# Study on comparable Labour Market Areas
# - Final research report –

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# 1. Introduction

## Overview of the project

In 2007, when the implementation of the NUTS Regulation was reviewed by Commission Regulation (EC) No 105/2007, National Statistical Institutes (NSIs) proposed an investigation of alternative classifications to the administrative levels below NUTS for the EU management of territory. As a result, Eurostat committed itself to exploring functional regions and the possible application of that concept to the entire EU. The first step was then to investigate with the help of the research community the potential value-added and feasibility of, and best practice for, a consistent EU-wide definition of labour market areas.

The report that follows is the final output from research activities undertaken by, and on behalf of, Eurostat in this direction. It is a result of the work of Eurostat Unit E4, coordinated by Mr. Oliver Heiden, and the external contractor DevStat – Servicios de Consultoría Estadística with its associated researchers, Prof. Mike Coombes from Newcastle University, and Prof. José Manuel Casado and Dr. Lucas Martínez from the University of Alicante.

The purpose of the "Study on comparable Labour Market Areas" is to explore the possibility of a consistent statistical classification of the whole EU territory, defined on a functional basis. To be specific, the objectives are to: (1) outline the state-of-art of applied sciences in the field of LMAs; (2) compare the LMA concepts recognised and implemented in each Member State; (3) draw conclusions on relevant best practice; (4) explore the added value of a common definition for the entire EU; and (5) identify possible ways and means of harmonising LMA definitions across the EU.

What makes this study different from the previous ones[1] is the intention to cover all the territory of EU 27 Member States (MSs) while also empirically testing a proposed method for the delineation of LMAs so as to formulate proposals for a possible EU wide harmonised grid of comparable LMAs. This empirical research is to reflect the assessment of LMAs' potential applications in the policy fields of the EC, but will also rely on the involvement of MSs in the collection of comparable information and the evaluation of intermediate results of the study.

[1] The topic was previously investigated by other international organisations and DGs of the European Commission (EC). Two decades ago, Eurostat and Newcastle University carried out a study of principles upon which to base definitions of LMAs to be used in a policy context. In 2001, OECD undertook a cross-national survey in order to examine the relevance of functional delineation of regions on the basis of travel-to-work. OECD's study offers a clear view of different existing concepts of LMA in different states, although it does not include all EU countries. More recently, DG REGIO expressed a strong interest in LMA statistics and Eurostat carried out a survey of the LMA definitions in Member States.

## Structure of the Final Research Report

Apart from this introductory section the report includes two main chapters which are the product of two of the activities of the project:

- **Assessment of LMAs' potential applications in policy fields of the EC**
  This chapter focuses on the need for comparability of areas in territorial policy analyses and makes a review of the main policy domains of the EC that could benefit from the appropriate statistics at sub-national level.
- **Recommendations on the establishment of an EU-wide harmonised grid of comparable LMAs**
  This chapter is concerned with empirical tests of the feasibility of establishing for the whole EU a harmonised grid of comparable LMAs, and with making recommendations on the means and resources necessary for future research to achieve this objective.
  Each chapter is completed by specific appendices.

This Final Research Report also includes in an Annex some reports produced earlier in this project. **Annex 1** includes a study reviewing LMAs in the applied social sciences, plus a study comparing existing national LMA definitions.

# 2. Assessment of LMAs' potential applications in policy fields of the EC

## 2.1. Introduction and context

This chapter is the product of one activity from a research study on the potential for creating a common European definition of Local Labour Market Areas (LMAs). These functional areas are an alternative to local and regional administrative areas for statistical and policy purposes. The increasing interest in LMAs reflects the fact that administrative boundaries are frequently the result of historical circumstances, rather than of present day territorial reality. The current debate on future regional policy in the EU suggests the need to strengthen Cohesion Policy, but this would not be helped if it was limited to using administrative boundaries. This chapter is set the task of investigating whether analysing statistics on LMAs might improve the implementation of the Europe 2020 Strategy by giving more appropriate insights into the performance of regions and the impacts of policy.

Policy researchers have seen welcome increases in the available data on regions and smaller areas in recent years. One result is that it is no longer simply the case that they must use administrative areas for their analyses, as it had been when the NUTS system identified three levels of broadly comparable sets of administrative areas within each Member State (MS). Now there is often data available for more than one set of areas at a sub-national level that is appropriate for the targeting and/or monitoring of key policies of the EU. The choice between sets of boundaries can help improve policy-making, but it draws attention to what is known as the MAUP (Modifiable Areal Unit Problem). Put most simply, the results of any territorial analysis will partly depend on the areas used for that analysis: a change in areas used will produce different results.

The relevance of the MAUP for policy analyses involving comparisons amongst regions and cities was examined in detail by ESPON[2] and their conclusion was that the fact that changing the areas used while analysing the same data produced "[s]uch contradictory results could, quite naturally, be very disturbing for the decision maker" (ESPON 2006). Two relevant illustrations of the MAUP have also been provided here in the Appendix to this chapter (section 2.5):

- Official statistics on the earnings rate (€) in the ten largest cities of France are compared and the rankings of the cities are shown to vary markedly depending on which type of official boundaries is used.

[2] ESPON (2006) *Final Report of the Project ESPON 3.4.3 "The Modifiable Areas Unit Problem"*

- Unemployment statistics in the UK for both the official labour market areas and a set of administrative areas are analysed to assess how much difference there is in the places identified as being in the highest unemployment areas on each basis.

The fact that the results when comparing areas are sensitive to the choice of areas that are used for those comparisons prompts the question of whether there is then a set of areas which ***should*** ideally be used. The basic answer to this question is that there is no one set of areas which is the ideal for all types of analyses, but that the most appropriate set of areas will depend on the purpose of the analysis concerned. To give an example: the ideal areas for analyses related to the increasingly vital issues around fresh water availability would probably be defined as river basins. Such areas would provide more accurate analyses of the supply of and demand for fresh water and so enable more appropriate policy targeting (eg. to identify where there is the most urgent need for new infrastructure or other policy actions).

The focus for this research is on sub-national areas which are appropriate for the analysis of statistics in the socio-economic realm of territorial policies. In this field the significance of the choice of areas for key analyses is increasingly recognised. Perhaps the single most important policy indicator in this policy field is *per capita* average value of Gross Domestic Product (GDP) but it has been shown[3] that when using administrative areas "regional economic indicators, such as GDP per capita, are frequently distorted" (ESPON 2007:23). The reason is that the income generated in one area, such as a city, may be largely consumed by households in other areas. The equivalent case in the fresh water policy field would be to consider as separate the areas where the water is used and the area where it falls and may be stored. Pursuing this analogy further, what is need in the socio-economic policy field is a set of areas which are equivalent to the water catchment and consumption areas.

The best documented examples of the need to look beyond administrative areas have often used the metaphor of catchment areas when emphasising that data for a city should be analysed as part of a larger area which also includes the commuter catchment area of that city. The most dramatic cases[4] are often provided by capital cities where "GDP is overstated relative to that produced by residents by between 4% and 76%" (European Commission 2007:15). One particular example is Brussels where the "Brussels-Capital Region (NUTS 1, 2 and 3) can be presented as one of the wealthiest in Europe (ranking twentieth at NUTS 3 level as regards its GDP/head), whereas its available income per inhabitant is in fact today one of the lowest of the

[3] ESPON (2007) *Final Report of the ESPON Project 1.4.4 "Preparatory Study on Feasibility of Flows Analysis Final Report"*
[4] European Commission (2007) *Growing Regions, growing Europe, Fourth report on economic and social cohesion*, Luxembourg, Office for Official Publications of the European Communities

three Belgian Regions, since almost 6/10 of the workers who contribute to the creation of its GDP reside in the other two Regions of the country. The political impact of such situations, especially in a federal country like Belgium where there is no financial cross-subsidisation between the Region's budgets, is easy to imagine" (ESPON 2006:139).

The recognition of the fundamental linkages between a city and its 'catchment area' is far from new in Europe or many other more developed parts of the world where it has led to many studies to define metropolitan regions, culminating most recently in that[5] from the OECD (2012). The common logic to these definitions is that it is not sufficient to simply look beyond the administrative boundary of the city to include adjacent heavily urbanised areas – the basis for the definition of a conurbation – because the hinterland of a city will extend further to embrace rural areas along with some other urban areas. This has been termed a 'functional region' and in most such definitions great significance is placed on the pattern of commuting to assess the extent of the functional linkages between cities and their surrounding areas. This dependence upon commuting data means that, in almost all cases, such region definitions are a form of LMA.

For this research however, the relevance of LMAs to analysis in socio-economic policy fields is seen as a general principle, rather than an issue limited to major cities and their immediate regions. Those factors which underlie the functional linkages binding together metropolitan regions, such as the long-term increases in personal mobility and the re-location of employment sites, have also created dispersed patterns of commuting across the many varied types of territory found in the EU. The primary implication is that the need here is for LMA definitions which are not limited to metropolitan regions but that embrace all areas. Less obviously perhaps, the second implication is that the notion of a single centre and its catchment area may not be as appropriate in areas which are more distance from the major cities (and in fact the increasingly widespread recognition that major urban regions are becoming more polycentric structure may mean that even there, a definition of LMA, which presumes a single centre and its hinterland, may not be ideal).

The need for a set of consistently defined LMAs covering the whole territory has for some time been recognised in several MSs. Earlier in this research a survey of MSs was undertaken and some of findings from the information collected have already been provided in the report included here as Annex n° 1 but here it is appropriate to reflect on the evidence about LMAs that have been defined across whole countries for reporting and analysis of socio-economic regional statistics. This survey

[5] OECD (2012): *Redefining "Urban". A New Way to Measure Metropolitan Areas*, OECD Publishing, Paris

information has both updated and extended in coverage an earlier review[6] for the OECD that had shown, for example, that the defined LMAs have been invoked when identifying eligible areas for the allocation of European funds in the cases of Finland, France, Germany, Italy and the United Kingdom. The following are a small selection of key points which are mainly drawn from the new survey information:

- Germany uses four indicators (including unemployment rate and wage rates) for their national set of LMAs to guide policy actions to improve regional economic structures.

- Italy uses the boundaries of their national set of LMAs in analyses[7] to define industrial districts (ISTAT, 2006).

- France has incorporated a national set of LMAs into its standard processes for the dissemination of socio-economic statistics at various spatial scales.

- A national set of LMAs has been defined and then regularly updated in the UK for over four decades and over that period its uses have ranged from the targeting of funding for industrial development to providing a template for the new areas needed for sub-regional analysis of housing supply and demand mismatches.

- In both the Czech Republic and Estonia their national sets of LMAs have been used regional and local planning by, for example, using their evidence on the daily activity spaces of people to help improve public transport provision.

- Finland has recently referred to its set of LMA boundaries when revising their local government structure, with one aim being that the new municipalities would more closely reflect functional areas.

This summary of some current uses of LMAs, in those countries where they have been defined as a national set of functional regions, reveals widespread recognition of their value. The diversity of uses which has been highlighted is 'over and above' that of their basic purpose of the reporting and analysis of labour market statistics. The reason why areas specifically designed to be LMAs have proved to have wider uses is that across many socio-economic issues the labour market is the most crucial domain in which the life chances of people are shaped. It is through commuting that most people access the work that brings them income, so patterns of commuting provide a window on the geography of opportunity. It is for this reason that LMAs are widely seen as appropriate areas for spatial policy-related analyses of so many socio-economic challenges to the quality of life of contemporary Europeans.

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[6] Cattan N (2001) *Functional regions: a summary of definitions and usage in OECD countries* DT/TDPC/TI(2001)6 OECD, Paris

[7] ISTAT (2006) *Distretti industriali e sistemi locali del lavoro 2001*, Rome, Istituto Nazionale di Statistica

## 2.2. The case for cross national delineation of LMAs

The preceding section of this chapter emphasised the need for comparability of areas in territorial policy analyses. The arguments presented were reinforced by citing evidence that numerous MSs have not only accepted the need for specially-defined LMAs but then also used their national set of LMA boundaries for other purposes. The value of appropriately defined LMAs is that they allow meaningful comparisons to be made between all the diverse parts of a territory. This value would be all the greater for comparisons between the highly diverse parts of the territory of the EU because the need for area comparability is accentuated when the analyses are both within and between countries.

In relation to socio-economic policy agendas, the need for area comparability in any EU-wide analyses is especially acute. The uneven impact of the recent steep growth of unemployment has only heightened the importance of regional policy targeting, and the issue of cross-national comparability is always a concern in these analyses. One of the most recent international studies tackling a related challenge was the joint research by the OECD and European Commission (OECD, 2012) that was aimed at establishing a new set of urban area boundaries. Although the coverage of these boundaries ranges from metropolitan areas down to smaller urban area populations (as low as 50,000 people), they do still exclude less urbanised areas. In their focus on urban areas, these new definitions are adopting an approach that has been pursued – with varying levels of success – by many academic studies over past decades, as well as by others in the statistics and policy fields more recently.

Of particular note in this connection are efforts at the European level such as those of the Urban Audit which was defined[8] as a "joint effort by the Directorate-General for Regional Policy (DG Regio) and Eurostat to provide reliable and comparative information on selected urban areas in Member States of the European Union and the Candidate Countries" (European Commission, 2004:5). Of most relevance here is what the Urban Audit terms a larger urban zone (LUZ) which is intended to reflect a functional region that is centred on the designated urban area. Due in part to the distinct process adopted in creating the Urban Audit data infrastructure, the basis of the LUZ definitions used to vary between countries. Although the definitions were indeed often derived by reference to commuting patterns around cities and towns, it was not possible to consider them as a comparable set of cross-national definitions of LMAs.

[8] European Commission (2004): *Urban Audit. Methodological Handbook*, Luxembourg, Office for Official Publications of the European Communities

One directly relevant assessment[9] highlighted the "very large heterogeneity in the national approaches used to define LUZ" (ESPON 2010:40). This study by ESPON then proceeded to develop its own approach to defining a new set of functional regions extending across a large number of MSs, but once again the basic strategy was to first identify a set of urban cores and then to designate their hinterlands using information on commuting flows. The recent combined efforts of the EU and the OECD (OECD, 2012) have resulted in the definition of a new set of metropolitan areas based on common principles. This exercise has answered the concerns expressed above regarding comparability issues but the nature of the method used remains the same. It is notable that this urban-centred strategy has become so familiar that in many studies there is little effort devoted to justify it, beyond simple statements such as that there is a wide range of economic flows which tend to be orientated around larger urban areas. The evidence of some long-term trends that might be termed counter-urbanisation, as well as evidence of polycentric trends in modern urban systems, is in effect being ignored by exclusively urban-centred approaches to region definition.

The consequence has been that cross-national region definitions have to date produced sets of boundaries that fail to include large parts of the territory analysed. For example the recent research by OECD (2012) defined urban-centred regions that covered less than 40% of the population of both Slovenia and the Slovak Republic. Yet clearly there are equally important policy challenges associated with creating appropriate conditions for socially and environmentally sustainable growth in areas without highly concentrated populations.

In the EU, the main published source for cross-national regional comparisons is the *Eurostat regional yearbook* which includes information for areas at two levels in the NUTS hierarchy of statistical reporting units. According to the regulation on which NUTS definitions are based, the lowest level of aggregation (NUTS 3) in this EU harmonised hierarchy of regions should have between 150,000 and 800,000 residents each, and this has led to them becoming a *de facto* option for policy analyses concerned with socio-economic issues at the regional scale in the EU. However the emphasis placed on administrative boundaries in the area definitions of the NUTS hierarchy has led to the criticism that the result is that "they introduce a confusion of scales, especially at NUTS 3 level…in countries with large NUTS 3 divisions like France or Spain, the three categories of spatial structure (intra-urban, peri-urban, rural) are always "mixed" [but in the]…countries with smaller NUTS 3 units like Germany or Belgium, each category of spatial structure can be isolated" (ESPON, 2006:86).

[9] ESPON (2010) *Final Report of the Project* ESPON 2013 Database

Thus the conclusion here is that although the NUTS cross-national region definitions do cover the whole EU territory as is necessary for policy purposes, they do not provide a suitably comparable set of region definitions. Of particular importance here is that they are 'generalist' in their purpose, with a default emphasis on local government boundaries rather than making any pretence at providing functional region definitions as would be the case of a set of well-defined LMAs.

In direct contrast are the increasing number of metropolitan region definitions that seek to identify functional regions around major centres, whether these be based on the NUTS 3 areas[10] as in Dijkstra (2009) or the smaller units used by OECD (2012). Here the problem is that the focus on major urban areas has enabled a greater comparability of boundary definition but only at the cost of not covering the whole territory of interest. Although most metropolitan region definitions share the basic motivation here of identifying clusters of commuting patterns so as to demarcate sub-national economic regions, this research has set itself the more demanding task of defining a set of comparable LMAs which includes not only metropolitan regions but also all other types of area found in the territory of the EU.

## 2.3. How a set of LMAs could impact on policy

The previous sections of this chapter emphasised that LMAs are widely seen as very appropriate areas for spatial policy-related analyses at sub-national levels, so this section considers the main policy areas of the EU that require sub-national scale analyses for effective monitoring of their outcomes.

The multilevel model of governance promoted in Europe over the past decades has evolved to extend the policy scope of the European Union, although the EU continues to function according to the general principle of subsidiarity. Most policy domains of the EU are a shared responsibility between the European level and Member States, while others benefit from coordination at the EU level. These latter include the economic and employment policies. Recent EU policy strategies prioritise more integrated development along with decentralised management and implementation of policies. Assessing the social, economic and environmental sustainable outcome of EU policies at sub-national level requires appropriate areas for intervention and monitoring.
The main features of LMAs are their functional coherence, coverage of both urban and rural territories, and linkage between areas as shown by the interaction revealed in commuting patterns. These features are directly relevant to the following policies: employment policy, regional policy, rural development policy and

[10] Dijkstra, L. (2009) *Metropolitan regions in the EU*, Regional Focus n° 01/2009

transport policy. These main policy domains are in turn related to youth policy and environment policy. As a result, this section will consider how a consistent set of EU LMAs could support the implementation of these policies.

The overarching EU strategic document, Europe 2020 Strategy, provides the starting point for this discussion of relevant policies. The approach here recognises that policy making, monitoring and evaluation require appropriate statistical data, and so, for each of the policies identified, an overview of the key indicator statistics at sub-national level is presented. These discussions of individual policies then lead to an assessment of the possible relevance of LMAs for the Eurostat "vision" towards improving the efficiency of European statistics.

i. Europe 2020 Strategy

**Europe 2020 Strategy**, designed as successor to the Lisbon strategy, aims to turn the EU into a smart, sustainable and inclusive economy delivering high levels of employment, productivity and social cohesion. There are three primary priorities:

- **Smart growth**: developing an economy based on knowledge and innovation;
- **Sustainable growth**: promoting a more resource efficient, greener and more competitive economy;
- **Inclusive growth**: fostering a high-employment economy delivering social and territorial cohesion.

Five measurable EU **headline targets** have been established for 2020.

**Headline targets:**

- 75% of the population aged 20-64 should be employed;
- 3% of the EU's GDP should be invested in R&D;
- The '20/20/20' climate/energy targets should be met (including an increase to 30% of emissions reduction if the conditions are right);
- The share of early school leavers should be under 10% and at least 40% of the younger generation should have a tertiary degree;
- 20 million less people should be at risk of poverty.

Source: COM(2010) 2020 final, EUROPE 2020 – A strategy for smart, sustainable and inclusive growth
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF

To monitor the progress towards Europe 2020 strategy headline targets, eight main indicators and three sub-indicators[11] have been developed. Headline targets relate to the EU level but link to targets set for each MS that take account of their different circumstances.

[11] http://epp.eurostat.ec.europa.eu/portal/page/portal/europe_2020_indicators/headline_indicators

Among the tools and initiatives put in place at EU level for measuring the progress towards the achievement of EU 2020 Strategy goals is the 2012 Annual Growth Survey[12] which should support economic and employment policy coordination with a focus on growth and competitiveness for today and tomorrow, thereby tackling unemployment and the social consequences of the crisis. Bringing the focus down to these labour market issues means that LMAs can be a critically important scale for targeting policy interventions and subsequently for monitoring the impact of those policies.

Moreover the labour market is a central component of a local economy, and as such allows analyses to link two Europe 2020 goals together, smart growth (which is primarily related to labour demand) and inclusive growth (which highlights 'supply side' social issues). Indeed if the local economy is drawn quite broadly – as with city regions – it is likely that the environmental externalities linked to economic development will be largely contained within the same boundary: thus the same areas can also be appropriate for analyses of the other goal of the Europe 2020 Strategy, sustainable growth. In this way the LMA might provide a suitable areal unit for a sub-national 'triple bottom line' monitoring of the progress towards the objectives of the Europe 2020 Strategy.

ii. Future Cohesion Policy and Territorial Agenda 2020

Despite some successes in previous programming periods, inequalities still exist among EU regions and so the **EU Cohesion Policy 2014-2020**[13] proposal will be "strongly linked to the Europe 2020 strategy, focusing on results [and] monitoring progress" towards two goals: Investment in Growth and Jobs and European Territorial Cooperation. A crucial feature here is that economic and social cohesion at the European level is seen to call for a stronger focus on the territorial impact of EU policies. The territorial development tools proposed include one termed Integrated Territorial Investments (ITI). ITIs involve several key elements but the main interest here is in the requirement[14] to designate a territory to be the focus of their actions. By delegating policy delivery to sub-national actors this approach applies the subsidiarity principle to the Territorial Agenda 2020, while placing cohesion centrally on the political stage:

[12] The Annual Growth Survey sets out what the Commission believes must be the EU's priorities for the coming 12 months in terms of economic and budgetary policies and reforms to boost growth and employment.
[13] COM(2011) 615 final/2
http://ec.europa.eu/regional_policy/sources/docoffic/official/regulation/pdf/2014/proposals/regulation/general/general_proposal_en.pdf
[14] EC, EU Cohesion Policy 2014-2020 Factsheets: Integrated Territorial Investment
http://ec.europa.eu/regional_policy/what/future/proposals_2014_2020_en.cfm

"*The multiple challenges confronting Europe – economic, environmental and social – show the need for an integrated and territorial place-based approach to deliver effective response.*"[15]

Discussions of the place-based approach feature references to functional areas along with diverse aspects of local economies which contribute to place competitiveness. In this way the policy is being conceived as ideally delivered within areas that are each functional economic areas, and as such could be identified as labour market areas.

iii. European Employment Policy and European Youth Policy

MS governments have the primary responsibility for employment policies but the EU increasingly sets common objectives and also analyses the measures taken at national level. As noted earlier, in the Europe 2020 strategy there are headline employment and unemployment targets. Two related strategies are the European Employment Strategy (EES) and the Youth Employment Strategy.

The common priorities and targets of the EES are set through the Employment Guidelines (Council Decision 2010/707/EU of 21 October 2010 on guidelines for the employment policies of the Member States). These guidelines recognize that employment policies link economic strategies to social inclusion concerns, and this linkage is illustrated by the following guidelines agreed by national governments.

*Guideline 7: Increasing labour market participation of women and men, reducing structural unemployment and promoting job quality*
*Guideline 8: Developing a skilled workforce responding to labour market needs and promoting lifelong learning*
*Guideline 9: Improving the quality and performance of education and training systems at all levels and increasing participation in tertiary or equivalent education*

All these guidelines recognize the need to link the economic development issues of labour demand to the more social issues of labour supply. LMAs are the local expression of this matching process and thus are an ideal framework for assessing its success or failure.

Regional Europe 2020 indicators have been published[16] at the NUTS 2 level by DG Regio. Indicators for additional employment analysis were specified in the Council Decision 2010/707/EU. The two main sources of employment data are the EU Labour Force Survey and the National Accounts, but data availability limits some indicators

[15] Ibidem
[16] http://ec.europa.eu/regional_policy/information/brochures/pages/country2012/index_en.cfm

monitoring at the national level. At the same time, there are indicators from the Eurostat Regional Statistics[17] database which allow analyses of NUTS2 or even NUTS3 regional levels, as the following small sample illustrates.

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| **EU Labour Force Survey, annual data**<br>• Persons in employment in age groups 15-64, 15-24, 25-54, 55-59, 55-64, 60-64, 65-69 and 20-64 as a proportion of total population in the same age group. Breakdown by sex.<br>• Total hours worked divided by the average annual number of hours worked in full-time jobs, calculated as a proportion of total population in the 15-64 age group. Breakdown by sex.<br>• Gender segregation in occupation/sectors, calculated as the average of national share of employment for women and men applied to each occupation/sector (ISCO classification/NACE classification) |
| **Eurostat, European System of Accounts**<br>• Growth in GDP per person employed and per hour worked |
| **Eurostat, Structure of Earnings Survey and national sources**<br>• Difference between men's and women's average gross hourly earnings as a percentage of men's average gross hourly earnings (for paid employees) |
| **LMP database, Eurostat**<br>• N° of participants in regular activation measures (LMP categories 2-7)/in assisted activation programmes (LMP sub-category 1.1.2)/n° of recipients of support (LMP categories 8-9) divided by the n° of persons wanting to work (ILO unemployed plus labour reserve) |
| **Job Vacancies Database and EU LFS, Eurostat**<br>• Ratio between the total number of the stock of vacancies compared to the total number of unemployed (v/u ratio) |

**Source: EC, DG Employment,Social Affairs and Equal Opportunities (2010): *Indicators for monitoring the Employment Guidelines including indicators for additional employment analysis, 2010 compendium***

Clearly these labour market indicators are prime candidates for analysis at the LMA scale to enable monitoring of the interaction between local dynamics, broader shifts in the economy and the policy interventions to tackle uneven development.

Unemployment among young Europeans is one of the major problems facing the new EU Youth Strategy for 2010-2018 adopted by the EU Council in November 2009. There are in fact two broad objectives set for this new framework:

[17] For more details, see http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/metropolitan_regions/data_metro/database_sub3

(1) more and equal education and labour market opportunities for young people and
(2) active citizenship, social inclusion and solidarity of young people.

EU Youth Strategy (2010-2018) covers fully eight fields of action, so a very broad assessment of the situation of young people was needed in a Dashboard of youth indicators[18]. All the EU indicators on youth are fully complementary to the headline targets of the Europe 2020 strategy and its initiative Youth on the Move[19] that tackles employment and mobility issues.

Certainly for the employment-related youth indicators, the conclusions drawn above about the wider Employment Policy apply here equally, not least because the data sources are mostly the same. In fact the relevance of the local scale is all the greater for young people who tend to find their first employment opportunities very locally (unless they are such 'high flyers' that they are not the concern of EU Youth Strategy). As a result policy interventions need to be tightly targeted at the localised concentrations of youth problems.

iv. European Transport Policy and European Environmental Policy

ECs most recent transport strategy (Transport 2050, White Paper 2011: Roadmap to a Single European Transport Area – Towards a competitive and resources efficient transport system) seeks to develop "a competitive transport system that will increase mobility … [but also] cut carbon emissions in transport by 60% by 2050" (CE, 2011). It sets different goals for different types of journeys: within cities, between cities, and long distances. Targets such as reducing by 50% urban travel by conventionally fuelled cars are directly related to the commuting patterns which are fundamental to the definition of LMAs.

The transport sector is not only important due to accessibility issues involved in the discussions above about employment opportunities, but also because of its major contribution[20] to greenhouse gas emissions. This issue has considerable sub-national variation due to contrasts between rural and urban areas generally, as well as those between different urban regions depending on their compactness as well as their public transport provision. As a result there would be very good reasons for LMA scale analysis of progress against the objective of efficient mobility[21]that is

[18] http://epp.eurostat.ec.europa.eu/portal/page/portal/employment_social_policy_equality/youth_policy/dashboard_youth
[19] Commission Staff Working Document on EU indicators in the field of youth, SEC (2011) 401 final
[20] Eurostat, Statistics in Focus n° 42/2009, Highlights of the Panorama of Transport.
[21] Commission Staff Working Paper, Analysis associated with the Roadmap to a Resource Efficient Europe, Part II, accompanying the document Roadmap to a Resource Efficient Europe, SEC (2011) 1067 final
http://ec.europa.eu/environment/resource_efficiency/pdf/working_paper_part2.pdf

seeking to improve access to jobs and thus to have a positive impact on employment rates.

Eurostat disseminates a variety of transport indicators at the regional level, and this partly reflects the fact that EU cohesion funding for transport projects has been very substantial. However the datasets of most interest here – unlike the statistics on road transport of goods, or those on maritime and air transport – are not derived from data collected[22] under legal acts.

v. Common Agricultural Policy

The reform of the Common Agricultural Policy (CAP) post 2013 is currently on the political agenda of the EU and as yet there are only proposed[23] objectives for the future, which are:

- Viable food production;
- Sustainable management of natural resources and climate action;
- Balanced territorial development.

These new main objectives link to the EU 2020 Strategy 2020 and also the emerging emphasis on territorial development in seeking smart, sustainable, and inclusive growth.

These proposals increase the importance placed on rural development, while also reinforcing the need for a common monitoring and evaluation system

> *(a) to demonstrate the progress and achievements of rural development policy and assess the impact, effectiveness, efficiency and relevance of rural development policy interventions, (b) to contribute to better targeted support for rural development, and (c) to support a common learning process related to monitoring and evaluation.*[24]

The initial indications[25] are that the list of common indicators will cover rural development issues in ways that parallel several indicators discussed earlier, such as GDP per head and employment rates. There will also be indicators related to major sustainability concerns, such as water quality and biodiversity. As noted in relation to policies for economic development generally, these sustainability indicators

[22] http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/en/reg_tran_esms.htm

[23] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, The CAP towards 2020: Meeting the food, natural resources and territorial challenges of the future, COM(2010) 672 final http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0672:FIN:en:PDF

[24] Proposal for a Regulation of the European Parliament and of the Council on support for rural development by the European Agricultural Fund for Rural Development (EAFRD), COM (2011) 627 final/2 http://ec.europa.eu/agriculture/cap-post-2013/legal-proposals/com627/627_en.pdf

[25] http://ec.europa.eu/agriculture/cap-post-2013/monitoring-evaluation/workshop-03-2012/technical-paper_en.pdf

consider the externalities which can be the outcomes of some development strategies, and most externalities of this kind tend to be localised in their impacts. Thus a rather local scale is appropriate for monitoring progress towards more balanced territorial development.

At present many rural development statistics are provided by Eurostat for the NUTS 3 regions and new urban/rural typology[26] (nb. it is notable that the relevant labour market statistics mostly derive from the LFS, but this is not a guaranteed data source at the regional scale[27]). An additional reason for a sub-national scale of rural development policy comes from the growing importance of community-led local development. Based on the experience of LEADER strategies for rural development, the trajectory of policy development has been towards a locally based approach. One other aspect which has even greater relevance to the LMA scale of interest here is the growing recognition of the need to structure policy activity within functional regions which combine both rural and urban areas.

vi. Relevance of LMAs to the Eurostat vision for the next decade

A major statistical policy document on Eurostat's "Vision" was released in the Communication from the Commission to the European Parliament and the Council on the production method of EU statistics (COM(2009) 404 Final)[28] and this represents a major updating of the European statistical approach.
One of the key issues facing the European Statistical System (ESS), as identified in Eurostat's Vision, are the dramatic changes that affect the ESS environment, such as:

- New information requirements in terms of quantity and quality; in particular, the integration of different data sources and domains is crucial to satisfy important information needs;
- Enterprises and citizens require that the regulatory environment is simplified and the response burden is decreased;
- New ICT tools are available for the production and dissemination of data.

In this context, Eurostat's vision for the next decade proposes strategies to cope with this changing environment through two dimensions:

[26] See http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-HA-10-001-15/EN/KS-HA-10-001-15-EN.PDF
[27] The transmission of labour market data at NUTS 3 level has no legal basis. However many countries transmit labour market NUTS 3 figures to Eurostat on a voluntary basis, under the understanding that they are not for publication with such detail, but for aggregation in few categories per country, i.e. metropolitan regions and urban-rural typology. Most of the NUTS 3 data are based on the Labour Force Survey (LFS), however, some countries transmit data based on registers, administrative data, small area estimation and other reliable sources. For more details, see http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/en/urt_lmk_esms.htm
[28] Available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0404:FIN:EN:PDF

- Horizontal integration across statistical domains, by both the NSIs and Eurostat:
  - For instance, by linking micro-data from different sources including administrative data or alternative sources;
  - By establishing legal acts that cover a variety of statistical domains.
- Vertical integration of the process from data source to final statistical product:
  - By establishing joint structures, tools and processes;
  - By applying the "European approach to statistics" which recognises that European aggregates do not need full national datasets (because modeling or sampling at the EU level could provide some of the data).

The overview of the policies that may benefit from using LMAs noted that some relevant indicators and statistical variables are not available at an appropriate scale, but it also argued that LMAs could support a more integrated approach to these sectoral policies which would then better contribute to overall EU strategy targets. These potential benefits are clearly relevant to the Eurostat vision and its emphasis on data integration and a more flexible response to the needs of policy users.

In addition it is clear that producing a consistent set of LMA boundaries across the EU would be an example of collaboration between NSIs and Eurostat which is part of the Vision. The possibility of consistent LMA definitions will be greater with the availability of data from the 2010/11 Population Censuses (collected within the framework of a Regulation of the European Commission), along with statistics that for some countries come from sample surveys or administrative sources. In this way compiling the commuting datasets needed for the LMA definitions would itself involve horizontal integration, as well as the vertical integration of national and Eurostat statistical practices.

Although more integrated activity between national and EU levels can be welcomed as an example of the Eurostat vision in practice, the key potential benefit of the LMAs is in providing multi-sectoral statistics to support evidence-based in numerous policy areas. A possible additional advantage would be that the LMAs could be used as the basis for new statistical products of value to policy makers. For example, there could be a typology of LMAs; the potential value of typologies for policy was very recently illustrated in European Commission (2010).

## 2.4. Conclusions

The results of statistical comparisons of areas are sensitive to the choice of areas that are used for these analyses. It is not possible to say that one set of areas ***should*** always be used, because the most appropriate areas will depend on the purpose of the analysis. Whereas analyses related to fresh water availability should probably use data for river basins, the concern here is with suitable sub-national areas for

social and economic policies. Administrative areas have often been used, but there is increasing recognition that 'functional regions' are more appropriate because they minimise the distortion of area comparisons. Almost all functional region definitions are based on commuting patterns and so are labour market areas (LMAs).

A large proportion of MSs recognize the need for a set of consistently defined LMAs covering the whole of their territories. Yet the importance of area comparability becomes still greater when the analyses are both within and between countries. The pressing need for comparable areas for cross-national analyses related to social and economic policy issues has, for example, prompted the definition of the OECD's new metropolitan areas and the EU's LUZ entities in the Urban Audit that in their latest version have converged with the OECD's definitions to give place to the new metropolitan areas presented in OECD (2012). These are identifiable as forms of LMA *but* they only cover large urban areas, whereas for this study the relevance of LMAs to analysis in socio-economic policy fields is not seen as being limited to major cities and their immediate regions.

The use of LMAs in a range of MSs extends well beyond the reporting and analysis of labour market statistics. The reason why areas specifically designed to be LMAs have proved to have wider uses is that across many socio-economic issues the labour market is the most crucial domain that shapes the life chances of people: indeed it is by commuting that most people access work which brings them income. Moreover the spatial pattern of commuting provides an insight into the geography of opportunity more generally.

It was this understanding which underpinned the section of this report considering ways in which a consistent cross-national set of LMAs could support the delivery and monitoring of EU policies, and in particular the Europe 2020 Strategy and a set of related thematic policies that have sub-national implementation or monitoring. These policies have indicators that emphasise competitiveness and social cohesion, and this combination of concerns makes LMAs a key scale because it is within labour markets that the benefits of growth can reach the unemployed. It is also within such wider LMAs as city regions that environmental externalities of economic development occur, thereby making the same spatial scale relevant to sustainability issues in growth policies. The conclusion was then that LMAs are possible areal units for a sub-national 'triple bottom line' for monitoring progress against the objectives of the Europe 2020 Strategy.

In moving on 'from theory to practice' it is not straight-forward to draw conclusions in the form of a specification for a set of LMAs for the EU policy uses reviewed here. A major aspect of this uncertainty is the size of LMAs: the environmental concerns

of sustainability may be best addressed over relatively large areas (as noted above), while social cohesion issues call for a narrower spatial focus because marginalised groups have restricted mobility levels, requiring a localised response to their needs. In fact this dilemma may be at least partly resolved by the practical considerations of obtaining the indicator data for EU policy analyses. Many of the necessary measures rely on sources such as the Labour Force Survey which are not available for very small areas.

In reality it would probably be inappropriate to seek to prescribe strong guide-lines for the definition of LMAs across the whole EU territory when creating acceptable boundaries from remote Scandinavia to urbanised Andalusia is a challenge at the research frontier. For this reason, it was appropriate that the empirical component of this study has proceded without fixed guide-lines to limits its experimentation, instead drawing primarily on experience of 'what works' in existing national definitions of LMAs.

## Appendix to chapter 2 - Assessment of LMAs' potential applications in policy fields of the EC

This appendix provides two brief demonstrations of the policy-related issues that motivate this research. They use different policy-relevant indicators for the ranking of areas, and they are applied in different Member States. It is not suggested that these two worked examples are actual cases of existing policy indicator analyses; the sole aim here is to provide analyses that are representative of the *general principles* with which this research is concerned.

The two cases each use different sets of areas to analyse the same data for:

- rankings of large French cities in terms of earning rates
- rankings of all parts of the UK in terms of unemployment rates.

In both cases, the results obtained using the existing sets of nationally-defined LMAs are compared with the results from using one or more set of local government areas.

### *French city earnings rates*

The first step in this case of the sensitivity of area comparisons to the areas used was to identify the ten largest cities in France. In fact this step itself could provide an example of the sensitivity of results to the areas used, but here the 'traditional' areas for identifying cities were used – viz: the set of local government areas which can be officially designated as "cities" – and in the case of France these are the Communes (LAU2).

Table A1 shows the ranking of the 10 largest Communes by population (2008), ranging from Paris down to Lille (which is just over a tenth of the size of the capital). Immediately to the right of the city names in Table A1 are the average hourly € earning rates (2009) for each of the Communes, and the **emboldened** figures next to these are the rankings of the cities on those rates (where **1** = the highest rate). There is no prior assumption here that the ranking of cities on their earning rates should match that on their size, instead the interest is in how far this ranking on city earning rates varies when different boundary definitions of the cities have been used to report the values from the same 'raw' data on how much people earned.

Moving across the columns in Table A1 to the right, the first of the non-Commune areas examined are the Départements (a higher level set of administrative areas). Whereas all other cities are then 'represented' by an area which is not only larger but also has a name that makes no reference to the enclosed city (eg. Lille is in the Nord Département) the size of the Paris Commune results in it being a Département

on its own. Table A1 thus shows the same € rate for the Commune and the Département in the case of Paris, but the ranking of every other city has changed due to the different way in which their € rates are affected by the change to the areas used for the analysis. These two set of € values have a very similar range (from just over 12 to around 13.5 in the nine non-capital city cases), and there is not an immediately 'obvious' way of choosing between them as ways to compare cities, because both sets of boundaries very largely derive from decisions made a very long time ago when the current realities of economic geography could not have even been imagined.

Comparing the earnings rates using the Communes with those for Départements finds that in the majority of cases the former values were higher than the latter – suggesting that € rates tend to be higher in urban cores than in the nearby areas – ***but*** the crucial point here is that there is a significant minority of cities where the opposite pattern is the case. The second and third cities in the size ranking illustrate this variation: Marseilles had only the sixth highest Commune rate but using the higher Département rate promotes it to third equal with Lyon (which has a lower rate at the Département level than for its own Commune).

Table A1 also reports the Région level rates in the same way, because these too are official statistical reporting areas of no little policy interest. Similar shifts in city rankings can be observed, whether these comparisons are made against Communes or against Départements. At this higher level Paris becomes part of Île de France, whose average € rate is lower than that of the urban core, although its top ranking is unaffected. More notable is the fac that at the Région level two of the cities are grouped together: the second largest Commune – Marseilles – is in the same Région (Provence-Alpes-Côtes d'Azur) as the smaller Nice and this, of course, results in the two cities being ascribed the same Région earnings rate. The average € rate for this relatively affluent Région is second only to that of Île de France among those that are shown in Table A1. While for all the other eight cities the Région € rate is lower than that of the urban core Commune, for these two port cities the opposite is true. The policy implications are potentially severe, with the prospect that these cities may benefit from any assistance that is targeted narrowly at low earning rate cities depending very substantially on the areas that are used for such an analysis.

Table A1 shows finally the results using the Zone Emploi which are areas specifically designed to be LMAs for presenting and analysing policy-relevant data at this scale. It is noticeable that on this basis the € rate for Nice sees this city back near the foot of the ranking. Of these ten Zone Emploi earnings rates, four are closest to the Commune rate for the same city, four closest to that of the Département, and two closest to the rate for the respective Région. To summarise then, this example has shown that a key statistical value:

- is very sensitive to the choice of administrative areas used for the analyses
- is higher for some cities, but lower for others, when larger areas are used
- yields substantially different rankings of cities due to this area sensitivity
- ranks cities differently if LMAs are used to any administrative area ranking.

***UK local unemployment rates***

In this example, the general principles illustrated in the case study of France (above) are explored in a more explicitly policy-driven example in the UK. In each analysis, areas are ranked in descending order of their unemployment rates, and then the cumulative proportion of the national population that they include is calculated while proceeding down the area unemployment ranking. The objective is to thus identify the '10% of areas with the highest unemployment rates' on each area basis. As with the case in France, the rankings compared here use either local government areas or the nationally defined LMAs known as TTWAs (Travel-to-Work Areas).

Whereas in the French case there are several scales of local government areas that could be compared, in the UK there is a unitary system of local government ***except*** in some parts of England. As it happens, the areas with a two-tier system tend not to have very high unemployment rates, so the highest 10% unemployment rate areas (Table A2) are in fact exactly the same whether the analysis uses the upper or lower tier of local authority (LA) areas in those parts of England: the highest rate areas are all either in the parts of England that have a unitary system, or are outside England (where a unitary system exists in all three countries). Figure A1 shows the distribution of the highest unemployment rate LAs in UK as at 2011. The map also shows the boundaries of the constituent countries and the regions within England: only the three southern regions outside London do not include at least one of the 10% highest unemployment LAs. The map also names several areas of the areas featuring among the 10% highest rate LAs, including the largest city of Scotland (Glasgow) and also of N. Ireland (Belfast) plus a substantial part of London. Although there is little doubt that unemployment is indeed high in this 'East End' part of the capital, neighbourhood scale data would cast doubt on whether there are not equally severe problems in other conurbations such as that of Manchester. The probability is that these provincial inner urban problems are not do not appear in this analysis because they have been 'averaged out' by the boundaries of their LAs being large enough to also embrace some more affluent neighbourhoods, whereas in London there are relatively small individual LAs in the inner area which cover few if any of the low unemployment neighbourhoods of the capital.

Table A3 and Figure A2 show the equivalent results using TTWAs. To help with the comparison against the results with the LAs, the named areas on the map are those

which do not have an equivalent area identified when using the other set of areas. Thus whereas on Figure A1 the named areas included some large city LAs (as has just been discussed), the areas identified in the TTWA analysis include several smaller and more peripheral places like Holyhead and Great Yarmouth (Figure A2). At the same time, Bradford is a large city TTWA which is also included on this basis. Comparing the unemployment rates themselves (Tables A2 and A3) shows that the 'qualifying' rate for TTWAs is lower than that for LAs: LAs need to have a rate of 6% or higher to be among the highest decile of LAs in the UK by unemployment rate, whereas a rate of 5.5% is enough to be included in the ranking when using TTWAs. This is the primary reason why the TTWA ranking includes areas like Great Yarmouth and indeed Bradford, because in fact the LAs covering these places have rather similar boundaries to their TTWAs and so their LA unemployment rates were similar to those for their TTWAs. As can be seen from Tables A2 and A3, these rates are not high enough for these places to be among the highest 10% if the ranking is of LAs. The key explanation lies in the LA ranking including parts of London along with the large cities such as Glasgow (where the TTWA rates are lower): when these large populations are included in identifying the highest unemployment areas, the top 10% threshold is achieved before the analysis reaches the 6% unemployment rate areas.

There is no definitive empirical 'proof' that one set of areas is superior to another for analyses such as those illustrated here, although some academic work has shown evidence to support the theoretical position that LMAs are the appropriate units for comparative analyses of local economies. Here the principal argument refers to the question of which areas are more 'fit for purpose' in policy contexts. To be specific: would it be more appropriate for a policy targeted at the highest unemployment areas in the UK to include a part of London such as Waltham Forest (Table A2) rather than Bradford? To ask this question tends to imply the use of LAs – because otherwise Waltham Forest will not be individually identifiable – and on this basis it certainly has a higher rate than Bradford. However the reason why it does not have its 'own' TTWA, as Bradford, is that there are major commuting flows into and out of Waltham Forest: it is heavily integrated into the London LMA. Consequently a policy response involving, for example, fostering job opportunities in the area is very likely to see its effects greatly dissipated by the jobs being taken by people of other areas. Instead the scale of the unemployment problem affecting Waltham Forest needs to be considered – and addressed – on the appropriate basis which is London-wide. By contrast the unemployment problem in Bradford is much more localised and, when appropriately addressed within its TTWA boundary, it can be anticipated that a policy intervention will mostly impact on the local residents.

## Table A1 Ranking of largest French cities by wage rates, using four different types of area

| *rank* | *Population 2008* | Commune | (€) | | Département | (€) | | Région | (€) | | Zone Emploi | (€) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *1* | *2211297* | Paris | 18.2 | **1** | Paris | 18.2 | **1** | Île-de-France | 15.5 | **1** | Paris | 16.8 | **1** |
| *2* | *851420* | Marseille | 12.9 | **6** | Bouches-du-Rhône | 13.2 | **3** | Provence-Alpes-Côte d'Azur | 12.7 | **2** | Marseille-Aubagne | 13.1 | **4** |
| *3* | *474946* | Lyon | 13.9 | **2** | Rhône | 13.2 | **3** | Rhône-Alpes | 12.4 | **4** | Lyon | 13.2 | **2** |
| *4* | *439553* | Toulouse | 13.2 | **5** | Haute-Garonne | 13.3 | **2** | Midi-Pyrénées | 12.3 | **5** | Toulouse | 13.2 | **2** |
| *5* | *344875* | Nice | 12.3 | **10** | Alpes-Maritimes | 12.8 | **5** | Provence-Alpes-Côte d'Azur | 12.7 | **2** | Nice | 12.7 | **8** |
| *6* | *283288* | Nantes | 13.3 | **4** | Loire-Atlantique | 12.2 | **8** | Pays de la Loire | 11.5 | **10** | Nantes | 12.3 | **10** |
| *7* | *272116* | Strasbourg | 12.7 | **8** | Bas-Rhin | 12.4 | **7** | Alsace | 12.3 | **5** | Strasbourg | 12.8 | **6** |
| *8* | *252998* | Montpellier | 12.4 | **9** | Hérault | 12.2 | **8** | Languedoc-Roussillon | 11.9 | **8** | Montpellier | 12.8 | **6** |
| *9* | *235891* | Bordeaux | 13.5 | **3** | Gironde | 12.5 | **6** | Aquitaine | 12.0 | **7** | Bordeaux | 12.7 | **8** |
| *10* | *225784* | Lille | 12.8 | **7** | Nord | 12.1 | **10** | Nord-Pas-de-Calais | 11.9 | **8** | Lille | 12.9 | **5** |

(€) = Salaire net horaire moyen 2009

**Sources**

population: www.insee.fr/fr/ppp/bases-de-donnees/donnees-detaillees/base-cc-evol-struct-pop/base-cc-evol-struct-pop-08.zip

salaire: www.insee.fr/fr/ppp/bases-de-donnees/donnees-detaillees/base-cc-salaire-net-horaire-moyen/base-cc-salaire-net-horaire-moyen-09.zip

## Table A2 10% highest unemployment areas using LAs

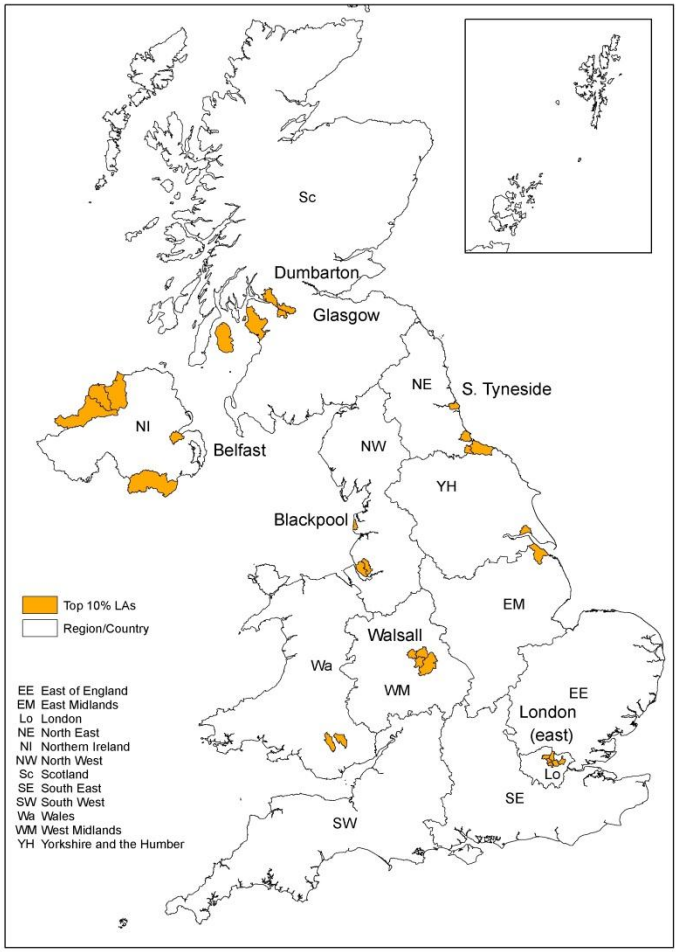
| LA | unemployment % | cumulative % |
|---|---|---|
| Kingston upon Hull | 7.9 | 0.4 |
| Derry | 7.9 | 0.6 |
| Wolverhampton | 7.7 | 1.0 |
| Middlesbrough | 7.5 | 1.2 |
| Birmingham | 7.3 | 2.9 |
| Hartlepool | 7.3 | 3.0 |
| Sandwell | 7.2 | 3.5 |
| Hackney | 7.1 | 3.9 |
| Newham | 7.1 | 4.3 |
| Blaenau Gwent | 7.1 | 4.4 |
| Strabane | 7.1 | 4.4 |
| Belfast | 7.0 | 4.9 |
| Limavady | 7.0 | 4.9 |
| Liverpool | 6.8 | 5.7 |
| Haringey | 6.6 | 6.1 |
| Walsall | 6.6 | 6.5 |
| North East Lincolnshire | 6.5 | 6.7 |
| North Ayrshire | 6.4 | 6.9 |
| Redcar and Cleveland | 6.3 | 7.2 |
| South Tyneside | 6.3 | 7.4 |
| Knowsley | 6.3 | 7.6 |
| Barking and Dagenham | 6.3 | 7.9 |
| West Dunbartonshire | 6.2 | 8.1 |
| Blackpool | 6.2 | 8.3 |
| Tower Hamlets | 6.2 | 8.7 |
| Waltham Forest | 6.2 | 9.1 |
| Merthyr Tydfil | 6.1 | 9.2 |
| Newry and Mourne | 6.1 | 9.4 |
| Glasgow City | 6.0 | 10.4 |

## Table A3 10% highest unemployment areas using TTWAs

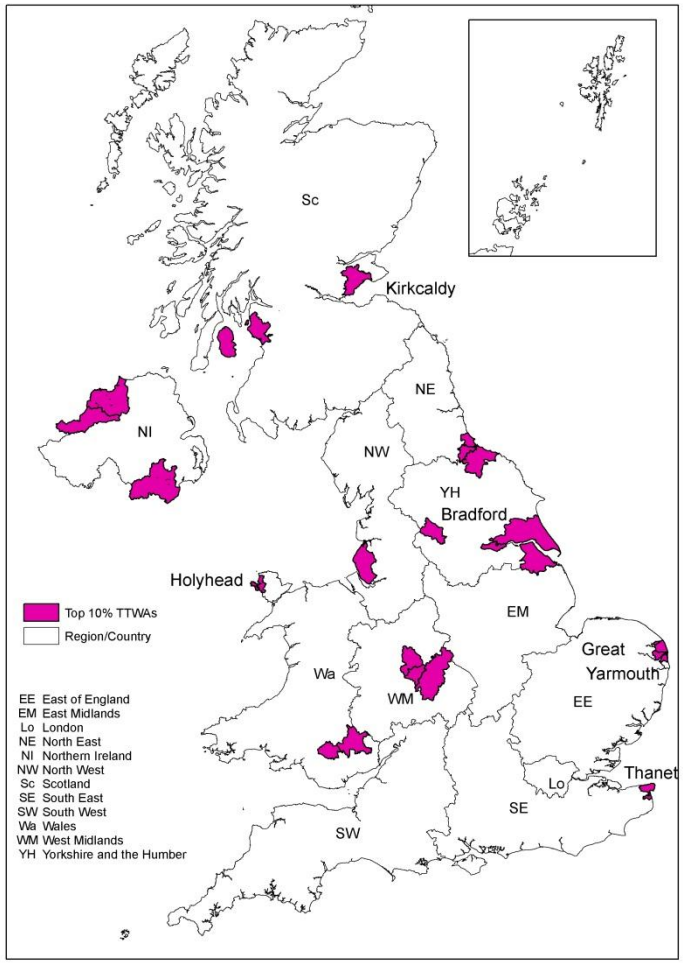
| TTWA | unemployment % | cumulative % |
|---|---|---|
| Newry | 7.6 | 0.2 |
| Strabane | 7.6 | 0.2 |
| Derry | 7.5 | 0.5 |
| Hartlepool | 7.0 | 0.6 |
| Wolverhampton | 6.6 | 1.2 |
| Irvine & Arran | 6.3 | 1.5 |
| Birmingham | 6.2 | 4.1 |
| Middlesbrough & Stockton | 6.2 | 4.9 |
| Liverpool | 6.1 | 6.4 |
| Dudley & Sandwell | 6.0 | 7.2 |
| Holyhead | 6.0 | 7.2 |
| Merthyr Tydfil & Aberdare | 5.9 | 7.4 |
| Hull | 5.8 | 8.2 |
| Grimsby | 5.8 | 8.5 |
| Ebbw Vale & Abergavenny | 5.7 | 8.7 |
| Great Yarmouth | 5.6 | 8.9 |
| Margate, Ramsgate & Sandwich | 5.6 | 9.1 |
| Kirkcaldy & Glenrothes | 5.6 | 9.3 |
| Bradford | 5.5 | 10.1 |

Source for Tables A2 & A3: average of the 12 months of 2011 claimant count proportions of estimated resident population aged 16-64 [www.nomisweb.co.uk]

## Figure A1 10% highest unemployment areas using LAs




## Figure A2 10% highest unemployment areas using TTWAs



# 3. Recommendations on the establishment of an EU-wide harmonised grid of comparable LMAs

## 3.1. Introduction

This part of the study is concerned with empirical tests of the feasibility of establishing for the whole EU a harmonised grid of comparable Local Labour Market Areas (LMAs), and with making recommendations on the means and resources necessary for future research to achieve this objective.

This last stage of the study builds upon findings of the earlier research. Chapter 1 of the Interim Research Report (IRR) (here included as Annex I) presented a review of the state-of-art of applied sciences in the field of LMA definitions, showing that most existing concepts of LMAs require all LMAs to be self-contained[29] in their commuting flows. Chapter 2 of the IRR had then shown that the commuting data needed to produce LMA definitions in the EU will very soon be available, mostly from Population Censuses completed in the last few years. The information will be mostly available at LAU2 level, and these zones are suitable 'building blocks' for defining LMAs (as they already are in those countries were LMAs are officially defined).

Chapter 3 of the IRR reviewed LMA definition method best practice and concluded that two official methods (that which defines Swedish LAMs *[Lokala arbetsmarknader]*, and the method defining the TTWAs *[Travel-to-Work Areas]* in the United Kingdom) which deserved empirical evaluation, along with a more 'academic' innovative method (based on genetic algorithms). This empirical evaluation should be undertaken on data for case studies countries providing

- variation in territorial terms found across the EU (e.g. heavily urbanised zones as well as predominantly rural and peripheral areas, including islands)
- variety of LAU2 area sizes (nb. this can strongly impact on some methods)
- some cases with existing official definitions, and some where there are none.

[29] Self-containment is a two-fold variable that comprises supply-side self-containment (the proportion of an area's employed population that works within the area) and demand-side self-containment (the proportion of jobs within an area that are filled by residents of that area). In many of the tables included in this chapter the variable *lower self-containment* is reported: this refers to the lower of the supply and demand-side self-containments and is the best measure of the degree of closeness of the area to being a 'perfect' LMA.

The study had access to national datasets from different sources for three countries[30] that between them covered all three criteria: Spain, Sweden and the UK. Access to data from other countries was facilitated by Eurostat through granting access to SIRE. These additional datasets included the necessary commuting information for the following countries: AT, BE, CH, ES, FR, IE, SE. These datasets presented some limitations; namely, incompleteness due to its coverage of each origin area being limited to the commuting flows to the 30 LAU2 destinations receiving the largest flows.

**Glossary**

| | |
|---|---|
| Countries | |
| xx | the standard EU 2 letter abbreviations are used (eg. ES = Spain) |
| | |
| General | |
| LMA | (local) labour market area |
| NSI | National Statistical Institute |
| MS | Member State |
| IRR | this project's Interim Research Report (which is included as an Annex to the Report of which this chapter is part of) |
| | |
| Data | |
| ES01 | 2001 ES Census commuting data obtained directly from the NSI |
| SE01 | 2001 SE Register-based commuting data on Sweden obtained from the web-site of the NSI |
| SE96/SE06/SE10 | 1996/2006/2010 SE Register-based commuting data on Sweden obtained from the web-site of the NSI |
| UK01 | 2001 UK Census commuting data obtained directly from the NSI |
| xx(SIRE) | 2001/similar commuting data for country xx obtained indirectly (via the Eurostat database SIRE) |
| | |
| Methods | |
| GEA | experimental method based on grouping evolutionary algorithms |
| LAM | method that defines official SE labour market areas: *Lokala arbetsmarknader* |
| TTWA | method that defines official UK labour market areas *Travel-to-Work Areas* (with criteria adapted minimally for transferability) |
| 'Euro' | method that defines official UK labour market areas Travel-to-Work Areas (with criteria changed on a hypothetical basis) |

The next three sections of this Chapter explore the definition of LMAs produced when the three alternative methods are applied to commuting datasets for the three MSs:

- Section 3.2 applies the centre-based method developed in Sweden to define the official local labour market areas (LAMs)
- Section 3.3 uses the TTWA method (which does not presume that LMAs all have the same spatial structure) that was devised to define official LMAs in the UK

[30] The data for UK and Spain was available as a result of the geographical origin of two of the experts involved in the project, while the data for Sweden is publicly available on Statistics Sweden webpage.

- Section 3.4 applies an experimental methodology based on the use of grouping evolutionary algorithms (GEA).

These main tests – three methods applied to three national cases (with data on 2001) – are enhanced in a number of ways. Section 3.2 includes data for Sweden from several years so as to assess the sensitivity of LMA definitions to changes in commuting patterns over the longer term. Section 3.3 then widens the test of the 'transferability' of the TTWA method by also applying it to datasets from SIRE.

To build towards a set of recommendations, Section 3.5 starts by comparing the equivalent size and self-containment criteria in existing official methods and thereby develops a hypothetical 'Euro' set of criteria which is then tested in several countries. Section 3.6 then summarises findings from the research by outlining recommendations in a question-and-answer format that hopefully helps to clarify their policy relevance. The chapter also has two appendices. Appendix 1 details the key characteristics of: (a) LAU2 areas which are basic territorial units here, (b) key commuting variables for these analyses, (c) all the 32 alternative sets of LMAs produced in the course of the research. In Appendix 2 the possibility of raising the 'Euro' set of criteria is briefly explored.

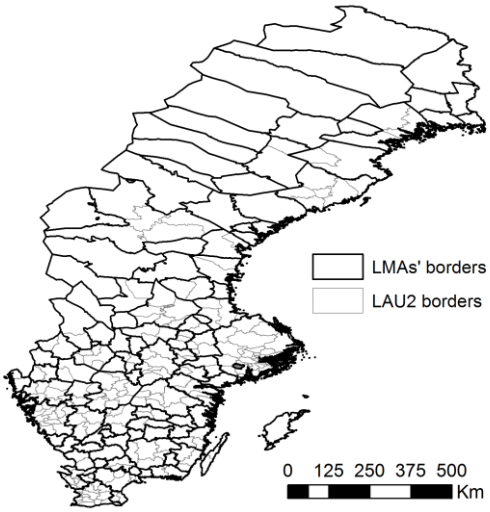
## 3.2. LMAs based on centres

The research starts with a centre-based method because this approach has been the most widely used and recognised. Earlier in this study the LAM method was identified as arguably 'best practice' among these methods. The method has been implemented here as a computerised algorithm that can be applied to suitable data for any country. Comparing the results with the official Swedish definitions confirms that the method has been successfully interpreted by this software. Map 1 shows the results of applying this implementation of the LAM method to 1996, 2001, 2006 and 2010 commuting data (made available via the internet by SCB).

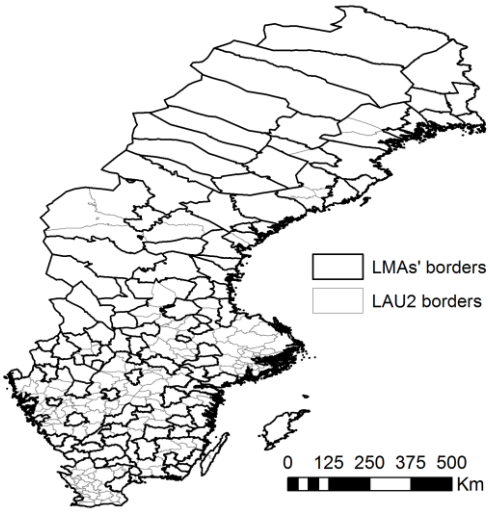
Before moving on to evaluate the results of applying the LAM method to the data for other countries, the data for Sweden provides a very valuable opportunity to assess how stable LMA boundaries are, given persistent changes to commuting patterns. Sweden reports an updated commuting dataset nearly every year, and here the datasets for four years have been analysed in parallel. Table 1 and Map 1 show the results. Table 1 also shows that the number of local authority areas used for the

**Map 1. LMAs from the implementation of the LAM method applied to SE96, SE01, SE06 and SE10**

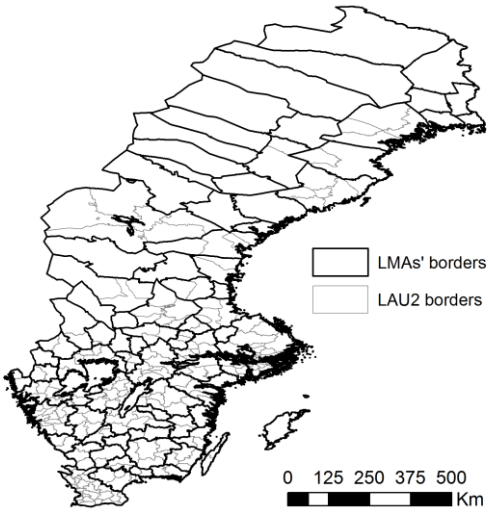
**1996**



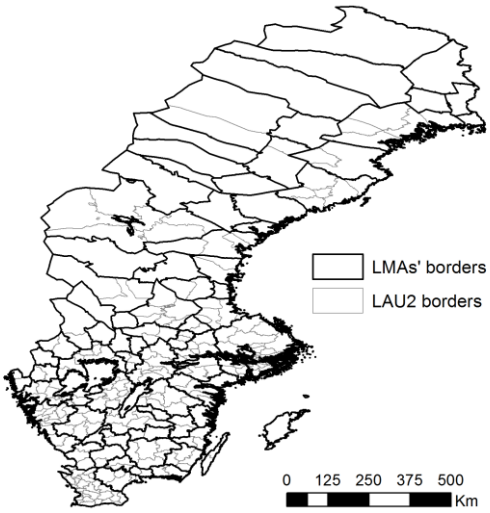

**2001**




**2006**




**2010**




number of separably identifiable LMAs is the gradual increase in longer-distance commuting that gradually erodes the separateness of all localities as labour markets.

The same process has been seen in all modern countries with comparable data available over the medium to long term. Some methods of defining LMAs are more sensitive to this effect than others, although the level of sensitivity shown in Table 1 was in fact quite closely matched by the level found when the TTWA method was applied to the same datasets. Indeed a method which is ***not*** very sensitive to this

**Table 1 Sensitivity of the results from applying the LAM method to SE96, SE01, SE06 and SE10**

| Year of data | Number of municipalities | Number of LMAs |
|---|---|---|
| **1996** | 288 | 105 |
| **2001** | 289 | 88 |
| **2006** | 290 | 79 |
| **2010** | 290 | 76 |

effect is failing to reflect the realities of commuting patterns. Hence the conclusions here are that an adequate LMA definition method ***should*** produce results which are time-specific because they are sensitive to change in commuting patterns, which then serves to reinforce the need to update LMA definitions when a new dataset is available (assuming that commuting patterns do continue to change, as they have for decades).

To explore in how transferable this city-based method[31] is to other MSs, the crucial test involves applying it to countries[32] with more complex urban systems, and also datasets with small LAU2 areas – that is, a higher "granularity" – and with boundaries that often cut through current settlements. Spain and the UK both have LAU2 areas with these features, and the results from applying the LAM method to these countries are shown respectively in Maps 2 & 3, while being summarised in Table 2.

The clearest problem found in transference of the LAM method to data for other countries is the low levels of self-containment of the LMAs defined in those countries (Table 2). This problem arises directly from the method not having a self-containment test for valid LMAs; one was simply not necessary in Sweden, partly due to the nature of the LAU2 areas there. By contrast, the same method produces some Spanish LMAs which are less than 10% self-contained, and in the UK the minimum level is under 20% and more notably perhaps, the median value in the UK is under 60%).

[31] LAM method has a first step to identify centres (zones where the supply-side self-containment is over 80% and where the maximum outgoing flow to a single destination is under 7.5% of working population, also grouping pairs of zones that have each other as destinations of their largest commuting outflows). The rest of the zones are assigned to the destination of their largest outflow, within a hierarchical process of assignments until all zones are allocated to LMAs (all of which must include a centre): considerable extra detail is provided in the Annex to Chapter 3 of the IRR.

[32] In fact the SCB has applied the LAM method in other Nordic countries (Denmark, Finland and Norway) but these countries do not meet these criteria. Even so the survey conducted by this study revealed that LAU2 areas in Denmark were considered by the Danish NSI to be too different from those in Sweden, resulting on the LAM method not producing results in DK which were likely to be adopted officially.

**Table 2 LMAs from the implementation of LAM method applied to several countries**

| | Number LAU2 zones | | Number of LMAs | Lower self-containment level | | LMA employed population | |
|---|---|---|---|---|---|---|---|
| | Allocated | Unallocated[33] | | Min. | Median | Min. | Median |
| **ES01** | 8030 | 78 | 1536 | 7.6% | 85.2% | 1 | 261 |
| **SE01** | 289 | 0 | 88 | 70.7% | 87.5% | 1253 | 14537 |
| **UK01** | 10474 | 84 | 681 | 18.7% | 59.0% | 464 | 14133 |

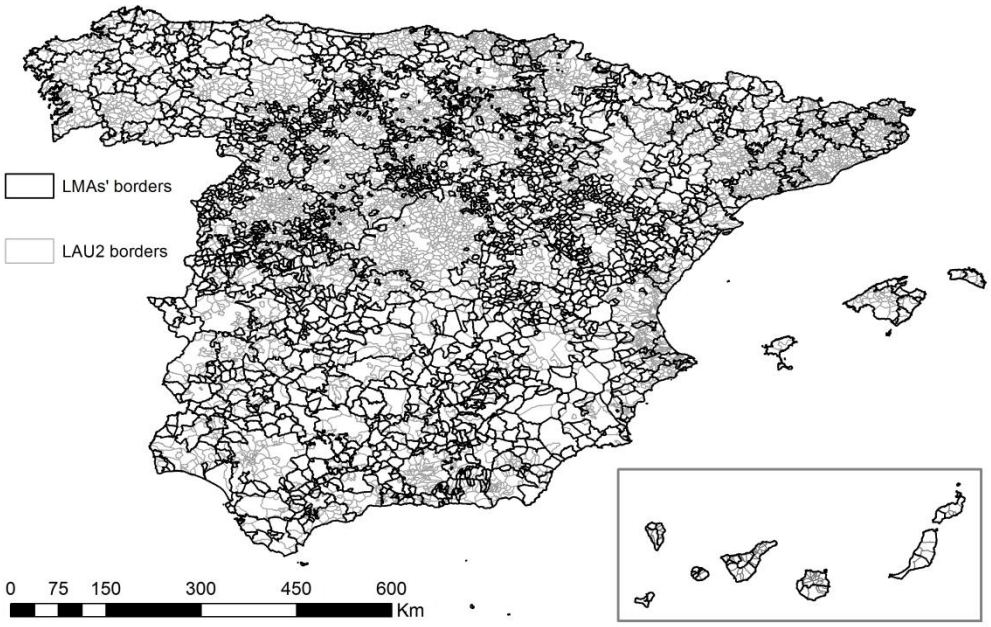
*Notes*: The full set of available statistics for each national exercise is available in the Appendix (Table A.6).

Another feature of the LAM method is the very wide size range of the LMAs it defines. It identifies very large LMAs around the main cities so that in the Spanish case the 20 largest LMAs cover 1876 municipalities and 8.6 million workers yet, at the same time, there is an overabundance of LMAs that each comprises one LAU2 zone in isolation (the median number of employed population in the Spanish LMAs resulting from the application of LAM method is in fact as low as 261). The main reason for the abundance of small sized LMAs is the absence of a minimum size constraint in selecting centres, which is not so relevant in Sweden due to its LAU2 zones' populations (in fact the LMA with lowest size there has 1253 occupied residents). In addition, there is no size test for the final set of LMAs. The problem of small size LMAs from the LAM is not however restricted to the Spanish case because in the UK too some of these LMAs house under 500 occupied residents.

The simultaneous existence of some very large areas is the outcome of the criterion chosen for aggregation: in the LAM method LAU2 areas are grouped simply according to the absolute size of commuting flows with other areas (unlike most other methods, the flows are not expressed as a proportion of all the flows at the origin and/or destination end, because if flow sizes are relative in this way the largest LMAs have less in-built tendency to grow ever larger). In most policy uses, LMAs that are not too variable in size are preferred because then it is more reasonable to see the defined areas as comparable. As a result, the tendency of the LAM method to define areas which vary radically in size is a distinct disadvantage.

[33] The figures on unallocated zones in the Spanish case reflect the existence of LAU2 zones for which there are no in or out commuting flows; such zones cannot be assigned to any LMA by methods that rely exclusively on commuting flows. In the British case however, the cause is the LAM method relying exclusively on the largest flows of areas which, in some cases, can produce 'loops' [eg. A->B->C->A] which remain unallocable zones if none of the zones qualify as centres.

**Map 2. LMAs from the implementation of LAM method applied to ES01**[34]

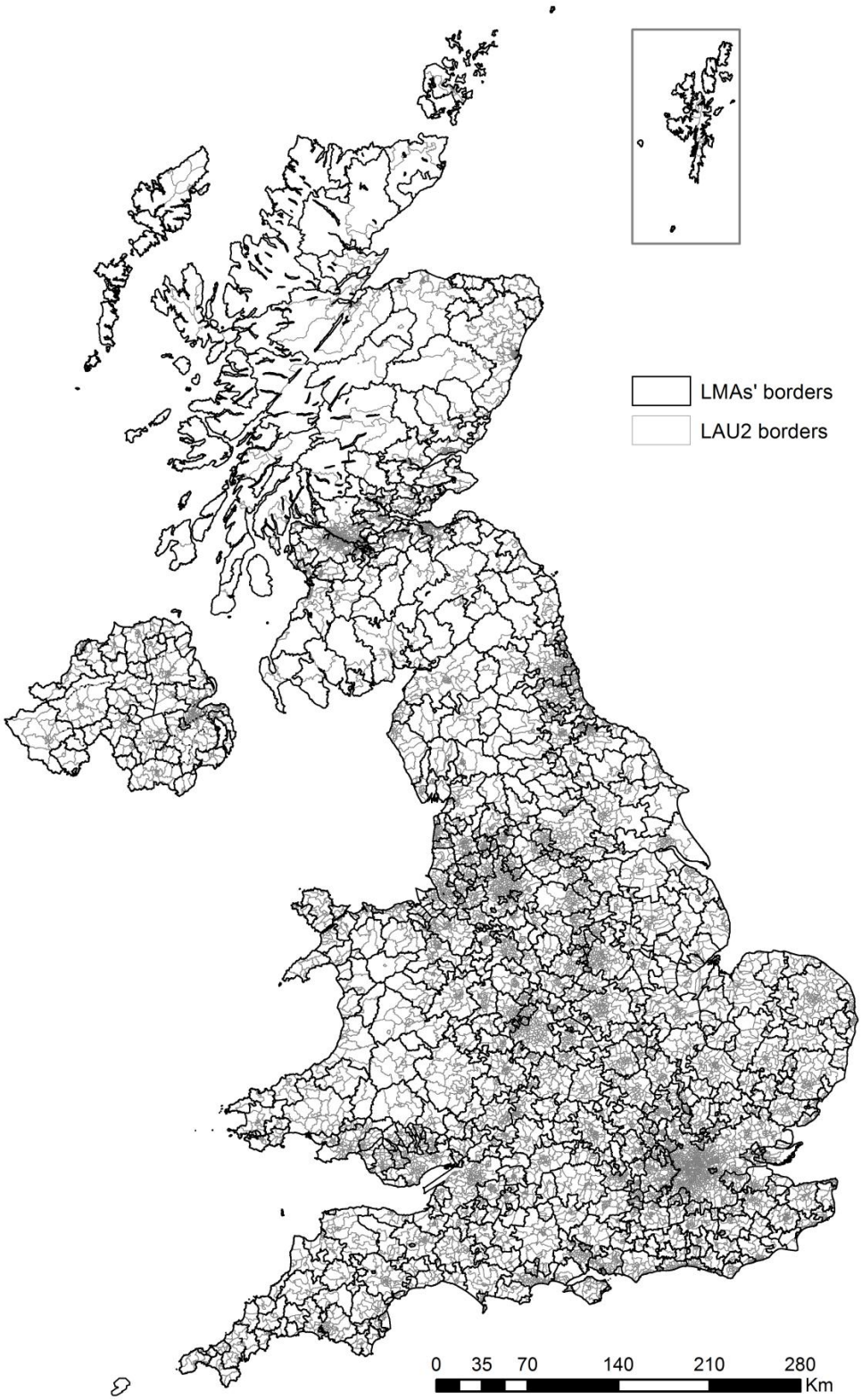



Maps 2 & 3 make it immediately evident that the size of the defined LMAs across both Spain and the UK varies hugely, often over short distances, in a way which was not found in Sweden (Map 1). In modern countries most people can commute some distance to access suitable jobs, with the result that very small LMAs scarcely exist (except perhaps on remote islands). This means that the results here in Spain (Map 2) are implausible in areas such as those immediately surrounding Madrid – the large LMA in the centre of the country – where almost all of the LAU2 areas have remained either unallocated zones or have been defined as LMAs of just one or two very small zones. Similar problems can also be seen, if to a rather less extent, in between substantial LMAs in the UK (Map 3).

Another problem is illustrated by the large LMAs such as that which covers the Madrid area and that covering London: there are 'enclave' areas which are totally surrounded by the main LMAs. These situations can arise where some LAU2 areas have met the criteria to be LMA centres but then the pattern of their commuting inflows does not

[34] Commuting data from Census of Population 2001 were facilitated by the Spanish NSI (INE) to the University of Alicante for research on LMAs (a full explanation of the details can be found in Casado, J.M.; Martínez, L. and Flórez, F. (2010) "Los mercados locales de trabajo españoles. Una aplicación del nuevo procedimiento británico", in Albertos, J.M. y Feria, J.M (ed.) *La ciudad metropolitana en España: procesos urbanos en los inicios del siglo XXI*. Madrid, Thomson-Civitas, pp. 275-313.

**Map 3. LMAs from the implementation of LAM method applied to UK01**



match the criteria of the method for them to be further grouped. These outcomes can be seen to be due to the criteria for identifying centres in the LAM method being based on the situation in Sweden: there the LAU2 areas are whole settlements, perhaps with nearby areas included too, but this is far from always the case elsewhere.

This is a problem which is not restricted to the LAM method because no centre-based method has been able to produce consistently satisfactory results when analysing individual small zones (especially in the UK). In fact this was also shown by the new OECD centre-based city region definitions: this method had to begin with a very major task of GIS-based analysis to group the small zones so that they identify whole built-up areas so to guarantee that the final areas would not to include any enclave areas. Whilst this is indeed one certain way of preventing such enclaves, it is inappropriate when applied as a basis for defining LMAs across all parts of the EU (whether or not these are 'metropolitan'). It clearly prioritises the morphology of urban areas over the functional linkages which are fundamental to LMAs. To put this into clear perspective, there will be some areas which are physically connected and yet are not strongly linked by commuting flows (eg. in the UK, W. Yorkshire and the W. Midlands). In any such case to solve the potential enclave problem by initially grouping all the built-up areas will prevent the commuting analyses defining the most appropriate results in those physical conurbations which embrace several functionally distinct LMAs.

The limitations of the LAM method which have been identified in this part of the report must be weighed against its strengths. Above all perhaps, its nature as a centre-based definition of LMAs gives it familiarity and intuitive appeal. It is also a distinctly simple procedure which makes it readily replicable, an advantage in the policy environment where transparency is valued. Unfortunately this very simplicity is part of the reason for some of the weaknesses identified here, including its poor transferability to MSs where many LAU2 areas are small and/or only cover part of a coherent settlement. Part of the problem is the inherent difficulty of identifying centres with 'building block' zones lacking those inherent characteristics of the LAU2 areas in Sweden which will have been taken for granted when their LMA definition method was created for application to these zones. In much the same way, the method produced Swedish LMAs with suitable characteristics even though it had no explicit self-containment or size minima applied. When the same method was applied to data for other countries such as ES and UK however, the results were not so satisfactory (Appendix, Table A.6).

The final question to ask here is whether these problems with the LAM method could be redressed by adding an extra element to the definitional process to further group areas which were inadequately self-contained (for example). One existing official

method which proceeds by iteratively grouping 'proto-LMAs' until they all meet the statistical requirements set is the method to define TTWAs. Experimental research has found that it is indeed possible to take results from the LAM method and input these to the TTWA method so all the final LMAs are of adequate self-containment and size. Without going into the details of the results, it is possible to recognise that solving the problem of the LAM method in this way must have a key disadvantage of negating two of the crucial benefits of that method viz: its simplicity and the primacy of its focus upon commuter flow links to identified centres.

### 3.3. LMAs defined by a method that does not prescribe a single structure

The previous section concluded that although a centre-based method has a clear advantage in the intuitive appeal of areas orientated around towns and cities, enhanced by the simplicity of the sample method (LAM) tested here, major problems arise when applying the method to other countries. It seems that the centre definition method is not transferable to countries in which the LAU2 boundaries cut through settlements because, for example, they are relatively small. This section of the report considers a method without a prescribed single structure – such as that every LMA should have (at least) one main centre – to test whether that method is more transferable between the countries examined in detail here.

There is one method which already has a record of transferability because it has been adopted and adapted in different countries in several continents: this is the method that has been developed as the way to define TTWAs (Travel-to-Work Areas) in the UK over several decades now. Although earlier forms of the method did initially identify 'job foci' as a type of centres, its evolution since then has resulted in TTWAs that have no presumed structure. The method used now[35] 'explores' the data to seek out clusters of commuting flows of any form. The fact that the TTWAs have had long-term UK policy use shows the method has proved acceptable in policy arenas, despite lacking the ready acceptability that centre-based methods are here credited with. On the same basis it can be argued that the fact that the TTWA method involves a more 'black box' definition process than the simple LAM centre-based method described above has not held back the use of TTWAs in relevant policy fields.

[35] In the TTWA method every zone is initially a potential LMA. The method then proceeds by iteratively considering the LMA with the lowest score on the criteria of validity. If that LMA does not fulfill the set criteria it is dismembered and its constituent zones are reassigned to whichever remaining potential LMAs scores highest on the interaction index. The criteria of validity are codified in terms of a trade-off relationship that has a target level for the lower supply and demand-side self-containment values which is relaxed for zones exceeding a minimum size in terms of economically active population (as described in the Annex to Chapter 3 in the IRR).

The clarity and relevance of its primary criteria has helped the TTWA method achieve its proven transferability to a diverse range of different geographical circumstances. All the defined TTWAs must possess the appropriate set statistical characteristics, guaranteeing that every one satisfies minima in terms of self-containment and size (with a certain level of 'trade-off' allowed between these two criteria). In any transfer of the method to another context, these criteria can be treated as parameters that are adjusted to make them appropriate to different circumstances. The key objective for this study is to produce ***comparable LMAs across the whole of the EU*** so it is essential that the same criteria values are used in all countries, but exactly what those values should be is yet to be determined.

In this section of the report the TTWA method is applied to several countries using the criteria values derived from those that defined the official 2001-based UK LMAs (Coombes & Bond 2007). In fact the criteria values used here are not precisely those used for the official definitions, because they had used an 'external' data source for the size measure, whereas here all the analyses rely completely upon commuting data. (In the original UK criteria the unemployed in the LMA size measure, adding the counts of those without work to total numbers of people in the commuting data.) As a result, the criteria here are not quite the same as those in the official UK TTWA definitions but instead are a 'scaled down' version[36] to adjust for the lack of unemployed people in the commuting data analysed here.

There is a rather more significant way in which this process of defining LMAs is not identical to the one which produced the official TTWAs in the UK. Before the official boundaries were confirmed there was a limited consultation process on the 'raw' boundaries produced by the computerised analysis of the UK01 commuting dataset. Any change to the boundaries had to meet rigid conditions to protect the critical statistical characteristics of the definitions, while the process did enable the small number of non-contiguities in the 'raw' boundaries to be resolved. Map 4 shows the LMAs produced here by applying the TTWA method to the UK01 dataset: it is of course 'raw' in that it has ***not*** been through a consultation process, so although the overall match to official TTWAs is of course very close there are some notable differences (which primarily involve there being more separate official TTWAs in some areas).

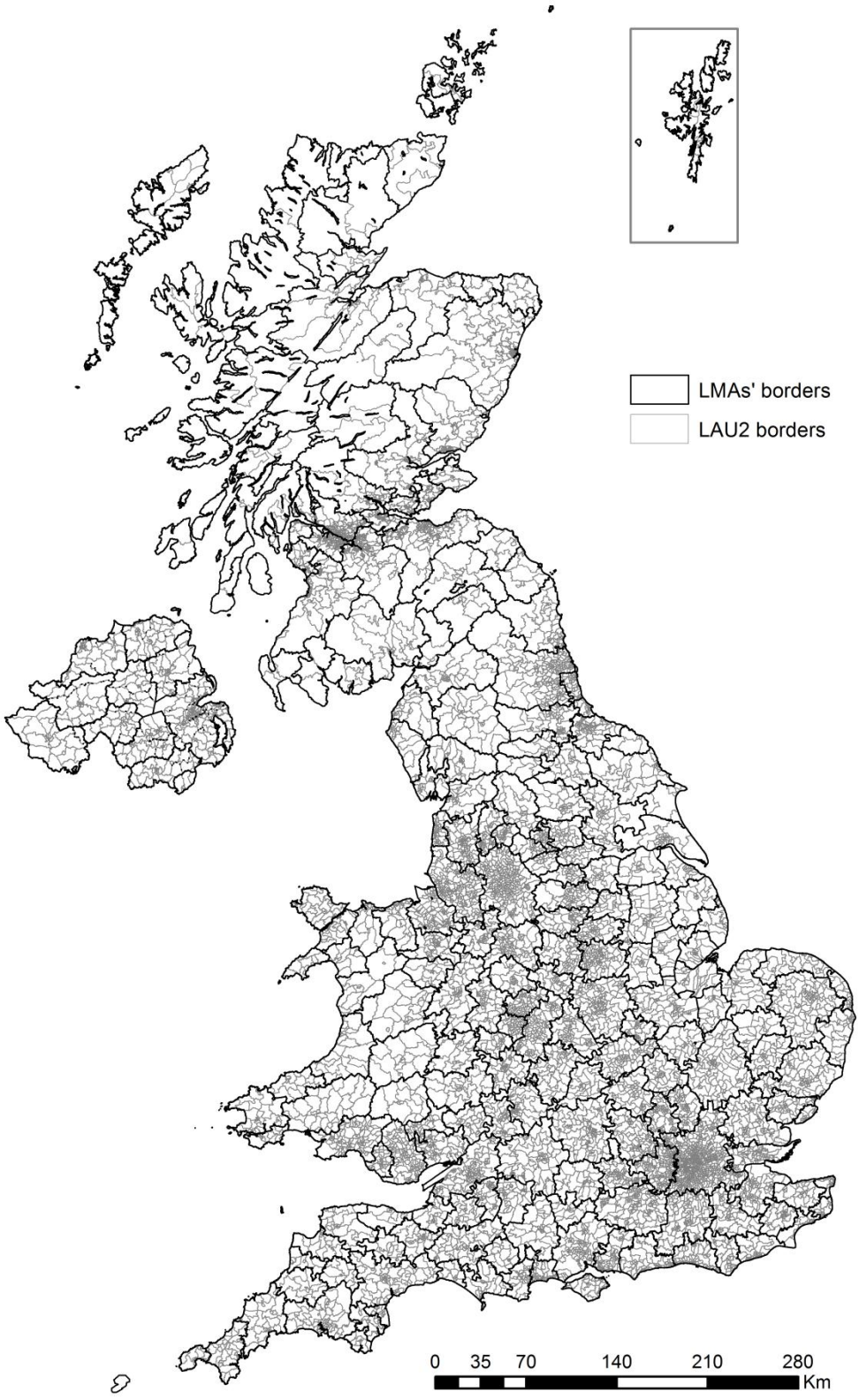
[36] The parameters that were used for the 2001-based official set of TTWAs were adapted in this research to be based on total trip origins rather than total economically active populations: a simple calculation that divided the national number of trip origins by the economically active population gave some guidance as a 'deflator' (0.9395); applying this to both the minimum value 3500 and target value 25000 and then slightly rounding these produces minimum=3300 and target=23500 and so these values are used for TTWA runs here (along with the existing self-containment minimum .6666 and target .7500).

Map 4 shows the results of this TTWA analysis of UK01 dataset and as such is directly comparable to the results of the LAM analysis of this dataset (Map 3). Probably the most striking difference is that the TTWA method produces LMAs that are remarkably similar in area size in almost all parts of the UK. Most people avoid lengthy commuting trips and this means that localised clusters of flows dominate the commuting patterns. The key feature of the TTWA method is that it does not prescribe any single structure, such as a set of primary centres; instead the method has revealed this spatial structure in the flows themselves. By contrast when same flow dataset was analysed by the LAM method it could not reveal this inherent pattern because its definition procedure was determined to impose a centre-and-hinterland structure that is not always appropriate. This lack of transferability is partly due to the geographical conditions found in the UK (eg. the sheer size of London and the extensive old industrial regions), but also the challenge of defining centres when analysing the very small and seemingly randomly shaped zones in the UK01 commuting dataset.

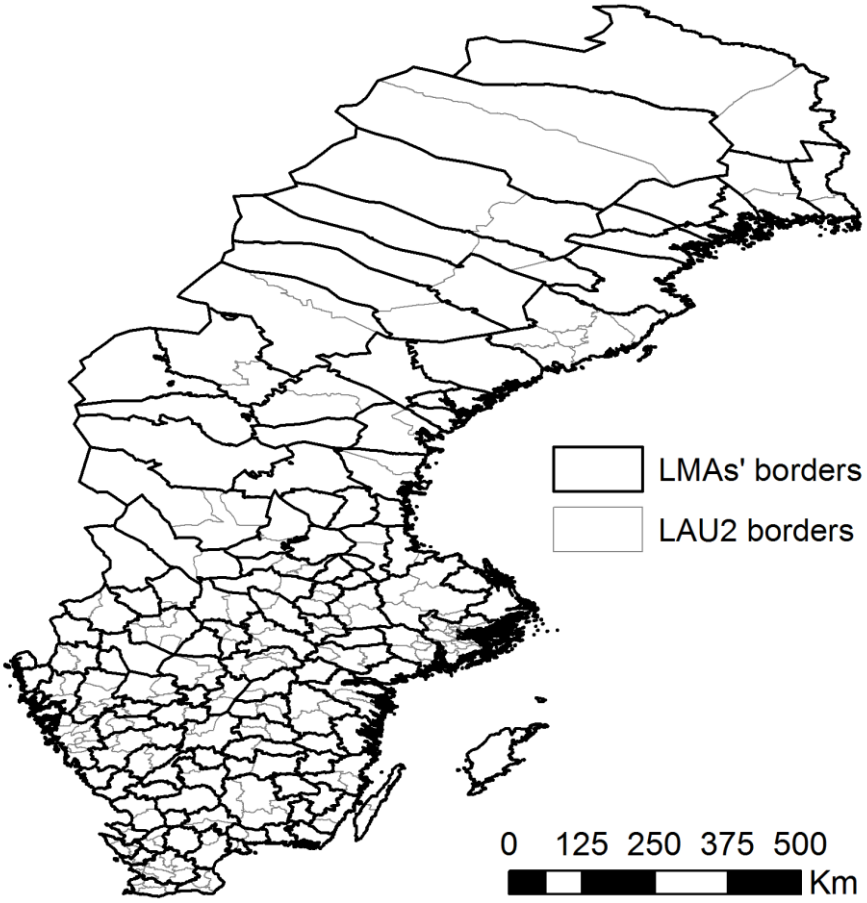
This leads naturally to the question of how transferable the TTWA method is to the Swedish situation for which the LAM method was devised. Map 5 shows the 126 LMAs produced applying the TTWA method to the SE01 data, a notable contrast in numbers to the 88 LAMs. In fact a substantial minority of the LAMs are exactly recreated by the TTWA method and this gives some encouragement that the results may not be wholly unacceptable in Sweden. The most notable difference is that LMAs produced by the TTWA method tend to be smaller than the LAMs in the areas around the largest cities. In these areas the local towns must not qualify as centres on the LAM criteria and thus have to become part of LAMs based on the nearby major cities, whereas the TTWA method is designed to enable any area to remain separable so long as it finally meets the statistical criteria set, and these LMAs must be satisfactory in terms of their size and commuting self-containment.

Of course, all the LAMs will be suited to the purpose they were created for, but the fact that the TTWA method has defined numerous additional statistically robust LMAs does not mean that it its results are inherently either worse or better. It may be the view of Swedish users that these TTWA-defined LMAs – while different to the LAMs – do also represent one 'dimension' of the complex modern labour market in these parts of the country. Such a view would be more evidence that the TTWA method does have a genuine transferability.

**Map 4. LMAs from the TTWA method applied to UK01**



**Map 5. LMAs from the TTWA method with applied to SE01**




The issue of transferability is further evaluated by applying the TTWA method to the ES01 commuting data for Spain. Map 6 shows these results (nb. there is no official set of LMAs to compare this against, in an equivalent way to the above comparison of the Swedish results with the LAMs). There are numerous LAU2 areas which are isolated – not grouped with any others in LMAs – although there are considerably fewer than there were in the results from the LAM method analysis (Map 2). As was mentioned when discussing those earlier results, there are some LAU2 areas with no commuting flows in or out in the ES01 dataset and this makes them unallocable for any method that relies exclusively on commuting data. Setting aside these problematic LAU2 areas, Map 6 suggests that the TTWA method has produced LMAs of rather similar spatial extent across much of Spain, although the most mountainous areas have larger LMAs (as was found in the north of the UK and also the large swathe of upland areas in the north-west of Sweden).

**Map 6. LMAs from the TTWA method applied to ES01**

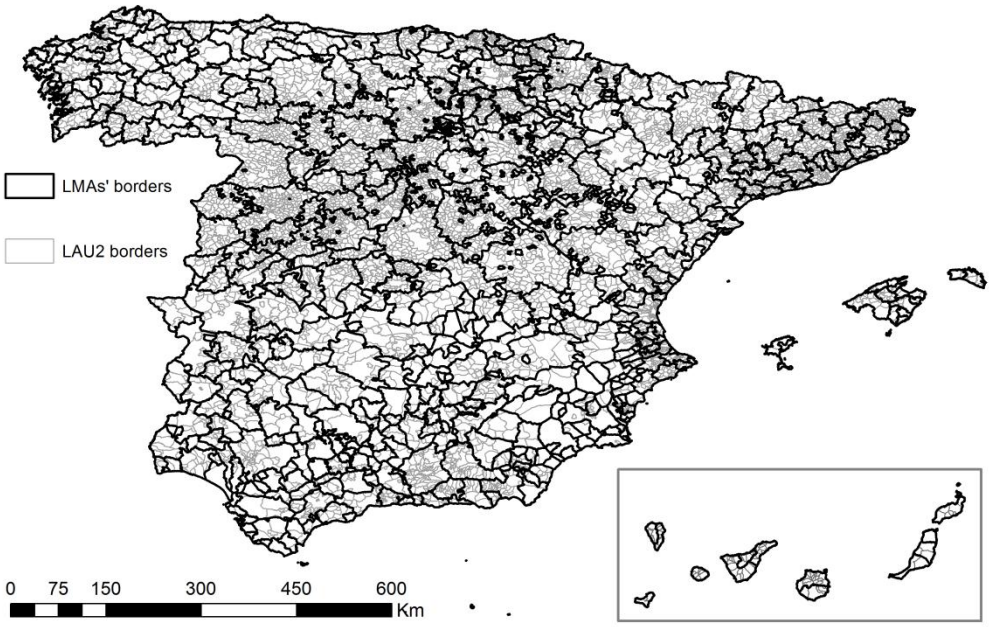



Table 3 provides the vital statistics on the LMAs defined by the TTWA method but, unlike the statistics for the LMAs defined by the LAM method seen earlier (Table 2), there is no need to state the minimum size or self-containment values of the LMAs defined here because the TTWA method ensures that they all meet the minimum values that were set. It is very positive finding that the median self-containment values for both ES01 and SE01 are well above 80% despite the TTWA method having defined large numbers of separable LMAs in both countries. The presence of some larger LMAs in both Spain and (especially) the UK than any found in Sweden clearly reflects genuine geographic realities: in the UK there is the world city of London, and also numerous large conurbations that are a similar size to the Barcelona or even the Madrid metropolitan regions, and as such they are larger than any to be found in Sweden. More surprising is the exact match between the median size of employed population of the Swedish LMAs from both methods considered so far: TTWA (Table 3) and LAM (Table 2). Given the much larger number of TTWA-defined LMAs than LAMs, this can

**Table 3 LMAs identified by the TTWA method applied to ES01, SE01 and UK01**

| | Number of LMAs | LMA min. self-containment (%) | | LMA employed population | | | Number of zones per LMA | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Median | Mean | Median | Mean | Max. | Median | Mean | Max |
| **ES01** | 492 | 85.9 | 85.0 | 8438 | 29947 | 2260167 | 8 | 16.3 | 156 |
| **SE01** | 126 | 82.7 | 82.6 | 14537 | 32469 | 840401 | 2 | 2.3 | 23 |
| **UK01** | 218 | 76.4 | 77.7 | 57819 | 122129 | 3376179 | 33 | 48.4 | 727 |

*Note*: The full set of available statistics for each national exercise is available in the Appendix (Table A.6)

be seen as further encouraging evidence of strong similarities between TTWA-defined LMAs and the officially-adopted LAMs.

A final test here of the transferability of the TTWA method is to apply it to the SIRE data available for the seven other countries whose commuting datasets are thought (after a briefer than ideal evaluation) to be sufficiently comparable for analysis here. Table 4 shows these results. It is not appropriate to draw too detailed conclusions from such overview statistics, but again it can be argued that the TTWA method has reflected the genuine geographical contrasts between the countries that are covered. In particular, Belgium is the most heavily urbanised of these countries, and it has been defined with LMAs which have the lowest median self-containment value and the highest median size of LMA employed population, just as is to be expected in a country with many closely-spaced substantial urban areas.

The evidence here of a high transferability of the TTWA method to other countries is, of course, rather limited and would benefit greatly from careful examination of the boundaries by NSI representatives of the countries covered. On present knowledge however it seems safe to conclude that the transferability which had already been seen in other countries has not been disproved here. One reason for this high degree of acceptability is that the method was developed to cope with UK LAU2 areas whose boundaries can seem to be almost random (as well as being highly unstable over time). A method which can find deep-seated patterns in the commuting flows between such areas will find little difficulty in analysing LAU2 areas with geographically meaningful boundaries whereas, by contrast, a method designed to be satisfactory where the LAU2 areas are highly suitable 'building blocks' for defining LMAs struggles greatly when transferred to a situation such as that in the UK.

**Table 4 LMAs identified by the TTWA method applied to those countries with sufficiently comparable SIRE data c.2001**

| | Number of LMAs | LMA min. self-containment (%) | | LMA employed population | | | Number of zones per LMA | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Median | Mean | Median | Mean | Max. | Median | Mean | Max |
| **AT(SIRE)** | 69 | 77.6 | 78.2 | 22860 | 49224 | 998073 | 22 | 34.4 | 252 |
| **BE(SIRE)** | 28 | 76.4 | 77.4 | 49604 | 93760 | 656537 | 12 | 21.0 | 117 |
| **CH(SIRE)** | 76 | 79.7 | 80.5 | 21076 | 41971 | 501292 | 30 | 38.1 | 192 |
| **ES(SIRE)** | 477 | 82.6 | 82.8 | 9289 | 31179 | 2217852 | 8 | 17.0 | 216 |
| **FR(SIRE)** | 519 | 87.4 | 87.7 | 24315 | 57368 | 4837335 | 54 | 70.4 | 706 |
| **IE(SIRE)** | 38 | 82.3 | 82.1 | 16551 | 30243 | 392551 | 78 | 90.7 | 441 |
| **SE(SIRE)** | 124 | 84.2 | 84.0 | 13950 | 31332 | 788168 | 2 | 2.3 | 23 |

*Note*: The full set of available statistics for each national exercise is available in the Appendix (Table A.7)

Another reason for the relative success of the TTWA method is that its definition criteria have been developed to produce adequate results in the many different geographical circumstances in the UK (from a huge metropolis to remote islands). These criteria in fact feature a trade-off between the size and self-containment objectives and this approach can help with transferability to other very different geographical circumstances. In fact transference to countries beyond EU has usually involved adjustment to the size and self-containment criteria values in the trade-off. That approach is relevant for applications covering a single country, but here the interest is in a consistent application of the same criteria. The conclusion is that the TTWA method has encouraging levels of transferability but the criteria applied here (based on those used in the UK) may need to be adjusted to produce acceptable results in the maximum number of MSs.

### 3.4. LMAs defined by a method that is not deterministic

In very general terms, all official LMA definition methods, including those in SE and UK, are similar in that they start with all the individual LAU2 areas and then apply specific aggregation criteria to choose which areas to group. These aggregation criteria are measures of interaction and/or dependence derived from the commuting flow data, with the areas to be merged being those with the maximum score on that measure. The process ends when a certain global condition is met. What may not be self-evident is that the aggregation criteria – whatever they are – do not guarantee that the final set of areas is optimal. This is because they are identifying the best possible solution in terms of the immediately available options: the analyses are considering the local properties at that stage of the process, but these may favour an aggregation which may prevent the eventual emergence of the best global solution. This is a problem that is widely recognised in the research literature on solving very complex problems such as the definition of LMAs (especially when the 'building block' areas run into hundreds of thousands).

The official methods are all deterministic: only one result can be derived from their application to any one dataset, given a certain set of criteria. It is useful here to also examine a non-deterministic approach, and the method[37] chosen is termed the GEA. This method seeks to maximise a global objective function that in effect measures the quality of any possible solution. The procedure can also incorporate some restrictions, and here the applications require that none of the final LMAs include non-contiguities.

[37] Martínez-Bernabeu L, Flórez-Revuelta F and Casado-Díaz JM (2012) "Grouping genetic operators for the delineation of functional areas based on spatial interaction" *Expert Systems with Applications* 39, 6754--6766.

The size of the optimisation problem – the best partition of a given territory into LMAs – makes it relevant to use a genetic algorithm. This is a stochastic exploration of the universe of all possible solutions, an intensive trial-and-error procedure that gradually improves the quality of the set of LMAs in terms of the objective function. It is possible to impose different termination conditions, but here the analysis proceeds until no further improvements can be found after 10000 trials. The optimisation strategy involves stochastic aggregation and disaggregation of LMAs – as well as the exchange of LAU2 areas between LMAs – and by allowing some changes which initially are locally sub-optimal the method can reach a better global final result due to the wider exploration of the many alternatives.

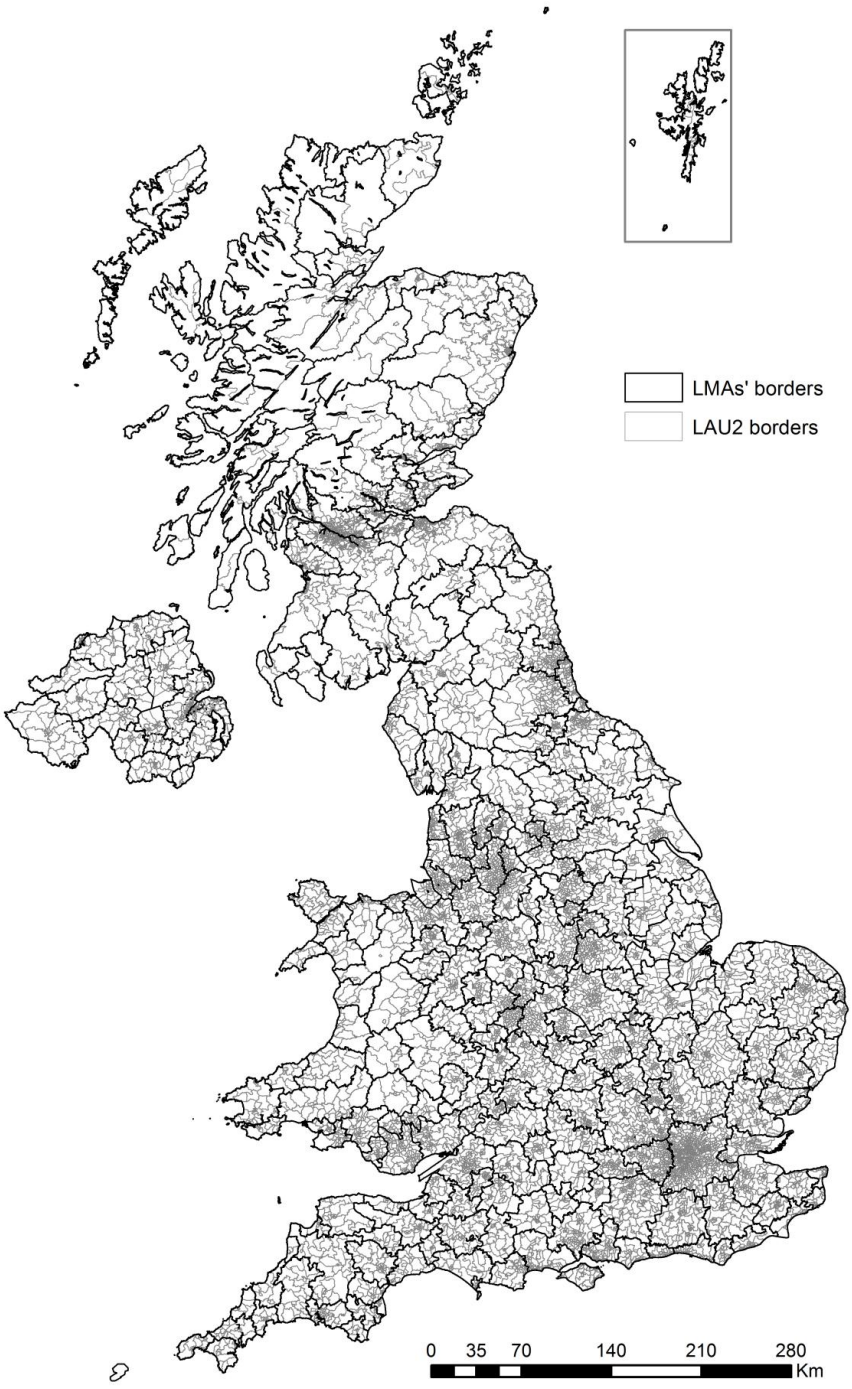
To be specific: the method does not stop when minimum self-containment and size criteria are met by all the potential LMAs, but instead the GEA continues exploring other alternatives to find the best definition of LMAs in global terms. To enable these results to be compared with those in previous presented here, the criteria used in the GEA analyses follow those that the TTWA method used. The objective function was defined as the sum of the attraction that in terms of commuting flows links each LAU2 area with the LMA it is part of, for the whole territory. The restrictions that the GEA method also observes are identical to those of the TTWAs in terms of self-containment and minimum size requirements for the final LMAs. In addition to the choice of criteria for the method, when there is also boundary information[38] available then a contiguity constrained version of the GEA method can be used, as is it has been here.

The two main drawbacks of this procedure are its complexity – which makes it less readily understandable – and that its non-deterministic nature means that in this experimental form it may not always produce the same results when the same criteria are used on the same dataset, due to its inclusion of several stochastic components. This last feature is mainly relevant to the analysis of those areas with a sparse pattern of commuting flows where there is no one clearly dominant pattern. In such cases the GEA method continues exploring the space of solutions and depending on when the process is stopped some LAU2 areas may not always be allocated to the same LMA.

The following maps depict the LMAs definitions resulting from the application of the GEA method to the three main datasets for this study: UK01 (Map 7), SE01 (Map 8) and

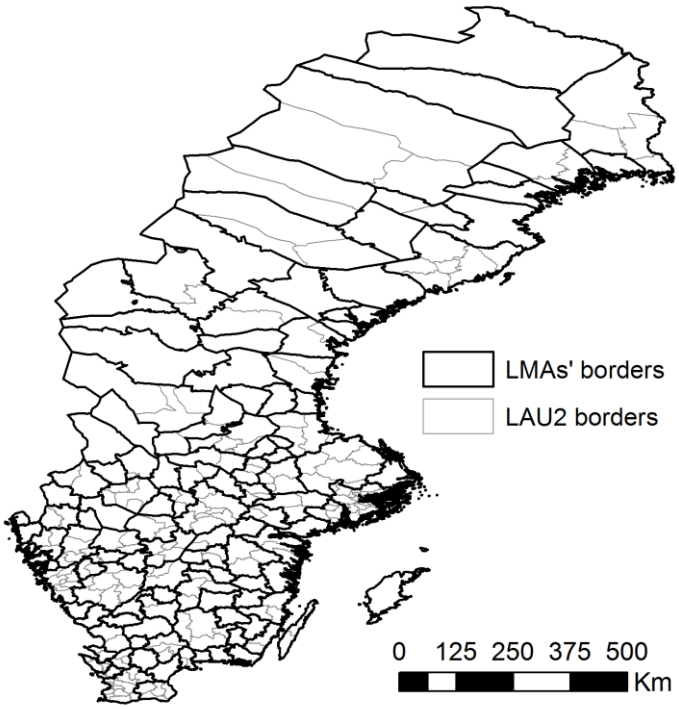
[38] The quality of this information is crucial here: it should ideally reflect not only physical neighbouring but also the existence of bridges linking two non-neighbouring localities (eg. across a bay). In fact the datasets used here illustrate this because the UK boundary information was less than ideal so that some of the results there are prone to be inappropriate, essentially due to this dataset ignoring some bridges.

**Map 7. LMAs from the GEA method applied to UK01**

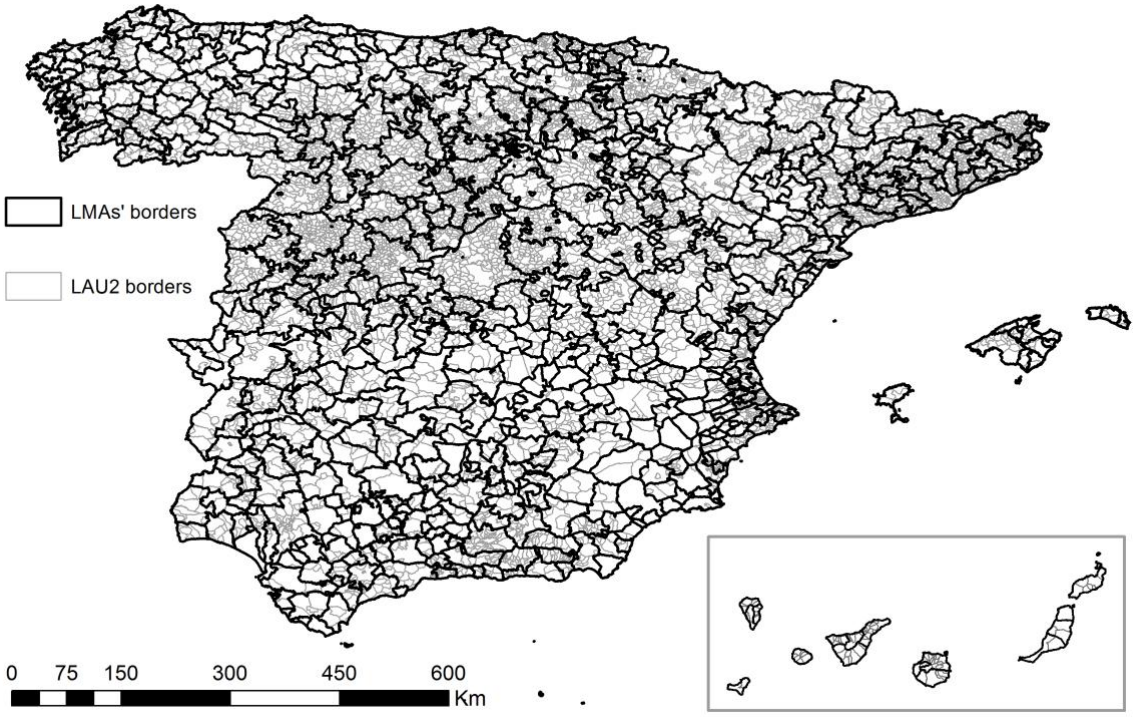



ES01 (Map 9). The results are broadly in line with expectations: boundaries produced by the GEA method are more similar to those produced by the TTWA method than those by the LAM method with its dependence upon the initial definition of centres. This is largely due to the GEA method using criteria values (self-containment and size) which the TTWA method had used. All the same, it is valuable to discuss where the two methods have produced rather different sets of LMAs.

**Map 8. LMAs from the GEA method applied to SE01**




**Map 9. LMAs from the GEA method applied to ES01**[39]




[39] In all the cases in this section of the report, LMA definitions include a contiguity constraint; even so, there are some zones in that Spain for which no contiguously grouped solution can be found by GEA.

One relevant criterion to judge the results of different methods by is a count of LMAs defined which meet set statistical criteria. Table 5 shows the GEA optimising approach has defined 20% more LMAs in the UK than the TTWA method found. About half of the 47 'extra' LMAs are around large urban centres: for example in the region including Liverpool as well as Manchester the number of GEA-defined LMAs is more than double the number the TTWA method defined here. Around a third of all the 'extra' GEA LMAs are in the more rural parts of the UK. Perhaps more importantly, the results from GEA are boundaries that seem likely to gain ready acceptance due to closely matching the 'common knowledge' of local geography in most areas. The most surprising result may be the considerable variation between large cities in the how large their GEA-defined boundaries are when compared to those from the TTWA method, because despite the two analyses using the same data and basic criteria the LMAs of some cities are larger in one set of results, while the opposite is true for some other cities.

**Table 5 LMAs identified by the GEA method when applied to ES01, SE01 and UK01**

| Data | No. LMAs | LMA min. self-containment (%) | | LMA employed population | | | Number of zones per LMA | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Median | Mean | Median | Mean | Max. | Median | Mean | Max |
| **SE01** | 120 | 84.4 | 83.4 | 14029 | 34092 | 840401 | 2 | 2.4 | 23 |
| **ES01** | 583 | 85.2 | 84.4 | 6259 | 25273 | 2244969 | 8 | 13.8 | 157 |
| **UK01** | 265 | 73.6 | 75.2 | 50346 | 100468 | 3214712 | 27 | 39.8 | 692 |

*Note*: The full set of available statistics for each national exercise is available in the Appendix (Table A.6)

Similar results are obtained when comparing the maps of ES LMAs identified using the TTWA method and those using the GEA. The total number of identified LMAs is around 20% higher in the GEA case while the size and self-containment values of the largest LMAs are rather similar. As in the UK case the GEA identifies both smaller and larger LMAs in large cities when compared to the TTWA method and this result may at least partially derive from the fact that GEA is contiguity constrained. What is more certain is that the GEA method is especially active in identifying more LMAs in less populated parts of Spain, and especially around second-rank provincial cities, where the TTWA method tends to define LMAs whose surface area is comparable to that of the main urban agglomerations.

A deeper analysis of the results from GEA shows some suboptimal assignments, primarily a number of LAU2 areas having higher interaction values with some LMAs other than those to which they have been allocated. Such results may be termed 'convenience marriages' and occur more frequently in the GEA method results than they had in the TTWA results as a direct result of the GEA method getting closer to the global solution for a given set of criteria and restrictions: they are a local disadvantage of achieving a global benefit. Although there are some technical alternatives which

could deal with this issue, to add these to the method would worsen one of the negative features of the GEA method in a policy context: its complexity.

The factors by which to evaluate methods include the statistical characteristics of the areas produced, and the views of experts in the countries analysed. Among the other relevant considerations for policy-makers could be a preference for sets of areas which are less queried: this is in fact probably one reason why the use of administrative areas has continued for so long. From that perspective – despite the results from the GEA method being promising – the conclusion at this stage seem likely to be that its more technical advantages *may* be outweighed by it still being experimental technology, while its greater complexity also makes it more difficult to explain. The other concern is that its non-determinism at this experimental stage may not be welcomed by the policy community. In the short term then, an alternative possibility that deserves mention is the use of this procedure as part of a final stage in the definition of LMAs through which the contiguity constraint necessary for policy areas could be ensured. To be more ambitious, this step could also provide a degree of optimisation of the 'raw' boundaries in consort with a process of consultation.

### 3.5. Towards future research options

Section 3.3 concluded by recognising that the TTWA method has a relatively high level of transferability but its criteria have usually been adjusted when the method has been applied to other countries. This section seeks hypothetical 'Euro' standard criteria from an examination of existing official methods of defining LMAs. Subsequently the criteria are applied to the datasets collated for this study.

Comparing equivalent thresholds in existing official methods (which are fully described in the Annex to Chapter 3 in the IRR) reveals the values which are relevant here.

- The method in Sweden has no minimum size, but actually their smallest LAU2 has over 2500 people so that is roughly equivalent to 1000 residents in work
- In the official methods examined, the lowest population minimum was the 1000 jobs in the IT method and this is very similar to 1000 employed residents
- The highest population minimum was the 10,000 people in the CZ method which is roughly equivalent to 5000 residents in work[40]
- The highest self-containment minimum is the 75% in the method of IT
- The lowest self-containment value is the 66.66% minimum used in the UK

[40] The criteria in the DE method are very different to those discussed here, but the method also includes discretionary decisions which can over-rule the criteria, so they are not considered here.

How can a hypothetical 'Euro' standard set of criteria be derived from these values? Two potential considerations present themselves. Where an official definition exists, the respective NSI may consider that 'Euro' LMAs should be no bigger than their 'native' LMAs, and similarly that their minimum self-containment should not be higher than has been required of the LMAs they define themselves. However there could also be the opposite response, with the NSI in fact asking "why at the European level did you define smaller and/or less self-contained LMAs than we think make sense?"

Given that it has already been suggested that the TTWA method provides the basis for experiments with different criteria, it is valuable that this method provide a trade-off between the self-containment and size criteria. For each of these, it is necessary to set an absolute minimum and a 'target' that is, in effect, the level above which all higher values are considered equal (ie. the target values are those that are the highest 'minimum' values that are of interest).

Bringing all these considerations together now allows the thresholds in existing official methods to yield a hypothetical 'Euro'standard set of criteria to test.

- 'Euro' LMAs must have an employed population size minimum of 1000 but they are set a target size of 5000
- 'Euro' LMAs must meet the self-containment minimum of 66.67% while at the same time their target is 75% (where both these values are the lower of their supply and demand self-containments)

It is important to note that this is a purely hypothetical set of 'Euro' criteria which has been derived here purely for experimental purposes[41].

Tables 6 and 7 summarise the main features of the sets of LMAs defined here using these criteria. One preliminary issue to deal with is that of the observable differences between the results in Spain and in Sweden depending on whether the analyses used SIRE data or not [ie. ES01 & SE01 vs. ES(SIRE) & SE(SIRE)]. These differences arise due to the SIRE datasets only including the largest 30 flows from the LAU2 areas covered. The impact of this difference is substantial in Spain where applying the TTWA method to the SIRE data defines 12% less LMAs (that are also less self-contained) in comparison to the LMAs defined using the unrestricted dataset ES01.

[41] In Appendix 2, the alternative of raising the criteria that must be satisfied (therefore the identification of significantly fewer separate LMAs) is briefly explored.

**Table 6 LMAs defined by the 'Euro' method when applied to ES01, SE01 and UK01**

| Data | No. LMAs | LMA min. self-containment (%) | | LMA employed population | | | Number of zones per LMA | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Median | Mean | Median | Mean | Max. | Median | Mean | Max |
| **SE01** | 166 | 80.9 | 80.4 | 10174 | 24645 | 840401 | 1 | 1.7 | 23 |
| **ES01** | 892 | 82.9 | 82.6 | 3641 | 16518 | 2258670 | 5 | 9.0 | 130 |
| **UK01** | 257 | 75.0 | 76.5 | 43312 | 103596 | 3310191 | 25 | 41.1 | 706 |

*Note*: The full set of available statistics for each national exercise is available in the Appendix (Table A.6)

**Table 7 LMAs defined by the 'Euro' method in countries with sufficiently comparable SIRE data c.2001**

| | No. LMAs | LMA min. self-containment (%) | | LMA employed population | | | No. of LAU2 zones per LMA | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Median | Mean | Median | Mean | Max. | Median | Mean | Max |
| **AT(SIRE)** | 80 | 76.5 | 77.6 | 17709 | 42456 | 1008059 | 19 | 29.6 | 259 |
| **BE(SIRE)** | 30 | 76.0 | 76.4 | 49604 | 87509 | 664508 | 12 | 19.6 | 120 |
| **CH(SIRE)** | 107 | 78.5 | 78.9 | 12049 | 29811 | 502635 | 16 | 27.1 | 165 |
| **ES(SIRE)** | 798 | 79.5 | 80.1 | 4572 | 18637 | 2220037 | 5 | 10.1 | 177 |
| **FR(SIRE)** | 729 | 85.4 | 85.8 | 13889 | 40842 | 4498780 | 36 | 50.1 | 623 |
| **IE(SIRE)** | 55 | 79.5 | 78.9 | 10225 | 20895 | 393719 | 46 | 62.7 | 447 |
| **SE(SIRE)** | 166 | 81.7% | 81.4% | 9645 | 23404 | 788168 | 1 | 1.7 | 23 |

*Note*: The full set of available statistics for each national exercise is available in the Appendix (Table A.7).

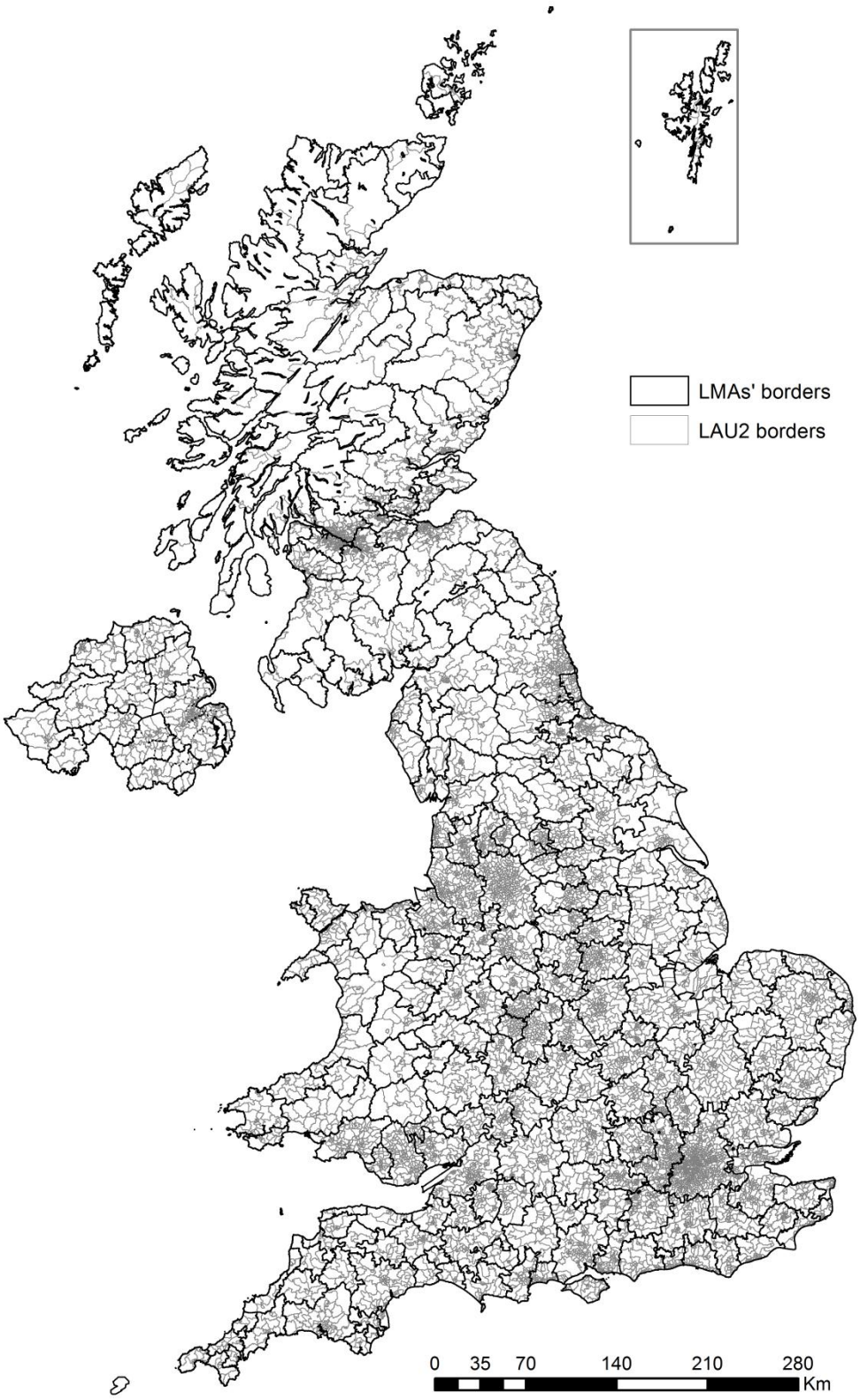
One way to assess the appropriateness of the selected criteria is their ability to define a set LMAs which is 'balanced' throughout the territory. Maps 10, 11 and 12 shows the results produced in the UK, Sweden and Spain. All the maps suggest sets of LMAs which are quite balanced in terms of their size distribution. Where there are much larger areas, these appear to be appropriately reflecting local geographical realities. For example the larger Spanish LMAs either cover metropolitan regions or other areas where there are dense interrelationships in commuting terms, or they are in the most rural areas where the low populations lead to the amalgamation of LAU2 areas in order to meet the population minimum size. There are similar cases in the UK but otherwise there is a strong size consistency, and similar generalisations can be made about the results in Sweden (where the rural areas cover most of the north-west of the country). An overview at this point involves comparing the results of the 'Euro' analyses with the number of LMAs in countries where there is an official definition of LMAs.

- The number of 'Euro' LMAs identified is much higher in SE compared to the official definition of LAMs and a similar outcome applies to FR; in both cases there are roughly twice as many 'Euro' LMAs as their national equivalents.
- In dramatic contrast, there are slightly fewer 'Euro' LMAs than TTWAs in the UK and the difference is more notable still in BE (47 vs. 30).

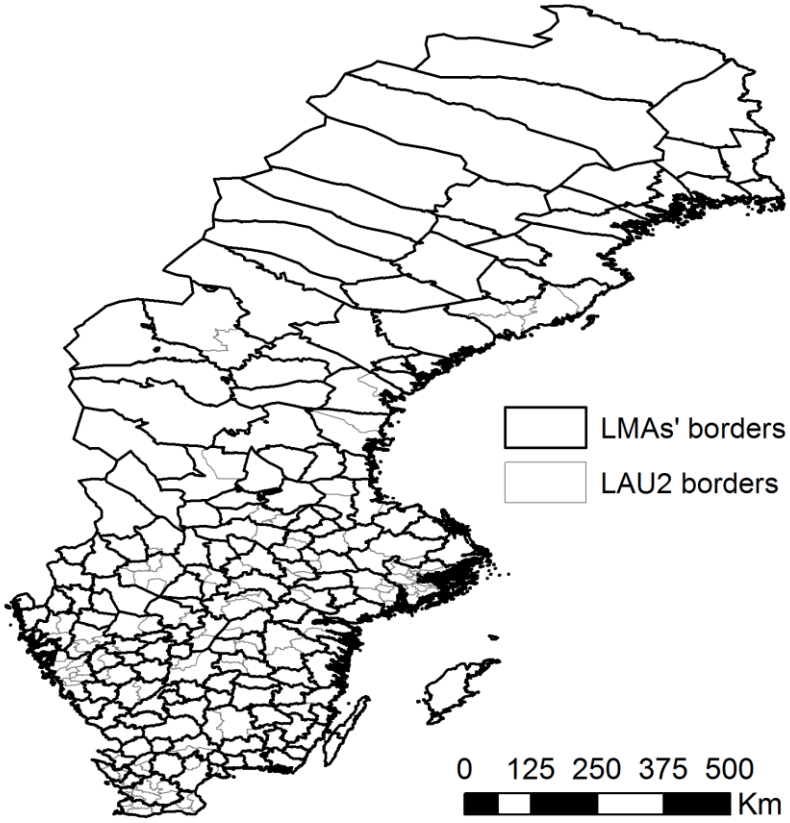
These results suggest that the 'Euro' criteria have perhaps found a 'middle way' between the national definitions considered. However the aim of this part of the report was not to propose a definitive set of criteria, but instead to further illustrate

the possibility of producing reasonable results in different countries with a consistent application of a common set of criteria.

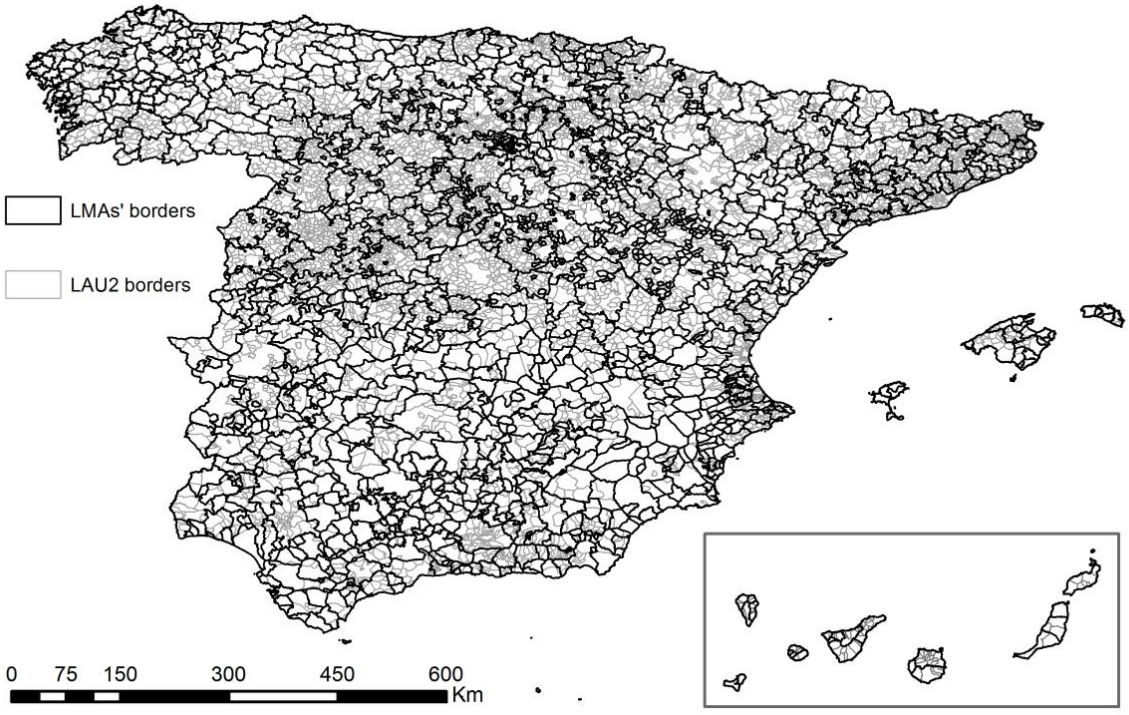
**Map 10. LMAs from the 'Euro' method applied to UK01**



**Map 11. LMAs from the 'Euro' method applied to SE01**

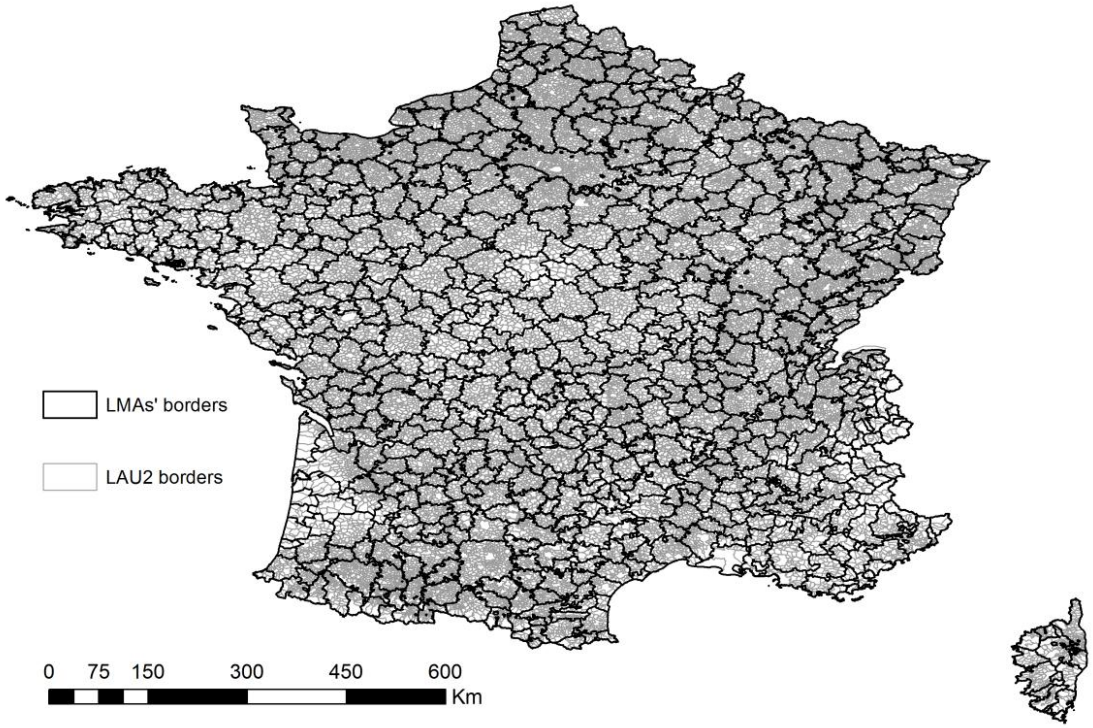



**Map 12. LMAs from the 'Euro' method applied to ES01**



Map 13 is particularly interesting because it covers France and so can be seen as one example of seeking transferability to another country not previously examined in this report in any detail. The application of the 'Euro' method to FR(SIRE) results in the definition of 729 LMAs, a figure more than double that of the official set of LMAs (*bassins d'emploi*). The increase is distributed in a very balanced way across the whole territory except for the region around Paris. In the national set of LMAs this region has been divided into many *bassins d'emploi* whilst here Map 13 shows the region divided into only four LMAs: more and smaller LMAs are simply not sufficiently self-contained due to the strong commuting flows around the metropolis. The different result with *bassins d'emploi* is in practice the result of the French method allowing for several 'special cases' such as that *grandes communes* like Paris can be the subject of different criteria within the national definition procedure. That approach stands in stark contrast to the consistent application here of the 'Euro' method to all areas of each country, and indeed to several countries simultaneously.

**Map 13. LMAs from the 'Euro' method applied to FR(SIRE)**



## 3.6. Summary and recommendations

This last section summarises the conclusions which can be drawn from the research, leading towards some recommendations through a set of questions and answers.

1. ***Is there a need for a grid of comparable LMAs?***

Other parts of this study have shown not only that several MSs find consistently defined national set of LMAs useful for policy analyses, but also that there are EU policies for which consistent cross-national LMA definitions could be very valuable.

2. ***Is the definition of EU-wide LMAs technically feasible?***

The analyses conducted in this study suggest that there are no insurmountable technical obstacles to producing cross-national LMA definitions; in the following questions the issues involved are considered separately in turn.

3. ***What data would be needed?***

The study found that the vast majority of official definitions of LMAs in the EU MSs rely on commuting flows between LAU2 areas and for the analyses reported here the only other information used was GIS-based boundary data. In the vast majority of cases this information derives from Population Censuses and there newer data will be available for most MSs in the next few years. (The equivalent commuting data from the 2001 Census 'round' was collated in SIRE: a repeat procedure should avoid recreating the problem caused by several NSIs supplying datasets subjected to severe reduction – notably only including the largest 30 flows from any LAU2 area – because this prevents consistent analyses being conducted.). There remain some MSs with no commuting dataset and this presents a residual difficulty.

4. ***Can any method work adequately in very varied geographical conditions?***

This study has extended the existing evidence that the TTWA algorithm has a high degree of transferability (as a result of its long-term development dealing with the geographical variety in the UK, and the technical challenges that its LAU2 areas pose). The flexible criteria of the method reveal patterns in the commuting flows which are usually recognisable as territorial reality, whether the LMA has a single centre or not. LMAs in all regions – from metropolitan to remote rural – are defined so that they possess the same minimum statistical characteristics.

5. ***What criteria should be used for EU-wide LMAs?***

As well as the essential requirement that LMAs should all be reasonably self-contained in terms of commuting flows, there is a good case for a size minimum in order to limit the sensitivity of data analysed using LMAs (nb. the sample survey collection process

of some relevant datasets might make very small LMAs of minimal value in any case because key policy indicators would be unavailable at that scale). There do not exist 'ideal' minimum values of size or self-containment for LMAs: selecting these values must be resolved empirically by examining alternatives to find a generally acceptable solution in terms of the nature and size of the LMAs that are produced. It was in this experimental mode that a test has been conducted here on an extensive group of MSs using a hypothetical set of 'Euro' self-containment and size criteria. The necessary next step is for further consideration of this issue by Eurostat and the NSIs.

6. ***Can the definitions be entirely automated?***

Most national methods include a final refining step in which 'raw' definitions are evaluated against local knowledge. In this extra step any boundary non-contiguities within the 'raw' definitions can be resolved (nb. those definition processes that are themselves contiguity constrained tend to produce sub-optimal LMAs). To ensure that a truly consistent EU-wide grid of LMAs definitions is produced it will be necessary for any such adjustments to be restrained so the final boundaries continue to meet the set statistical characteristics, thus avoiding *ad hoc* solutions that undermine the general validity of the definitions. In fact the GEA method used in Section 3.4 can offer one way to ensure the final LMAs have no non-contiguities, as part of a general 'fine tuning' (perhaps linked to a consultation process).

7. ***Who should carry out the definitions?***

The familiar alternatives are either parallel national analyses, or a centralised process conducted by Eurostat. In the latter case the NSIs would need to provide commuting data meeting a Eurostat specification and would also be crucial to any consultations. The other alternative is that NSIs conduct the analyses themselves, subject to Eurostat overview to ensure that the common method is applied consistently and to protect the statistical characteristics of the LMAs. Successful precedents exist for both these options so the decision is left to be agreed between the NSIs collectively and Eurostat.

# Appendix 1 to chapter 3 - Recommendations on the establishment of an EU-wide harmonised grid of comparable LMAs

## Table A.1. Characterisation of the basic zones used in the analysis (i)

| | No. LAU2 | Population | | | | | Area (m²) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Max | SD | Mean | Median | Min | Max | SD | Median | Mean |
| BE[1] | 589 | 84 | 472071 | 28706.39 | 18110 | 11612 | 1142297 | 213750185 | **37820201.5** | 40100910 | 51830094.2 |
| BG[2] | 5302 | 0 | 1165503 | 18311.37 | 1427 | 243 | 0 | 492029000 | **23980272.8** | 15490500 | 20942204.1 |
| CZ[1] | 6249 | 3 | 1233211 | 17574.47 | 1675 | 412 | 422868 | 496025461 | **16689088.3** | 7986477 | 12622469.7 |
| DK | 2244 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | **n.a.** | n.a. | n.a. |
| DE | 12229 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | **n.a.** | n.a. | n.a. |
| EE[1] | 227 | 72 | 398594 | 27773.35 | 5905 | 1808 | 1760000 | 871620000 | **143774185.1** | 175520000 | 191331894.3 |
| IE[2] | 3441 | n.a. | n.a. | n.a. | n.a. | n.a. | 50000 | 127030000 | **14011428.2** | 19450000 | 20395884.9 |
| GR[1] | 6130 | 0 | 789166 | 13526.32 | 1784 | 381 | 200000 | 577171000 | **24155819.8** | 14518500 | 21526494.8 |
| ES[1] | 8112 | 5 | 3255944 | 47368.70 | 5763 | 585 | 25784 | 1750327196 | **92377422.2** | 34896870 | 62220848.6 |
| FR[2] | 36682 | n.a. | n.a. | n.a. | n.a. | n.a. | 40000 | 18360000000 | **143778260.6** | 10750000 | 17250025.1 |
| IT[1] | 8094 | n.a. | n.a. | n.a. | n.a. | n.a. | 150000 | 1307710000 | **49944646.5** | 21815000 | 37232037.3 |
| CY[1] | 615 | n.a. | n.a. | n.a. | n.a. | n.a. | 276339 | 153834000 | **13512659.7** | 11718600 | 15028374.3 |
| LV[2] | 118 | 1364 | 706413 | 65679.94 | 19054 | 7082 | 17490684 | 2524643008 | **506206781.0** | 369623654 | 547134034.7 |
| LT | 555 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | **n.a.** | n.a. | n.a. |
| LU[1] | 116 | 293 | 88586 | 8982.24 | 4254 | 1985 | 5290000 | 113360000 | **14106227.4** | 19675000 | 22296206.9 |
| HU[1] | 3152 | 12 | 1712210 | 31829.39 | 3182 | 837 | 560000 | 525130000 | **36767506.2** | 18685000 | 29513781.7 |
| MT[2] | 68 | 241 | 22492 | 4877.34 | 6073 | 3994 | 159823 | 26599210 | **5206010.9** | 2789774 | 4634657.2 |
| NL[2] | 431 | n.a. | n.a. | n.a. | n.a. | n.a. | 4520000 | 460320000 | **68076079.6** | 59100000 | 78256542.9 |
| AT[2] | 2357 | n.a. | n.a. | n.a. | n.a. | n.a. | 358100 | 466783800 | **38524247.7** | 24274000 | 35783686.6 |
| PL[1] | 2478 | 1346 | 1709781 | 50645.53 | 15390 | 7407 | 3320000 | 633700000 | **78799993.9** | 111825000 | 126182155.0 |
| PT[1] | 4260 | n.a. | n.a. | n.a. | n.a. | n.a. | 51550 | 416802430 | **34517479.9** | 11287720 | 21618398.4 |
| RO[2] | 3180 | n.a. | n.a. | n.a. | n.a. | n.a. | 1890000 | 804490000 | **55662685.3** | 61350000 | 74965632.1 |
| SI[1] | 210 | 322 | 276091 | 21624.83 | 9678 | 4708 | 6934510 | 555385710 | **88364178.0** | 64739460 | 96538140.6 |
| SK[1] | 2928 | 0 | 112907 | 5995.67 | 1848 | 637.5 | 357863 | 359787871 | **18735969.3** | 11607310 | 16753298.2 |
| FI[1] | 348 | 115 | 576632 | 40575.91 | 15305 | 5752 | 6 | 17333.89 | **1620.1** | 699.11 | 1123.3 |
| SE[1] | 290 | 2549 | 795163 | 61429.10 | 31665 | 15285 | 8710000 | 21891000000 | **3078599788.1** | 679610000 | 1669456034.5 |
| UK[2] | 10310 | n.a. | n.a. | n.a. | n.a. | n.a. | 43450 | 1638643400 | **68453662.6** | 4984152.5 | 23868798.7 |

*Notes*
([1]) 1 January 2009: zip file all EU27 countries from
http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/local_administrative_units (except Greece, from individual file same address)
([2]) 1 January 2010: individual country file from
http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/local_administrative_units
A major reduction in LAU2 took place in LV 01/07/2009

## Table A.2. Characterisation of the basic zones used in the analysis (ii)

| Dataset | Working population per zone | | | | | Jobs per zone | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Mean | Median | Std.dev. | Min | Max | Mean | Median | Std.dev. |
| **AT(SIRE)** | 20 | 667006 | 1432 | 642 | 14134.0 | 2 | 837072 | 1432 | 306 | 18146.4 |
| **BE(SIRE)** | 22 | 105173 | 4457 | 3044 | 6470.0 | 5 | 187872 | 4457 | 1554 | 13313.3 |
| **CH(SIRE)** | 7 | 165494 | 1101 | 376 | 4288.3 | 2 | 315892 | 1101 | 169 | 7629.7 |
| **ES(SIRE)** | 1 | 1209296 | 1834 | 177 | 17052.3 | 0 | 1560221 | 1834 | 117 | 21268.5 |
| **FR(SIRE)** | 0 | 1535231 | 814 | 181 | 9400.2 | 0 | 2330159 | 814 | 88 | 13627.1 |
| **IE(SIRE)** | 0 | 6819 | 325 | 154 | 499.7 | 0 | 20657 | 325 | 71 | 1028.6 |
| **SE(SIRE)** | 1018 | 345749 | 13443 | 6447 | 25918.2 | 830 | 515612 | 13443 | 5441 | 36055.8 |
| | | | | | | | | | | |
| **ES01** | 0 | 1225956 | 1817 | 150 | 17325.8 | 0 | 1485561 | 1817 | 122 | 20382.5 |
| **SE01** | 1033 | 374121 | 14156 | 6731 | 27879.5 | 825 | 531912 | 14156 | 5953 | 37315.5 |
| **UK01** | 237 | 17725 | 2522 | 2032 | 1725.2 | 61 | 266442 | 2522 | 1386 | 5222.7 |

*Note*
*Employed population* and *jobs per zone* as per data used in the analyses included in the text, based on commuting datasets from SIRE or NSIs sources (INE, ONS and SCB).

## Table A.3. Characterisation of the basic zones used in the analysis (iii)

| Dataset | Trip origins per zone | | | | | Trip destinations per zone | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Mean | Median | Std.dev. | Min | Max | Mean | Median | Std.dev. |
| **AT(SIRE)** | 0 | 2136 | 29.2 | 15 | 67.0 | 7 | 30 | 29.2 | 30 | 2.6 |
| **BE(SIRE)** | 0 | 580 | 29.4 | 16 | 46.6 | 9 | 30 | 29.4 | 30 | 2.4 |
| **CH(SIRE)** | 0 | 1399 | 26.7 | 11 | 56.9 | 1 | 30 | 26.7 | 30 | 6.7 |
| **ES(SIRE)** | 0 | 4931 | 18.6 | 6 | 81.4 | 0 | 30 | 18.6 | 19 | 10.3 |
| **FR(SIRE)** | 0 | 10374 | 22.6 | 7 | 78.4 | 0 | 29 | 22.6 | 27 | 7.8 |
| **IE(SIRE)** | 0 | 462 | 12.9 | 3 | 31.0 | 0 | 30 | 12.9 | 10 | 9.3 |
| **SE(SIRE)** | 4 | 288 | 29.9 | 17 | 38.7 | 24 | 30 | 29.9 | 30 | 0.5 |
| | | | | | | | | | | |
| **ES01** | 0 | 1313 | 22.6 | 10 | 41.5 | 0 | 1145 | 22.6 | 12 | 36.1 |
| **SE01** | 14 | 287 | 99.4 | 85 | 59.5 | 19 | 279 | 99.4 | 89 | 45.1 |
| **UK01** | 3 | 4477 | 144.0 | 92 | 181.1 | 18 | 442 | 144.0 | 128 | 73.4 |

*Note*
Trip origins/destinations per zone refer to the number of LAU2 zones that act as origins/destinations for an specific LAU2 zone (e.g. if zone A receives 20 workers from zone B and 30 workers from zone C then number of trip origins for zone A is 2). It is noticeable that for SIRE data a maximum of 30 destinations is reported for each LAU2 (a limit that is evident when those data are compared with those provided by national NSIs: INE, ONS and SCB).

## Table A.4 Characterisation of the basic zones used in the analysis (iv)

| Dataset | Supply-side self-containment (%) | | | | | Demand-side self-containment (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Mean | Median | Std.dev. | Min | Max | Mean | Median | Std.dev. |
| **AT(SIRE)** | 5.3 | 94.5 | 31.6 | 28.9 | 13.9 | 6.8 | 100.0 | 62.7 | 64.0 | 21.1 |
| **BE(SIRE)** | 9.1 | 81.1 | 30.9 | 26.8 | 14.2 | 6.2 | 100.0 | 52.9 | 53.5 | 16.9 |
| **CH(SIRE)** | 2.4 | 98.7 | 34.6 | 31.3 | 15.3 | 5.4 | 100.0 | 67.3 | 69.7 | 21.9 |
| **ES(SIRE)** | 0.0 | 100.0 | 54.7 | 55.4 | 18.2 | 0.0 | 100.0 | 79.6 | 84.5 | 18.7 |
| **FR(SIRE)** | 0.0 | 100.0 | 45.1 | 43.0 | 18.3 | 0.0 | 100.0 | 78.5 | 82.8 | 17.2 |
| **IE(SIRE)** | 0.0 | 100.0 | 27.5 | 25.0 | 17.5 | 0.0 | 100.0 | 56.8 | 56.3 | 29.3 |
| | | | | | | | | | | |
| **ES01** | 0.0 | 100.0 | 62.9 | 65.4 | 21.0 | 0.0 | 100.0 | 74.1 | 78.9 | 19.3 |
| **SE01** | 21.0 | 95.1 | 67.6 | 71.7 | 18.3 | 13.4 | 96.8 | 76.5 | 80.1 | 13.1 |
| **UK01** | 6.6 | 95.3 | 25.9 | 23.3 | 10.6 | 0.2 | 97.4 | 38.6 | 37.8 | 18.7 |

*Note*
Supply-side self-containment is the share of employed population that work locally. Demand-side self-containment is the share of jobs that are occupied by workers who reside in the zone.

## Table A.5 Characterisation of commuting datasets

| | Number of LAU2 zones | *Connectivity* | *Polarisation* |
|---|---|---|---|
| **AT(SIRE)** | 2371 | 1.23% | 8.39% |
| **BE(SIRE)** | 589 | 5.01% | 11.04% |
| **CH(SIRE)** | 2896 | 0.92% | 8.11% |
| **ES(SIRE)** | 8108 | 0.23% | 8.19% |
| **FR(SIRE)** | 36565 | 0.06% | 6.92% |
| **IE(SIRE)** | 3558 | 0.38% | 11.60% |
| **SE(SIRE)** | 289 | 20.79% | 26.64% |
| | | | |
| **ES01** | 8108 | 0.28% | 12.19% |
| **SE01** | 289 | 34.51% | 27.34% |
| **UK01** | 10558 | 1.38% | 13.93% |

*Notes*
*Connectivity* refers to the number of connections in the commuting matrix (flows≠0) over the total number of possible connection, n(n-1), where n is the number of zones. *Polarisation* refers to the % of zones that are destinations for the largest outflow from 1(+) other zone(s).

**Table A.6 Characterisation of the results (i). Based on data provided by NSIs for a selection of countries**

| Data | Method | Assigned zones | | No. LMAs | Global SC (%) | LMA min. self-containment (%) | | | | | LMA employed population | | | | | Number of zones per LMA | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Yes | No | | | Min. | Median | Mean | Max. | SD | Min. | Median | Mean | Max. | SD | Min | Median | Mean | Max | SD |
| **SE96** | LAM | 288 | 0 | 105 | 93.1 | 68.5 | 88.8 | 87.7 | 96.2 | 5.3 | 1256 | 11732 | 36313 | 963222 | 103428 | 1 | 1 | 2.7 | 34 | 4.1 |
| **SE96** | TTWA | 288 | 0 | 136 | 88.5 | 70.2 | 84.0 | 83.8 | 96.1 | 6.2 | 3332 | 12749 | 28036 | 746138 | 71229 | 1 | 2 | 2.1 | 23 | 2.3 |
| **SE01** | LAM | 289 | 0 | 88 | 93.0 | 70.7 | 87.5 | 87.7 | 95.3 | 4.5 | 1253 | 14537 | 46490 | 1082322 | 129439 | 1 | 2 | 3.3 | 35 | 5.0 |
| **SE01** | GEA | 289 | 0 | 120 | 88.7 | 68.0 | 84.4 | 83.4 | 95.1 | 6.3 | 3368 | 14029 | 34092 | 840401 | 86321 | 1 | 2 | 2.4 | 23 | 2.6 |
| **SE01** | TTWA | 289 | 0 | 126 | 87.4 | 68.0 | 82.7 | 82.6 | 95.1 | 6.4 | 3368 | 14537 | 32469 | 840401 | 83016 | 1 | 2 | 2.3 | 23 | 2.4 |
| **SE01** | 'Euro' | 289 | 0 | 166 | 86.6 | 66.8 | 80.9 | 80.4 | 95.1 | 7.0 | 1253 | 10174 | 24645 | 840401 | 73008 | 1 | 1 | 1.7 | 23 | 2.1 |
| **SE06** | LAM | 290 | 0 | 79 | 92.7 | 79.6 | 87.4 | 87.5 | 95.0 | 4.1 | 1248 | 17016 | 54187 | 1117352 | 141949 | 1 | 2 | 3.7 | 36 | 5.3 |
| **SE06** | TTWA | 290 | 0 | 118 | 86.8 | 68.6 | 81.8 | 82.3 | 94.4 | 6.1 | 3354 | 16756 | 36278 | 867188 | 89351 | 1 | 2 | 2.5 | 23 | 2.5 |
| **SE10** | LAM | 290 | 0 | 76 | 92.3 | 76.0 | 85.9 | 86.2 | 95.1 | 4.6 | 1245 | 16768 | 57799 | 1197405 | 155031 | 1 | 2 | 3.8 | 36 | 5.5 |
| **SE10** | TTWA | 290 | 0 | 102 | 87.5 | 67.5 | 82.8 | 82.4 | 93.5 | 6.2 | 3359 | 19286 | 43066 | 929463 | 103773 | 1 | 2 | 2.8 | 22 | 2.8 |
| **ES01** | LAM | 8030 | 78 | 1536 | 94.4 | 7.6 | 85.2 | 83.7 | 99.0 | 9.4 | 1 | 261.5 | 9592 | 2447627 | 83904 | 1 | 1 | 5.2 | 469 | 19.3 |
| **ES01** | GEA | 8030 | 78 | 583 | 90.1 | 66.7 | 85.2 | 84.4 | 98.9 | 6.9 | 3300 | 6259 | 25273 | 2244969 | 112508 | 1 | 8 | 13.8 | 157 | |
| **ES01** | TTWA | 8031 | 77 | 492 | 90.7 | 68.0 | 85.9 | 85.0 | 98.9 | 6.8 | 3332 | 8438.5 | 29947 | 2260167 | 122742 | 1 | 8 | 16.3 | 156 | |
| **ES01** | 'Euro' | 8031 | 77 | 892 | 89.8 | 66.8 | 82.9 | 82.6 | 98.9 | 7.1 | 1002 | 3641 | 16518 | 2258670 | 91872 | 1 | 5 | 9.0 | 130 | 12.6 |
| **UK01** | LAM | 10474 | 84 | 681 | 72.2 | 18.7 | 59.0 | 58.9 | 96.0 | 14.6 | 464 | 14133 | 38926 | 3619455 | 151000 | 1 | 9 | 15.4 | 809 | 36.2 |
| **UK01** | GEA | 10558 | 0 | 265 | 78.6 | 66.7 | 73.6 | 75.2 | 96.5 | 6.8 | 3769 | 50346 | 100468 | 3214712 | 220046 | 2 | 27 | 39.8 | 692 | 52.0 |
| **UK01** | TTWA | 10558 | 0 | 218 | 81.4 | 66.7 | 76.4 | 77.7 | 96.5 | 7.4 | 3769 | 57819 | 122129 | 3376179 | 261627 | 2 | 33 | 48.4 | 727 | 62.6 |
| **UK01** | 'Euro' | 10558 | 0 | 257 | 81.0 | 66.8 | 75.0 | 76.5 | 96.5 | 7.3 | 1267 | 43312 | 103596 | 3310191 | 242733 | 1 | 25 | 41.1 | 706 | 59.2 |

*Notes*
*SD*: standard deviation. *Assigned zones* refers to the number of LAU2 zones effectively assigned to a valid LMA (there is a discrepancy in the number of basic zones assigned in each case due to the characteristics of the different procedures). Global SC refers to global self-containment (the percentage of resident workers that occupy a job within the boundaries of the LMA where they reside over the total number of jobs in the country)

**Table A.7 Characterisation of the results (ii): based on SIRE data for a selection of countries**

| Data | Method | Assigned zones | | No. LMAs | Global SC(%) | LMA min. self-containment (%) | | | | | LMA employed population | | | | | Number of zones per LMA | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Yes | No | | | Min. | Median | Mean | Max. | SD | Min. | Median | Mean | Max. | SD | Min | Median | Mean | Max | SD |
| **AT(SIRE)** | TTWA | 2371 | 0 | 69 | 87.9 | 66.9 | 77.6 | 78.2 | 95.8 | 6.1 | 4078 | 22860 | 49224 | 998073 | 124175 | 2 | 22 | 34.4 | 252 | 38.3 |
| **AT(SIRE)** | 'Euro' | 2371 | 0 | 80 | 88.1 | 66.8 | 76.5 | 77.6 | 94.5 | 6.2 | 1306 | 17709 | 42456 | 1008059 | 117617 | 1 | 19 | 29.6 | 259 | 37.6 |
| **BE(SIRE)** | TTWA | 589 | 0 | 28 | 85.0 | 67.9 | 76.4 | 77.4 | 90.9 | 6.2 | 6262 | 49604 | 93760 | 656537 | 140904 | 4 | 12 | 21.0 | 117 | 23.6 |
| **BE(SIRE)** | 'Euro' | 589 | 0 | 30 | 84.0 | 67.9 | 76.0 | 76.4 | 90.9 | 6.1 | 6262 | 49604 | 87509 | 664508 | 135584 | 4 | 12 | 19.6 | 120 | 22.9 |
| **CH(SIRE)** | TTWA | 2896 | 0 | 76 | 86.3 | 67.6 | 79.7 | 80.5 | 97.3 | 7.0 | 3373 | 21076 | 41971 | 501292 | 69213 | 5 | 30 | 38.1 | 192 | 35.8 |
| **CH(SIRE)** | 'Euro' | 2896 | 0 | 107 | 85.6 | 67.7 | 78.5 | 78.9 | 97.3 | 6.9 | 1013 | 12049 | 29811 | 502635 | 60948 | 1 | 16 | 27.1 | 165 | 32.6 |
| **ES(SIRE)** | TTWA | 8098 | 10 | 477 | 90.3 | 68.1 | 82.6 | 82.8 | 97.3 | 5.9 | 3313 | 9289 | 31179 | 2217852 | 121791 | 1 | 8 | 17.0 | 216 | 25.8 |
| **ES(SIRE)** | 'Euro' | 8099 | 9 | 798 | 89.5 | 66.9 | 79.5 | 80.1 | 97.3 | 6.3 | 1001 | 4572 | 18637 | 2220037 | 95058 | 1 | 5 | 10.1 | 177 | 17.0 |
| **FR(SIRE)** | TTWA | 36555 | 10 | 519 | 92.7 | 74.4 | 87.4 | 87.7 | 99.0 | 4.7 | 5338 | 24315 | 57368 | 4837335 | 223499 | 3 | 54 | 70.4 | 706 | 59.4 |
| **FR(SIRE)** | 'Euro' | 36555 | 10 | 729 | 91.7 | 74.0 | 85.4 | 85.8 | 98.6 | 5.1 | 1713 | 13889 | 40842 | 4498780 | 178831 | 1 | 36 | 50.1 | 623 | 48.9 |
| **IE(SIRE)** | TTWA | 3448 | 10 | 38 | 90.2 | 69.4 | 82.3 | 82.1 | 94.3 | 6.8 | 3899 | 16551 | 30243 | 392551 | 63222 | 18 | 78 | 90.7 | 441 | 73.2 |
| **IE(SIRE)** | 'Euro' | 3448 | 10 | 55 | 88.7 | 67.7 | 79.5 | 78.9 | 93.0 | 6.7 | 1210 | 10225 | 20895 | 393719 | 53513 | 9 | 46 | 62.7 | 447 | 64.8 |
| **SE(SIRE)** | TTWA | 289 | 0 | 124 | 88.8 | 69.0 | 84.2 | 84.0 | 96.2 | 6.6 | 3466 | 13950 | 31332 | 788168 | 78687 | 1 | 2 | 2.3 | 23 | 2.5 |
| **SE(SIRE)** | 'Euro' | 289 | 0 | 166 | 87.6 | 67.2 | 81.7 | 81.4 | 96.2 | 7.2 | 1231 | 9645 | 23404 | 788168 | 68544 | 1 | 1 | 1.7 | 23 | 2.1 |

*Notes*
*SD*: standard deviation. *Assigned zones* refers to the number of LAU2 zones effectively assigned to a valid LMA (there is a discrepancy in the number of basic zones assigned in each case due to the characteristics of the different procedures). Global SC refers to global self-containment (the percentage of resident workers that occupy a job within the boundaries of the LMA where they reside over the total number of jobs in the country).

## Appendix 2 to chapter 3 - Recommendations on the establishment of an EU-wide harmonised grid of comparable LMAs

In this Final Research Report (Section 3.5), a hypothetical set of 'Euro' criteria for LMA definitions was devised; with this set then used in the analyses of available national commuting datasets. The logic that drove the choice of criteria was two-fold:

A there should be target and minimum values for both self-containment and size;

B the values should derive from the lower ones in existing national LMA definition criteria.

Principle A reflects the decision to adapt the UK method of analysis, because it has pioneered this use of minima and targets to allow a restricted trade-off between size and self-containment, and this approach has not been questioned (probably due to the established transferability of this method). In any case, significant further experimentation with methods was beyond the scope of the brief additional research reported in this Appendix.

Principle B is probably well-founded in its emphasis upon existing national LMA definition criteria, but is more questionable in its prioritising of the lower values among the sets of criteria considered. To be very specific, this logic meant the hypothesised 'Euro' criteria were set so low that the number of separate LMAs they produce was very high: low criteria result in high numbers of qualifying LMAs.

To be of greatest practical policy value, a set of European LMAs will probably need to be 'populated' with relevant data on conditions and trends in each area, so their needs/potential can be compared. Much of the relevant data – such as from the LFS – would only be availability at NUTS3 level and this means that areas significantly smaller than NUTS3 would not currently be very useful on this basis. Table A8 compares the numbers of NUTS3 areas with the numbers of LMAs from the hypothetical 'Euro' criteria analyses (nb. "Euro(SIRE)" analyses were based on the datasets provided by SIRE – which had problems of data suppression in some cases – whereas the "Euro(web)" analyses used unsuppressed data obtained directly from the relevant NSI). With the one exception of Belgium – where the NUTS3 areas are notably small and thus highly prone to split realistic labour market areas in so urbanised and integrated a country – the number of 'Euro' LMAs is substantially larger than the number of NUTS3 regions in all the countries, which vary in nature from sparsely populated Sweden to the intensively developed UK.

**Table A8 Comparison of the number of NUTS3 Regions and hypothetical 'Euro' LMAs**

| | NUTS3 | Euro(SIRE) | Euro(web) |
|---|---|---|---|
| **Austria** | 35 | 80 | |
| **Belgium** | 44 | 30 | |
| **Czech Republic** | 14 | 107 | |
| **Spain** | 59 | 798 | 892 |
| **France** | 100 | 729 | |
| **Ireland** | 8 | 55 | |
| **Sweden** | 21 | 166 | 166 |
| **UK** | 133 | | 257 |

The way to define significantly fewer separate LMAs is to raise the criteria that they all must satisfy. Principle A (above) can still be observed by retaining the use of target and minimum parameters, because this enables a trade-off between size and self-containment that allows peripheral areas like (groups of) islands to remain separate LMAs even when the size of their employed population is low, due to the very high level of the self-containment of their commuting patterns. At the same time, across the vast majority of a country like the UK – little of which is far from a substantial urban area – all plausible LMA definitions will have large populations so the key issue there will be the minimum self-containment level that has been set.

Table A9 provides some results from sample variations of parameters in the LMA definition criteria. The first two rows – covering the numbers of NUTS3 Regions and of the hypothetical 'Euro' LMAs – are provided as a 'benchmark' by replicating data presented above (Table A8). The first additional set of results is based on analyses with criteria in which all four parameters have raised values: employed populations must have a minimum of 5,000 (but the target is 50,000), while a commuting self-containment minimum was set at 75% (but with a target value of 85%). The effect of these changes is to reduce to less than half the number of LMAs from the hypothetical 'Euro' set in both Spain the UK (nb. these are the only countries for which additional analyses have been carried out). The number of LMAs on this basis in the UK is found to be lower than the number of NUTS3 Regions, but the number in Spain is still very much higher than this 'benchmark' value there.

In fact it is a realistic outcome that sets of LMAs defined on a consistent basis in the two countries have a higher number of separable areas in Spain than the UK. While the number of NUTS3 Regions in a country primarily reflects its population size, hence there being more in the UK than in Spain, the number of LMAs should also reflect its territorial size and the extent to which there are rather thinly populated areas remote

from the main urban areas. There are several of this latter area type in the UK, primarily in northern Scotland, but there are more such areas in numerous parts of Spain.

Table A9 explores the sensitivity of the results described so far to the minimum size requirement which is the most important parameter in determining how many LMAs are defined in these remote thinly populated areas. In the fourth and fifth rows are results from raising this minimum first from 5,000 to 10,000 and then to 20,000 (Table A9). The effect on LMA numbers in the UK is remarkably slight as a result of it including relatively few remote areas, but as expected the impact is very strong in the case of Spain. There is no simple way of determining the most appropriate set of parameters, with the key concern being the use value of the boundaries produced for the purpose which called for those definitions to be created. Thus it is a potentially relevant concern that the higher minimum size parameter set here (20,000) prevents some major island groups in the UK from remaining LMAs in their own right: this would not be a result that would be seen as useful for many purposes.

For the final set of results reported here the minimum employed population reverts down to 10,000 but the self-containment minimum is raised to 85% (and the target to 95%). Table A9 shows that the effect in Spain is to produce fewer LMAs: many of the 207 LMAs defined with the same population parameters but the lower self-containment minimum and target must have had self-containment values close to those requirements because when the requirements are raised only 114 Spanish LMAs meet these criteria. A similar rate of decline in separable LMA numbers also occurs in the UK. Here again it should be emphasised that the relevant form of evaluation is the use value of the areas defined by any particular analysis. In effect the 56 UK LMAs defined on this basis are really more like "city regions" than most labour market areas used in national policies. More localised definitions tend to be used for policies where it is hoped to target responses at areas of acute need, but at the same time there is a risk that if the areas are drawn too tightly then the higher level of commuting across those boundaries – which results from more narrowly defined areas – could mean that the benefits of policy action targeted at those areas are more likely to be gained by people of adjacent areas who commute in to take the newly created job opportunities.

**Table A9 Comparison of the number of NUTS3 Regions and LMAs defined by alternative criteria**

| | UK (web) | ES (web) |
|---|---|---|
| **[NUTS3]** | [133] | [59] |
| **['Euro' : minSIZE=1,000 targetSIZE=5,000 minS-C=66..6 targetS-C=75.0]** | [257] | [892] |
| **minSIZE=5,000 targetSIZE=50,000 minS-C=75.0 targetS-C=85.0** | 121 | 277 |
| **minSIZE=10,000 targetSIZE=50,000 minS-C=75.0 targetS-C=85.0** | 112 | 207 |
| **minSIZE=20,000 targetSIZE=50,000 minS-C=75.0 targetS-C=85.0** | 109 | 147 |
| **minSIZE=10,000 targetSIZE=50,000 minS-C=85.0 targetS-C=95.0** | 56 | 114 |

A final statistical point relates to the potential distortion to policy analyses resulting from analysing GDP values for areas with relatively low self-containments. This risk is related to the deviation of the measure known as Job Ratio (viz: no. jobs / no. employed people) from the ideal of 1.0 (viz: an area where the number of jobs equals the number of employed people). By defining the LMAs so that their self-containment minimum is relatively high, this risk is reduced. However this is in fact a rather 'blunt tool' to deal with problems arising from an unbalanced Job Ratio because some of the LMAs which have self-containments that are extremely high (eg. more than 90%) still have some of the most unbalanced Job Ratios. It would be possible to have Job Ratio balance as an explicit parameter in LMA definitional criteria, but this is a non-trivial extension to research conducted to date.

# 4. Annex I - Interim Research Report