic_unit/docs/wp13_towards_a_common_standard.pdf>

Freeman, A. (2004). *Measuring and Comparing World Cities, Working Paper 9*. London: Greater London Authority. May 2004. <www.london.gov.uk/mayor/economic_unit/docs/workingpaper_09.pdf>

GLA (2006). *Invest in London: Invest in Britain – Why the 2007 Comprehensive Spending Review must deliver for London*. London: GLA, December 2006

Hall P (1999). 'Planning for the Mega-City: a new Eastern Asian urban form?' in Brotchie, J., Newton, P., Hall, P. and Dickey, J. (eds) *East-West Perspectives on 21st Century Urban Development: Sustainable Eastern and Western Cities in the New Millenium*, 3-36. Aldershot: Ashgate.

Hall, P. (2004). Is the Greater South-East a Mega-City Region, paper presented at the Institute of Public Policy Research seminar on Sustainable Development in the South East, 10th December 2004. See http://www.ippr.org

IAURIF (Institute for Urban Planning and Development of the Paris Ile-de-France region), Cahiers de l'Iaurif, No 135. See www.iaurif.org/en/doc/studies/cahiers/cahier_135/index.htm

Mills, E. S. and Hamilton, B.W (1994). *Urban Economics*, 5th ed., New York: Harper Collins.

Office for National Statistics (2004). *Key Statistics for Urban Areas in the South East, London*. Available at: www.statistics.gov.uk/downloads/census2001/ks_urban_south_east_part_1.pdf

Office of Management and Budget (2000a). *Standards for Defining Metropolitan and Micropolitan Areas*: Notice, Federal Register, Wednesday 27 December 2000. Available at: www.census.gov/population/www/estimates/00-32997.pdf

Office of Management and Budget, (2000b). *Alternative Approaches to defining metropolitan and nonmetropolitan areas*: Notice, Federal Register, Vol 63 No 244

Parkinson, M., Simmie, J., Clark, G. and Verdonk, H. (2004) *Competitive European Cities: Where do the core cities stand?* London: Office of the Deputy Prime Minister

Pumain, D., Saint-Julien, T., Cattan, N. and Rozenblat, C. (1992). *The statistical concept of the town in Europe* Statistical document, Theme 3, Series E, Luxembourg: Eurostat

Simmie, J., Blake, N., Brownhill, S., Glasson. J., Holt, R., Marshall, T., Martin, R., Westwood, A., and Wood, P. (2005). *Realising the Full Economic Potential of London and the Core Cities*. Oxford: Oxford Brookes University

Urban Audit (2004a). *Demographic, economic and social data on 258 cities across Europe,* Document 82/2004, 25 June 2004, Luxemburg: Eurostat. <www.urbanaudit.org and www.europa.eu.int/comm/regional_policy/urban2/urban/audit/src/intro.html>

Urban Audit (2004b). *Methodological Handbook*. Luxemburg: Eurostsat. <www.urbanaudit.org and www.europa.eu.int/comm/regional_policy/urban2/urban/audit/src/intro.html>

Appendix 1: Memo to Urban Audit III 'think tank', December 2005

The memo below was submitted to the 'think tank' of Urban Audit when it met on 14th December 2005.

Background

This memo presents suggestions for the next phase of Urban Audit arising from the requirements of the London Development Agency and the Greater London Authority.

These arise from a research programme to promote a common standard for the measurement of economic, social and other indicators about cities worldwide.[19]

London as a world city requires reliable and robust statistical evidence about its performance in comparison with other cities, not only in the UK and Europe but also throughout the world. However there appears to be no recognised standard for such comparisons, even though they are an essential prerequisite for drawing meaningful conclusions to inform urban and regional policy.

Because we require worldwide comparisons, and not comparisons confined to Europe, we began looking at what seemed to us the most developed general systems, most notably the Metro Area system of the USA and also the Canadian system.

Our initial line of investigation was to ask, therefore, whether the US Metro Area methodology, or a related methodology, could be applied in Europe. Although there are many differences specific to Europe, an adequate city measurement methodology from our point of view would have to provide for world wide comparisons and we would hope that Urban Audit would take into account, in framing its UA III programme, the standards either already established such as those of the USA and Canada, and those under investigation, such as the research being proposed by the OECD.

We also feel that much could be achieved in this area by the development of more formalised links and cooperation between the "principal players" who are working on standards for defining cities – i.e. Urban Audit in Eurostat, OECD and the US national authorities – given the long established and well developed US methodology.

We understand that Urban Audit's programme is already at an advanced stage of definition and delivery. However we anticipate that, in conjunction with other participants in the programme, we can find ways to incorporate flexibility and experimentation into its subsequent development, based on the experience of using and producing the useful data that this project has so far developed.

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[19] See Freeman, A (2005), *Working Towards a common standard: Comparing European and American cities*. GLA Economics Working Paper 13, London:GLA, which can be obtained from http://www.london.gov.uk/mayor/economic_unit/docs/wp13_towards_a_common_standard.pdf. See also the presentations at the GLA/LDA seminar on 'Measuring World Cities', which took place on 22 September 2005 (http://www.london.gov.uk/mayor/economic_unit/world_cities.jsp).

Suggestions and requirements

LUZs[20] and the need for functional city definitions

GLA Economics' highest priority is the specification of Functional Urban Regions (LUZs in UA terminology). Our understanding is that the priority of the UA programme to date has been in the provision of City and Sub-city level data, and in providing information on a large number of indicators.

For us the importance of FURs is that they provide for economic analysis on a basis that is independent of existing and to some extent arbitrary administrative boundaries that have been outgrown by the actual development of most European Cities.

We realise and understand that the Urban Audit clientele include city and other administrations who require accurate information about what is happening within their boundaries. However there is a second, at least equally important clientele, being those with responsibility for regional economic policy and specifically urban policy. Without accurate and comparable information on the actual extent of Europe's cities there is, in effect, no sound or robust evidence basis for policy.

We therefore welcomed the decision to include the LUZ level in UA statistics; that is, the definition of a city, economically, as extending to all areas that are economically integrated – principally through commuting - into a region containing a dense 'core' at its centre.

The problem we have, however, is that the method of construction at present used by UA is a hybrid, if we understand it correctly. The 'core' is defined as a political-administrative unit, and the commuting field is defined economically in terms of travel densities.

A consistent definition would use economic or demographic data to construct the core, instead of administrative data.

Because the UA method combines an administrative core with an economic commuting field (and the commuting threshold linking this field to the core has varied or not been applied at all in some cases, see our comments below), we have concluded that the LUZ data , sadly given all the hard work and effort that UA has given to it, does not provide a robust set of comparable economically defined LUZs / FURs for European cities. It neither corresponds consistently to an administrative boundary, nor consistently to an economic boundary.

We would hope that the definition of the UA III project would provide at least for pilot projects to investigate the feasibility of alternative core definitions, perhaps for a more limited set of cities in order to fall within resource constraints.

The method of construction for the core remains to be defined on the basis of discussion and research. It could be defined either, as in the US system, as a densely settled zone or, as in the GEMACA project, for example, as a region of dense employment.

The problem of uniform standards

We were disappointed at the extent to which LUZ definitions varied from location to location and in particular, with the fact that reporting agencies could vary the commuting threshold to

[20] Editorial note: LUZ (Larger Urban Zone) is an Urban Audit term which means essentially the same thing as a Functional Urban Region (see Box 2).

adapt to local circumstance. This could lead to non-comparability. The experience of the US, where there is a wide difference in settlement and transport patterns in the East and the West, has moved in the opposite direction of standardising on a single, continent-wide, threshold of commuting that qualifies a county (in Europe, NUTS3/4 area) for inclusion in the metro area (in Europe, LUZ or FUR). We feel the UA programme would be strengthened by a commitment to try and move towards a single consistent definition that would be applied across the board.

Size of LUZ building block

The fact that LUZs are defined in terms of NUTS3 for most countries, and NUTS4 for some, raises quite serious difficulties concerning the provision of regional statistics. Where LUZs are defined in terms of NUTS3 areas, it is possible for data providers (such as ourselves) to provide a wide range of indicators by using the NUTS3 data published by Eurostat. But for those countries where, perhaps rightly, NUTS4 is the unit of definition, no such generally available data can be used to construct this same wide range of indicators.

As a possible short-term solution for this problem, we suggest UA consider producing a set of standard multipliers, based either on employment or population density, which could be used to derive estimates for NUTS4 data on the basis of publicly available NUTS3 data. Eurostat should consider, in the longer term, providing a wider range of data at NUTS4 level.

Summary of suggestions

(1) a higher priority to LUZ (FUR) statistics

(2) recognition of the problem of compatibility with existing systems such as the US metro system and with existing research such as that of the GEMACA project and the OECD

(3) move away from a hybrid LUZ definition towards a consistent definition based on a core defined either from population densities or from employment densities

(4) recognition of the need for a uniform threshold of commuting across Europe

(5) provision of standard multipliers to convert NUTS3 to NUTS4 data, for those countries using NUTS4 as the building block for city definitions.

(6) Establishment of a formal network between Eurostat, OECD and the US national statistical authorities to cooperate on developing a widely accepted and socio-economically based standard for defining cities. Other interested parties such as GLA Economics, BAK and the GEMECA project could be invited to participate in such a network built around these three key organisations.

Appendix 2: Geographic definition of metropolitan regions available in the International Benchmarking Database (IBD) 2006

IBD Region Notation	Metropolitan Region	Geographical Definition	Official NUTS Codes
Bruxelles / Brussels	Brussels	Nuts1=2=3	BE1
København	Copenhagen	København og Frederiksberg kommuner+ Københavns amt	DK001 + DK002
Region Stuttgart	Stuttgart	LK Esslingen + LK Göppingen + LK Ludwigsburg + SK Stuttgart + LK Böblingen + LK Rems-Murr Kreis	DE113 + DE114 + DE111 + DE112 + DE116 + DE117 + DE118 + DE141 + DE142
Region München	Munich	LK Freising + LK Erding + LK Eichstätt + SK Ingoldstadt + LK Neuburg-Schrobenh. + LK Pfaffenhofen a. d. Ilm + SK München + LK München + LK Starnberg + LK Dachau + LK Fürstenfeldbruck + LK Ebersberg	DE257 + DE252 + DE253 + DE258 + DE254 + DE259 + DE255 + DE25B + DE25C + DE251 + DE256 + DE25A + DE241 + DE248 + DE245 + DE24B + DE242 + DE246
Berlin	Berlin	Nuts1=2=3	DE3
Hamburg	Hamburg	Nuts1=2=3	DE6
FrankfurtRheinMain	Frankfurt	SK Darmstadt + SK Frankfurt am Main + SK Offenbach + SK Wiesbaden + LK Bergstrasse + LK Darmstadt-Dieburg + LK Gross-Gerau + LK Hochtaunuskreis + LK Main-Kinzig-Kreis + LK Main-Taunus-Kreis + LK Odenwaldkreis + LK Offenbach + LK Rheingau-Taunus-Kreis + LK Wetteraukreis + LK Giessen + LK Limburg-Weilburg + LK Vogelsbergkreis + SK Mainz + SK Worms + LK Alzey-Worms + LK Mainz-Bingen + SK Aschaffenburg + LK Aschaffenburg + LK Miltenberg	DE711 + DE712 + DE713 + DE714 + DE715 + DE716 + DE717 + DE718 + DE719 + DE71A + DE71B + DE71C + DE71D + DE71E + DE721 + DE723 + DE725 + DEB35 + DEB39 + DEB3B + DEB3J + DE261 + DE264 + DE269
IHK-Köln	Cologne	SK Köln + LK Erftkreis + LK Oberbergischer Kreis + SK Leverkusen + LK Rheinisch-Bergischer Kreis	DEA23 + DEA27 + DEA2A + DEA24 + DEA2B
Attiki	Athens	Nuts1=2=3	GR3
Barcelona	Barcelona	Nuts3	ES511
Comunidad de Madrid	Madrid	Nuts1=2=3	ES3
Bas-Rhin	Strasbourg	Nuts3	FR421
Rhône	Lyon	Nuts3	FR716
Ile de France	Paris	Nuts2	FR10
Bouches-du-Rhône	Marseilles	Nuts3	FR824
Greater Dublin Area	Greater Dublin Area	Dublin + Mid-East Ireland	IE021 + IE022
Turin	Turin	Nuts3	TIC11
Milan	Milan	Nuts3	ITC45
Lazio	Rome	Nuts2	ITE4
Gelderland	The Hague	Nuts2	NL22
Noord-Holland	Amsterdam	Nuts2	NL32
Lisbon	Lisbon	Nuts2	PT17
Uusimaa	Helsinki	Nuts3	FI181
Stokholm	Stockholm	Nuts1=2=3	SE01
Greater London	Greater London	Nuts1	UKI
Greater Manchester	Greater Manchester	Nuts2	UKD3
Metropolitan Glasgow	Glasgow	East Dunbartonshire and West Dunbartonshire, Glasgow City, Inverclyde and East Renfrewshire and Renfrewshire, North Lanarkshire, South Lanarkshire	UKM31,UKM34, UKM35,UKM36, UKM38
Metropolitan Edinburgh	Edinburgh	Clackmannanshire and Fife, East Lothian and Midlothian, Scottish Borders, City of Edinburgh, Falkirk, West Lothian	UKM22, UKM23, UKM24, UKM25, UKM26, UKM28
West Midlands of England (Nuts2)	Birmingham	Nuts2	UKG3
Zürich	Zürich	Nuts3 (Canton)	
Bassin Lémanique	Genève	Canton Genève + Canton Vaud	
Nordwestschweiz	Basle	Canton Basle-Stadt + Canton Basle-Landschaft	
Oslo og Akerhus	Oslo	Nuts2	NO01
Ostösterreich	Vienna	Nuts1	AT1

Appendix 3: Summary tables

Table 1: Employment and population in 2005	Area, Square Kilometres	Population, Thousands	Persons in Employment, '000s	Employment per 1,000 people	Hours worked per employee per year
Amsterdam	2,659	2,607	1,491	57	1,397
Athens	3,808	3,993	1,581	40	1,831
Barcelona	8,241	5,259	2,576	49	1,770
Basle	996	552	339	61	1,661
Berlin	891	3,387	1,538	45	1,491
Birmingham	899	2,586	1,293	50	1,656
Brussels	161	1,010	668	66	1,538
Cologne	2,544	2,164	1,135	52	1,399
Copenhagen	623	1,215	730	60	1,556
The Hague	4,989	1,976	930	47	1,368
Edinburgh	8,233	1,416	718	51	1,656
Frankfurt	13,375	5,292	2,642	50	1,447
Geneva	3,494	1,085	611	56	1,682
Glasgow	3,701	1,752	877	50	1,656
Greater Dublin Area	6,986	1,613	798	49	1,612
Greater London	1,584	7,450	4,513	61	1,656
Greater Manchester	1,286	2,546	1,295	51	1,656
Hamburg	755	1,733	1,051	61	1,472
Helsinki	6,366	1,349	767	57	1,637
Lisbon	2,901	3,594	1,861	52	1,664
Lyon	3,249	1,664	732	44	1,429
Madrid	7,995	6,008	3,167	53	1,773
Marseilles	5,088	1,915	719	38	1,440
Milan	1,983	3,851	2,018	52	1,568
Munich	7,547	2,884	1,725	60	1,445
Oslo	5,372	1,029	608	59	1,343
Paris	12,012	11,415	5,145	45	1,461
Rome	17,236	5,285	2,446	46	1,552
Stockholm	6,490	1,882	1,041	55	1,578
Strasbourg	4,755	1,075	427	40	1,477
Stuttgart	3,654	2,663	1,424	53	1,420
Turin	6,830	2,237	1,009	45	1,568
Vienna	23,554	3,480	1,584	46	1,541
Zürich	1,729	1,273	819	64	1,649

Table 2: Output and productivity in 2005	Nominal GDP			Real GDP at prices of 2000				
	In Nominal dollars at current exchange rates			Whole City		Per Capita		Per Hour
	City-Wide, millions of dollars	per capita, dollars	per hour, dollars	millions of PPP Euros of 1997	Millions of PPP Dollars of 1997	PPP Euros of 1997	millions of PPP Dollars of 1997	PPP dollars of 1997
Amsterdam	116,019	44,500	55.71	84,280	90,624	32,326	34,760	43.51
Athens	83,340	20,871	28.79	85,622	92,067	21,443	23,056	31.81
Barcelona	157,360	29,923	34.51	132,373	142,336	25,172	27,066	31.21
Basle	38,390	69,553	68.10	21,643	23,273	39,213	42,164	41.28
Berlin	99,057	29,244	43.19	71,847	77,255	21,211	22,808	33.69
Birmingham	80,260	31,033	37.47	66,095	71,070	25,556	27,480	33.18
Brussels	72,744	72,018	70.81	56,650	60,914	56,085	60,307	59.30
Cologne	88,828	41,054	60.08	66,356	71,351	30,668	32,977	48.26
Copenhagen	80,234	66,026	70.67	50,078	53,848	41,210	44,312	47.43
The Hague	64,373	32,580	50.58	44,742	48,110	22,645	24,349	37.80
Edinburgh	45,957	32,466	38.67	39,549	42,526	27,939	30,042	35.78
Frankfurt	226,465	42,797	60.96	159,966	172,007	30,230	32,506	46.30
Geneva	55,707	51,362	54.18	32,311	34,743	29,791	32,033	33.79
Glasgow	55,198	31,508	38.02	44,562	47,916	25,437	27,351	33.00
Greater Dublin Area	87,361	54,177	67.93	84,800	91,183	52,589	56,547	70.90
Greater London	343,098	46,055	45.90	280,780	301,914	37,690	40,527	40.39
Greater Manchester	75,886	29,804	35.37	62,611	67,324	24,591	26,442	31.38
Hamburg	99,505	57,432	64.34	69,417	74,642	40,066	43,082	48.27
Helsinki	71,483	52,989	56.98	48,530	52,183	35,974	38,682	41.60
Lisbon	80,137	22,295	25.88	84,269	90,612	23,445	25,210	29.27
Lyon	73,178	43,971	70.00	50,788	54,611	30,518	32,815	52.24
Madrid	199,488	33,204	35.52	167,226	179,813	27,834	29,929	32.02
Marseilles	65,914	34,423	63.69	45,138	48,536	23,573	25,347	46.90
Milan	175,863	45,672	55.60	144,735	155,629	37,588	40,417	49.20
Munich	166,769	57,821	66.90	122,718	131,955	42,548	45,750	52.93
Oslo	75,659	73,508	92.65	34,462	37,055	33,482	36,002	45.38
Paris	595,727	52,188	79.23	418,784	450,305	36,687	39,449	59.89
Rome	182,473	34,529	48.07	135,606	145,813	25,660	27,592	38.41
Stockholm	102,260	54,347	62.28	64,635	69,500	34,351	36,936	42.33
Strasbourg	35,920	33,411	56.90	25,238	27,138	23,475	25,242	42.99
Stuttgart	120,849	45,387	59.78	85,850	92,312	32,243	34,670	45.66
Turin	79,943	35,742	50.54	56,584	60,843	25,299	27,203	38.47
Vienna	136,636	39,262	55.97	94,017	101,094	27,016	29,049	41.41
Zürich	79,224	62,234	58.66	46,702	50,217	36,687	39,448	37.18

Table 3: Population '000

of residents	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Amsterdam	2,397	2,422	2,440	2,457	2,464	2,468	2,475	2,486	2,503	2,518	2,535	2,559	2,573	2,587	2,599	2,607
Athens	3,585	3,627	3,664	3,700	3,735	3,770	3,802	3,832	3,858	3,878	3,893	3,904	3,916	3,940	3,973	3,993
Barcelona	4,738	4,654	4,663	4,713	4,744	4,748	4,628	4,666	4,706	4,736	4,805	4,806	4,952	5,118	5,226	5,259
Basle	518	527	530	534	536	537	539	540	540	541	542	543	546	549	551	552
Berlin	3,434	3,446	3,466	3,475	3,472	3,471	3,459	3,426	3,399	3,387	3,382	3,388	3,392	3,388	3,388	3,387
Birmingham	2,618	2,619	2,616	2,615	2,604	2,601	2,600	2,586	2,579	2,573	2,560	2,568	2,576	2,578	2,579	2,586
Brussels	960	951	950	949	952	948	951	953	954	959	964	978	992	1,000	1,007	1,010
Cologne	2,060	2,076	2,092	2,102	2,110	2,121	2,125	2,131	2,133	2,138	2,143	2,153	2,158	2,158	2,164	2,164
Copenhagen	1,152	1,154	1,157	1,159	1,165	1,173	1,182	1,188	1,193	1,199	1,205	1,209	1,211	1,212	1,212	1,215
The Hague	1,817	1,829	1,840	1,851	1,865	1,876	1,886	1,896	1,907	1,919	1,934	1,949	1,960	1,967	1,972	1,976
Edinburgh	1,363	1,364	1,365	1,369	1,374	1,379	1,379	1,381	1,384	1,387	1,392	1,396	1,397	1,400	1,412	1,416
Frankfurt	4,940	5,010	5,087	5,125	5,134	5,159	5,179	5,189	5,198	5,217	5,239	5,257	5,277	5,280	5,294	5,292
Geneva	960	969	977	984	994	1,001	1,001	1,005	1,011	1,019	1,029	1,039	1,050	1,063	1,075	1,085
Glasgow	1,825	1,819	1,810	1,803	1,799	1,791	1,781	1,772	1,766	1,759	1,751	1,750	1,746	1,745	1,747	1,752
Dublin	1,330	1,351	1,371	1,385	1,393	1,410	1,406	1,434	1,456	1,478	1,499	1,521	1,535	1,561	1,582	1,613
London	6,799	6,829	6,829	6,845	6,874	6,913	6,974	7,015	7,066	7,154	7,237	7,308	7,355	7,388	7,429	7,450
Manchester	2,546	2,554	2,548	2,545	2,536	2,527	2,514	2,503	2,499	2,489	2,487	2,516	2,514	2,531	2,539	2,546
Hamburg	1,652	1,669	1,689	1,703	1,706	1,708	1,708	1,705	1,700	1,705	1,715	1,726	1,729	1,734	1,735	1,733
Helsinki	1,147	1,162	1,176	1,191	1,207	1,224	1,240	1,258	1,274	1,291	1,305	1,318	1,329	1,338	1,347	1,349
Lisbon	3,299	3,361	3,370	3,375	3,383	3,391	3,401	3,414	3,427	3,445	3,468	3,499	3,534	3,566	3,593	3,594
Lyon	1,517	1,530	1,541	1,546	1,551	1,556	1,561	1,566	1,577	1,587	1,599	1,611	1,631	1,646	1,661	1,664
Madrid	4,947	4,964	4,985	4,998	5,005	5,013	5,025	5,091	5,145	5,205	5,372	5,527	5,719	5,805	5,964	6,008
Marseilles	1,768	1,777	1,788	1,794	1,802	1,809	1,815	1,824	1,834	1,844	1,856	1,872	1,871	1,878	1,909	1,915
Milan	3,739	3,743	3,735	3,731	3,724	3,721	3,728	3,737	3,753	3,758	3,774	3,705	3,721	3,776	3,839	3,851
Munich	2,614	2,641	2,692	2,707	2,708	2,715	2,720	2,713	2,711	2,738	2,776	2,817	2,838	2,859	2,870	2,884
Oslo	880	889	898	907	918	929	941	953	963	975	981	990	1,001	1,011	1,024	1,029
Paris	10,696	10,753	10,793	10,833	10,859	10,884	10,895	10,913	10,946	10,984	11,033	11,078	11,205	11,264	11,362	11,415
Rome	5,130	5,143	5,159	5,157	5,154	5,148	5,142	5,134	5,124	5,117	5,116	5,117	5,146	5,205	5,270	5,285
Stockholm	1,642	1,655	1,670	1,686	1,709	1,726	1,744	1,763	1,783	1,803	1,823	1,839	1,850	1,861	1,873	1,882
Strasbourg	960	969	979	987	995	1,003	1,010	1,017	1,025	1,032	1,040	1,048	1,057	1,062	1,070	1,075
Stuttgart	2,484	2,528	2,559	2,563	2,560	2,567	2,578	2,582	2,587	2,601	2,613	2,634	2,650	2,657	2,664	2,663
Turin	2,241	2,235	2,236	2,236	2,228	2,221	2,222	2,220	2,217	2,214	2,215	2,165	2,172	2,192	2,237	2,237
Vienna	3,246	3,283	3,317	3,338	3,339	3,340	3,344	3,345	3,350	3,360	3,369	3,373	3,385	3,432	3,474	3,480
Zürich	1,151	1,152	1,158	1,162	1,169	1,175	1,179	1,182	1,188	1,199	1,212	1,227	1,241	1,250	1,262	1,273
Total	92,156	92,655	93,151	93,528	93,767	94,024	94,137	94,419	94,756	95,208	95,865	96,394	97,231	98,002	98,903	99,237

Table 4: '000s of employee jobs	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Amsterdam	1,218	1,237	1,253	1,232	1,244	1,278	1,311	1,358	1,403	1,436	1,470	1,502	1,513	1,507	1,489	1,491
Athens	1,394	1,397	1,414	1,359	1,390	1,422	1,397	1,402	1,484	1,497	1,526	1,537	1,502	1,543	1,564	1,581
Barcelona	1,938	1,979	1,953	1,903	1,924	1,975	2,025	2,077	2,149	2,252	2,300	2,357	2,375	2,443	2,487	2,576
Basle	338	345	337	334	331	326	324	323	325	324	329	334	337	338	339	339
Berlin	1,564	1,673	1,648	1,640	1,627	1,623	1,596	1,564	1,553	1,552	1,575	1,571	1,547	1,526	1,538	1,538
Birmingham	1,287	1,238	1,208	1,181	1,201	1,233	1,235	1,248	1,257	1,281	1,282	1,304	1,287	1,288	1,295	1,293
Brussels	641	631	626	628	613	611	608	616	621	630	643	655	654	661	664	668
Cologne	1,006	1,021	1,037	1,020	1,001	992	999	1,008	1,028	1,056	1,095	1,108	1,107	1,096	1,095	1,135
Copenhagen	709	701	687	670	668	676	683	695	709	724	734	746	746	734	729	730
The Hague	750	773	783	789	794	809	831	862	884	904	924	943	948	943	931	930
Edinburgh	702	691	680	669	663	657	683	670	700	681	721	749	703	714	716	718
Frankfurt	2,447	2,511	2,536	2,511	2,498	2,490	2,500	2,501	2,531	2,570	2,640	2,674	2,663	2,632	2,639	2,642
Geneva	581	588	577	570	563	564	566	565	572	582	588	601	609	610	611	611
Glasgow	854	843	830	817	813	809	791	796	833	848	857	898	856	869	874	877
Dublin	473	474	474	487	504	520	557	609	646	685	716	738	744	753	763	798
London	4,261	4,098	3,954	3,825	3,895	4,007	4,059	4,176	4,240	4,418	4,414	4,527	4,437	4,447	4,454	4,513
Manchester	1,263	1,215	1,194	1,173	1,159	1,156	1,194	1,184	1,190	1,238	1,246	1,258	1,269	1,270	1,292	1,295
Hamburg	987	1,018	1,034	1,029	1,026	1,012	1,005	999	1,010	1,023	1,042	1,056	1,051	1,038	1,043	1,051
Helsinki	706	667	626	592	591	600	622	641	665	700	732	751	748	743	749	767
Lisbon	1,548	1,614	1,621	1,602	1,586	1,586	1,617	1,635	1,692	1,723	1,755	1,820	1,826	1,819	1,858	1,861
Lyon	684	673	660	653	658	663	662	669	681	700	718	728	729	725	731	732
Madrid	2,238	2,301	2,309	2,276	2,242	2,286	2,290	2,382	2,481	2,588	2,697	2,802	2,875	2,953	3,047	3,167
Marseilles	626	625	616	618	622	626	624	630	640	655	677	694	706	708	714	719
Milan	1,960	1,958	1,921	1,864	1,853	1,867	1,884	1,883	1,934	1,959	1,968	1,995	2,009	2,005	2,024	2,018
Munich	1,536	1,562	1,581	1,563	1,546	1,536	1,536	1,547	1,578	1,618	1,670	1,721	1,717	1,702	1,707	1,725
Oslo	532	526	523	523	528	537	556	580	605	616	629	627	621	606	607	608
Paris	5,021	5,000	4,881	4,813	4,816	4,808	4,797	4,815	4,892	5,027	5,148	5,185	5,168	5,114	5,138	5,145
Rome	2,151	2,171	2,171	2,121	2,075	2,098	2,102	2,107	2,138	2,157	2,195	2,239	2,305	2,336	2,435	2,446
Stockholm	1,052	1,043	1,011	948	944	955	974	973	1,001	1,030	1,027	1,048	1,048	1,040	1,036	1,041
Strasbourg	383	381	386	384	387	390	391	397	405	414	426	428	429	428	425	427
Stuttgart	1,378	1,406	1,417	1,387	1,359	1,351	1,355	1,358	1,379	1,375	1,442	1,420	1,441	1,431	1,426	1,424
Turin	977	986	974	939	943	963	979	992	985	1,001	1,009	999	996	998	1,010	1,009
Vienna	1,543	1,573	1,581	1,573	1,578	1,584	1,560	1,556	1,550	1,567	1,563	1,564	1,572	1,564	1,573	1,584
Zürich	785	797	781	767	754	754	754	767	777	787	800	819	821	815	815	819
Total	45,535	45,716	45,285	44,457	44,395	44,765	45,068	45,585	46,538	47,617	48,561	49,398	49,359	49,397	49,819	50,276

Table 5: Hours per employee

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Amsterdam	1,515	1,493	1,505	1,496	1,491	1,464	1,483	1,485	1,469	1,470	1,461	1,436	1,414	1,407	1,402	1,397
Athens	1,838	1,837	1,856	1,876	1,847	1,838	1,855	1,840	1,853	1,865	1,844	1,852	1,853	1,844	1,836	1,831
Barcelona	1,819	1,819	1,808	1,803	1,808	1,807	1,792	1,794	1,819	1,799	1,798	1,797	1,777	1,780	1,774	1,770
Basle	1,704	1,681	1,693	1,690	1,708	1,684	1,654	1,646	1,649	1,675	1,674	1,634	1,617	1,628	1,661	1,661
Berlin	1,658	1,645	1,666	1,637	1,637	1,615	1,597	1,585	1,576	1,558	1,556	1,530	1,521	1,518	1,506	1,491
Birmingham	1,767	1,768	1,729	1,723	1,736	1,734	1,733	1,731	1,725	1,713	1,701	1,703	1,684	1,672	1,664	1,656
Brussels	1,610	1,600	1,604	1,565	1,565	1,563	1,561	1,580	1,570	1,557	1,560	1,564	1,570	1,564	1,544	1,538
Cologne	1,548	1,530	1,552	1,522	1,526	1,515	1,498	1,494	1,483	1,462	1,440	1,426	1,414	1,409	1,411	1,399
Copenhagen	1,511	1,499	1,520	1,485	1,552	1,513	1,512	1,527	1,542	1,555	1,568	1,570	1,562	1,550	1,554	1,556
DenHaag	1,505	1,479	1,494	1,486	1,466	1,450	1,465	1,450	1,434	1,425	1,415	1,388	1,371	1,372	1,369	1,368
Edinburgh	1,767	1,768	1,729	1,723	1,736	1,734	1,733	1,731	1,725	1,713	1,701	1,703	1,684	1,672	1,664	1,656
Frankfurt	1,567	1,547	1,568	1,538	1,539	1,524	1,507	1,500	1,494	1,490	1,476	1,466	1,458	1,450	1,459	1,447
Geneva	1,744	1,718	1,716	1,713	1,727	1,709	1,680	1,665	1,675	1,696	1,693	1,659	1,640	1,652	1,682	1,682
Glasgow	1,767	1,768	1,729	1,723	1,736	1,734	1,733	1,731	1,725	1,713	1,701	1,703	1,684	1,672	1,664	1,656
Dublin	1,892	1,865	1,823	1,805	1,809	1,805	1,806	1,765	1,698	1,678	1,677	1,666	1,654	1,634	1,629	1,612
London	1,767	1,768	1,729	1,723	1,736	1,734	1,733	1,731	1,725	1,713	1,701	1,703	1,684	1,672	1,664	1,656
Manchester	1,767	1,768	1,729	1,723	1,736	1,734	1,733	1,731	1,725	1,713	1,701	1,703	1,684	1,672	1,664	1,656
Hamburg	1,581	1,572	1,588	1,559	1,561	1,547	1,531	1,524	1,518	1,518	1,505	1,497	1,489	1,483	1,482	1,472
Helsinki	1,721	1,704	1,718	1,684	1,729	1,737	1,755	1,745	1,723	1,723	1,680	1,659	1,649	1,638	1,656	1,637
Lisbon	1,848	1,770	1,764	1,750	1,735	1,790	1,745	1,710	1,718	1,728	1,680	1,681	1,677	1,654	1,671	1,664
Lyon	1,609	1,601	1,601	1,589	1,583	1,561	1,566	1,561	1,549	1,544	1,498	1,475	1,437	1,430	1,440	1,429
Madrid	1,823	1,823	1,820	1,814	1,804	1,810	1,810	1,810	1,833	1,818	1,816	1,802	1,772	1,773	1,777	1,773
Marseilles	1,609	1,604	1,605	1,597	1,591	1,568	1,574	1,570	1,559	1,553	1,507	1,486	1,445	1,440	1,452	1,440
Milan	1,633	1,626	1,612	1,602	1,587	1,596	1,597	1,597	1,601	1,600	1,595	1,583	1,582	1,575	1,570	1,568
Munich	1,563	1,539	1,558	1,526	1,528	1,514	1,494	1,489	1,486	1,479	1,463	1,459	1,451	1,444	1,456	1,445
Oslo	1,401	1,401	1,411	1,409	1,407	1,389	1,383	1,376	1,375	1,377	1,362	1,345	1,328	1,320	1,341	1,343
Paris	1,629	1,623	1,627	1,616	1,610	1,586	1,592	1,588	1,577	1,573	1,526	1,507	1,467	1,459	1,472	1,461
Rome	1,623	1,617	1,604	1,591	1,577	1,586	1,586	1,586	1,589	1,586	1,583	1,572	1,570	1,561	1,555	1,552
Stockholm	1,556	1,545	1,549	1,582	1,619	1,624	1,634	1,643	1,638	1,647	1,622	1,595	1,566	1,555	1,573	1,578
Strasbourg	1,662	1,653	1,654	1,644	1,638	1,615	1,622	1,616	1,606	1,598	1,550	1,526	1,485	1,478	1,489	1,477
Stuttgart	1,498	1,481	1,510	1,478	1,481	1,472	1,453	1,452	1,447	1,460	1,445	1,433	1,423	1,415	1,428	1,420
Turin	1,640	1,632	1,617	1,606	1,592	1,601	1,603	1,604	1,607	1,604	1,600	1,586	1,584	1,577	1,571	1,568
Vienna	1,636	1,638	1,603	1,595	1,590	1,580	1,616	1,625	1,658	1,650	1,610	1,602	1,590	1,554	1,544	1,541
Zürich	1,671	1,644	1,659	1,666	1,692	1,683	1,657	1,645	1,654	1,675	1,672	1,633	1,615	1,623	1,650	1,649

Table 6: GVA in millions of 1997

PPP Euros at constant 2000 prices	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Amsterdam	60.5	62.1	63.0	63.4	64.5	66.9	68.6	72.4	75.6	79.0	81.9	81.8	81.9	81.9	83.5	84.3
Athens	58.1	59.9	59.5	57.9	59.0	60.0	59.0	59.8	62.2	65.6	68.7	71.7	74.4	78.1	82.2	85.6
Barcelona	91.9	94.1	94.2	92.6	94.9	98.5	101.5	104.3	107.9	112.7	116.4	120.3	121.8	125.5	128.6	132.4
Basle	17.4	17.2	17.3	17.5	17.8	17.7	18.1	18.6	19.1	19.2	19.6	20.0	20.5	20.7	21.2	21.6
Berlin	69.6	72.8	73.1	74.9	75.1	76.5	75.3	73.9	74.3	73.8	74.8	73.9	72.7	70.4	71.9	71.8
Birmingham	47.6	46.9	46.9	48.0	50.1	51.7	52.9	54.3	55.0	56.5	58.5	60.0	60.6	62.6	65.2	66.1
Brussels	45.1	44.1	44.2	43.4	44.5	44.5	45.5	46.6	47.6	49.4	51.6	52.4	54.2	53.6	54.9	56.7
Cologne	56.1	58.1	59.0	58.3	59.8	61.5	62.3	63.3	63.1	62.7	63.5	65.2	65.0	63.6	65.2	66.4
Copenhagen	38.0	38.2	37.8	37.4	39.2	40.6	41.4	42.7	43.1	45.0	47.1	47.2	47.3	48.0	48.4	50.1
The Hague	32.9	33.6	34.4	35.2	36.0	36.9	37.9	39.0	40.9	42.2	43.2	43.8	44.1	43.9	44.5	44.7
Edinburgh	28.1	28.0	28.2	28.8	29.9	30.6	31.0	31.5	32.0	32.7	34.3	35.2	35.9	37.1	38.9	39.5
Frankfurt	128.8	136.5	137.9	136.9	136.8	140.3	143.1	145.4	148.0	152.2	158.6	160.1	157.7	153.7	157.9	160.0
Geneva	28.6	27.9	27.7	27.2	27.2	27.3	27.6	28.0	29.1	29.7	30.9	30.9	31.1	31.0	31.6	32.3
Glasgow	32.5	32.2	32.3	32.9	34.0	34.5	34.9	35.7	36.6	37.6	39.2	40.1	41.1	42.4	44.0	44.6
Dublin	37.8	36.8	37.1	38.3	40.5	46.2	50.0	55.3	59.4	66.5	71.2	75.3	77.0	80.8	82.3	84.8
London	183.0	177.5	177.2	182.8	191.3	196.6	202.7	211.3	221.7	230.6	240.6	245.8	253.7	260.8	269.2	280.8
Manchester	43.6	43.1	43.1	44.2	46.1	47.4	48.1	49.1	50.6	51.9	53.9	55.3	56.3	58.1	61.2	62.6
Hamburg	57.3	60.8	60.1	60.4	60.9	61.9	62.5	63.6	64.5	64.8	67.6	70.8	70.5	66.6	68.6	69.4
Helsinki	32.1	29.4	27.8	27.9	29.2	31.2	32.8	34.4	38.2	40.2	43.9	45.7	44.8	45.3	47.3	48.5
Lisbon	60.4	61.8	62.9	62.0	63.5	67.2	68.9	72.8	77.3	80.4	82.6	84.2	83.5	82.8	83.8	84.3
Lyon	36.1	35.7	36.2	35.6	36.2	37.5	38.3	40.8	42.3	43.4	45.5	47.3	47.4	48.1	49.7	50.8
Madrid	106.2	108.4	109.8	109.1	111.3	114.9	117.9	123.2	130.8	136.7	143.3	148.7	152.1	156.7	161.5	167.2
Marseilles	31.9	32.8	33.4	33.7	34.5	35.2	35.1	36.3	37.5	38.2	40.7	42.2	42.7	43.2	44.7	45.1
Milan	126.7	126.4	124.3	123.3	127.5	130.6	132.4	134.7	139.4	142.0	146.7	148.4	144.8	143.8	145.1	144.7
Munich	78.1	83.2	85.6	84.8	85.9	88.8	91.5	93.6	96.4	100.0	107.9	111.6	114.3	113.8	119.3	122.7
Oslo	22.3	22.4	22.6	23.5	23.5	23.4	24.9	27.0	29.9	31.0	31.5	31.6	31.5	31.9	33.1	34.5
Paris	322.7	324.5	329.8	326.2	331.9	334.1	338.0	346.1	354.0	372.7	389.7	398.0	403.6	410.4	414.7	418.8
Rome	108.2	111.3	113.3	112.9	113.3	114.4	115.7	117.4	121.0	121.2	124.6	127.8	129.0	130.5	135.6	135.6
Stockholm	41.6	41.6	41.1	41.3	42.6	43.9	46.4	48.7	52.3	56.0	59.3	57.9	61.0	61.0	63.1	64.6
Strasbourg	19.7	19.6	20.3	20.4	20.8	21.5	21.9	22.1	22.9	23.3	24.1	24.3	24.3	24.1	25.0	25.2
Stuttgart	69.3	72.0	70.6	66.0	67.1	68.8	69.5	72.6	74.4	76.8	80.0	83.7	82.3	81.6	84.6	85.8
Turin	49.6	49.9	49.9	48.4	50.7	52.2	52.6	54.4	54.3	55.4	56.3	56.2	56.6	55.9	56.7	56.6
Vienna	70.6	73.1	74.9	75.7	77.6	78.6	80.6	81.6	84.2	86.7	89.7	89.8	89.8	90.9	92.6	94.0
Zürich	39.2	38.9	38.5	38.3	38.2	38.4	39.0	41.0	42.3	43.2	45.9	45.2	45.1	44.6	45.5	46.7
Total	2,271	2,301	2,314	2,309	2,361	2,420	2,468	2,541	2,628	2,719	2,833	2,893	2,919	2,943	3,021	3,079

Table 7: Productivity in PPP

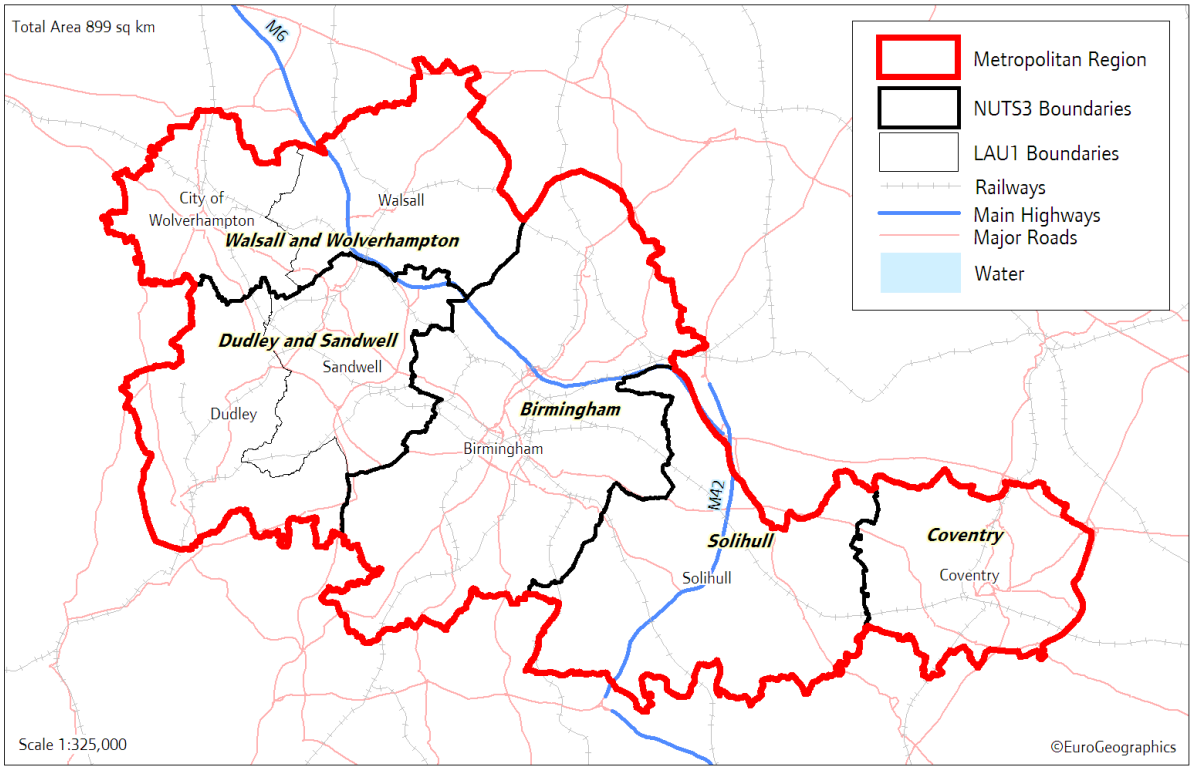
Euros per hour worked	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Amsterdam	32.79	33.62	33.40	34.40	34.80	35.76	35.31	35.91	36.67	37.46	38.13	37.92	38.31	38.65	39.99	40.47
Athens	22.66	23.32	22.69	22.73	22.98	22.96	22.78	23.19	22.60	23.49	24.41	25.19	26.71	27.43	28.61	29.58
Barcelona	26.07	26.13	26.68	27.00	27.29	27.59	27.97	28.00	27.59	27.83	28.15	28.40	28.86	28.85	29.16	29.03
Basle	30.10	29.77	30.27	30.90	31.43	32.33	33.76	34.90	35.56	35.37	35.60	36.78	37.68	37.58	37.61	38.39
Berlin	26.81	26.44	26.63	27.90	28.22	29.17	29.54	29.82	30.37	30.53	30.52	30.72	30.89	30.40	31.04	31.34
Birmingham	20.92	21.45	22.46	23.59	24.04	24.19	24.73	25.14	25.36	25.75	26.84	27.00	27.97	29.06	30.25	30.86
Brussels	43.68	43.67	44.05	44.21	46.43	46.65	47.96	47.81	48.85	50.31	51.41	51.09	52.75	51.89	53.61	55.14
Cologne	36.07	37.16	36.68	37.55	39.14	40.94	41.66	42.02	41.38	40.59	40.28	41.23	41.49	41.15	42.19	41.78
Copenhagen	35.46	36.30	36.23	37.58	37.86	39.68	40.12	40.20	39.45	40.01	40.86	40.31	40.63	42.16	42.72	44.11
The Hague	29.14	29.41	29.36	30.03	30.91	31.43	31.11	31.23	32.31	32.78	33.06	33.47	33.90	33.90	34.92	35.15
Edinburgh	22.63	22.97	23.98	24.97	25.95	26.87	26.23	27.14	26.51	28.02	28.00	27.64	30.34	31.06	32.64	33.28
Frankfurt	33.59	35.14	34.69	35.47	35.58	36.97	37.99	38.75	39.12	39.75	40.70	40.84	40.63	40.26	40.99	41.83
Geneva	28.19	27.64	27.93	27.89	27.97	28.32	29.00	29.80	30.35	30.05	30.97	31.05	31.17	30.78	30.77	31.43
Glasgow	21.53	21.62	22.51	23.35	24.06	24.55	25.46	25.88	25.46	25.91	26.92	26.25	28.50	29.19	30.22	30.69
Dublin	42.28	41.64	42.88	43.59	44.37	49.19	49.74	51.48	54.13	57.86	59.30	61.21	62.56	65.71	66.24	65.94
London	24.30	24.50	25.92	27.73	28.29	28.30	28.82	29.23	30.32	30.47	32.05	31.88	33.95	35.08	36.32	37.57
Manchester	19.51	20.06	20.90	21.88	22.94	23.62	23.24	23.97	24.62	24.48	25.45	25.81	26.35	27.37	28.46	29.18
Hamburg	36.75	38.02	36.65	37.64	38.05	39.53	40.63	41.80	42.04	41.68	43.11	44.77	45.07	43.25	44.39	44.88
Helsinki	26.40	25.83	25.86	27.93	28.54	29.88	30.02	30.80	33.33	33.35	35.67	36.70	36.35	37.20	38.09	38.68
Lisbon	21.13	21.64	22.01	22.11	23.07	23.65	24.42	26.05	26.59	27.00	28.01	27.52	27.28	27.52	26.98	27.22
Lyon	32.80	33.18	34.23	34.36	34.72	36.24	36.96	39.08	40.10	40.14	42.31	44.06	45.23	46.39	47.23	48.58
Madrid	26.03	25.84	26.12	26.43	27.52	27.76	28.45	28.58	28.77	29.05	29.25	29.46	29.86	29.93	29.81	29.78
Marseilles	31.68	32.74	33.82	34.13	34.84	35.80	35.69	36.72	37.62	37.54	39.88	40.94	41.85	42.43	43.13	43.62
Milan	39.59	39.69	40.13	41.29	43.38	43.84	44.00	44.81	45.03	45.30	46.71	46.97	45.57	45.53	45.66	45.76
Munich	32.55	34.62	34.74	35.54	36.36	38.18	39.85	40.63	41.11	41.77	44.16	44.46	45.89	46.31	47.97	49.23
Oslo	29.87	30.36	30.62	31.87	31.59	31.38	32.42	33.82	35.99	36.52	36.81	37.50	38.21	39.91	40.65	42.20
Paris	39.45	39.99	41.51	41.94	42.81	43.81	44.26	45.25	45.87	47.15	49.63	50.94	53.24	55.00	54.84	55.69
Rom	30.99	31.68	32.55	33.44	34.64	34.40	34.69	35.15	35.63	35.42	35.85	36.32	35.66	35.78	35.81	35.73
Stockholm	25.40	25.83	26.27	27.58	27.90	28.33	29.15	30.47	31.88	33.02	35.62	34.62	37.14	37.76	38.71	39.37
Strasbourg	30.94	31.05	31.81	32.27	32.79	34.17	34.58	34.43	35.18	35.24	36.39	37.18	38.16	38.12	39.41	39.98
Stuttgart	33.58	34.60	33.00	32.23	33.34	34.59	35.32	36.79	37.28	38.24	38.39	41.15	40.17	40.32	41.53	42.47
Turin	30.94	31.04	31.66	32.13	33.80	33.84	33.52	34.16	34.29	34.51	34.91	35.50	35.85	35.53	35.72	35.77
Vienna	27.98	28.38	29.54	30.18	30.92	31.44	31.95	32.28	32.77	33.56	35.64	35.85	35.94	37.38	38.10	38.51
Zürich	29.85	29.68	29.71	29.99	29.96	30.23	31.25	32.51	32.90	32.75	34.33	33.81	34.01	33.73	33.83	34.58
Total	29.87	30.35	30.89	31.64	32.37	33.02	33.51	34.19	34.63	35.12	36.27	36.63	37.39	37.84	38.44	38.97

Appendix 4: Illustrative maps

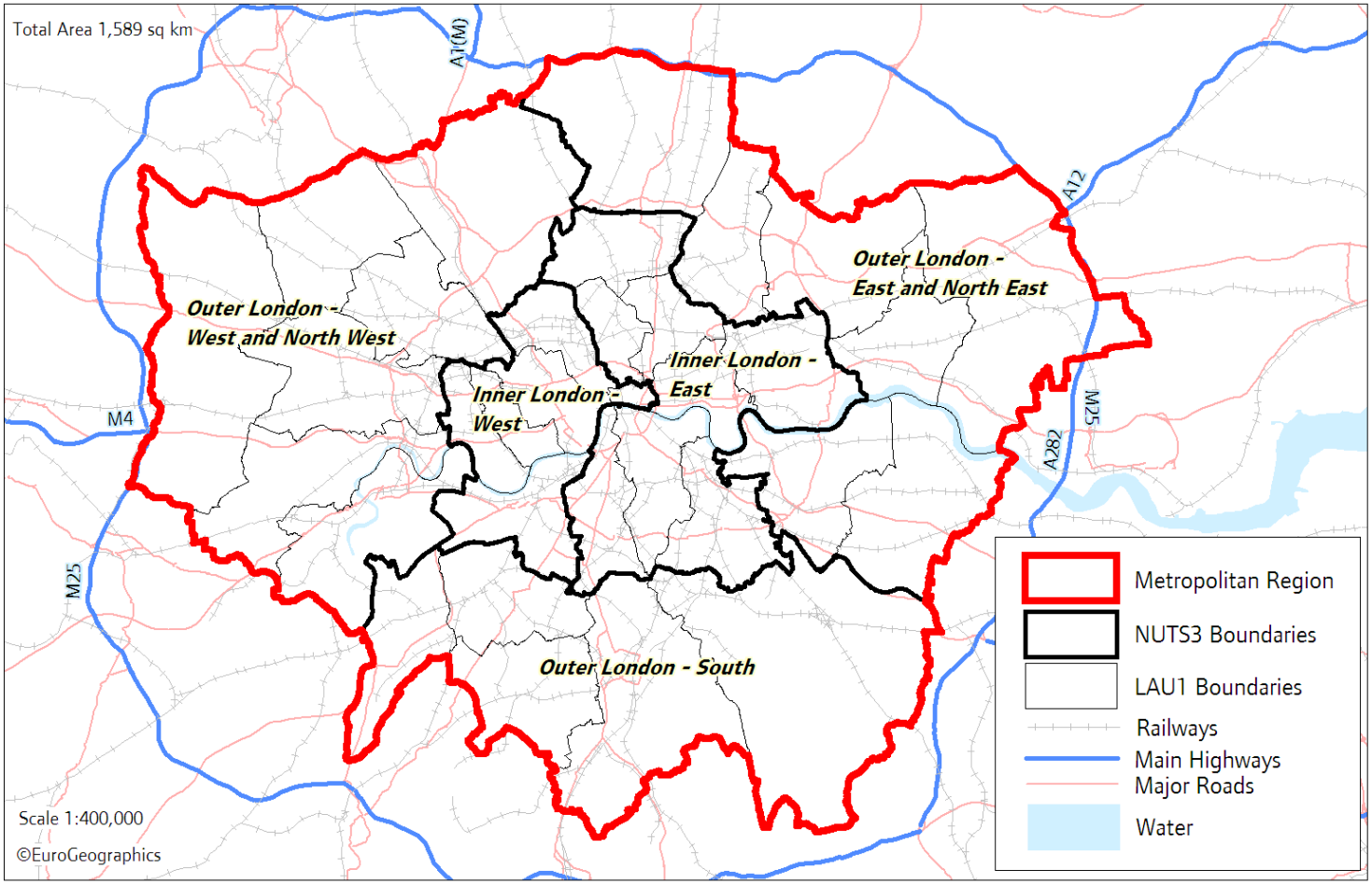
The maps in this section illustrate the geographical definition of the cities in our database. The red boundary shows the geographical definition used in the database.[21]

[21] All maps courtesy of the Data Management and Analysis Group of the GLA, definitions supplied by BAK Basle

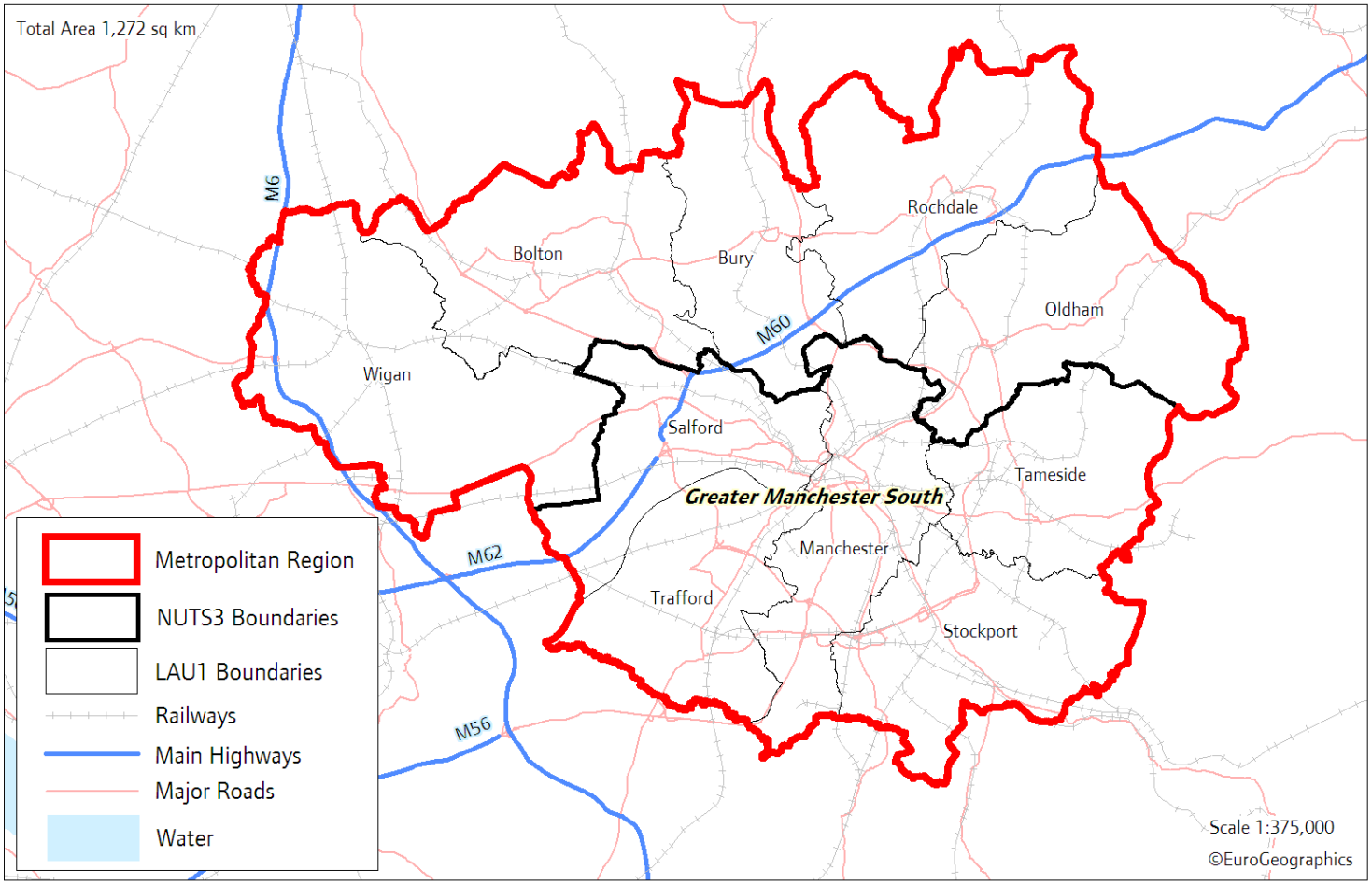
Birmingham Metropolitan Region, UK



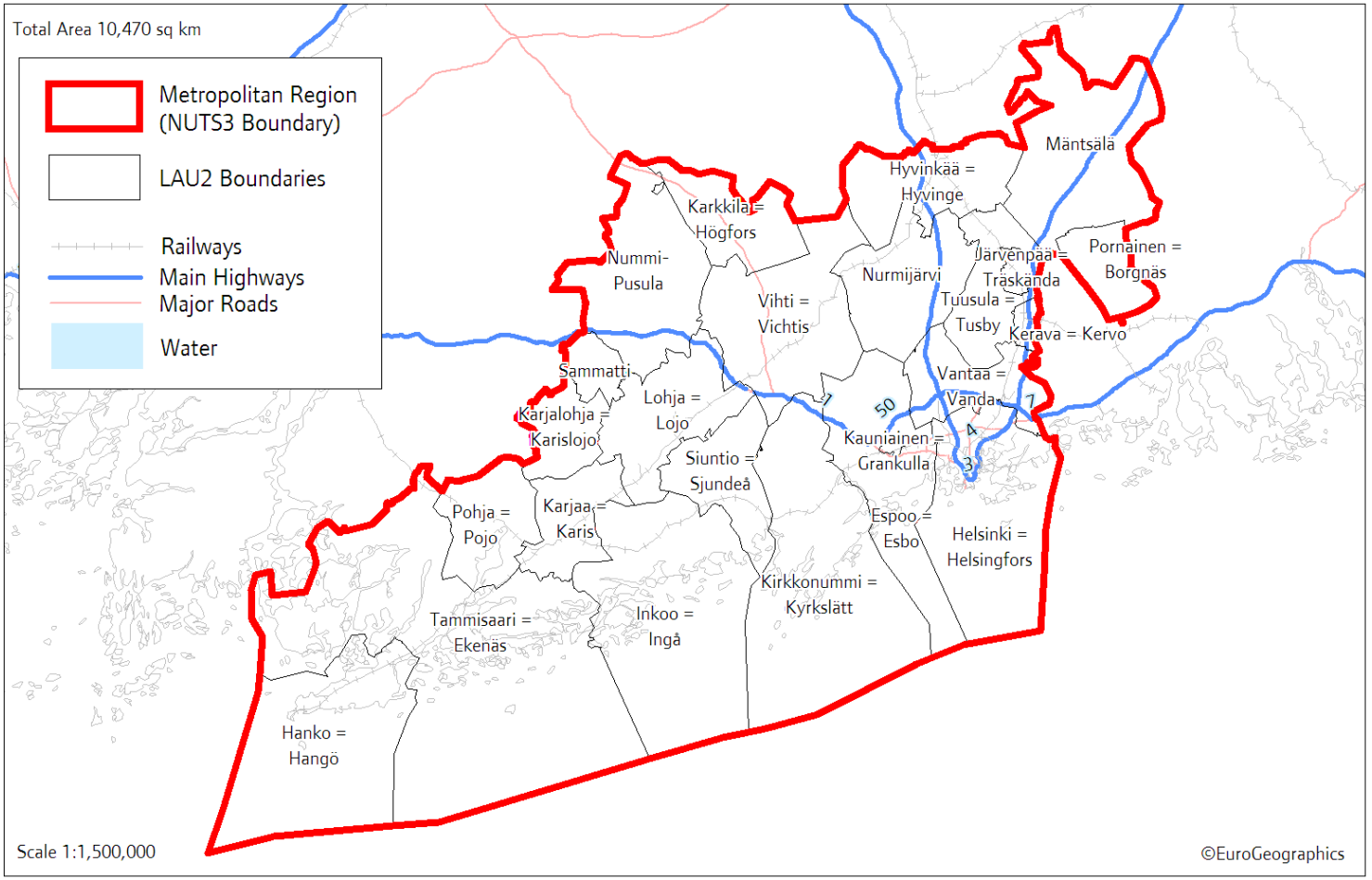
Greater London Metropolitan Region, UK



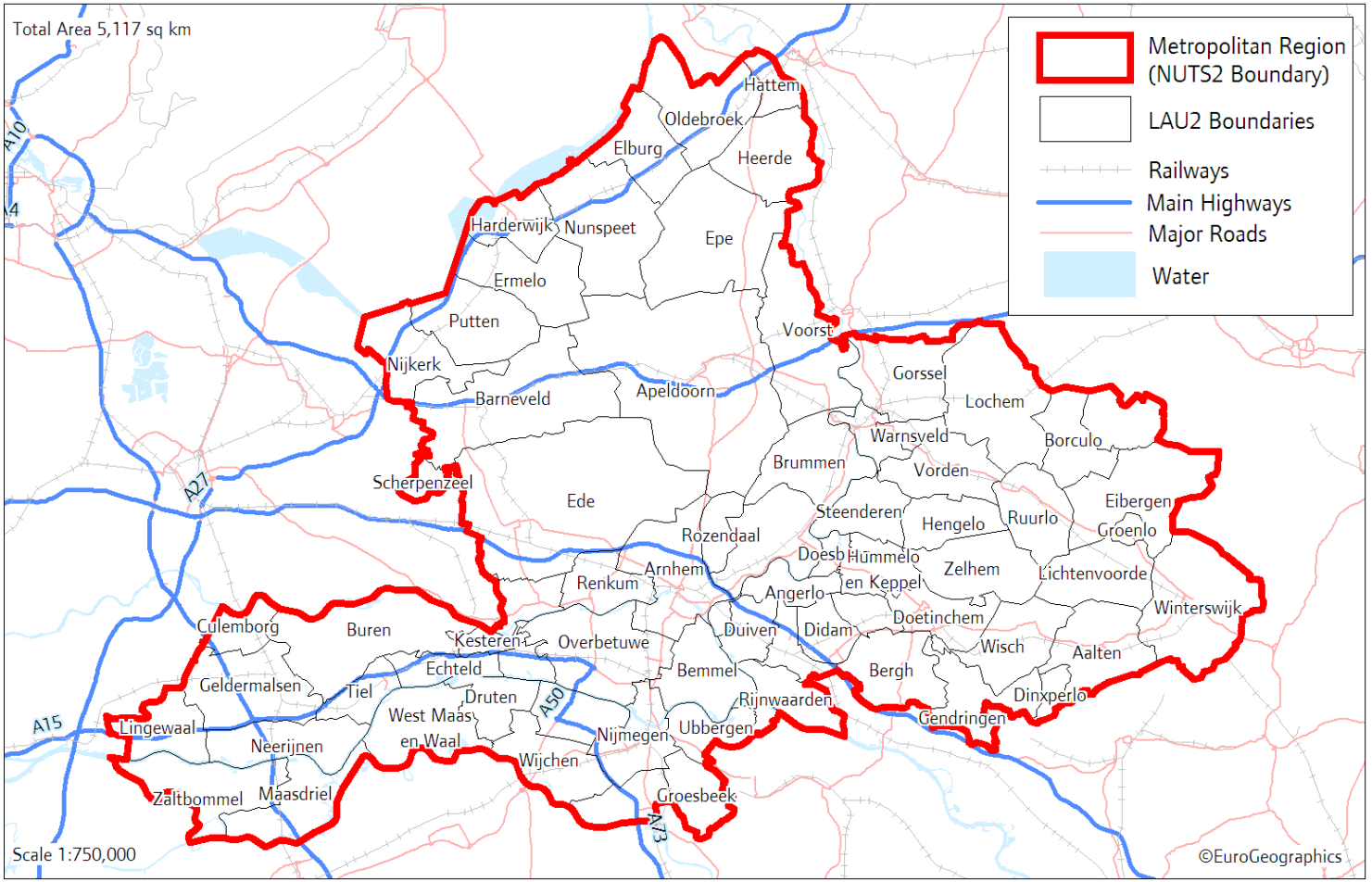
Greater Manchester Metropolitan Region, UK



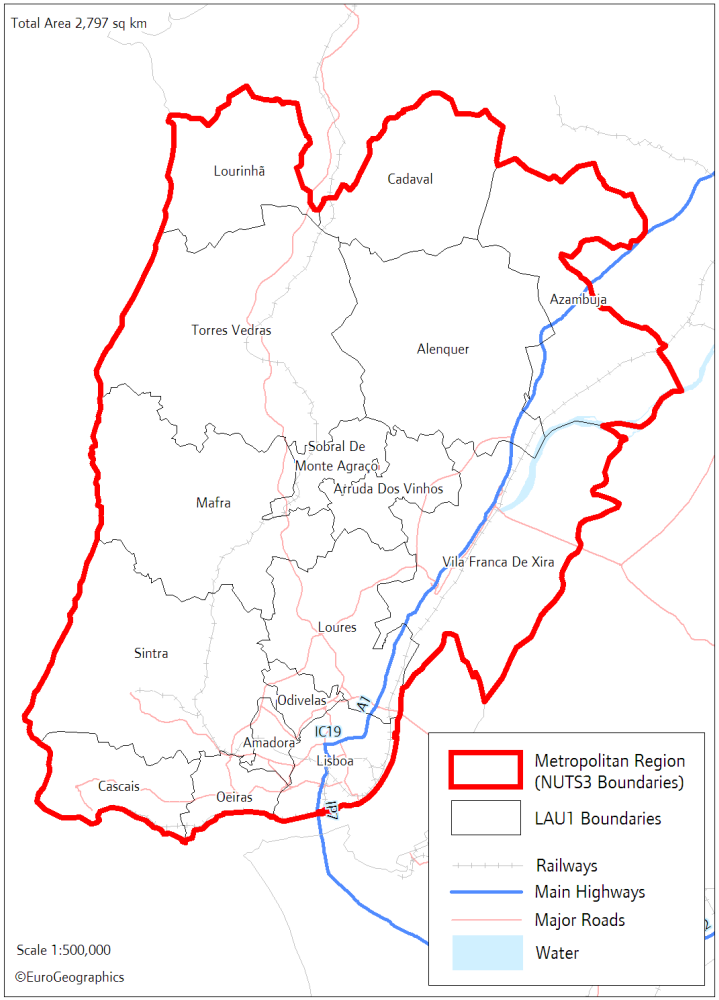
Helsinki Metropolitan Region, Finland



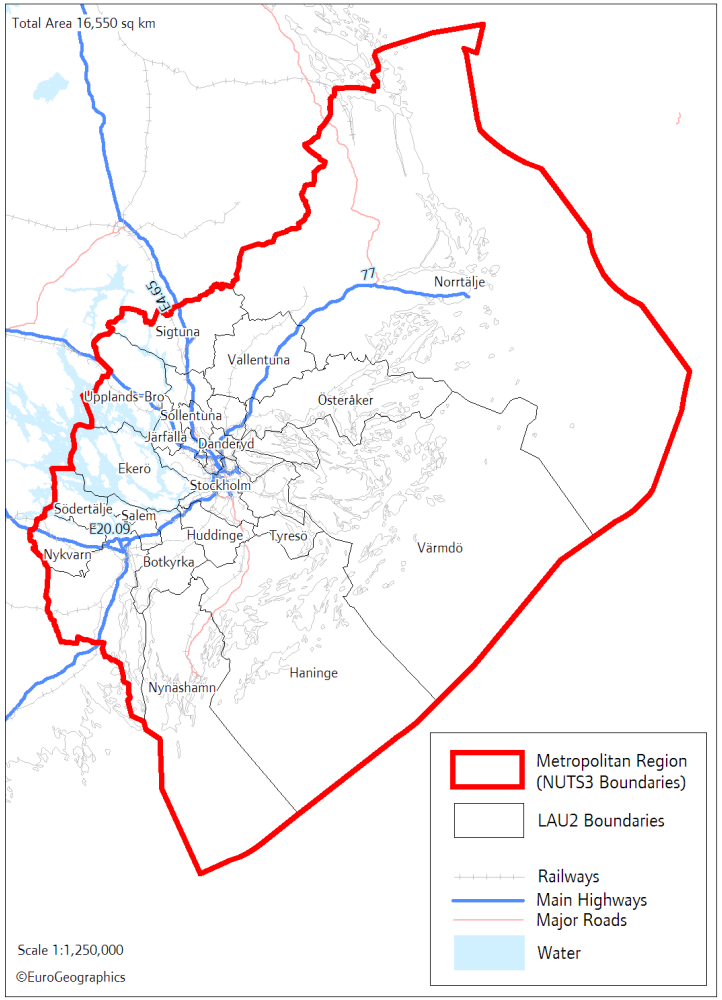
The Hague Metropolitan Region, Netherlands



Lisbon Metropolitan Region, Portugal



Stockholm Metropolitan Region, Sweden



Amsterdam Metropolitan Region, Netherlands