ESPON

FOCI
Future Orientations for CIties

Applied Research 2013/1/1

Final Scientific Report | Version 15/12/2010

EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE

This report presents the final results of an Applied Research Project conducted within the framework of the ESPON 2013 Programme, partly financed by the European Regional Development Fund.

The partnership behind the ESPON Programme consists of the EU Commission and the Member States of the EU27, plus Iceland, Liechtenstein, Norway and Switzerland. Each partner is represented in the ESPON Monitoring Committee.

This report does not necessarily reflect the opinion of the members of the Monitoring Committee.

Information on the ESPON Programme and projects can be found on www.espon.eu

The web site provides the possibility to download and examine the most recent documents produced by finalised and ongoing ESPON projects.

This basic report exists only in an electronic version.

Table of Contents

Figures

Chapter 1

Chapter 2

Chapter 3

Chapter 4

Chapter 5

Chapter 6

Chapter 7

Chapter 8

Chapter 9

Chapter 10 - Part A

Tables

Chapter 1

Chapter 3

Chapter 4

Chapter 6

Chapter 7

Chapter 8

Chapter 9

Chapter 10

Chapter 13

Chapter 14

Chapter 1 – Environment in European cities ("sustainability")

Jaume Fons, Alejandro Simon (UAB)

Stefan Kleeschulte, Mirko Gregor (GeoVille)

1. Introduction

Urban systems emerge as distinct entities from the complex interactions among social, economic and cultural attributes, and information, energy and material stocks and flows that operate on different temporal and spatial scales. Such complexity poses a challenge to identify the causes of urban environmental problems and how to address them without causing greater deterioration.
Classically urban environmental issues have been addressed from the health perspective (e.g. air pollution or water). The Rio Conference in 1992 was a turning point towards the integration of sustainability into all policy fields. At European level it has been reflected in the Thematic Strategy on Urban Environment where urban environmental management is included as one of the four pillars, the others being urban transport, sustainable construction and urban design.

However, the diversity of factors acting at different scales poses a great challenge when analysing the sustainable dimension of urban areas in a large geographic area as Europe. Some of the constraints or complexities that we face today can be summarised as follows:

- Data availability. The increased capacity of computing and data availability from multiple sources has not yet been digested in a structured system that would make the use of existing resources more efficient. In that sense the INSPIRE Directive is an important step towards an integrated and harmonised environmental information system, but still under development.
- New paradigms as quality of life, looking for a better integration between environment, planning, management and people's life requires closer cooperation between multiple disciplines (sociology, economy, biology,…).
- The need for a conceptual framework. Very often the limitations imposed by the data availability and new demands do not allow to test assumptions taken for granted.
- The availability of detailed studies at local level are important but does not provide –alone or uncoordinated, the basis to build robust theories.

The scope of this project is far beyond solving some of these questions. However, our hypothesis is that the spatial patterns of urban dynamics are key to understand the environemntal aspects of urban areas.

2. Literature review

Sustainability

Framing the concept
Sustainability has become a mainstream word frequently used, as if only mentioning it would solve the environmental problems. In particular the concept sustainable cities appear everywhere, but in many cases the conceptual or empirical basis is missed. Consequently it is very difficult to set targets and to get the right information to assess the evolution and trends. Moreover, very often the concept is used as an absolute attribute (sustainable/unsustainable) whereas it would be more pertinent to analyse sustainable/unsustainable process/trends.

The policy report European Sustainable Cities (1994,1996) called for an integrated ecosystems-based view of the city and emphasised, for example, demand-side management, equity and efficiency in the use of resources and effective engagement with local communities and other stakeholders. Practical application of these ideas and further development of local sustainability approaches has been carried out through the European Sustainable Cities and Towns Campaign.
Although the integration of different disciplines (thermodynamics, ecology and information theory) is still in a research phase, several factors have been identified as key components of sustainable systems:

- Rates of consumption of natural resources below certain thresholds;
- Maximisation of energy efficiency;
- Maintenance of ecosystem services;
- Maximisation of networks, diversity and information flow.

Taking some of these principles, three different approaches have been identifyied:

- **Ecological footprint**. The ecological footprint is a measure of the resources necessary to produce the goods that an individual or population consumes. Some authors criticise this approach because, among others, it does not take into account land degradation obscuring the effects of a larger sustainability problem. However, it has been a useful tool for communication as has been proven in London.
- **Urban metabolism**. The socio-economic metabolism approach conceptualizes the relationship between societies and their natural environment as a physical input–output process: materials and energy are extracted from the environment, processed within society, partly accumulated as socioeconomic stocks (e.g., buildings, infrastructure, durable consumer goods, etc.), and, finally, released into the environment, either as waste and emissions, or as deliberate discharges such as fertilizers or pesticides (Ayres and Simonis, 1994; Fischer-Kowalski, 1997; Matthews et al., 2000)
- **Environmental vectors or domains**. In this approach different compartments of the urban system are analysed considering their trends over time.

The problem of the first two approaches is the high data requirements reflected in that most of the studies focus in few, if not only one, cities or areas.
The environmental vectors also allow to emphasize the land dimension, beyond the city skirts, which is a central component of the hypothesis presented in the project:

- Environmental issues in the city
  - Air quality
  - Energy consumption
  - Land consumption
  - Quantity and quality of green areas
- Environment beyond the city border
  - Land consumption
  - Geographic estension of the impact of the city growth
  - Pressure on natural areas
  - Fragmentation

<u>Land resources</u>
Land, and soil, can be considered limited resources at human scale. The Soil Thematic Strategy identifies soil sealing by impervious surface as one of the main threats to soil conservation in Europe. Moreover, there is an impact that extends far beyond of the city limits by the destruction of biotopes and fragmentation of eco-systems. It also increases the pressure on protected areas by increased air pollution.
These changes are characterized by a generalized **homogenization** of the existing traditional landscape diversity and the creation of largely chaotic patterns. Such a chaotic development is typical for complex systems and is also referred to as autonomous development (Antrop, 1998). New forms of land use are **not ecologically related** any more with the land and the place.

Pollution

Despite the **progress** made in controlling local air pollution, urban areas show increasing signs of environmental stress and air quality is one of the major concerns (EEA, 2009). In the period 1997-2005, between 16 and 45 % of the urban population was potentially exposed to ambient air concentrations of PM10 higher than the EU limit value set for the protection of human health. There was no discernible trend over this period and differences between years were related to weather conditions (EEA 2007). Many European urban areas experience daily average PM10 concentrations higher than 50µg/m3 on more than the permitted 35 days per year. The highest urban concentrations were observed in cities in northern Italy (Po valley), Spain, Portugal, the Czech Republic, Poland, Hungary, Romania, Bulgaria, the Benelux countries, Greece, and the cities of the West Balkan countries.

For ozone (O_3) there was considerable variation over the years. During most years, 20-25% of the urban population was exposed to concentrations above the target value. In 2003, a year with extremely high ozone concentrations due to specific meteorological conditions, the exposure to high concentrations increased to about 60%.

About a quarter of the urban population in north-western Europe, Romania and Bulgaria remain potentially exposed to concentrations above the NO_2 limit value. The percentage of the urban population exposed to SO_2 concentrations above the short-term limit values decreased to less than 1% and the EU limit value is thus close to being met (EEA, 2007).

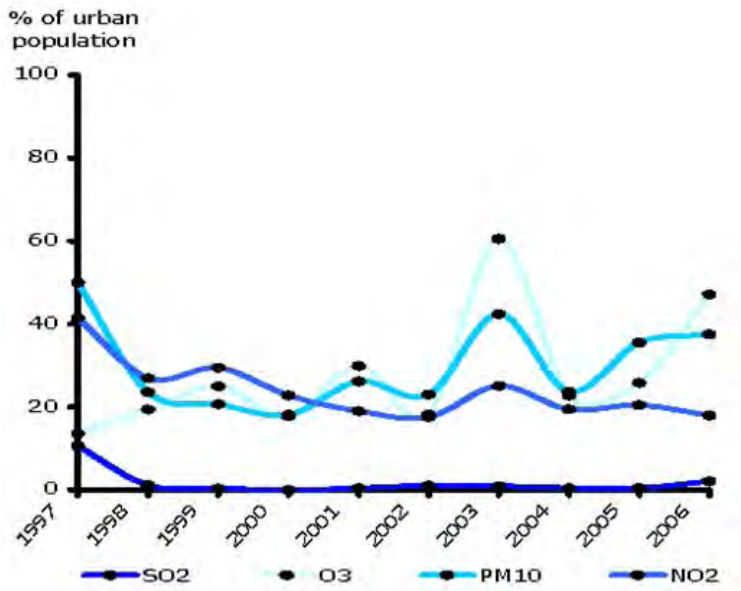


Figure 1. Percentages of the urban population in EEA member countries (except Turkey) exposed to air pollution above the limit and target values (AirBase)

As a result, the exceedance of air quality standards seriously increased respiratory and cardiovascular diseases, in particular with young children or elderly people (EEA, 2010). There seems to be a strong relation between the amount of heavy traffic and the health effects; epidemiological studies, for instance in the Netherlands show that more negative health effects such as lung diseases, coughing and heart diseases occur to people living in the vicinity of major roads (Hoek, 2002). In the European Union, the number of premature deaths that can be attributed to anthropogenic PM2.5 due to emissions from traffic and other sources is estimated to be about 350 000 for the year 2000 (CAFÉ 2005). These health effects are linked to high economic losses in form of higher costs for medical treatments and losses for employers for sick workers.

While the linkage is clear between air pollution and emission sources (road traffic, heating systems,…), the relationship between city form and air pollution is more complicated since it strongly depends on the selected area of study (districts, city center, metropolitan area,…) and type of contaminants. Moreover, local geographic and climate conditions can obscure other factors.
In a simulation study, Borrego et al. (2006) found that the highest emission rates were attribute to the so-called corridor city, i.e. cities characterized by growth in linear corridors with origin in the city centre, supported by high quality transport infrastructure (highways). The disperse city demonstrated the lowest emissions per area and the compact city was characterized by lower emission rates per inhabitant. It was concluded that, at regional level, compact cities with mixed land use provide better air quality compared to disperse cities with lower densities and segregated land use or network cities equipped with intensive transport structures.

Noise
European cities have become increasingly "noisy"; the noisy places became not necessarily louder, but there are less quiet places left. Today not only traffic noise, but also leisure and neighbourhood noise affects people since noise surrounds them nearly 24 hours a day. Detailed noise data across Europe is, however, hard to obtain. Different sources give the following picture:

- **Road traffic** is the dominant source of exposure in major urban areas. In 2006, the EU Thematic Strategy on the Urban Environment reported that exposure to continuous road traffic noise affected:
    - 160 million people in the EU-15 (40% of the population) at an “averaged” level above 55 dB(A)- associated with significant annoyance;
    - 80 million people (20% of the population) were exposed to continuous road traffic noise above 65 dB(A) - associated with cardiovascular effects;
- In 2002 the European Commission introduced the Environmental Noise Directive relating to the assessment and management of environmental noise. From the currently available exposure data which only cover parts of the Member states, it can be seen
    - 56 % of the population living in cities is exposed at an “averaged” level above 55 dB(A)- associated with significant annoyance;
    - 35 % of the population living in cities is exposed is exposed to continuous road traffic noise above 65 dB(A) - associated with cardiovascular effects;

Persistent high levels of noise are associated to reading disabilities, memory and concentration loss, as well as to irreversible health effects such as heart attacks and strokes (Stansfeld et al. 2005, Babisch 2006 and Jarup et al., 2008), for instance in the Netherlands, yearly 20-150 people suffer from heart attacks caused by traffic noise (Houthuijs, 2008). It has also an economic impact as stated by Gjestland (2007): in Norway, the "cost" of one extremely annoyed person has been estimated to be approximately 1600 € per year -due to the linearity, the "cost" of a moderately annoyed person thus equals 800 € per year. Moreover, it has been observed that house prices decrease between 1.2 and 1.6% per dB in Denmark, and in Germany the price goes down by a 50% at 70 dB (European Commission, 2007)

Waste
One of the targets set in the 5th Environment Action Programme (EAP) was to reduce the generation of municipal waste per capita per year to the average 1985 EU level of 300kg by the year 2000 and then stabilise it at that level. Figure 2 shows that the target was far from ever being reached. The average amount of municipal waste generated per capita per year in many western European countries still exceeds 550kg.

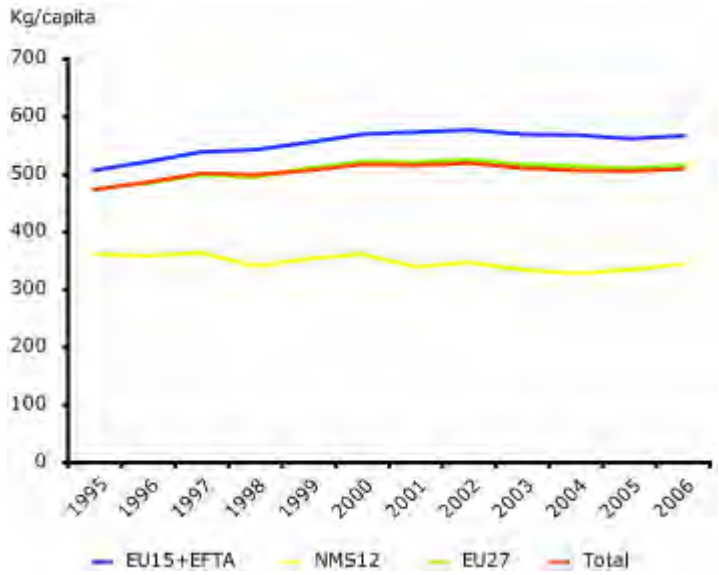


Figure 2. Municipal waste generation in Western Europe (EU-15 + EFTA), New Member States (NMS12), EU countries (EU-27) and total in Europe (total)
Source: EEA, 2008

The target was not repeated in the 6th EAP. The Waste Framework Directive (2008/98/EC) rather includes a general target to break the link between economic growth and the environmental impacts associated with the generation of waste. Since generation of municipal waste per capita has stabilised in the EU since 2000 while GDP has increased by 13%, the generation of waste at least has been decoupled from economic growth across the EU. As a result, it is likely, though it does not necessarily follow, that the environmental impacts associated with municipal waste generation have also been decoupled from GDP.
Municipal waste generation rates in new Member States are lower than in western European countries and generation appears to have decreasing somewhat since the mid-nineties. This decrease occurred over a period with strong economic growth as well as growth of consumption expenditure. The causes of the decoupling and overall decreases in municipal waste generation per capita in EU-12 are not clear. Several countries of the region have reported that the reductions are only apparent caused by changes in measurement methods. Weighing of waste deliveries at landfills has been gradually introduced in EU-12 countries over the past decade. Previously the amounts were estimated according to volume. Since amounts of lightweight waste (e.g. packaging) are growing and amounts of heavy fractions (e.g. ash and slag) are decreasing, individual landfills may have overestimated weight of municipal waste in the years immediately prior to introduction of weighing, if based on even older waste composition data. This would lead to a sharp reduction in recorded weight following the introduction of direct weighing of waste. Since weighing has been introduced gradually these numerous sharp reductions would be smoothed out and appear as a gradual decrease in waste generation over a country or region.
Other trends, such as those in consumption patterns and waste collection methods (e.g. limited collection of bulky waste), may also have played a role. Reporting systems may also need further development, especially regarding the definition of municipal/non-municipal waste in some streams e.g. waste from small enterprises and services, bulky waste and packaging waste.

Urban sprawl, a key issue

Urban systems emerge as distinct entities from the complex interactions among social, economic and cultural attributes, and information, energy and material stocks and flows that operate on different temporal and spatial scales. Such complexity poses a challenge to

identify the causes of urban environmental problems and how to address them without causing greater deterioration.
Urban sprawl, as opposed to compact city, has been recognised as one of the main problems of cities at the turning of the century for several reasons:

- Unsustainable loss of natural resources (Jenks et al., 1996; Williams et al., 2000; Jenks and Dempsey, 2005).
- Many social and ecological problems are side effects of urban sprawl (Burton, 2000; Jenks and Burgess, 2000).

Urban sprawl first appeared as an American phenomenon, but recent works well described the specificities of this problem in Europe (EEA, 2006; Couch et al. 2007). It can also be recognised that European institutions have been progressively including the urban environment in their agenda although the competence of urban issues lies at Member State level[1].

Working definition

A variety of urban forms have been covered by the term "urban sprawl" ranging from contiguous suburban growth, linear patterns of strip development, leapfrog and scattered development. In terms of urban form, sprawl is positioned against the ideal of the compact city, with high density, centralised development and a spatial mixture of functions, but what is considered to be sprawl ranges along a continuum of more compact to completely dispersed development. In any way it is important to recognise that urban sprawl is not merely an attribute, or **pattern**, of a city. Moreover, it should be considered as a **process of urban change** (Couch et al. 2005). Finally, urban sprawl cannot be defined by a single parameter (Kasanko et al. 2006). Galster et al (2001) defines sprawl as a pattern of land use in an urbanised area that exhibits low levels of some **combination of eight distinct dimensions**: density, continuity, concentration, clustering, centrality, nuclearity, mixed uses and proximity. These eight attributes also combine two dimensions of the compacity/sprawl characterisation: physical and functional. The physical compactness refers to the spatial configuration of land use development within the city, the functional compactness to the density and the mix of daily activity
For the purpose of this work these eight dimensions will be considered whenever the information is available.

Urban sprawl in the past 50 years

One of the problems to understand urban sprawl in Europe is the lack of long time series of data. Availability of satellite images and computing capacities were big constrains until the end of 1980s. Consequently, most of the existing information for the period 1950 – 1990 relies on population data. In that sense the work developed under the MOLAND project is the best land cover data for the period 1950 – 2000 since it covers 28 cities.
The following tables summarise the main trends in Europe for the 1950-2000 period compiled from existing literature (Antrop 2004, Kasanko et al. 2006, Turok and Mykhnenko 2007, and Couch et al. 2007).
From the long term data it can be concluded:

- The largest urban land expansion in Europe started in the 1950s.

[1] By the early 1990s DG Environment had placed the issue of the urban environment on the EU policy agenda and later Communications from the European Commission in the second half of the 1990s sought to create an 'urban agenda' which moved urban problems and sustainable urban development up the EU policy agenda. An indication of this change has been that since 1998 most EU Presidencies have held Urban Forums of one sort or another. Indeed by the beginning of the Twenty First Century 'urban issues' had been incorporated into the Structural Funds (Objective 1 and 2) and the URBAN programme was well established along with a number of other urban related initiatives particularly associated with economic competitiveness and social exclusion. Later on urban issues have been mainstreamed and DG Environment has developed a 'Thematic Strategy on the Urban Environment' (2006) as part of the Community's 6th Environmental Action Framework.

- The past **history** was reflected in **high diversity** of city attributes at the beginning of this period.
- Rapid changes during the last 50 years resulted from combined effects of increasing affluence, mass motorisation for the transport of persons and goods, the introduction of air transportation and the shift from manufacturing to services in urban economies caused a much more **dispersed**, **fragmented** and **low density** urban development. This development did affect existing functions and structures of many cities, in particular less attractive neighbourhoods and obsolete industrial and port areas suffered. Many cities experienced population loss.
- The process did not take place at the same time in all regions. Process in **Mediterranean cities** started later than Northern and Western Central Europe. Also Mediterranean cities were more compact and kept some of this attribute during the 1990s.
- By the end of the 1960s and 1970s a process of **revitalisation** started with new town and urban renewal efforts. Gradually, more investments were made in housing, businesses, infrastructure and public services. The revival is related to the emergence of a society and economy based on knowledge, information and creativity and an accompanied growing interest in urban life styles. But physical and socio-economic polarisation also increased and became a large scale urban problem.

Time-lag	Average annual city population growth rate[1]	Average annual growth of built-up areas (%)[2]	Trends in Western Europe
1950 - 1960		3.3 (1.1 – 8.4)	At the beginning of this period the number of growing cities was more than three times greater than the number of declining. Maximum peak of the growth of built-up areas Progressive decrease in the number of growing cities.
1960 - 1970	2.87		
		2.3 (0.5 – 6.1)	
1970 -1980	2.32		
1980 -1990	0.97	1.4 (0.4 – 2.5)	Period of stabilisation. Although the average rates decreased, the number of declining cities remained the same as in the late 1970s.
1990 - 2000	-0.13	*0.5* *(estimate from CLC for whole Europe)*	The differential between growing and declining cities narrowed steadily until the late-1990s, when cities fell below national trends and were actually declining on average. For the first time the number of declining cities was greater than the growing ones. The late 1990s was the worst period for European cities as a whole, with decline most widespread.
2000 - 2005	0.15		Resurgence (in general). There was a slight improvement in the first few years of the new millennium, although there were still more cities in relative decline than growing.

1 After Antrop 2004; 2 after Kasanko et al. 2006.

Table 1. Major trends in population and built-up areas in Western Europe (1950-2005)

Time-lag	North West Europe (+ Denmark)	Western Europe	Mediterranean	New Member States
1950 - 1960	Urban population: 75% Start process of suburbanisation	*High variability between cities and countries. No common pattern.*	Urban population: 45% Compact and densely populated	Urban population: 40% Compact cities by centralised planning and reliance on public transport. No suburbanisation process identified. High similarities in the structure of the cities.
1960 - 1970	Redevelopment and dispersal of old neighbourhoods.	Start process of suburbanisation in many cities.		
1970 - 1980	Revitalisation. Recovering the city centre in terms of both population and urbanisation.	Revitalisation. Recovering the city centre in terms of both population and urbanisation.		
1980 - 1990		Revitalisation. Recovering the city centre in terms of both population and urbanisation.	Increasing the process of sprawl.	Towards the end of 1980s start of political changes.
1990 - 2000	High rates of sprawl in Ireland. Denmark showed the lowest rates of sprawl.	Average rates of sprawl. Steadily growth of German cities.	Rapid increase of urban sprawl.	Post socialist period. Most cities are declining and sprawling. Romania and Poland show the highest shares of declining cities.
2000 - 2005	Continuous long-term decline in UK (Merseyside, Tyne and Greater Glasgow). The period in question also saw a considerable amount of urban regeneration work in town centres, and even inner areas of these conurbations. This was accompanied by significant increases in population of such areas – e.g. Glasgow's Merchant City.	Growth of German cities at lower rates. Few German cities show continuous decline (Leipzig being a prototype of decline and sprawl).	Most of the Spanish and French cities show a continuous growth. Sprawl is still important in Spain.	Decline in most Polish cities.

Table 2. Major trends of urban dynamics in regions of Europe for the period 1950-2005. After Couch et al. (2007) and Turok and Mykhnenko (2007)

- Central planning, dominance of public transport and no land market determined a specific form o **compact** city in **former socialist countries**. Changes since the 1990s are explored in next section.
- Urban change is incremental: most of the physical fabric of cities survives for many decades if not for centuries. The social fabric is much more prone to change, but nevertheless, in general, changes only by a few percentages of change per year.
- There has been a process of **convergence** in most of the cities accelerated by the end of 1990s.

Improved statistical data (e.g. Urban Audit) and the availability of Corine Land Cover for the reference years 1990 and 2000 (2005 to come) explains why this section focuses in the 1990s and early 2000s. The appearance of urban issues into the European agenda in the 1990s has facilitated the development of new initiatives for urban data collection at European level (see for example the GMES[2] programme and related Downstream Services). However, most of this information is not yet available.

During this period the growth of urban areas and associated urban infrastructure consumed more than 8 000 km^2, about 3 times the size of Luxembourg. This increase has been at higher speed than population change.

Combining land cover and population changes (1990-2000) with population density and percentage of urban land (2000) the following patterns emerged (Figure 1)[3]

- Regions with a **high level of urbanisation** and relatively **slow to moderate (physical) growth** are mainly dominant in the Pentagon area (the area limited by London, Paris, Milan, Munich and Hamburg). The fastest urbanisation in north-west Europe is found here. This means that already highly urbanised regions in the European heartland have continued to grow relatively fast. Densification and dedensification are found side by side in this part of Europe.
- In most of southern Europe and in parts of north-western Europe, mainly in regions in Ireland, a **low to moderate level of urbanism** is present. A relatively **rapid physical growth with low densities** is dominant here. The most rapid urbanisation has occurred in regions in Spain, Portugal and Ireland. These are countries which experienced relatively strong economic growth and major infrastructure investments supported by the EU. Also some regions in the Netherlands, Italy and Greece have shown rapid urbanisation.
- In nearly all of Eastern Europe, but also in parts of central and north-western Europe - mainly in France and Great Britain and in some southern European regions in Spain, Italy and Greece – a **low level of urbanism** is linked to **limited physical growth**, mostly with low densities. Because this combination is primarily found in peripheral locations in Europe, the gap between peripheral, rural regions and more rapidly urbanising, urban regions is widened. At the same time, the divergence between most of Eastern Europe, and the more rapidly urbanising southern European regions and the Pentagon is increasing. However, a number of large cities in Eastern Europe belong to the first group, where there has been relative fast urban growth.

In conclusion, in Europe urbanisation generally leads to less dense urban areas, because dedensification is the most dominant form of urbanisation. Urbanisation in regions with a low level of urbanism is relatively limited, in contrast with urbanisation in regions with higher levels of urbanism. As a result, the differences in urbanism in the European Union are increasing.

[2] GMES: Global Monitoring for Environment and Security (http://www.esa.int/esaLP/LPgmes.html)
[3] A similar approach was taken in ESPON Project 2.4.1 (2006) with similar results (Final Report, page 103).

Changes in Central and Eastern countries

Political changes occurred at the end of the 1980s and 1990s in the former socialist countries represent a special case because the factors that shaped cities in the previous period were very different from the rest of Europe. The centralised planning and the non-existence of land markets resulted in more compact cities compared to the western counterpart. By 2000 most of the cities were still below 100 000 inhabitants (25% between 100 000 and half a million, 6 between half a million an one million; and only 3 with more than one million -Budapest, Warsaw, Prague).

Although regional differences exist and the process has taken different pace depending on the cities, some commonalities have been found:

- General **decline in population** in the last decade except in Poland, Slovakia and Slovenia.
- **Privatisation** of the housing stock. After the transformation, a large number of the dwellings were sold to the inhabitants at low prices. As a consequence the new member states show the highest number of owner-occupied dwellings in Europe (96.7% in Lithuania in 2001). The exception is the Czech Republic (47% in 2001) that has never introduced such privatisation plans (vanKempen et al., 2005).
- Gradual **deterioration** of housing blocs as consequence of low income of many new owners, unable to repair and maintain the dwellings (Murie et al., 2005).
- Progressive deterioration of city centres. Increase of **pollution** because inadequate transport policies.
- Changes in the economic basis in the cities, increasing the opportunities in the **service sector**. However, the workers required for the service sector are not always those who have lost their job in another sector.
- **Commercial development** constitutes and important force that has substantially contributed to a massive reorganisation of land use patterns. Such development has been recognised as a tool of local economic regeneration and growth, often supported by government policies.
- Revitalisation of city centre has **raised the prices** in the inner city, becoming too expensive (e.g. Lithuania).
- Disparity in prices between capitals, more expensive, and regional cities.

All these elements have lead to the current situation:

- Increased **suburbanisation and sprawl**, although most of the cities are still more compact than in the Western Europe. The acceleration of city sprawl is evident in Hungary, as well as in Poland and the Czech Republic.
- The situation is more dramatic in cities where sprawl has been combined with **decline** implying a strong environmental impact (e.g. Budapest).
- Social, and sometimes ethnic, **polarisation**.

The major constrains to further improve the situation in these countries are:

- **Brownfields**. Former industrial sites that have been abandoned and in most cases have serious problems of contamination. The cost of remediation of these sites is very high. It has been estimated that 40% of the Budapest area can be characterised as brownfield land (Baross 2007). The EC's Thematic Strategy on the Urban Environment1 recognises brownfield regeneration as a major means to achieve a sustainable urban environment
- Existing "**frozen land**" (Bertaud 2004): It consists of either a) areas with "fuzzy" tenure, or b) areas owned by government but not occupied by a legitimate government function. This prevents their timely renovation or recycling.
- Residential estates of **high density panel housing** located in the suburbs.
- Weak and poorly maintained **infrastructure** which is inadequate to support the high residential densities found in the centre.

Drivers of urban sprawl

In order to systematise the existing literature on drivers of urban sprawl the following dimensions have been considered (Figure 2):

- **Scale**.
  - Macro level. Political and economic paradigms that shape the nature of the urban societies.
  - Meso level is where much of the discourse about the causes of urban sprawl can be found.
  - Micro level captures the decisions of individual actors in the urban system.
- **Demand and supply**. Very often the drivers focus on the demand side. However, recent studies in Germany showed that the supply side may be more important than demand alone (Dosch, 2008).
- **Domain**: society, economy, governance, transport and land. This categorisation is largely in line with the ESPON projects on polycentricity and economic change (ESPON, 2005), where the characteristics of urban development are related to changes in the main functions of urban regions: population, transport, tourism, manufacturing, and knowledge and decision-making in the private and public sector. It also relates to the basic determinant blocks of regional competitive performance presented in the current project.

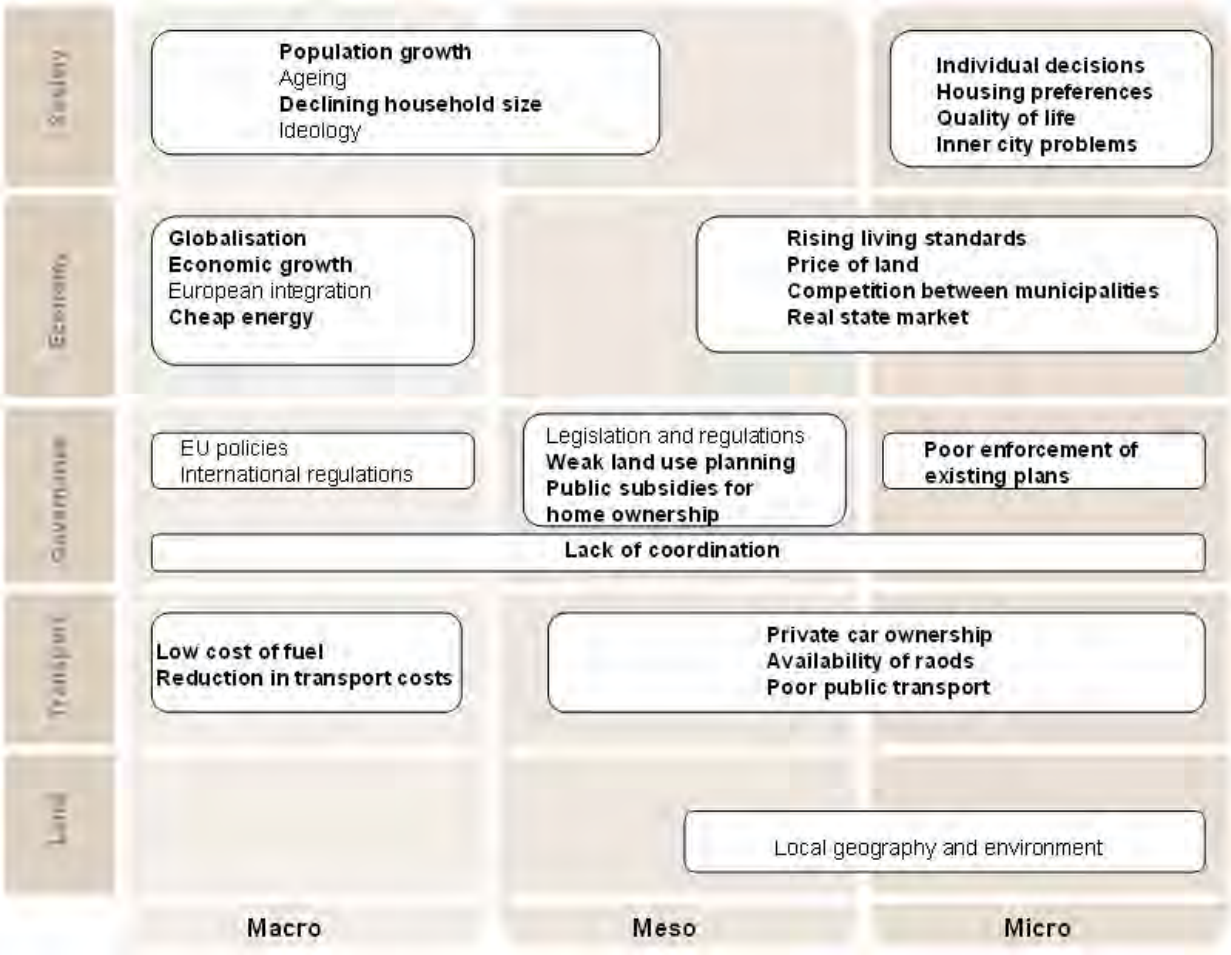


Figure 3. Main drivers of current urban sprawl in Europe. Drivers have been organised in two dimensions: domain (horizontal) and spatial scale (vertical). Demand/supply has not been differentiated. In bold: factors that drive urban sprawl; the remaining factors may become drivers of urban sprawl under

certain conditions. Adapted from EEA (2006), Couch et al. (2008) and , Urban sprawl book and PBL (2008)

As has been seen in the previous sections population growth no longer determines the outward expansion of built-up areas. There are other elements related to cultural aspects and **individual decisions** modulated by the supply side and other external conditions (price, transport, and cost).

The **feedback** between drivers and urban process can be seen in the case of population dynamics:

- Population change is an important consequence of urban conditions, especially the availability of economic opportunities (Green and Owen, 1995; Champion and Fisher, 2004; Storper and Manville, 2006). Migration is a response to differences in employment or the quality of life between places, even if the process of adjustment is inefficient. The bigger the differences, the more worthwhile it may be to move, subject to barriers such as distance, legal restrictions, housing constraints and information on the opportunities available. The propensity of people to move is affected by their age, qualifications, financial resources and sense of attachment.
- Population change is also an important influence on urban economic conditions (Glaeser et al., 2001; Glaeser, 2005; Florida, 2004; Krugman, 2005). There is evidence that sheer population size and deep labour pools increase agglomeration economies and productivity (Rosenthal and Strange, 2004; Rice et al., 2006). Loss of population has certainly caused wider economic and environmental problems for cities (Cheshire and Hay, 1989; Begg et al., 1986). Shifts in the level of population affect local jobs through demand for consumer goods and services, housing, schools, etc. Changes in working age residents also affect the supply of skills, which may influence mobile investment decisions. The composition of the new population is bound to have an important bearing on the scale and nature of the economic impact.

Globalisation is recognised as one of the main drivers of urban sprawl interrelated with the development of information and communication technologies together with the increased accessibility to almost any place in the world (JRC). The traditional geographic range (space of influence) is overcome, and place is disconnected of economy (Castells, 2001). This has direct consequences for governance creating a conflict between local/regional policies and global market.

EU integration may have an undesired side effect through the investments on major transport infrastructures and opening the doors of sprawl to new areas. Since transport is one driver of urban sprawl special attention should be paid in these cases implementing additional policies of containment (EEA, 2006).

Real estate market is an important player from the supply side. According to Bertaud land price profile follows approximately the population density profile in market economies. This promotes the urbanisation of the less dense areas within a certain time distance of the main centre.

The **differential price** between agricultural land and already urbanised land discourages the revitalisation or recycling of built space generating derelict land. It also has a strong impact in fertile flat areas where accessibility generates a conflict of uses leading to a **marginalisation** of agriculture.

One of the main failures to effectively control urban sprawl is the **lack of horizontal (space) and vertical (institutional) integration of policies** (EEA, 2006). City boundaries are becoming diffuse increasing the complexity of levels of governance (e.g. intermediate metropolitan administrations).

Nearly all environmental management is carried out at a **local level**, and measures adopted at this level influence the impacts at broader scales (Bellot et al. 2007). Municipalities have limited number of tools to influence the urban spatial structure although some typical municipal objectives have a spatial implication:

- Protecting the natural environment requires more compact cities;

- Maintaining a high ratio of public transport trips requires high densities;
- Low housing prices requires an increase in land supply at densities set by demand generating a large suburban expansion.

Fragmented decision-making. Typical situation for actor groups involved in the development of land (UBA, 2008):

- **Municipalities** maintain the hope that new inhabitants will lead to a tax surplus, when in fact studies have shown that this is only seldom the case. Therefore they generally favour the development of land. Costs are transferred as far as possible to the investor and as the municipality bears "no" costs the project is regarded as "good".
- For **landowners** a plot represents an economic asset in whose increasing value they hope to profit. Thus, owners of agricultural land which is facing development become highly active.
- For **project developers** high unit costs to connect new dwellings or commercial premises to supply networks are often more than offset by the much cheaper land prices in peripheral areas at the edge of existing settlements. The extra transport costs are countered by other sales arguments (e.g. property prices, "living in the countryside").
- **Utility companies** have little motivation to influence the location and density of use of newly constructed or newly connected areas, as the associated costs are reimbursed by users in the form of construction subsidies or by a general rising of charges for all users.
- **Householders** seeking a new location are often ignorant of the high costs for technical infrastructures associated with low density peripheral areas. The low price of suburban land hides the rising infrastructure costs per housing unit which low settlement density causes.
- As a result fragmented decision taking supports therefore unsustainable land use developments: The single decisions are comprehensible; but either actors ignore the high follow up cost for transport, infrastructure, loss of land, biodiversity and ecosystem services or transfer these costs to others, finally every resident.

The complex interrelations and possible **side effects** are often missed –or difficult to assess at the time of issuing the policies. For example rising prices as consequence of policy for urban concentration (Cheshire, 2006; Richardson and Bae, 2004).

In market economies **actors** play an important role. It seems that that the preferences of people are lower densities and car ownership in many parts of Europe (see France for example Richardson and Bae, 2004 pàgina 93 posar referència). It has also been reflected in the rise of second homes that has been facilitated by the supply side (construction and related economies have been one of the most successful sectors in Spain in the last 10 years).

Land use and transport are inter-dependent in complex ways as development influences mobility patterns. New suburban development without adequate public transport typically increases the demand for private car use. In contrast the construction of new light rail systems has a tendency to increase housing densities around access points (Handy, 2005). Households make choices between residential areas taking into account the price of housing and the price of commuting between the work and home. When travel costs fall below a certain threshold and income reaches a certain level the rate of sprawl quickens, and sprawl is more common in regions where incomes are high and commuting costs are low (Wu, 2006).

Past history and geographical surroundings of the cities are underlying factors that modulate the morphology and trajectories of the cities. Coastal or mountainous location creates very different development options than location on a plain or along a river (Kasanko et al. 2006).

3. Future perspectives

Cities are concentrators of population, knowledge and economy, but also of waste (Bugliarello, 2006). In order to overcome the negative aspects there is a need for local energy generation, more efficient management of energy use and readjustment of living patterns.

- Factors that will be active in coming years and that will have a certain impact (high certainty).
    - Cities have certain **inertia** and policy takes a long time to have any significant effect in terms of change of urban patterns (Cheshire, 2006). For this reason tackling the problems at an early stage, with a progressive implementation, is to be preferred to late and aggressive action. These results challenge current assessment methods of climate change stabilization strategies and show that it is essential to take into account urban dynamics and inequalities in the design of climate policy (Gusdorf, Hallegatte, and Lahellec).
    - Urban sprawl has a long term impact since it is a process almost irreversible. Hence it is very important to **consider the past legacy on planning** (e.g. costs for developing public transport system). Some extreme cases: brownfields, ghost neighborhoods
    - **Implementation of stronger policies** to control urban sprawl (e.g. Germany, National Sustainability Strategy of the Federal Government, 2006) and stronger enforcement of law at mesoscale (see for example the resolution of the European Parliament on the Fact-finding mission to the regions of Andalusia, Valencia and Madrid, 21 June 2007).
    - **Air quality** and **noise** levels are expected to improve given the current European policies, but also because of increasing concern on public health.
    - Climate change is expected to have an impact on the environment and quality of cities in different ways:
        - Policies to reduce the vulnerability to climate change, in particular drought and other extreme events (heat waves) will improve early warning systems and better management of water resources.
        - Covenant of Mayors. Although it is voluntary, some 1000 cities have already joined this initiative which involve monitoring and planning for emissions reduction. There is an uncertainty on how the economic crisis will stop the involvement of more cities and the performance of the ones that have already joined it.
    - **Land price** is an important driver very often not controlled by policies.

- Emerging issues that may have a potential impact (uncertain, but high potential – management at meso/micro level).
    - Management of current built-up areas, and in particular the sprawled ones, remains an area for big improvements. The focus so far has been too much in avoiding or controlling urban sprawl and large dispersed areas have been forgotten.
    - Innovative housing design (intermediate between collective and individual housing) in order to meet simultaneously the individual household aspirations and the collective density criteria (SCATTER project).
    - Location of community services, like schools, seems an important factor for people to decide where to live.
    - Green economy in the construction sector. There is a large sector of people involved in construction with low qualification. There is a vast opportunity to improve the energy efficiency of existing buildings and to develop

cheaper and more sustainable construction systems.

- High uncertainties
  - Changes in actors
    - Next to the implementation of traditional "top-down" growth control instruments, urban land use policies should employ awareness campaigns and foster capacity building for more effective inter-municipal planning cultures in regional and sub-regional scales. Furthermore, this study found (qualitative) evidence that the intensity of the political debate on urban sprawl and more sustainable forms of urban development at the federal and state level influences the consciousness of local stakeholders.
    - Actor's structure: age, economic sectors, social classes.
  - Private investments going to Eastern Europe to find new opportunities (recent trends and still to be in coming years)
  - Integration of different levels of governance.
- There is not a unique model of urban evolution given the history and geographic constrains. Consequently the objective should be to reach similar objectives (increased diversity, mixed use of spaces, improved urban environment), but not necessarily with the same means. Best practices should be promoted taking these aspects into consideration.

4. Empirical results

How are European cities growing (1990-2006)?

Typologies of growth

The main question behind city growth is urban sprawl and its sustainability. In a similar manner as it has been explained in the structure of the cities, urban sprawl is part of the complex interactions and evolution of cities and there is not a single index that would enable to classify a city as sprawling or not. Once again we should consider different trajectories of cities leading to different types of growth which in the most extreme cases could be defined as sprawl.

Conceptually different types of urban developments have been considered:

- **Redevelopment**. Changing the use of existing urban land (e.g. industrial to residential). This would fit with the idea of land reuse or recycling.
- **Infilling**. Development of new areas within the city.
- **Expansion**. Urban development in the fringe or in less dense areas

Redevelopment and infilling can be related to compact urban development, while expansion will lead to more diffuse patterns.

In order to characterise the urban development in Europe a first set of variables were selected representing the status and changes. After removing higher correlated variables and those that explained less variability in the factorial analysis, the following ones were selected.

Index	Description
Ratio of built-up area	Percentage of built-up area of total land area
Degree of soil sealing	Percentage of sealed area of the total land area
Increase of built-up area	Percentage of new of built-up area over total built-up area at the beginning of the period.
Land take per capita	Increase of built-up area divided by the total population
Degree of redevelopment	Percentage of redevelopment over all new built-up areas for the period.
Destination of new urban areas	The growth rate of residential areas and industrial, commercial and transport areas. Those areas have been identified according to CORINE Land Cover nomenclature and methodology.

Table 3. Variables used in the definition of typologies of urban development

It should be highlighted that the information on built-up areas and related changes are derived from CORINE Land Cover. Then, there is a clear limitation on the resolution of the data both on the stock (percentage of certain type of land cover) and changes. Limitations are clear on linear features (e.g. roads and rails) and also on plots below the CLC resolution that may be relevant for urban areas. This issue is further discussed in the section *What is the accuracy of CLC*?.

The existing CORINE Land Cover data allows us to analyse changes for two periods: 1990-2000 and 2000-2006. However, data for United Kingdom and Greece was not yet available for the period 2000-20006 at the time of the preparation of this report. Consequently the basic analysis is for the period 1990-2000 and comparisons for the period 2000-2006 are done without UK and Greece.

Another important methodological aspect is that the reference years provided for CORINE Land Cover are not the same for all countries. It is particularly true for the reference year 1990 since some countries started in 1987 and the latest ones did it in 1994. Then, for the reference year 1990 there is a variability of 7 years between the first country to produce CORINE Land Cover and the last one. This gap has been reduced in 2000 and 2006 with a maximum of one year. To overcome this problem changes have been computed on basis of ha/year. However, there is an insolvable issue with that approach since it assumes that changes have been equally distributed during the period analysed.

Three main typologies have been identified which are characterised by three groups of descriptors (Table):

- Size and form. Only the extreme values of degree of soil sealing and the ratio between the city and LUZ are significantly different.
- Urban development. The differential urban development in the city and the LUZ can describe the process of expansion of the city. When the ratios of increase are similar or higher in the core city one can consider a stable situation. On the contrary, when the increase is higher in the LUZ, then there is a clear expansion of the city beyond its (administrative) boundary.
- Destination of new urban areas.

The distinctive features of each typology are summarised as follows:

- **Type 1. Slowly growing cities.**
    - **a. Slowly growing cities densifying the existing urban areas**. Cities with below 600 000 inhabitants and low degree of sealing. Very slow rate of urban growth with a high degree of redevelopment. However, the low percentage of soil sealing (also related to low percentage of built-up areas) shows the potential for these cities to grow. The new developed areas are

mainly residential in the core city. Some of these cities are losing population both in the core city and LUZ (e.g. Kaunas). Geographic extent: Mostly Eastern cities. Examples: Vilnius, Kaunas (LT); Szczecin (PL); Miskolc (HU); Bradford (UK).

- **b. Slow growing cities with diffuse urban development**. The core city shows a higher degree of soil sealing (higher percentage of urbanised land), and has a relatively large LUZ. Consequently the rate of growth is about three times higher in the LUZ compared to the core city. The degree of redevelopment is very low both in the core city and LUZ. The risk for those cities would be to increase the pace of urban development that would lead to more sprawled system. The population is very stable or has small rates of growth. Geographic extent: Some capital cities. UK, DE, BE. Examples: Budapest (HU); Brussels (BE), Berlin (DE), London (UK).

- **Type 2. Rapid growing cities.** This group represents almost half of the European cities. Because this variety they don't have any particularity regarding its size and form. This group is defined by an intermediate rate of growth and low level of recycling. New developments in the core city are mainly residential areas, whereas in the LUZ the new developments are for industrial and commercial activities. However, there is a small gorup of cities (**2b**) that have a relatively large LUZ. Comparatively the urban development in the LUZ is also very high. Geographic extent: There is not any specific pattern of distribution. Examples: Madrid (ES); Rome (It); Prague (CZ); Tallinn (EE).
- **Type 3. Very rapid growing cities with diffuse urban development**. This group includes the cities with the highest degree of urban development, far beyond the average of the other typologies. In terms of city structure they have the lowest degree of sealing (high availability of space) and the city is almost half of the LUZ size. It seems that the availability of space is a factor that facilitate the expansion which show similar trends in core city and LUZ. Examples: Braga (PT), Groningen (NL), Erfurt (DE); Murcia (ES)

	Size and form			Urban development				Destination of new urban areas		%
	City area (km^2)	Sealing (%)	City/LUZ	Increase of built-up area (%) City	LUZ	Land take per capita	Redevelopment (%)	City	LUZ	
1 Slowly growing										
a. compact	200	17	21	0.8	1.7	1.8	33	**Residential**>Commercial	Residential=Commercial	19
b. diffuse	250	42	10	1.0	3.1	1.7	6	Resiedential=Commercial	Residential=Commercial	13
2 Rapidly growing & diffuse										
a. City < LUZ	233	24	18	7.8	8.6	13.3	10	**Resiedential**>Commercial	Residential<**Commercial**	47
b. City << LUZ	114	27	8	11.7	20.9	9.0	11	Residential<**Commercial**	Residential<**Commercial**	9
3. Very rapid growing & diffuse										
	332	14	40	44.0	41.5	79.4	1	Residential=Commercial	Residential=Commercial	12

Table 4. Typologies of cities according to urban development (1990-2000)

Changes in urban development of European cities are synthesized in five typologies representing different pace and patterns of growth. Size and form parameters are: city area, percentage of soil sealing in the city and the ratio between city and LUZ area (in percentage). Significant differences are only observed on the extreme values of soil sealing and City/LUZ ratio. Urban development includes those parameters that explain how much the urban areas are growing: increase of built-up as percentage of existing artificial areas (if the value is higher in the LUZ it could be associated to more diffuse/sprawling processes); land take per capita is the increase of built-up divided by the population (it could be assimilated to an indicator of land consumption);

redevelopment estimates the percentage of total land changes that occurs on previously developed land (this indicates the degree of land recycling) .Destination of new urban areas: two classes of new urban areas are differentiated a) urban residential, and b) industrial, commercial and transport areas. Percentage (last column) indicates the percentages o cities in Urban Audit within each typology. Sources: Urban Audit: city and LUZ delineations, area and population. CLC (1990, 2000 and 1990-2000 Changes): increase of artificial areas, redevelopment and destination of new urban areas.

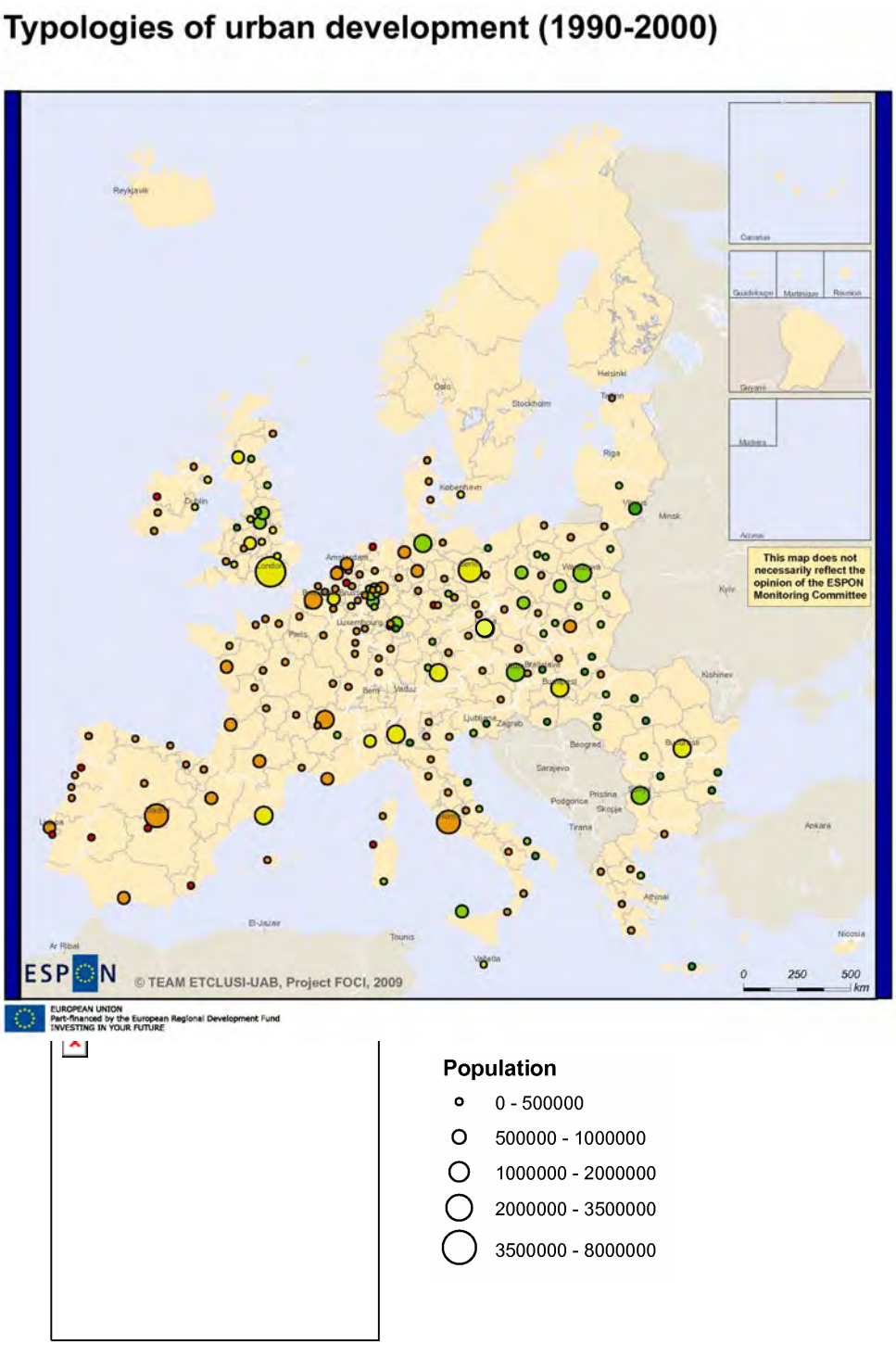


Figure 4. Typologies of urban development (1990-2000)
Sources: CORINE Land Cover 1990, 2000, 1990-2000 changes.

How have cities evolved in the period 2000 – 2006?

As has been highlighted before, United Kingdom and Greece were excluded from the comparison since land cover data was not available for 2000-2006 in these countries.
A first look at the overall changes in the European cities indicates an increase in the land that has undergone some urban development (Figure). However, the areas under redevelopment have significantly increased in both core city and LUZ during the period 2000-2006. The development of new residential areas has been reduced, while industrial and commercial areas are still increasing and becoming the main source of urban expansion. This is a general trend observed in the last 20 years where urban sprawl is less and less associated to increase of residential areas and more to other economic developments. However, there are some exceptions like the Mediterranean coast, and specifically in Spain where second homes and speculation have been driving factors for urban sprawl still in the period 2000-2006. Many Eastern cities also show a differential trend being the development of new residential areas dominant over new industrial and commercial ones.
All in all, the densification process (redevelopment + infilling) is slightly increasing in the overall balance.

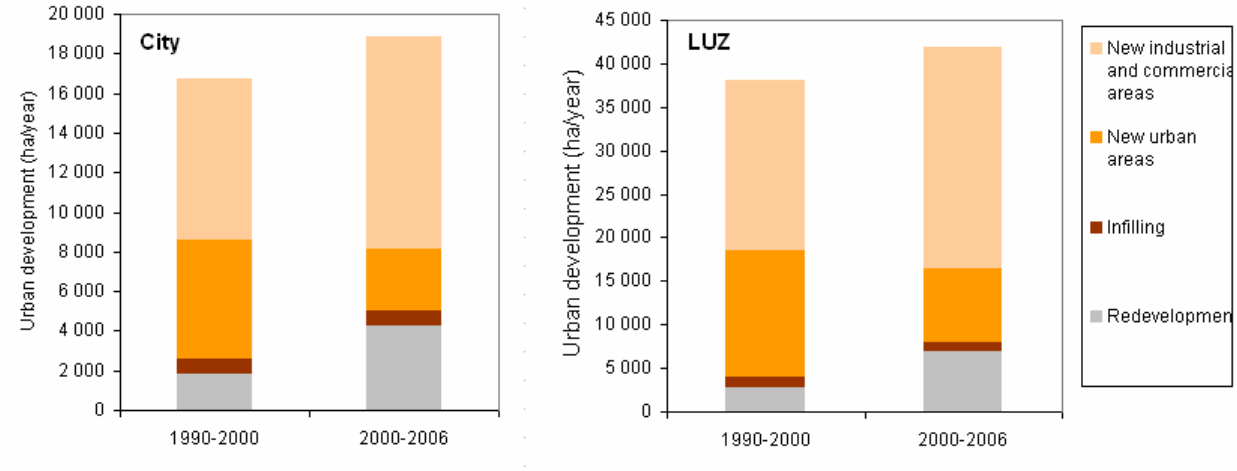


Figure 5. Urban development in cities and LUZ (1990-2000, 2000-2006)

Urban development refers to the total urban changes for the given period and aggregated for all European cities. The trends are similar in the city and the LUZ as well. The hectares per year reused or redeveloped in 2000-2006 have significantly increased compared with the previous period. Development of new residential areas has decreased while development of new industrial and commercial areas are still increasing. Infilling: Development of new areas within the denser city. Sources: CLC 1990, 2000 and 2006. UK and Greece are not included because data not available for 2006.

Moving from the overall picture to the pathways taken by the different typologies it is observed that the the **slow growing and compact** cities (type 1a) have experienced an increased rate of development and land take (type 3). The availability of space and the low rates in the 90's may have facilitated these new developments. The new developed areas are mainly for industrial and commercial use in the bigger cities, whereas in some smaller ones residential development is still prevailing.
The **slow growing and diffuse** cities (type 1b) show decreased land take during the period except on the LUZ. Those cities had a relativelly small city compared to LUZ so it could partly explain this evolution.
The **rapid growing and diffuse** cities (type 2) includes half of the European cities. Then, their evolution fits very well with the overall picture: reduction of the land take in

both cthe city and LUZ. However, the growth in the LUZ is still relatively higher than in the core city. The second group within this class (2b) has increased.
Finally, the **very rapid growing cities** in the 90's have slowed down. This process has been more marked in the core city than in the LUZ.
There is a process of convergence between the different typologies, with few exceptions (type 2b), characterised by decreasing differences in the rate of land take, a general increase of redevelopment and an higher pace of change in the LUZ.

	Urban development				**%**
	Increase of built-up area (%) City	LUZ	Land take per capita	Redevelopment (%)	
1 Slowly growing					
a. compact	2.2	2.9	4.6	13.0	19
b. diffuse	0.6	4.4	1.2	24.0	13
2 Rapidly growing & diffuse					
a. City < LUZ	3.3	5.6	7.5	20	47
b. City << LUZ	14.1	21.7	12.1	20	9
3. Very rapid growing & diffuse					
	11.6	18.0	30.5	17	12

Table 5. Change in urban development by typologies (2000-2006)
The table shows the evolution of the typologies defined for the period 1990-2000. Orange colour indicates that the indicators have changed in the direction of increasing urban development and reducing land recycling. Green colour indicates that urban development has stabilised or is decreasing. Sources: CLC 2000 and 2006. UK and Greece are not included because data not available for 2006.

Coming back to the question to what extent compacity is relevant for the different typologies the conclusion is that the existing structure can modulate future evolution, but not to the extent to overcome other driving forces like land price, people's preferences and style of life. However, from the policy and plannign perspective it is always desirable to keep as much as possible this compact structure to avoid impacts that can last long. One of those legacies of the past are brownfields, lands and buildings in urban areas which have lost their original use and have the ecological costs. Very often they are associated with abandoned industrial areas with potential problems of contamination. Their extension is quite variable depending on the country. For example in Belgium (Flanders) were estimated to represent around 0.5 % of the total area of the country, while in Romania reached the 4%. The redevelopment of brownfields is often marginally or not economically viable as compared to greenfield development. To increase its competitiveness, there is a need for the implementation of a complete package of measures, including economic, legal and fiscal incentives. In the period 2000-2006, the Structural funds expended for the EU25 were of 2.25 billion EUR for the rehabilitation of industrial sites and about 2 billion EUR for the rehabilitation of urban areas.

Impact on natural resources

Urban growth is at expenses of other land uses. In the core cities there is a clear dominance of new building development on previous agricultural land (Figure). This is due to several factors. Firstly most of the available land for urban growth is agricultural.

Secondly, agricultural land is in most cases technically more suitable for construction than forest areas both topographically and in economic terms. Thirdly, natural areas are often considered as valuable recreational areas and hence cities have protected them from building activities. Grouping cities by regions highlights some specificities like in Eastern countries about 30% is developed on previous forests.

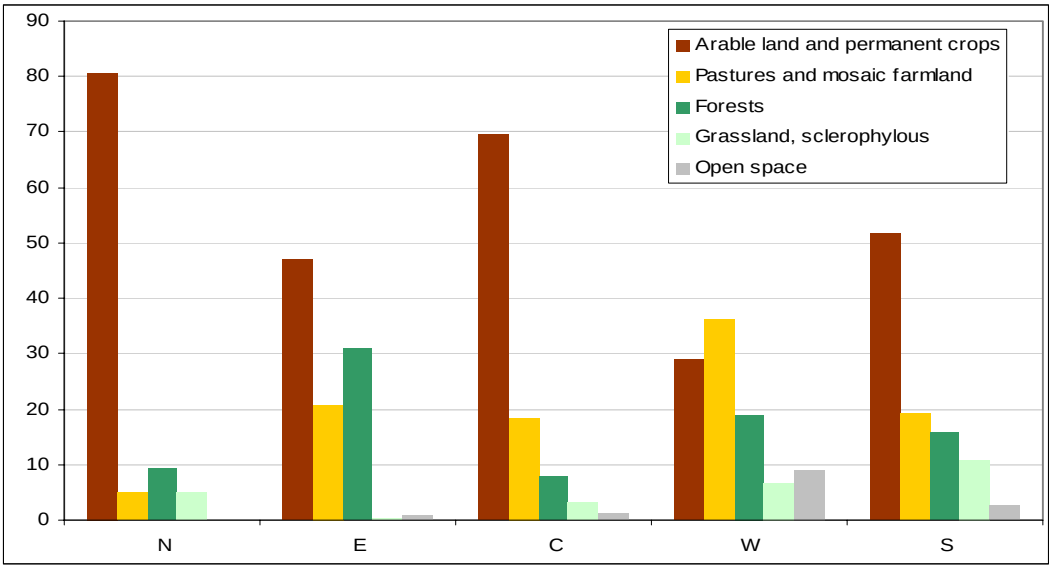


Figure 6. Natural and agricultural land lost due to urban development in the cities (1990-2000)
Percentage indicates the previous land uses in the total developed land. Cities have been grouped by countries: Northern, Eastern, Central, Western and Southern Europe[4]. Source: CORINE Land Cover.

In the LUZ the agricultural land is still the primary source. However, in Eastern cities most of the land is developed on forests.

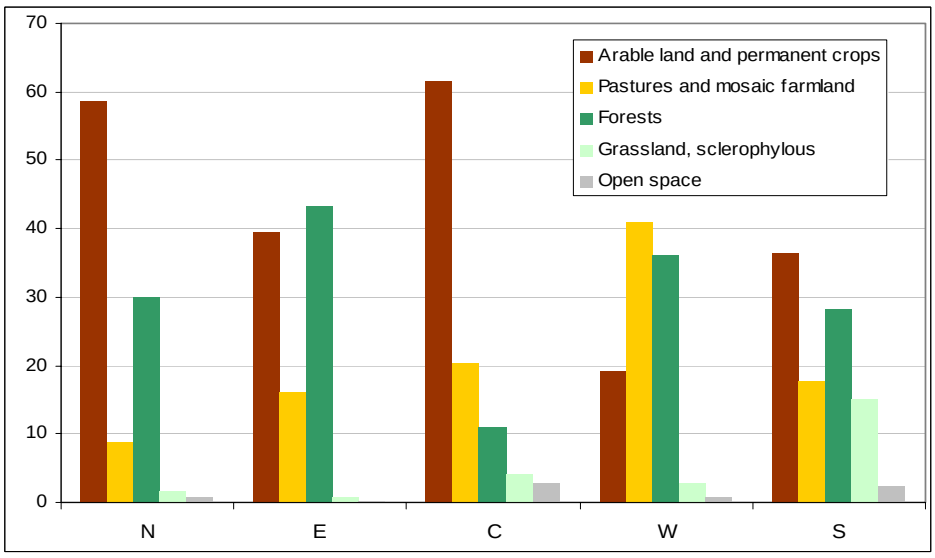


Figure 7. Natural and agricultural land lost due to urban development in LUZ (1990-2000)

[4] Northern countries: DK, FI, SE, NO. Eastern: HU, BG, CZ, EE, HR, LT, LV, PL, SK, SI, RO. Central: AT, BE, DE, LU. Western: FR, IE, NL, UK. Southern: CY, ES, GR, IT, MT, PT.

Percentage indicates the previous land uses in the total developed land. Cities have been grouped by countries**:** Northern, Eastern, Central, Western and Southern Europe. Source: CORINE Land Cover.

What is the accuracy of CLC ?

All the spatial analysis developed so far is based on CORINE Land Cover. As it has been explained before there are some important methodological constrains, namely the minimum mapping unit and the minimum change detection. In addition, the methodology used for CORINE is know to underestimate linear features like roads and rails.
The development of the Urban Atlas is a great improvement in that sense, since the Urban Audit cities will be mapped at higher resolution. However, this is an ongoing project and for the moment data is only available for 2006.
As July of 2010 only 200 cities were available. Then, this results are based on this set of cities.
It can be observed (Figure 9) that for all the land cover classes there is a high correlation between the areas calculated with CLC and the area obtained with Urban Audit. Residential areas, forest, agriculture and water courses are the ones with the highest correlation (R^2 above 0.9). On the other side, the rest of classes included under artifical areas, and relevant for the assessment of cities, show the lowest correlation. These results indicate to what extent any deviation of CLC from Urban Atlas –taken as reference closer to the reality, is random or systematic.
Moreover, looking to the position of the points in the scatter plots in relation to the red line (exact fit 1:1) it is possible to assess to what extent CLC is understimating, overestimating or close to the actual area for each land cover class:

- **Residential areas**. Urban Atlas uses a smaller Minimum Mapping Unit (MMU), so it is able to clearer separate single residential units from each other. Those residential units are more often aggregated in CORINE due to its large MMU (25 ha), at the same time often including smaller industrial and commercial units as well which could not be well separated due to the relatively coarse resolution of the input image data. As a consequence, a larger share of residential areas (11) can be found in the CLC2006 classification.
- **Industrial and commercial areas, includign trasnport infrastructure**. Urban Atlas uses very high resolution images, smaller MMU and additional data, so it is not astonishing that the Urban Atlas mapped more industrial, commercial, public, military and private units.
- **Mineral extraction sites and dump sites**. The situation is very similar to the previous class, although the differences observed are of lowe magnitude.
- **Gren urban areas**. This is the class with higher dispersion of values strongly influenced by the small dimension of individual patches of green urban areas. It also explain the overestimation by CLC.
- **Forest, agriculture and water courses**. Patches for such land cover classes tend to be bigger than the ones inside the urban areas. Then, the results are very colse.

All these results seem to indicate systematic deviations not following a particular pattern. Looking for possible links to city structure or size it is only clear that smaller cities are the ones with less deviation –which is an expected result.

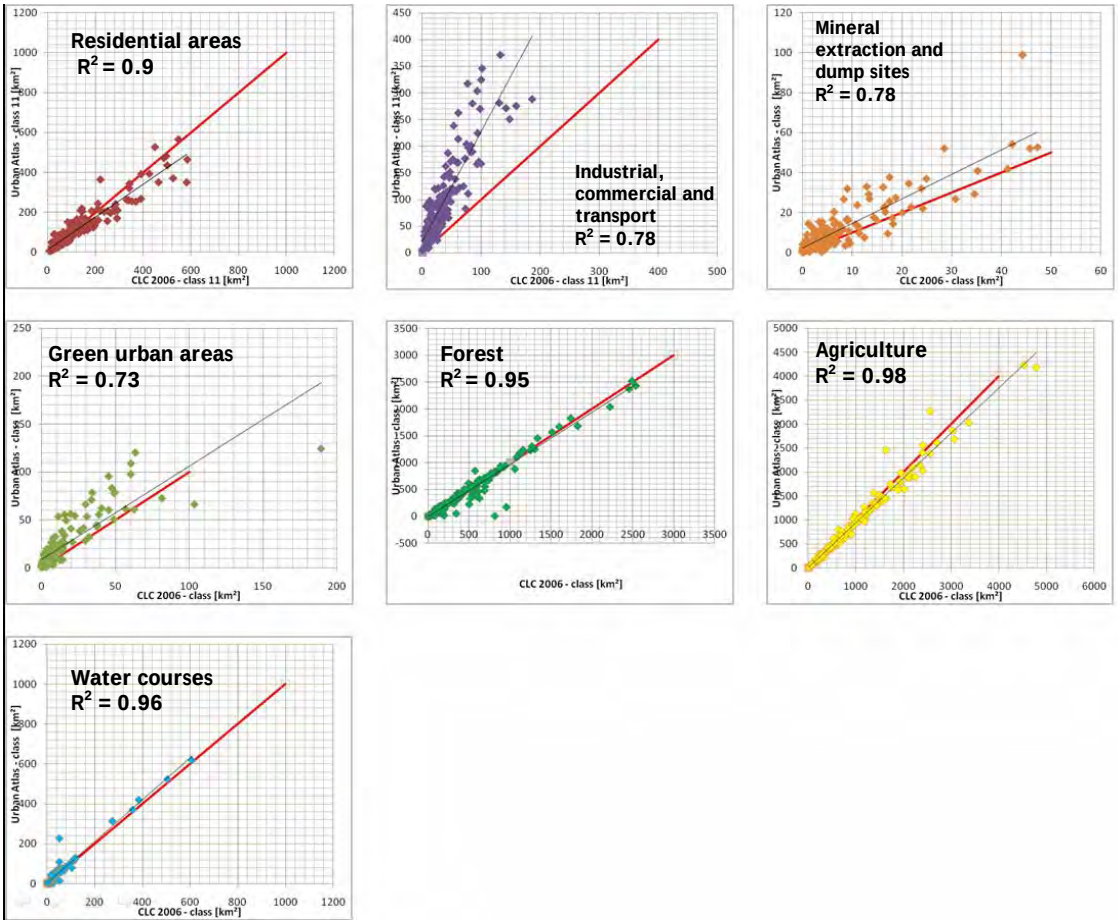


Figure 8. Relationship between CLC 2006 (x-axis) and Urban Atlas (y-axis) for different land cover classes (area in km²)

Red line depicts the ideal situation of exact mach between the two datasets. Grey lines represent the fitted regression between CLC and Urban Atlas. Then, if the points of the scatter plots are above the red line, CLC underestimates the area for that particular land cover class. On the opposite, if the points are below the red line CLC overestiamtes the area for that particular class. Data sources: CORINE Land Cover (2006) and Urban Atlas (2006). Each point in the scatter plots represents one metropolitan area (Large Urban Zone of Urban Atlas).

The implications for our assessment are as follows:

- CLC provides systematic underestimation of commerical and industrial areas, compared with higher resolution Urban Atlas, resulting in deviations up to 30% of the actual value.
- Deviations are less accentuated for the rest of artificial classes.
- There may be important errors on the stocks (percent of different land cover areas).
- CLC is structured in a 3 hyerarchial layers. Then, it is not relevant to compare some classes at level 3.
- The implications for changes are not known since Urban Atlas only has one time shot.
- The conclusion that urban sprawl is more driven by commercial and industrial areas compared to residential ones is reinforced since this class is underestimated by CLC.

These results confirm that new approaches are needed, and currently the technologies are already there. In fact there is already a working group defining an improved methodology to provide CORINE Land Cover Like information at higer resolution for the areas were this may be relevant (e.g. urban areas).

Is city form relevant for the environment?

Structure of European cities: form and compacity

The understanding of the city's structure is important for the assessment of its growth. The availability of space and set up of the urban area may determine to some extent the feasibility for a city to grow and to what extent. European cities have been identified as compact cities compared to the American counterpart, and this is considered a more sustainable model. However, the complexity of the spatial organisation of cities could not be translated into simple indices that establish a threshold for what is a compact city and what is a dispersed one. More than that there is a continuum where the compact and the dispersed cities are only the extremes. Because of that, very often comparisons are taken having in mind the extremes and omitting the complexity of the full range of situations. Analysing the compacity of European cities means to apply a magnifying glass to a segment of the continuum between dispersed and compact cities

How to measure urban form and compacity?

The degree of compacity of a city could be described by its form, density, proximity and continuity. The assessment of these attributes in European cities poses the challenge of data availability. Given the limitations of data resolution from CORINE Land Cover a good alternative would be the land cover data from Urban Atlas. Currently it is only available for 200 cities; consequently the results will be necessarily limited to this subset of cities. Additionally, the high resolution soil sealing data (2006) has a full European coverage and provides also relevant information related to land use intensity (degree of imperviousness of the artificial areas).

Taking into account the data constraints the following indicators have been developed:

- **Urban form**
  - **Compacity index**. This index shows how far a city is from a circular form with the same area (Figure 9). The circular form is the one with the lowest perimeter to area ratio. It ranges from 0 (highly irregular and less compact form), to 1. Given the high resolution of Urban Atlas, first all artificial areas were selected. Then, all small features like roads outside urban areas removed. Finally, the remaining patches less than 200 m apart were aggregated. The index was calculated for the largest patch which in most of all cases represents the core city.

  - **Mixed uses**. High land use mix diversity is considered a desirable situation in order to promote more compact cities, and also facilitate the socialisation of the communities. Ideally the land use mix should be evaluated at block level. However, since Urban Atlas is derived from satellite images it is not possible to identify mixed uses in a single block or parcel. Then, what has been measured is the mix of single uses (Figure). Moreover, commercial areas will only include services above certain size that are clearly identifiable with satellite images. The indicator has been developed considering three uses: residential, commercial and industrial, and other land use classes. A value of 0 for this measure means that the land is exclusively dedicated to a single use, while a value of 1 indicates perfect mixing of the three land uses.

Compacity index: 0.27 Compacity index: 0.83

Figure 9. Urban form and compacity index of Foggia (Italy, left) and Katowice (Poland, right)
The index ranges from 0 (more irregular and less compact city) to 1. Foggia and Katowice are the most extreme cases for the available cities in Urban Atlas. Black: built-up areas; red: approximation of the urban form to a 1 km grid. Data source: Urban Atlas.

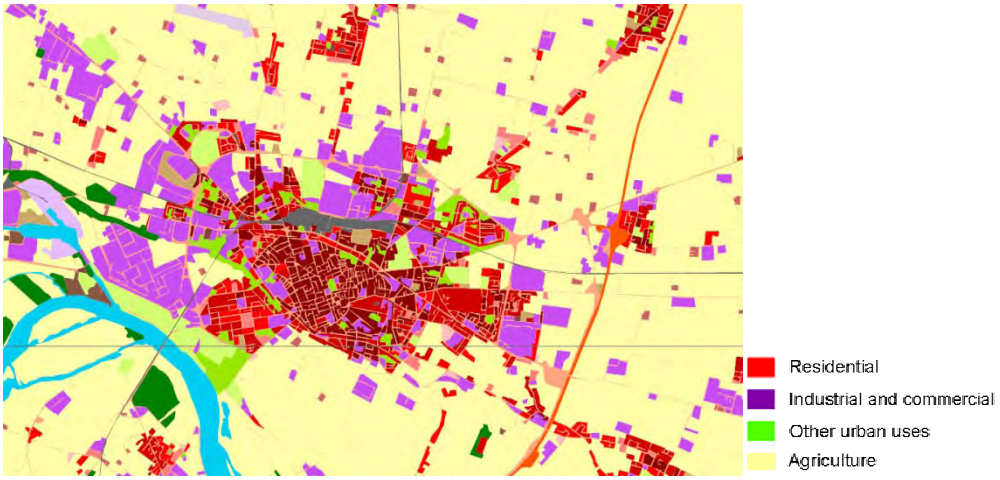


Figure 10. Land use in Cremona (Italy)
This city has the highest value for the land use mix index (0.99). Data source: Urban Atlas.

- **Density**
  - **Soil sealing per capita**. Soil sealing is the coverage of the soil by an impervious layer. It reflects the maximum intensity of use of the land. It is assumed that an efficient city will have a good performance in different areas while keeping at minimum the land consumption, in that case the soil sealed per capita.

- **Proximity**
  - **Distance to the city centre**. Distance has been computed as the distance between all the urban patches and the city centre (the largest patch). Two factors are relevant: number of patches (that could be related to high fragmentation or sprawl) and size of the metropolitan area (LUZ). The latter one may introduce an artifact since the delineations are based on

administrative boundaries resulting from different historical process and planning cultures in Europe. Then, the sum of all distances has been corrected by the total area and normalised.

Is the city form relevant for the urban development?

Considering all the factors that may describe the city form and compacity, the soil sealing per capita is currently the only one that provides a full European coverage.

The sealed area per inhabitant ranges from 11 to 332 m^2 per inhabitant (Figure), being Prague the city with the lowest index and Charleroi on the opposite side. In general, Southern cities have lower values (e.g. Barcelona, Rome, Athens). However, it should be noted that the sealed area per habitant is high in the coastal cities of Portugal. Cities from UK also show, in general, a low degree of sealing. Cities that use more land per inhabitant are in Northern and Central Europe.

Figure 11. Sealed area per inhabitant in European cities (2006)

The figure shows the land that is sealed for residential, industrial and commercial uses (in m^2) per inhabitant. Sources: Urban Audit and High Resolution Soil Sealing Layer (2006).

To further understand what are the implications of the intensity of use and the relationship with the city form, the compacity index has been analysed for the subset of cities available in Urban Atlas.

Four groups were identified that reflect a pattern from more irregular and dispersed cities to more compact ones (Table):

- Large irregular cities. Lower land use mix and relatively small city centre compared to the metropolitan areas (LUZ).
- Large irregular cities with intensive land use. This group shares similar properties than the previous one, although the highest degree of soil sealing is found here.
- Intermediate cities. For most of the indexes this group represents a more compact city, although the soil sealing per capita is relatively high.
- Compact cities. Cities with the highest index of compacity, characterised by a large core city in relation to its metropolitan area (LUZ).

Class	Compacity index	Land use mix	Soil sealing per capita	Distance to city centre	City/LUZ	Land take per capita
1. Large irregular cities	0.36	0.50	165	29	13	13
2. Large irregular cities with intensive land use	0.47	0.60	224	26	19	21
3. Intermediate compact cities	0.56	0.65	195	21	24	22
4. Compact cities	0.68	0.66	185	16	23	13

Table 6. Typologies of urban form

Compacity index ranges from 0 (very irregular from) to 1 (highly compact and close to a circular form). Land use mix ranges from 0 (one dominant single use) to 1 (perfect mix of different uses –residential, commercial and industrial). Distance to city centre is a normalized index that reflects both the number of urban patches and their distance to the city centre. City/LUZ is the ratio between the core city area to the LUZ area. Land take per capita is the increase of built-up divided by the population (2000-2007). Data sources: Urban Atlas (compacity index, land use mix and distance to city centre), High resolution soil sealing, and CORINE Land Cover (land take per capita).

These results confirm certain relationships between the compacity index and other descriptors of the city form. The land use mix increases as the city is approaching a more compact form, although significant differences are only found between the extreme cases. This index should be taken with caution since Urban Atlas only identifies single land uses per mapping unit.

As the city is more compact the distance from the urban patches in metropolitan area to city centre is decreasing. It may also be related to the relatively larger core city to its metropolitan areas (LUZ).

However, it should be noted that the soil sealing per capita, related to intensity of land use, does not show a clear trend towards a lower values in more compact cities. There are several factors that interact and configure the form of the city. While the form is more resilient, the soil sealing per capita is more dynamic and strongly influenced by

population dynamics even in one decade. Then, it is important to consider several indicators to better understand the form of the city and its implications on city evolution and performance.
Finally the growth of the cities (land take per capita) does not follow the same pattern as the city form. The intermediate groups include the cities that had the more rapid growth, in terms of land take, during the period 2000-2006. These results should be taken with caution because a) use of different data sources (Urban Atlas and CORINE Land Cover), b) different resolution of the data, c) different periods (2000-2006 for land take, and 2007 for compacity indexes). However, the literature already reveals the disconnection between city form and urban development, especially in the last 20 years, thanks to the technology and the increased scarcity of suitable land for construction near many urban areas.

Is city compactness relevant for the environment?
The relationship between city form, compacity and energy consumption has been largely explored in order to identify the most suitable design for an efficient city. However, there is still a large gap in knowledge given the diversity of factors interacting and the scarcity of appropriate data to test different hypothesis. Our results reflect to a certain extent the current limitations, although Urban Atlas provides for the first time a harmonised data with broad European coverage, and enough resolution, to further explore these connections.
Individual correlations between the parameters presented in Table 1 and transport modes, and air quality are not relevant. Then, there is not a single factor that would explain, even partially, why transport is more efficient in one city than other or why some metropolitan areas have better air quality.
Comparison of transport patterns, and air quality, between the different typologies of city compactness reveals that differences are only relevant between the extreme groups (dispersed – compact). Then, other factors are also relevant to explain the broad range of situations: efficiency of vehicles, availability of good public transport network, or natural factors influencing the atmospheric conditions.
It is considered that low densities result in greater traffic demands. This means, development of transport infrastructure does not only trigger urban sprawl; the relationship is reciprocal causing a “loop of positive feedback” between urbanisation and transport systems (ESPON 2004). Low density urban development - urban sprawl - demands more transport, in particular by road; although, a large number of socio-economic factors influence travel patterns as well. It is also assumed that above certain thresholds of city density or certain density of habitants in certain cluster the public transport is not efficient.
In addition, there is a strong regional component since the Eastern countries have a higher share of journeys by public transport to work. This may be explained by the concurrence of several factors: the evolution of different economic systems in the past which in turn left more dense cities in the Eastern countries, economic difficulties to access to private car,… All these factors interfere with the simple analysis of urban form.
Regarding transport mode to work, there are no significant differences in percentage of people going by bike or by foot. On the other side, most significant differences are encountered in percentage of people using public transport. In parallel more compact cities show the lowest concentration of PM_{10} and NO_2.

Compact class	Percentage of journeys to work by car and motorcycle	Percentage of journeys to work by foot or cycling	Percentage of journeys to work by public transport	Annual average concentration of PM_{10}	Annual average concentration of NO_2
1. Large irregular cities	64	12	24	34	32
2. Large irregular cities with intensive land use	62	10	28	31	27
3. Intermediate compact cities	57	11	32	30	26
4. Compact cities	56	10	34	25	22

Table 7. Relationship between typologies of city compacity and transport mode to work, and air quality parameters
Data source: Urban Audit.

5. Conclusions

Urban development in the last 20 years tended to homogenise and reduce the distance between different development paces. Generally speaking, stable cities or the ones with slow development in the 90s have experienced a rellativelly rapid increase while the cities that were very rapidly growing at that time have slowed down at the turn of the century.

Reuse of previous urban land has significantly increased in both core city and LUZ. The development of new residential areas has been reduced, while industrial and commercial areas are still increasing and becoming the main source of urban expansion. This is a general trend observed in the last 20 years where urban sprawl is less and less associated to development of residential areas and more to other economic developments. However, there are some exceptions like the Mediterranean coast, and specifically in Spain where second homes and speculation have been driving forces for urban development still in the period 2000-2006. Many Eastern mid-size to small cities also show a differential trend being the development of new residential areas dominant over new industrial and commercial ones.

City form, and city compacity, is the result of the history and evolution of urban areas including geographic and cultural factors.

The available information indicates that several factors confluence in the more compact cities:

- Higher proximity of urban patches to the city centre or core city
- Mixed uses of land

However, more dynamic indicators like soil sealing per capita reveals that urban morphology and compacity alone does not explain the complexity of the system. Moreover, urban development in the last decade shows that intermediate cities are the most dynamic ones at the risk of being less efficient on use of land resources (soil sealing per capita).

From the transport perspective, compacity relates to increased use of public transport to work. However, more data is required to have a complete overview on all traffic in European cities. Current efforts done by the EC in this sense are very relevant.

All these factors are reflected in air quality, which indicates better conditions in more compact cities.

References

Ambiente Italia, 2003. European Common Indicators Towards a Local Sustainability Profile. Ambiente Italia, Milano.

Antrop, M., 2004. Landscape change and urbanization process in Europe. Landscape and urban planning 67(1-4):9-26.

Antrop, Marc. 2004. Landscape change and the urbanization process in Europe. *Landscape and Urban Planning* 67, no. 1-4 (March 15): 9-26. doi:10.1016/S0169-2046(03)00026-4.

Babisch, W., 2006. Transportation noise and cardiovascular risk, Review and synthesis of epidemiological studies, Dose-effect curve and risk estimation. Dessau, Umweltbundesamt, WaBoLu-Hefte 01/06

Baross, P. 2007. Urban Sprawl in Eastern Europe, the Budapest example. In *Urban Sprawl in Europe*. Brussels. http://www.rics.org/Newsroom/Keyissues/Urban/urban_sprawl_seminar_31Aug07.html.

Barredo, J.I., Kasanko, M., McCormick, N., and Lavalle, C., 2003. Modelling dynamic spatial processes: simulation of urban future scenarios through cellular automata. Landscape and Urban Planning, 64(3):145-160.

Barredo, J.I., Lavalle, C., Demicheli, L., Kasanko, M. and McCormick, N., 2003. Sustainable urban and regional planning. The MOLAND activities on urban scenario modelling and forecast. Joint Research Centre of the European Commission 2004 EUR 206 200 73 EN.

Barredo, J.I., Lavalle, C., Kasanko, M., Sagris, V., Brezger, A.S. and McCormick, N., 2004. Climate change impacts on floods in Europe.Towards a set of risk indicators for adaptation. Joint Research Centre of the European Commission 2004 EUR 21472 EN.

Barredo, J.I., Petrov, L., Sagris, V., Lavalle, C. and Genovese, E., 2005. Towards an integrated scenario approach for spatial planning and natural hazards mitigation. Joint Research Centre of the European Commission EUR 21900 EN.

Bellot, Bonet, Peña, and Sánchez. 2007. Human Impacts on Land Cover and Water Balances in a Coastal Mediterranean County. *Environmental Management* 39, no. 3 (March 17): 412-422. doi:10.1007/s00267-005-0317-9.

Bertaud, A. 2004. The Spatial Structures of Central and Eastern European cities: more European than socialist? In *International symposium on post-communist cities the Russian and East European Center (REEC) "Winds of Societal Change: Remaking Post-communist Cities"*, 21.

Blue Plan, 2005. A Sustainable Future for the Mediterranean. The Blue Plan's Environment & Development Outlook. Edited by Guillaume Benoit & Aline Comeau. Earthscan, London. 450 p.

Bond, T.C., Wehner, B., Plewka, A., Wiedensohler, A., Heintzenberg J., Charlson R., (2006). Climate-relevant properties of primary particulate emissions from oil and natural gas. Atmospheric Environment. 40 (19), 3574-3587

Borrego, C., Martins, H., Tchepel, O., Salmim, L., Monteiro, A. and Miranda, A.I., 2006. How urban structure can affect city sustainability from an air quality perspective. Environmental Modelling & Software, 21(4):461-467.

Brueckner, J.K., (2000). Urban sprawl: diagnosis and remedies. International Regional Science Review, 23 (2), 160-171

Bulkeley, H., Betsill M., (2005). Cities and Climate Change: Urban Sustainability and Global Environmental Governance. London and New York: Routledge.

Burton, E. 2000. The Compact city: Just of just compact? A preliminary analysis. Urban Studies 37(11): 1969-2001.

Camagni, R., Gibelli, M.C., and Rigamonti, P., 2002. Urban mobility and urban form: the social and environmental costs of different patterns of urban expansion. Ecological economies, 40(2): 199-216.

Cameron, I., Lyons T.J. and Kenworthy, J.R., 2004. Trends in vehicle kilometers of travel in world cities, 1960-1990: underlying drivers and policy responses. Transport Policy, 11(3):287-298.

Couch, C. and Karecha, J., 2006. Controlling urban sprawl: Some experiences from Liverpool. Cities 23(5):242-363.

Couch, C. Karecha, J. Nuissl, H. Rink, D., 2005. Decline and Sprawl: An evolving type of urban development – observered in Liverpool and Leipzig. European Planning Studies (13)1:117-136.

Couch, C., G. Petschel-Held, and L. Leontidou. 2007. *Urban Sprawl in Europe - Book Information*. http://www.blackwellpublishing.com/book.asp?ref=9781405139175&site=1#about.

Couch, C., Petschel-Held , G. and Leontidou, L., 2008 Urban Sprawl in Europe. Landscape, Land-Use Change & Policy. Blackwell Publishing, RICS.

Couch, Chris, Jay Karecha, Henning Nuissl, and Dieter Rink. 2005. Decline and sprawl: an evolving type of urban development – observed in Liverpool and Leipzig. *European Planning Studies* 13, no. 1: 117. doi:10.1080/0965431042000312433.

De Roo, G., Miller, D., (2000). Compact Cities and Sustainable Urban Development: A Critical assessment of Policies and Plans from an International Perspective. Ashgate, Hampshire, England.

Dieleman, F.,Wegener,M., (2004). Compact city and urban sprawl. Built Environ, 30 (4), 308-323

Dosch, F. 2008. Driving forces of land consumption in Germany. http://www.bbr.bund.de/cln_005/nn_62854/EN/ResearchProgrammes/GeneralDepartmentalResearch/SpatialPlaning/LandConsumption/01__Start.html

Dosch, F., 2001. Land consumption and soil sealing in Germany - monitoring, measures, indicators. Technical Workshop on Indicators for Soil Sealing. Copenhagen, 26 - 27 March, 2001.

EEA & JRC, 2002. Towards an Urban Atlas. Assessment of spatial data on 25 European cities and Urban areas. European Environment Centre and Joint Research Centre of the European Commission. Environmental Issue Report No. 30. Luxembourg, Office for Official Publications of the European Communities.

EEA and JRC, 2006. Urban sprawl in Europe. The ignored challenge. EEA Report 10/2006. Office for Official ublications of the European Communities, Luxembourg.

EEA European Environment Agency, 2007. http://ims.eionet.eu.int, EEA CSI 004

EEA, 2009. Ensuring Quality of Life in European Cites and Towns. In press.

European Commission, 2007. EU Research on Environment and Health - Results from projects funded by the Fifth Framework Report, Luxembourg: Office for Official Publications of the European Communities.

European Commossion, 1990. Green Paper on the urban environment. Communication from the Commission to the Council and the European Parliament. COM(1990) 218 FINAL.

Ewing, R., Pendall, R., Chen, D., (2002). Measuring Sprawl and its Impact. Smart Growth America, Washington, DC.

Fisher, J.B., Kelly, M., Romm, J., (2006). Scales of environmental justice. Combining GIS and spatial analysis for air toxics in California. Health & Place 12 (4), 701-714

Frank, N., S White, Z.-R. Peng, K. Harris, and W. Sanders. 2000. Exploring Sprawl: Findings of a Comprehensive Review of the Literature Related to "Sprawl" or What Do We Really Know? Department of Urban Planning, University of Wisconsin-Milwaukee.

Gillham, O., Maclean, A., (2001). The Limitless City. Island Press, Washington, DC.

Gjestland, T; 2007. The socio-economic impact of noise: A method for assessing noise annoyance. Noise Health, 9:42-4

Gusdorf, François, Stéphane Hallegatte, and Alain Lahellec. Time and space matter: How urban transitions create inequality. *Global Environmental Change* In Press, Corrected Proof. doi:10.1016/j.gloenvcha.2008.06.005. http://www.sciencedirect.com/science/article/B6VFV-4T9TC2J-1/2/eb3974b73eb4f0e1b75a7792d393347a.

Haase, D., Nuissl, H., (2007). Does urban sprawl drive changes in the water balance and policy? The case of Leipzig (Germany) 1870-2003. Landscape and Urban Planning, 80 (1-2), 1-13

Handy, S., 2005. Smart growth and the transportation-lad use connection: What does the research tell us? International Regional Science Review 28(2):146-167.

Hasse, J., Lathrop, R., (2003). Land resource impact indicators of urban sprawl. Applied Geography, 23 (2-3) 159-173

Highwood E.J., Kinnersley R.P., (2006). When smoke gets in our eyes The multiple impacts of atmospheric black carbon on climate, air quality and health. Environment International 32 (4), 560-566

Hitzenberger, R., Tohno, S., (2000). Comparison of black carbon (BC) aerosols in two urban areas - concentrations and size distributions. Atmospheric Environment, 35 (12), 2153-2167

Hoek, G.et al, 2002. Association between mortality and indicators of traffic-related air pollution in the Netherlands: a cohort study, The Lancet 360 (2002) 9341-47

Holden, E. and Norland, I., 2005. Three challenges for the compact city as a sustainable urban form: Household consumption of energy and transport in eight residential areas in the greater Oslo Region. Urban Cities, 42 (12):2145-2166.

Holmes, N.S., Morawska, L.,(2006). A review of dispersion modelling and its application to the dispersion of particles. An overview of different dispersion models available. Atmospheric Environment, 40 (30), 5902-5928

Jarup L., et.al., 2008. Hypertension and exposure to noise near airports: the HYENA study. Environmental Health Perspectives Volume 116, Number 3, March 2008:329-333

Jenks, M., Burgess, R., (2000). Compact Cities: Sustainable Urban Forms for Developing Countries. Spon Press, London.

Johnson, M.P., (2001). Environmental impacts of urban sprawl: a survey of the literature and proposed research agenda. Environonmental Plannning A, 33, 717-735

Kalnay, E., Cai, M., (2003). Impact of urbanization and land-use change on climate. Nature, 423, 528-531

Kasanko, Marjo, Jose I. Barredo, Carlo Lavalle, Niall McCormick, Luca Demicheli, Valentina Sagris, and Arne Brezger. 2006. Are European cities becoming dispersed?: A comparative analysis of 15 European urban areas. *Landscape and Urban Planning* 77, no. 1-2 (June 15): 111-130.

Kasanko, Marjo, Jose I. Barredo, Carlo Lavalle. 2006. Are European cities becoming dispersed?: A comparative analysis of 15 European urban areas. Landscape and Urban Planning 77, no. 1-2 (June 15): 111-130.

Keilman, N., 2003. Biodiversity: The threat of small households. Nature, 421 (6922):489-490.

Koelmans, A.A., Jonker, M., Cornelissen, G., Bucheli, T., Van Noort P., Gustafsson O., (2006). Black carbon. The reverse of its dark side. Chemosphere. 63 (3), 365-377

Kousky, C., Schneider S.H., (2003). Global climate policy. Will cities lead the way. Climate policy. 3 (4), 359-372

Longley, P.A., Mesev. V.,(2000). On the measurement and generalization of urban form. Environonmental Planning A, 32, 473-488

Marshall, J.D., McKone, T.E., Deakin, E., Nazaroff, W.W.,(2005). Inhalation of motor vehicle emissions: effects of urban population and land area. Atmospheric Environment. 39 (2), 283-295

Mattew K., (2006). Green Cities.Urban Growth and the Environment. Brookings Institution.

Mitchell, C.J.A., 2004. Making sense of counterurbanization. Journal of Rural Studies, 20:15-34.

Muñoz, F., 2003. Lock-living: urban sprawl in Mediterranean cities. Cities 20(6): 381-385.

Naess, P., and O. Jensen. 2004. Urban structure matters, even in a small town. Journal of Environmental Planning and Management 47, no. 1: 35-57.

Nuissl, H. and Rink, D., 2005. The 'production' of urban sprawl in eastern Germany as a phenomenon of post-socialist transformation. Cities, 22(2):123 – 134.

Ode, Å. and Fry, G., 2006. A model for quantifying and predicting urban pressure on woodland. Landscape and Urban Planning, 77(1-2):17-27.

Ott, T., 2001. From concentration to deconcentration – migration patterns in the post-socialist city. Cities, 18(6):403 – 412.

Owen, S.M., MacKenzie, A.S., Bunce R.G.H., Stewart H.E., Donovan, R.G., Stark, G., Hewitt C.N., (2006). Urban land classification and its uncertainties using principal component and cluster analyses. A case study for the UK West Midlands. Landscape and Urban Planning, 78, 311-321

PBL, 2008. Urbanisation dynamics and Quality of Place in Europe, EURBANIS report 1. Planbureau voor de Leefomgeving (NEAA), Bilthoven, the Netherlands.

Per Ronald van Kempen, Marcel Vermeulen, Ad Baan, European Institute for Comparative Urban Research, 2006. Urban Issues And Urban Policies In The New EU Countries. Ashgate Publishing, Ltd.

Pijanowski, Bryan C., Daniel G. Brown, Bradley A. Shellito, and Gaurav A. Manik. 2002. Using neural networks and GIS to forecast land use changes: a Land Transformation Model. Computers, Environment and Urban Systems 26(6): 553-575.

Scipioni, Antonio, Anna Mazzi, Marco Mason, and Alessandro Manzardo. 2008. The Dashboard of Sustainability to measure the local urban sustainable development: The case study of Padua Municipality. Ecological Indicators In Press, Corrected Proof.

Stansfeld et al., 2005. Aircraft and road traffic noise and children's cognition and health: a cross-national study. The Lancet, Volume 365, Issue 9475, Pages 1942

Sutton, P.C., (2006). A scale-adjusted measure of Urban sprawl using night-time satellite imagery. Remote Sensing of Environment. 86 (3), 353 - 369

Svensson, M.K. and Eliasson, I., 2003. Diurnal air temperatures in built-up areas in relation to urban planning. Landscape and Urban Planning, 61:37-54.

Tapioa, P., Banisterb, D., Luukkanena, J., Vehmasa, J., Willamo R., (2007). Energy and transport in comparison: Immaterialisation, dematerialisation and decarbonisation in the EU15 between 1970 and 2000. Energy Policy, 35 (1), 4333-451

Thunis, P., Rouil L., Cuvelier, C., Stern R., Kerschbaumer, A., Bessagnet, B., Schaap, M., Builtjes, P. Tarrason, L., Douros, J., Moussiopoulos, N., Pirovano, G., Bedogni, M., (2006). Analysis of model responses to emission-reduction scenarios within the citydelta project. Atmospheric Environment, 41 (1), 2007, 208-220

Torrens, P.M., Marina, A., (2000). Measuring Sprawl. Centre for Advanced Spatial, London.

Tsai, Y., (2005). Quantifying Urban Form. Compactness versus 'Sprawl'. Urban Studies, 42 (1) 141-161

Turok, Ivan, and Vlad Mykhnenko. 2007. The trajectories of European cities, 1960-2005. *Cities* 24, no. 3 (June): 165-182.

van Kempen, R, Vermeulen, M. Baan, A. 2005. Urban Issues And Urban Policies In The New EU Countries. Ashgate Publishing.

Voogt J.A., Oke T.R., (2003).Thermal remote sensing of urban climates. Remote Sensing of Environment. 86 (3), 370-384

York, R., (2007). Demographic trends and energy consumption in European Union Nations 1960 - 2000. Social Science Research. 36 (3), 855-872

Zellner, Moira L., Thomas L. Theis, Arunprakash T. Karunanithi, Ahjond S. Garmestani, and Heriberto Cabezas. 2008. A new framework for urban sustainability

assessments: Linking complexity, information and policy. Computers, Environment and Urban Systems In Press. Corrected Proof.

Chapter 2 – Major past trends and probable future demographic trends

Gilles Van Hamme

Demographic trends in the European cities are in accordance with the general trends at European level and at the national and regional level in which they are embedded. This is why we will first describe the demographic trends at the European level (section 1) before we get into the national and regional specificities of these trends (section 2). Demographic specificities of the cities will be tackled in the third section, including the intra-urban demographic differentiation.

1. Major trends at the European level

Past trends

At the most general level, demographic trends of the whole Europe are of course affecting the cities. Demographic trends are well documented in the institutional literature: the state of the cities and cohesion reports give a relatively clear idea of demographic trends in the European cities and regions. In this literature, the accent is put on global trends affecting nearly all European cities: the ageing process, immigration processes, evolutions of the household compositions and declining fertility are the most common themes. These trends are the result of long term structural trends on which policies seem to have little impact:

- the decline of fertility rate is related to social and cultural evolutions such as the increasing women's activity rate. In recent years, fertility rates have stabilized at a relatively low level in nearly all European countries, with some countries showing a slight increase (Sweden, France) ;
- the increase of life expectancy;
- the ageing process as a long term consequence of these two first processes;
- the household's decomposition with the growing share of single-adult household is also to be understood in this structural evolutions of the society (woman's work, individualism…);
- immigration. From the nineties on, Europe became an immigration continent, which was not the case before (Vandermotten et al., 2004). The trends in immigration are much more subject to short and medium term evolutions and immigration is often seen as the possible adjustment variable in demography and economy. However, migratory policies have a moderate impact on migratory flows which concentrate in the major cities.

Future evolutions

Because of the inertia of the age structure, demographic trends are reasonably well predictable. First, it seems that in the last years, fertility rate has reached a bottom level and does not change much. Second, life expectancy continues to increase regularly in Europe. By applying these trends on the age structure, there is little doubt that Europe as a whole and all parts of Europe will have to face a population decrease, an ageing process and a growing dependency ratio.

Immigration seems to be the only process which could soften this ageing process. However, the economic crisis will probably affect immigration policies. Past experience in the seventies in North-western countries suggest that the crisis and closing borders finally reduce the immigration process and change its nature (from working immigration

to familiar one). How much the new crisis will affect immigration in a more open, unequal and globalized world is of course subject to uncertainty?

2. Geographical differences in these major trends

Past trends

At the second level, the European trends have diversified pattern at regional level and cities themselves have similar evolutions than the regional and national environment in which they are embedded (State of the European cities, 2007). These national and regional demographic patterns are well known and also, to a certain extent, well predictable because of the inertia of the age structures (Espon 1.1.4, 2004; Shrinking regions, 2008; Fourth report on social and economic cohesion, 2007). The most unpredictable evolution concerns of course migratory flows, especially those coming from outside Europe.

The major geographical cleavage is between Eastern and Western Europe (Map 1). The most dramatic demographic evolutions have been observed in central and Eastern European countries. First, it is due to the huge fall of fertility in the 90's. Second, in the same time, life expectancy is lower and has stagnated in some countries in the nineties. Finally, central and Eastern Europe has not been attractive for immigration: on the contrary, migratory balances have been negative for nearly all regions between 1995 and 2005 except Czech and Hungarian regions as well as some capital cities. However, because of originally younger population in the eighties, the population is not older in the NMS than it is in Western Europe but the ageing process is much faster because of these trends.

In Western Europe, the fall of fertility has been more regular and never reaches the level observed in some parts of Eastern Europe, except in some parts of Germany, Northern Italy and Northern Spain. One of the main long term evolutions inside Western Europe is that we do not anymore observe difference between peripheral Western Europe (Mediterranean and Ireland) and the north-western countries. In the sixties, natural growth was higher in the peripheral Europe and migratory flows were from peripheral to central areas at both European and national scales (Vandermotten et al., 2004).

Nowadays, the geographical pattern of demographic trends inside Western Europe has become much more complex (map 1):

- the difference in fertility rate has disappeared and some southern parts of Europe have the lowest rates of all Europe (Northern Spain for example);
- life expectancy is often higher in some Mediterranean regions (Greece for example). Once reached a certain level of GDP per capita, the economic wealth has a marginal impact on life expectancy which depend much more on social and cultural features, such as the quality of the food or the health system (OECD, Social indicators, 2006);
- Mediterranean countries and Ireland have become massive immigration countries at least from the end of the nineties.

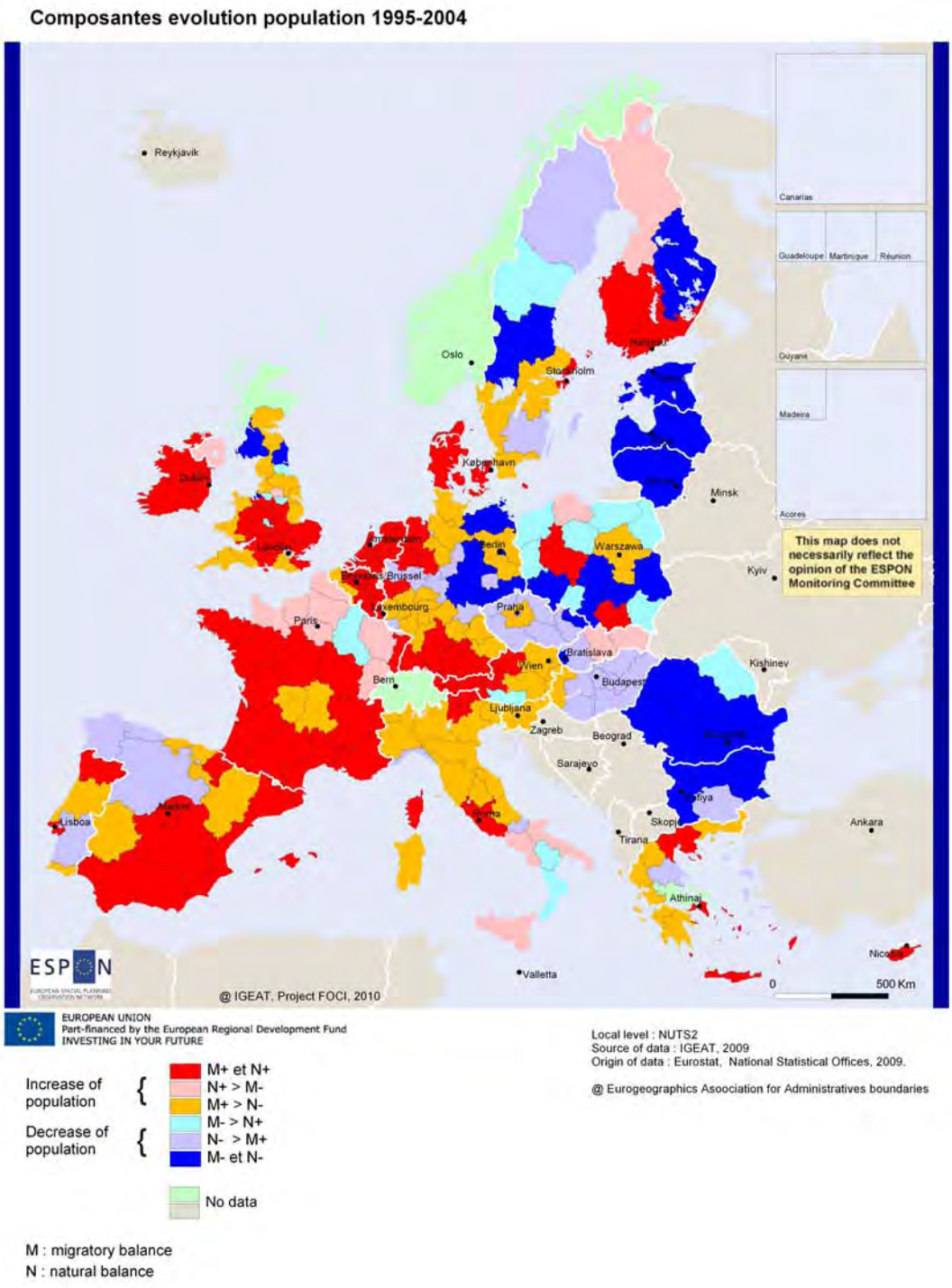


Figure 1. Components of population increase at NUTS2 level, 1995-2004
Note: Each region has been classified according to the main component (natural or migratory) of its demographic increase or decrease. For example N+ > M- (pink) means

a region with population increase because of natural growth and despite negative migratory balance.

Future evolutions

Most of the shrinking regions for the next 25 years are indeed located in central and Eastern Europe, including Eastern Germany (see map 2) (Shrinking regions; ESPON 1.1.4). However, the capacity of Western European regions to maintain their population is in most of the regions, except France and Ireland, related to the capacity to attract new migrants. And as already discussed in section 1, for economic and political reasons, there is no certainty about that.

However, because of the inertia of age structure and lower life expectancy, dependency ratio of the older population on the active age population will still be lower in the NMS than it will be in Western Europe in 2030 (Map 3). Major cities are also characterized by lower dependency on the old population but the main reason here is their capacity to attract young active population.

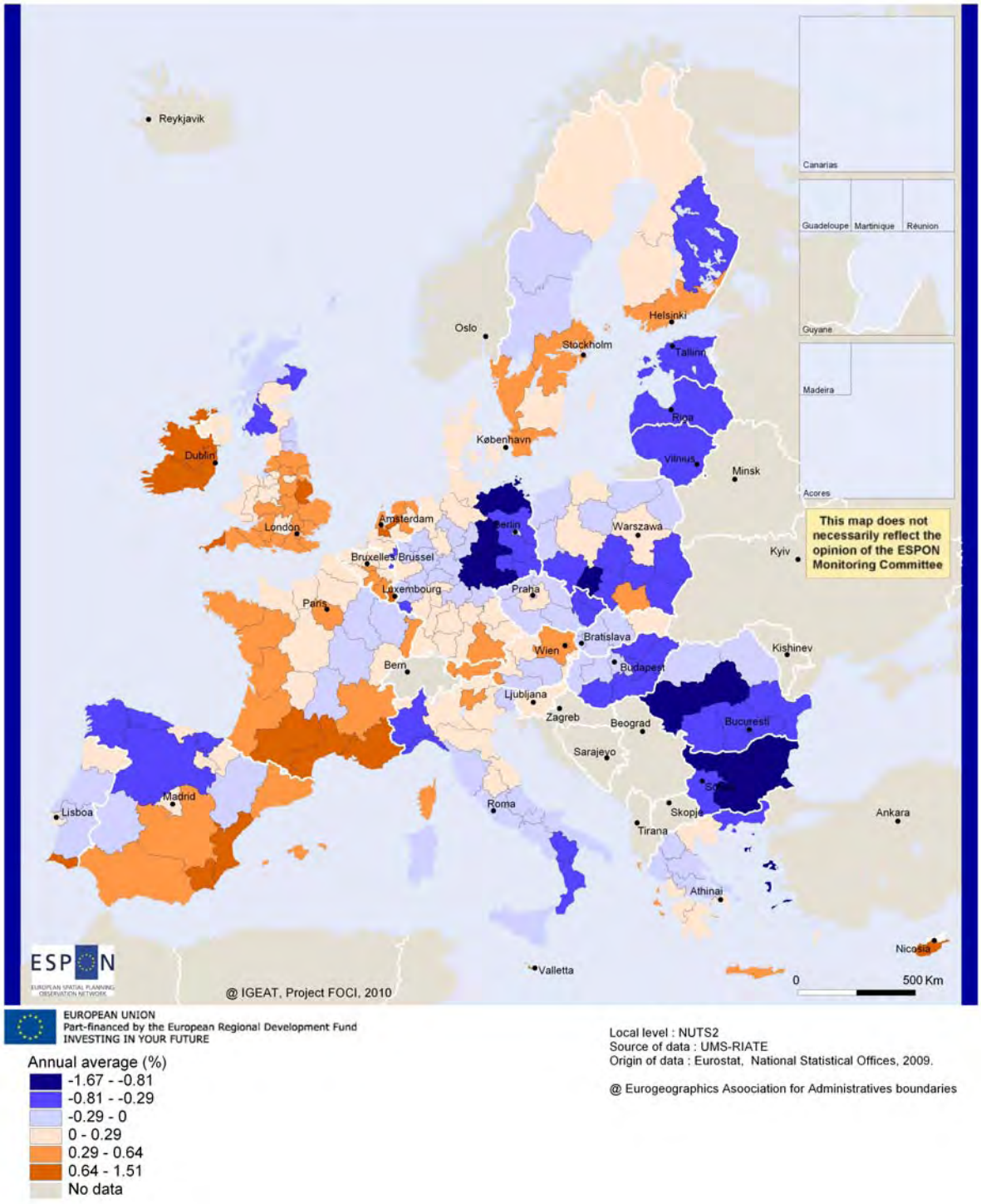


Figure 2. Population increase 2005-2030. NUTS2

Source: Eurostat, National Statistical institute for France and UK, UMS-RIATE for calculations*.

*Data have been gathered in a project financed by the European parliament

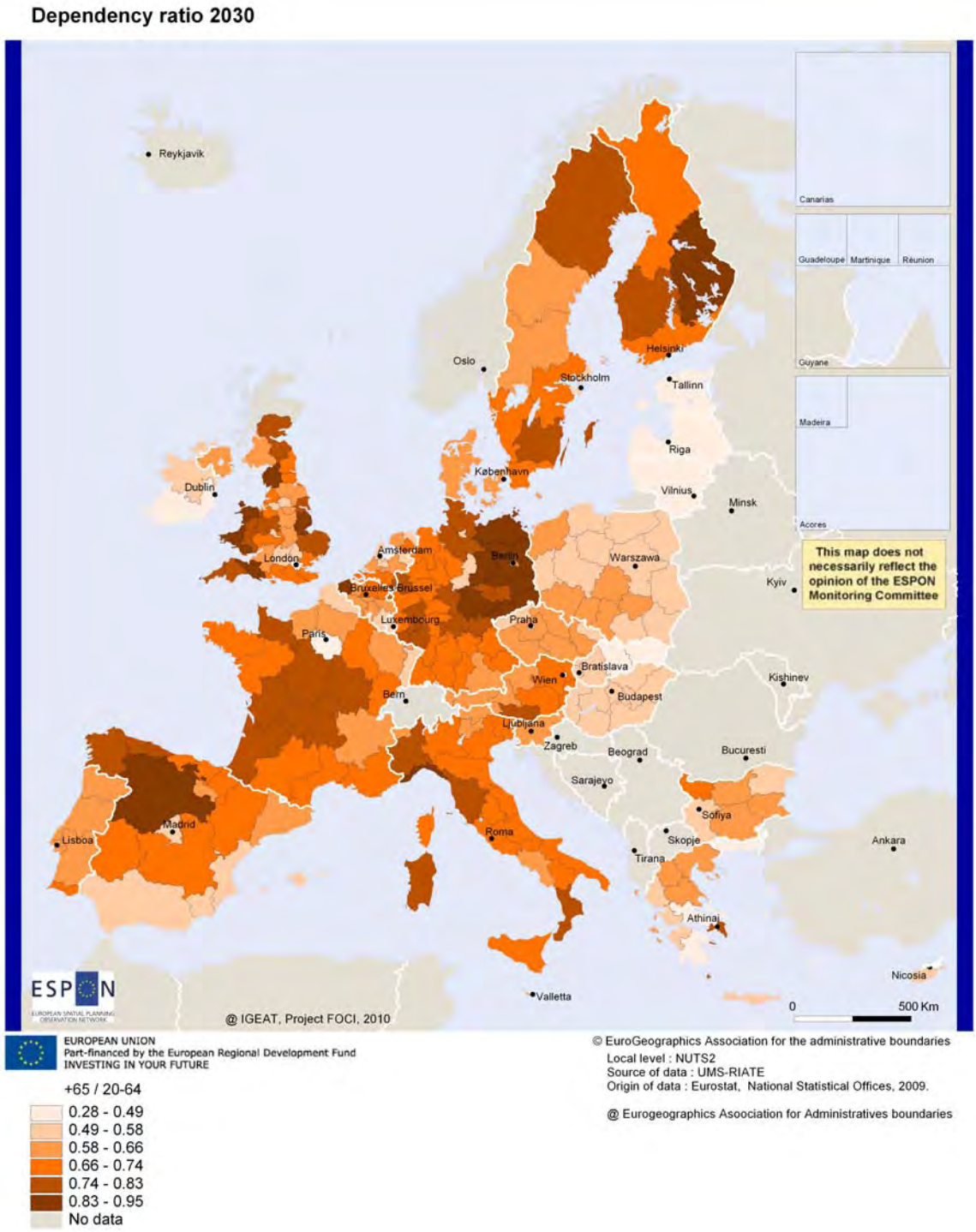


Figure 3. Dependency of old versus active age population in 2030. NUTS2
Source: Eurostat, National Statistical institute for France and UK, UMS-RIATE for calculations*.
*Data have been gathered in a project financed by the European parliament

3. Specificities of the cities

As already stated, The demography of the cities – especially when not considering the biggest ones – are very much in accordance with the regional and national trends in which they are embedded. This is illustrated by maps 4 and 5, which illustrate the growth pattern of European cities on two different periods, according also to two different sources. Map 4 gives annual population growth on the base of NUTS3 proxy of LUZ, because data are more complete than urban audit in the 90's. Map 5 gives the evolution of population between the two last periods of urban audit, that is for most regions between 2001 and 2004. When compared to the data of NUTS3 proxy for the same period, correlations are 0.7 which is rather weak for two different measures of the same indicator. It may be explained by the difference of period and delimitations in the sources.

Evolution of the population in European cities, 1995-2007

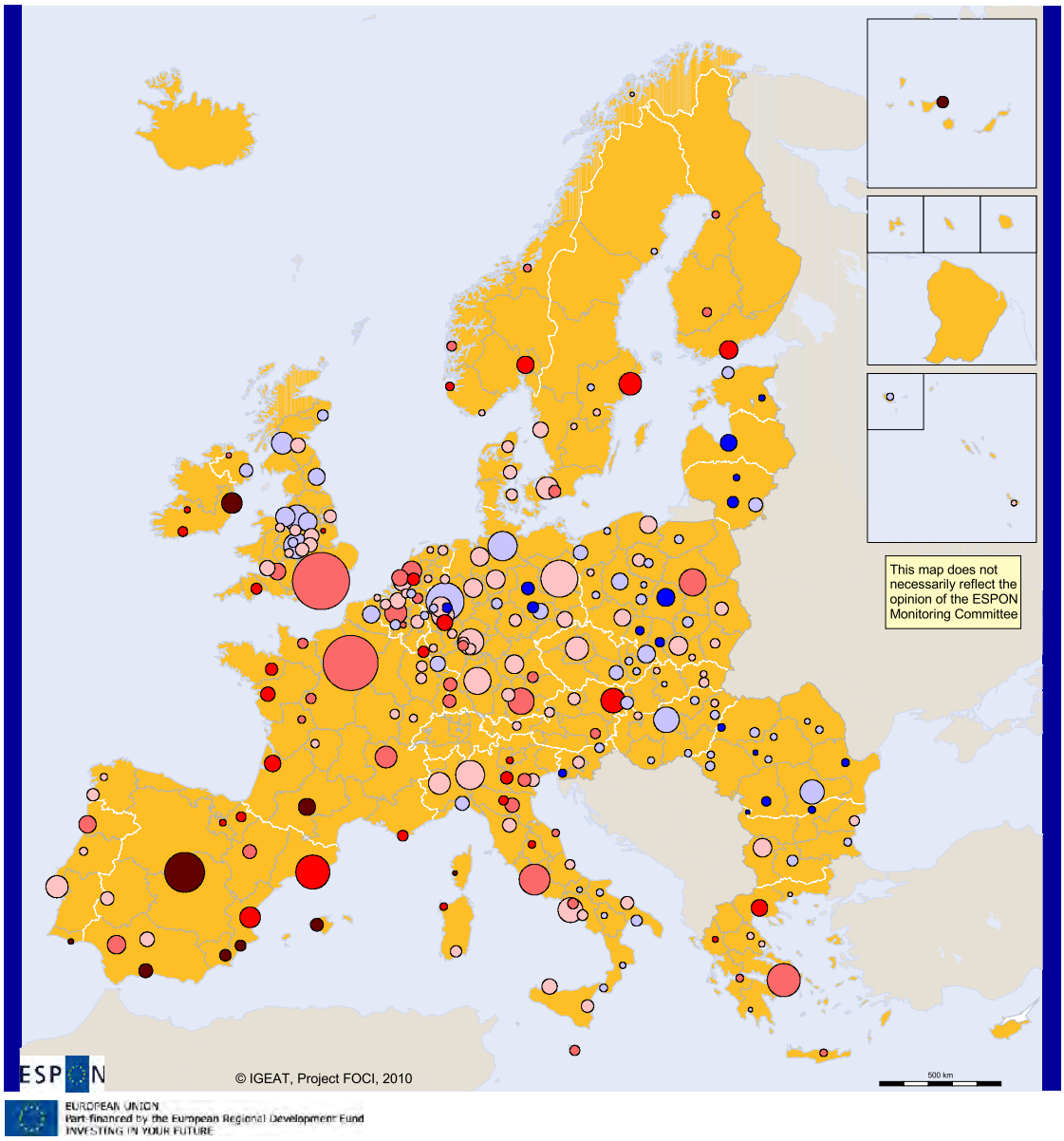


Figure 4. Population growth in the LUZ, 1995-2007
Source: Eurostat, and personal calculations

Evolution of the population in the LUZ and in the surrounding NUTS2, first half of the years 2000

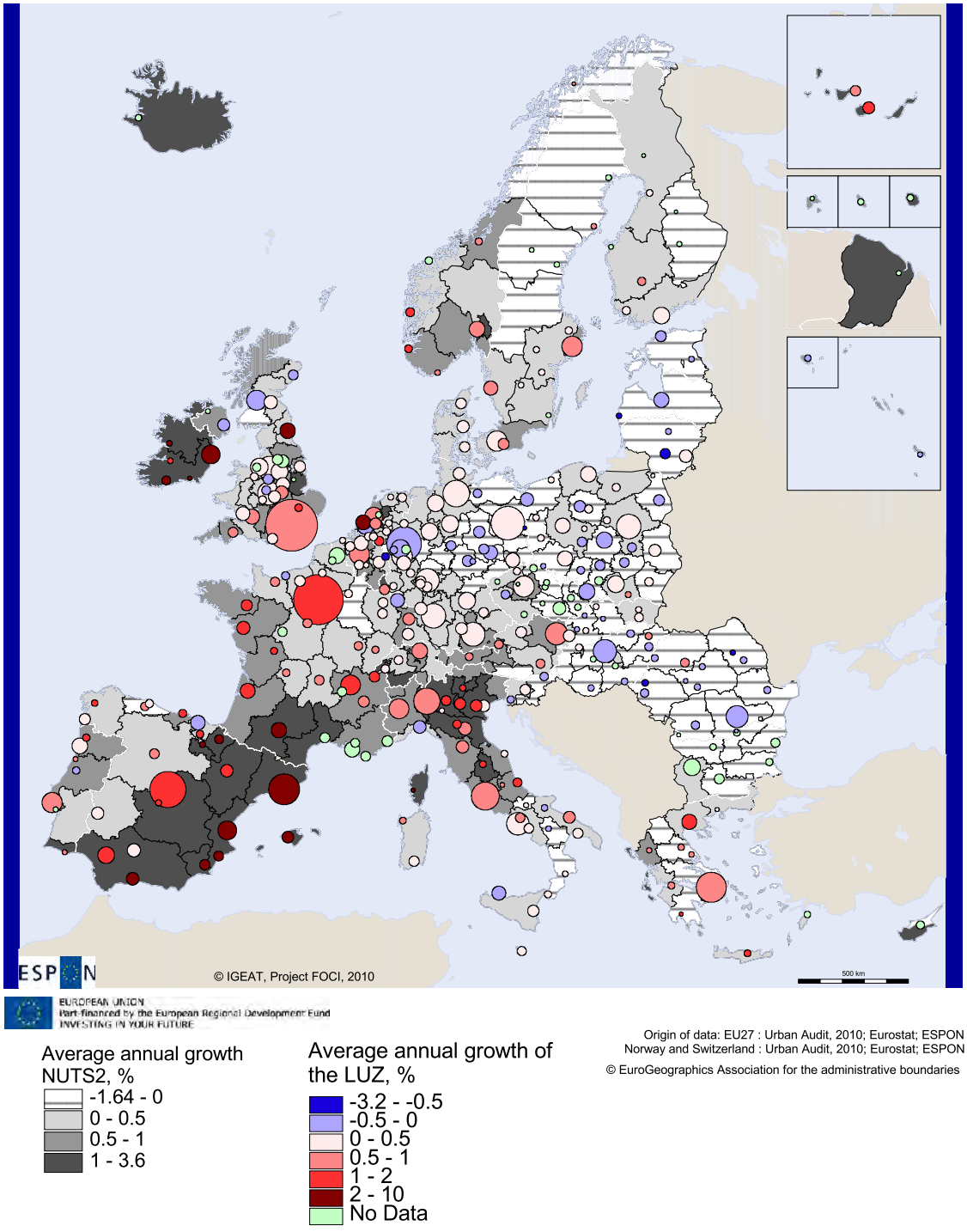


Figure 5. Population growth in the LUZ and in the NUTS2 regions, first half of the years 2000*

* the period is not strictly the same for all cities because the reference year of the data are different for each city. For most cities, the period is 2001 to 2004.

Source: Urban audit, Eurostat and personal calculations

However, cities in general – at least beyond a certain level of the urban hierarchy – have a specific position in the migratory process. They attract young populations (students, young active and foreigner immigrants) and expulse older active (active adult's households with children, old active people, and young pensioners).

According to the position of the cities in the urban hierarchy, this process occurs at the different scales: major cities such as London or Paris and many other capital cities play this role at the national and growingly at the international level (migration of wealthy pensioners to coastal Spain for example); at a lower hierarchical level, cities may play this role at the regional level; for the small cities, this process could be reduced to the suburbanization process which is of course also taking place in the bigger cities.

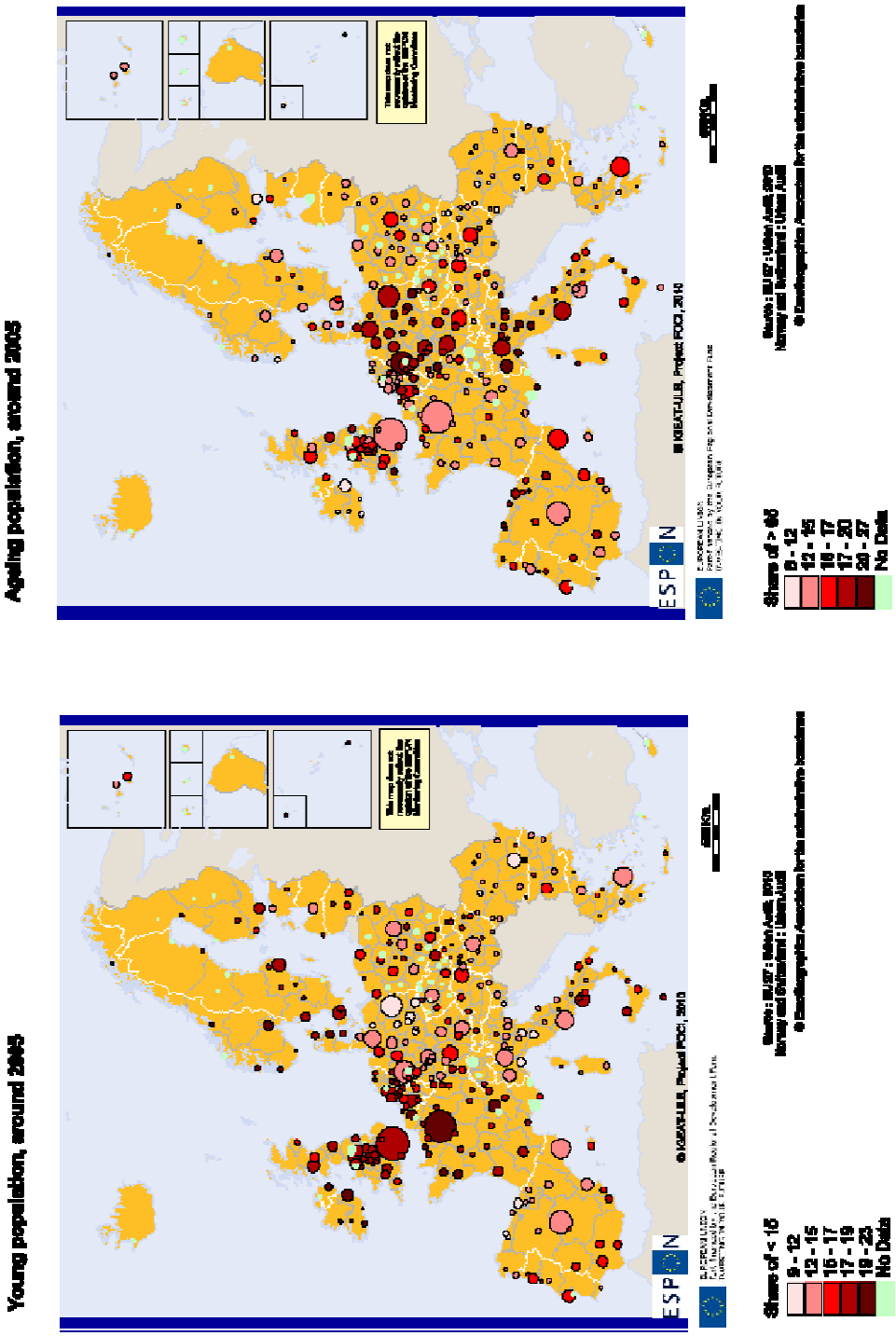


Figure 6. Young and old people in European LUZ, around 2005
Source: Urban audit, and personal calculations

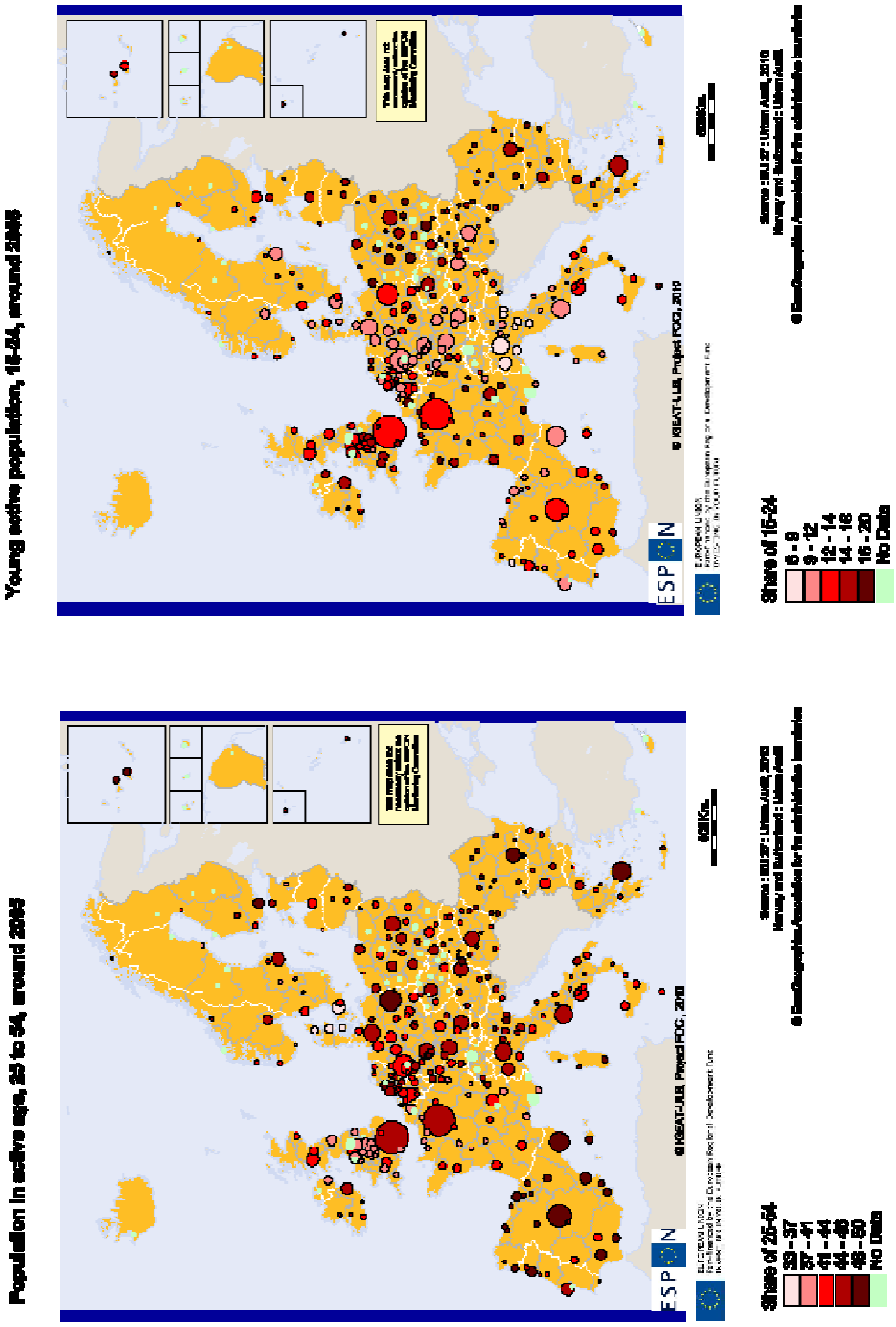


Figure 7. Active ages in European LUZ, around 2005
Source: Urban audit, and personal calculations

The official literature treats in a more marginal way major trends of the internal evolutions of the cities. Concerning this aspect of intra-urban dynamics, the huge scientific literature is structured around two major paradigms, strongly related to the social and territorial cohesion: suburbanisation (Harvey, 1990; Donzelot, 2004) and gentrification (e.g. Smith, 2000; Lees et al., 2007; Van Criekingen, 2008). The demographic results of the intra-urban migratory movements can be synthesized as follows:

- A younger population in the city centres, especially in the most central areas where a gentrification process has taken place;
- A higher share of active households with children in the suburban areas. These middle class populations are the most concerned by the urban sprawl process through suburbanization;
- Poor immigrants – new comers as well as the second or third generation of ancient immigration – are concentrated in some specific areas of the cities. Two types of geographical structures can be observed regarding the location of immigrant in the cities: concentrations near to the centres (case in Belgium, Germany, UK…) or in specific parts of the suburbs (France, Mediterranean countries).

-

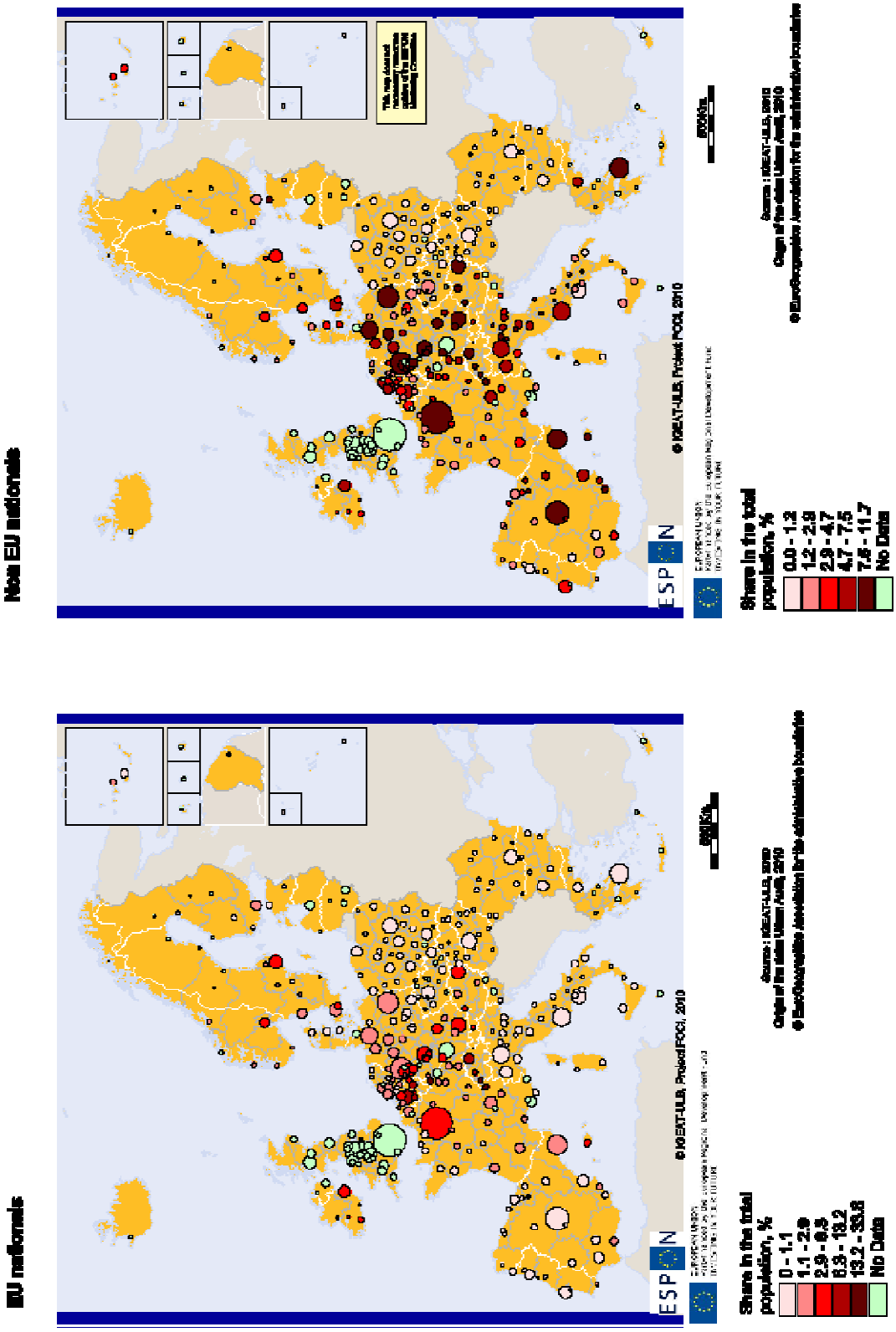


Figure 8. Share of foreigner population in European cities, around 2005

According to these trends, Map 9 is showing spectacular results. Cities in blue on the map have gone through higher population growth in the core cities than in the suburban areas. Of course, most of the cities are in red, which means the suburbanization process is the dominant process. This is especially true in most of Mediterranean, Ireland and Central and Eastern cities, where suburbanization has developed much later than in most north-western European cities (after 1990 in ex-communist countries). But for many cities, especially in the most dense and urbanized parts of Europe – the blue banana between Northern England and Northern Italy – the reverse is true, that is core cities have gone through higher population growth than their suburbs. This is particularly true in Great Britain but also in some big German cities, in Vienna and in the two biggest North Italian cities (Milano and Torino). Ain exceptions are to be found in Amsterdam and Den Haag, that is in a country where suburbanization has traditionally been limited by very strict land planning. This is a rather new situation which can be explained by several factors:

- a gentrification process, that is a renewal of the core cities dynamics due to processes of urban renovation, new cultural features and the growing flexibilization of young active population (Vancriekingen, 2009; Bromley et al., 2007);
- a concomitant slowing down of suburbanization process, notably because this process occurs at higher ages;
- intense foreigner immigration towards city centres, where new foreigner population is often confined in specific deprived and not yet gentrified neighbourhoods (see map 11).

However, because this intra-urban dynamics may hide very different demographic evolutions, we propose a typology of European LUZ according to their intra-urban dynamics: we distinguish first between growing and declining LUZ, and then we take into account the dynamics in the core and in the peripheral areas of the LUZ. On this map, we can distinguish several major types of evolution:

- in the dense urban and central parts of Europe, many cities are characterized by their population growth in both core and peripheries, with often higher growth rates in the core cities;
- in Eastern Europe, most of the cities are characterized by the decline of their population with an intense process of suburbanization, except mainly Warsaw and Praha;
- in Mediterranean LUZ, we observe population growth with an intense process of suburbanization.

Demographic evolutions of core and peripheral cities, 2000-2005

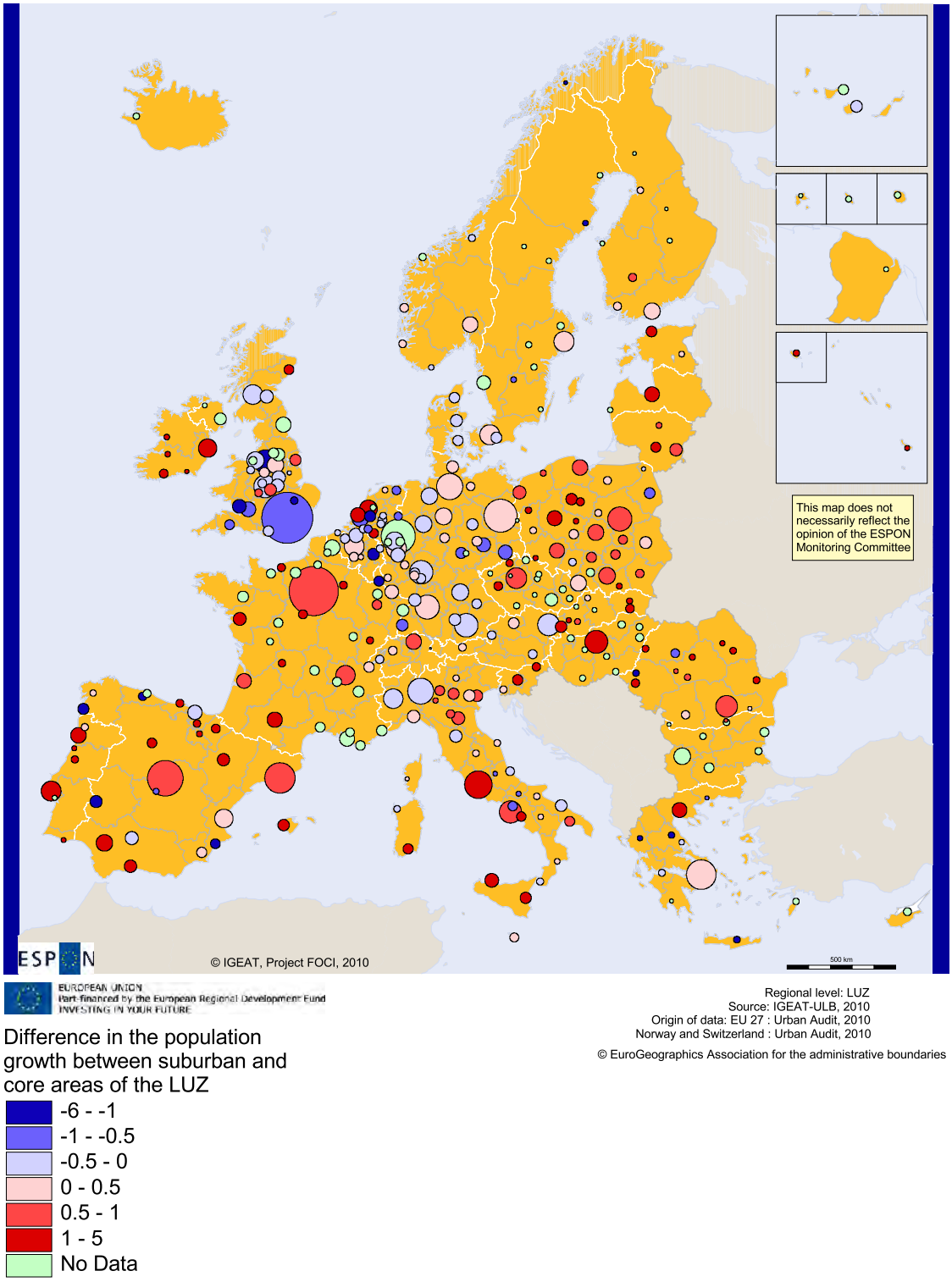


Figure 9. Population dynamics in core and peripheral European cities, first half of the years 2000

* the period is not strictly the same for all cities because the reference year of the data are different for each city. For most cities, the period is 2001 to 2004.

Source: Urban audit, and personal calculations

Indicator: For each LUZ, the difference between the average growth of the periphery and the average annual growth of the core cities is calculated. The more blue, the higher the difference in favour of the core city

Typology of intra-urban dynamics in European LUZ, in the years 2000

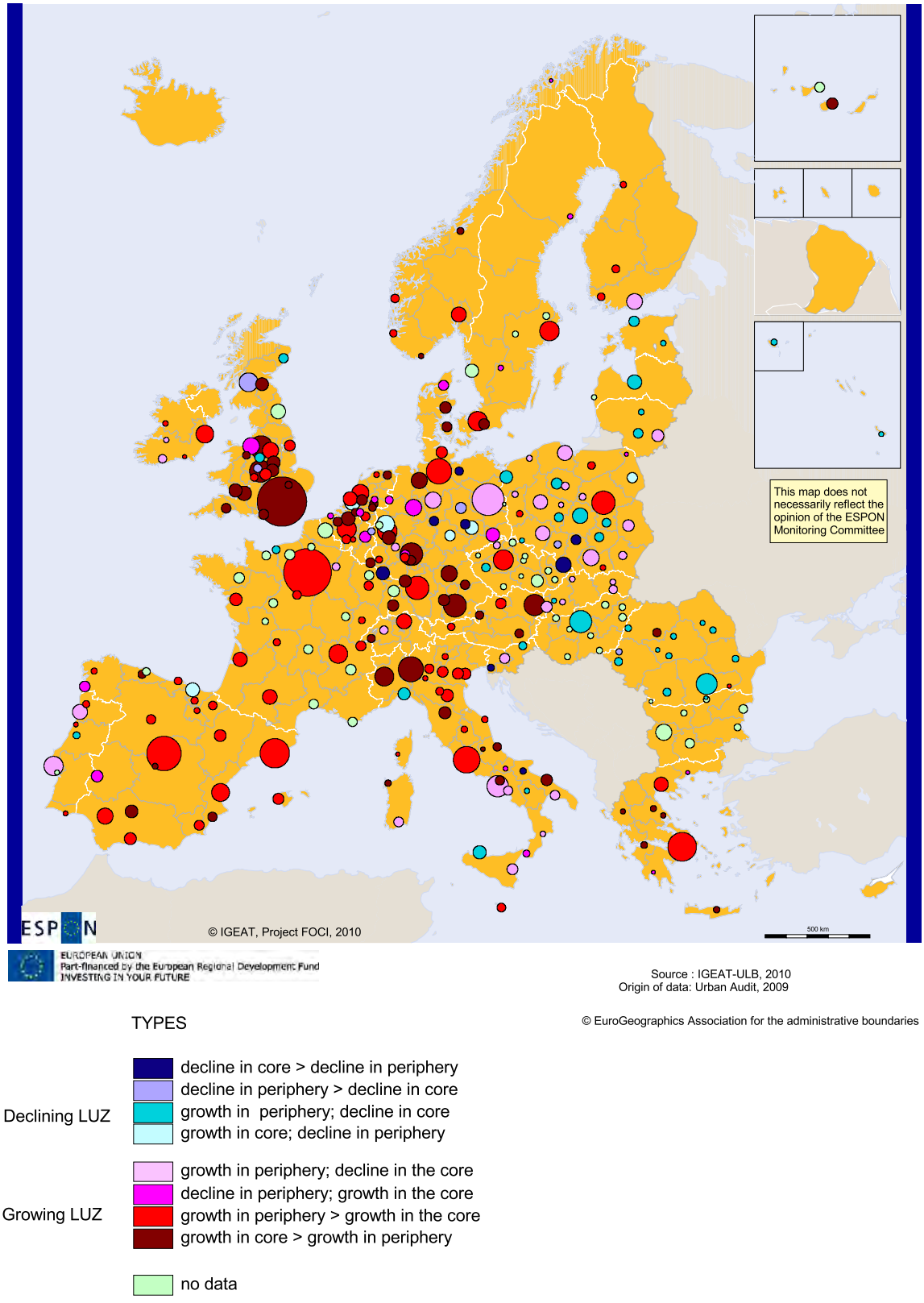


Figure 10. Typology of cities according to the population dynamics in core and peripheries, first half of the years 2000

* the period is not strictly the same for all cities because the reference year of the data are different for each city. For most cities, the period is 2001 to 2004.

Source: Urban audit, and personal calculations

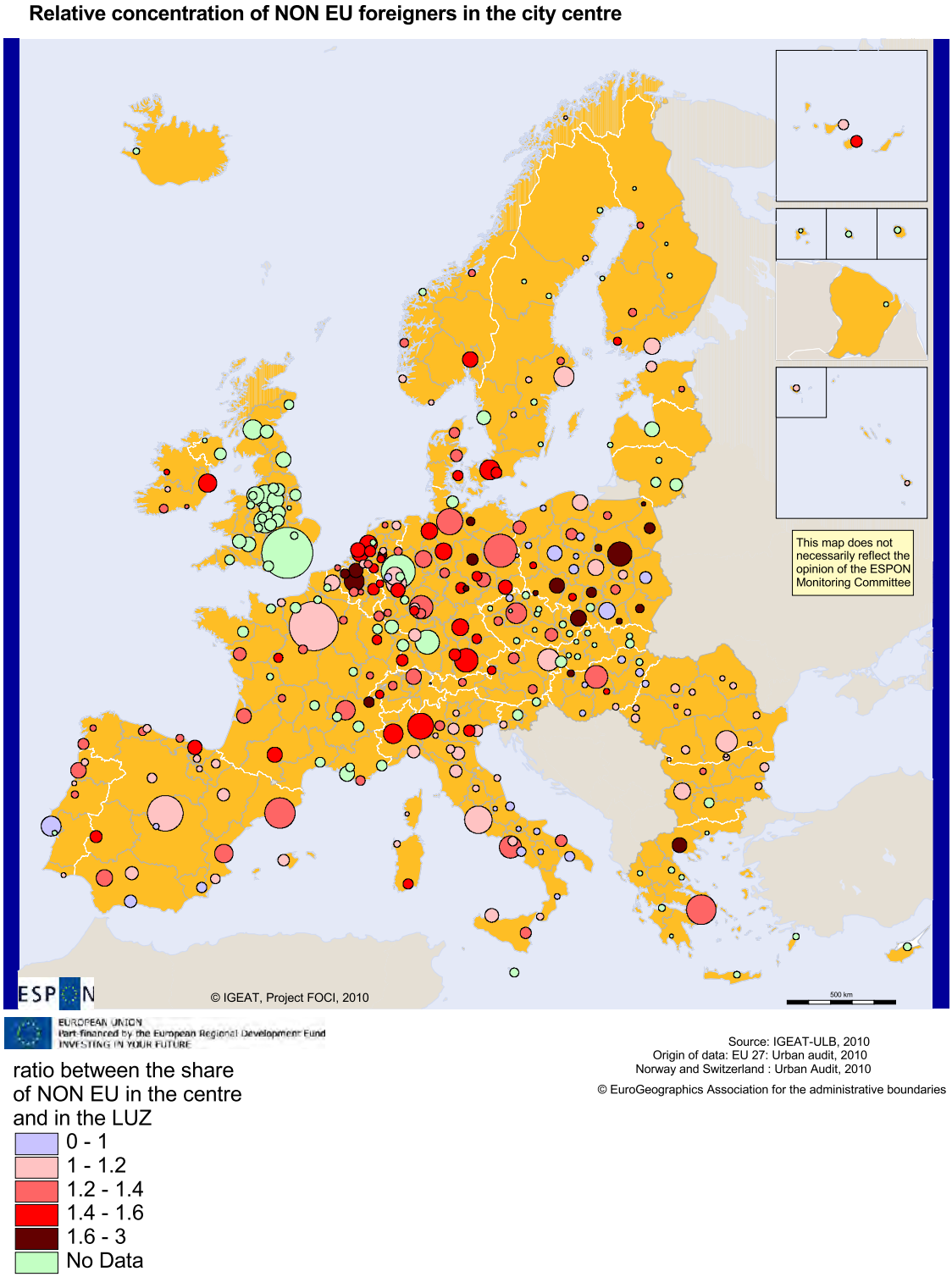


Figure 11. Relative concentration of the NON-EU foreigners in the city centre, around 2005

4. Main expected trends

At European level, as already stated, we should not expect major evolutions in the structural trends in terms of the evolution of fertility rates and life expectancy. Hence,

given the current age structure, demographic evolutions are well predictable at the European, national and regional level (map 2).

However, migratory trends are much more unpredictable.
For Western Europe as a whole, the question is whether, in the context of the crisis, the extra-European immigration will continue in the next years. Two scenarios are possible. First, because of push factors, immigration remains at high level despite the political will to control it. Second, because job opportunities are declining, immigration slows down and is limited to family reunification, which has been the evolution observed during the seventies crisis in north-west European countries. However, in both scenarios, we may also suppose that the most attractive countries for immigration, except for family reunification, will not be the same because most of these countries have been more severely hit by the crisis. This is the case for Spain, Greece, Ireland and, to a lesser extent, United Kingdom.
At the intra-urban scale, the question is whether the recent dynamics of core cities observed in the denser and urbanized parts of Europe will spread to Mediterranean and Eastern cities. In the latter, suburbanization has been a very late process, mostly post 1990, which means that we may expect it will continue for some years.

Chapter 3 – Social cohesion in European cities

Gilles Van Hamme, IGEAT

Introduction

In general, European studies are using a static and normative view of social cohesion through several simple indicators (see for example « State of European Cities »; Reports on social and territorial cohesion). Also, it seems to confuse two very different aspects in the way to assess the social cohesion inside the European space: social cohesion to sustain competitiveness; social cohesion as alternative non economic evaluations of well-being (Buck, 2005).

In this project, we intend to clearly separate these two main aspects and only focus on the second one in this chapter, the first being integrated in the chapter on competitiveness. This approach is also the one adopted by OECD in its report on social indicators (Society at a Glance: OECD Social Indicators - 2006 Edition, page 16): "Promoting social cohesion is a central goal for social policy in many OECD countries. However, because of the lack of a commonly-accepted definition of the term, identifying suitable indicators is especially difficult. The approach taken in this volume is to assess social cohesion through indicators that describe both the extent to which citizens participate in societal life and derive satisfaction from their daily activities; and those informing about various pathologies and conditions that put affected individuals at risk of exclusion from mainstream society, or that reveal the extent of social strife in a country."

OECD provides then a more operational conception of social cohesion related to 4 major objectives of social policy:
"A) Enhancing ***self-sufficiency***
B) improving ***Equity***
C) improving the ***health status*** of populations
D) Improving the ***Social cohesion*** which is often identified as an over-arching objective of the social policies of countries. While little agreement exists on what precisely it means, a range of pathologies are informative about *lack* of social cohesion. This is true, for example of crime, imprisonment, suicides, industrial strife, and family instability. Falling under this heading are also measures of the extent to which individuals' participate in the community where they live." (Society at a Glance: OECD Social Indicators - 2006 Edition, page 11)"

The literature provides some evidence of general trends about the evolution of social inequalities, social-spatial inequalities and social exclusion in the cities.

First, it seems clear that in the last decades, social polarization has increased in nearly all rich countries, including the new member states of EU after the collapse of communism. However, the intensity and the timing of this trend are very different from one country to another. For example, while it has mainly occurred in the eighties in the UK, it has begun only from the nineties in the Nordic countries. Also, the final point is very different from one country to another (Croissance et inégalités : Distribution des revenus et pauvreté dans les pays de l'OCDE, OCDE, 2008). However, we also find some evidences, at least for the European countries, that – mainly for the recent years – the inequalities have increased more at the top of the income distribution than at the bottom (Smeeding, 2002).

There is no systematic empirical testing trying to assess these trends at the city level in Europe. However, many authors argue that this trend has been particularly dramatic in the global cities, whatever the driving forces behind this process (Sassen, 1990; Hamnett, 1996). To put it very simply, the level of social polarization of a city seems to

depend first of the national context and second to its level of insertion in the global economy and the new forms of economic growth related to the knowledge-based economy.

The following box gives an overview of a survey of the literature on social polarization in cities in Europe.

Trends in social polarization in European cities

It seems clear that in the last decades, social polarization has increased in nearly all rich countries, including the new member states of EU after the collapse of communism (Atkinson, 2003). However, the intensity and the timing of this trend are very different from one country to another. For example, while it has mainly occurred in the eighties in the UK, it has begun only from the nineties in the Nordic countries. Also, the final point is very different from one country to another (OCDE, 2008).
Because of the lack of comparable data across European cities, there is no systematic empirical assessment of these trends at the city level in Europe. However, many authors argue that this trend has been particularly dramatic in the global cities, whatever the driving forces behind this process (Sassen, 1990; Hamnett, 1996). To put it very simply, the level of social polarization of a city seems to depend first of the national context and second to its level of insertion in the global economy and the new forms of economic growth related to the knowledge-based economy. To assess the trends at the city level, we synthesize urban monographs across Europe from different size and context:

Cities	Social inequalities	Socio-spatial inequalities	Processes
Paris (1)	Increase since 1980	Strong increase since 1980, with a growing immigrant concentration in deprived neighbourhoods	- Deindustrialization and professional polarization - Gentrification to the detriment of low social classes
London (2)	Increase since 1980	Highest level for all British cities and increasing	- Professionalization process - gentrification
Berlin(3)	Increase in the 90's	Opposition between East and West berlin	- transition toward market economies has accelerated deindutrialization and unemployment - gentrification in Esat Berlin
Milan (4)	Slow increase since 1980	No spatial segregation at the neighbourhood scale	- Limited deindustrialization because of the economic dynamics based on small and medium entreprises - poverty is sparse and peripheral rather than concentrated
Zurich (5)	Increase since 1990	Increasing	- Social polarization with the weakening of the middle classes Spatial polarization and increasing difficulties for poor neighbourhoods to access to the desired district
Athènes (6)	Decrease since 1990	Like Milano, poverty is dispersed and social disparities persist within the districts rather than between districts	Increasing middle class with the economic development
Oslo (7)	Decrease in the 70's and	Low but growing spatial segregation	Limited social inequalities are related to the strong Providence-

	polarization in the next decades. Nevertheless, poverty is very limited		State and the directive territorial planning
Helsinki (8)	Decrease from the 60's and increase after the 90's	Low but growing spatial segregation	- Progressive taxation and social redistribution explains the limited social inequalities until the 90's - after the 90's, the weakening of the providence-State and the knowledge-based growth has increased significantly social (and spatial) polarization. - important share of social housing throughout the city
Lodz (9)		Growing since the WWII	Spatial polarization after the collapse of communism with the suburbanization of middle classes and the concentration of poor in the deprived core areas
Naples (10)	Increasing since the 70's	Strong spatial polarization between a middle class core city and deprived suburban areas	- strong immigration concentrated in the deprived suburbs - neglect of deprived suburbs by public bodies
Luxemburg (11)	Increase since the 60's	Spatial polarization process, notably with the concentration of poor Portuguese immigrants	Polarization between middle class suburbs and some deprived core areas.
5 biggest Belgian cities (12)	Strong increase since the 80's. Highest level in Brussels	Increasing gaps between districts in terms of unemployment rates but stable in terms of incomes	Professionalization process, especially in Brussels.

(1) Edmond Préteceille, 2004, *The Greek Review of Social Research*, 113, pp 105-120

(1) Pierre Beckouche, 1992-1993, *«Une région parisienne à deux vitesses»*, Strates, Numéro 7

(1-2-3-4) Anne Claire DAVY, Brigitte GUIGOU, Mariette SAGOT, 2005, *Ségrégation urbaine et politiques publiques : étude comparative*, Institut d'Aménagement et d'Urbanisme de la Région d'Ile-de-France, p 116

(2) C. Hamnett & D. Cross, 1998, *Social change, social polarisation and income inequality in London, 1979–1993*, GeoJournal 46, pp 39–50.

(3) Franz-Josef Kemper, 1998, *Restructuring of Housing and Ethnic Segregation:*

Recent Developments in Berlin, Urban Studies, Vol. 35, No. 10, pp 1765- 1789

(5)Martina Koll-Schretzenmayr, Frank Ritterhoff and Walter Siebel, 2009, *In Quest of the Good Urban Life:Socio-spatial Dynamics and ResidentialBuilding Stock Transformation in Zurich,* Urban Studies, pp 1-17

(6) Vassilis P. Arapoglou, John Sayas, 2009, *New Facets of Urban Segregation in Southern Europe: Gender, Migration and Social Class Change in Athens*, European Urban and Regional Studies 2009; 16; p 345-362

(6) Maloutas T, 1997, La ségrégation sociale à Athènes, Mappe Monde n°4, p 4

(6) Maloutas T, 2007, *Segregation, Social Polarization and Immigration in Athens during the 1990s: Theoretical Expectations and Contextual Difference*, International Journal of Urban and Regional Research, Volume 31.4, pp 733–58

(7) Terje Wessel, 2000, *Social Polarisation and Socioeconomic Segregation in a Welfare State: The Case of Oslo*, Urban Studies, Vol. 37, No. 11, pp 1947–1967

(8) Mari Vaattovaara and Matti Kortteinen, 2003, Beyond Polarisation versus Professionalisation? A Case Study of the Development of the Helsinki Region, Finland, Urban Studies, Vol. 40, No. 11, pp 2127–2145,

(9) Marcinczak S, 2008, *The socio-spatial structure of post-socialist Lodz, Poland. Result of national census 2002*, Bulletin of geography (socio-economic series) n°8, p 18

(9) Craig Young and Sylvia Kaczmarek, 2008, *The socialist past and postsocialist urban identity in Central and Eastern Europe, the case of Lodz*, European Urban and Regional Studies 15(1), pp 53–70

(10) Raffaele Cattedra, « Espace public et cosmopolitisme : Naples à l'épreuve d'un inédit métissage urbain », *Cahiers de la Méditerranée* [En ligne], vol. 67 | 2003, mis en ligne le 25 juillet 2005, Consulté le 12 octobre 2009. URL : http://cdlm.revues.org/index137.html

(10) Serena Vicari, 2001, Naples: Urban regeneration and exclusion in the Italian south, European Urban and Regional Studies 8(2), pp 103–115

(11) Manfred Schenk, 2008**,** *Ville de Luxembourg: La ségrégation à travers les mouvements migratoires*, FOREG

(12) Vandermottten et al. (2010), Métropolisation et inégalités sociales dans les grandes villes belges….

Second, social-spatial polarization in the cities seems also to have increased in the last decades with growing gaps in well-being between the districts of the cities. This can be explained by global economic changes and cut backs on welfare (Badcock, 1997). However, it is clear that the spatial configuration of this process is very different according to the socio-residential heritages of the cities (Musterd & Murie, 1996). This socio-spatial configuration is not unimportant since some authors argue that the place of residence has an impact on the social exclusion processes (Musterd & Kesteloot, 2003).

Third, there is less evidence of a general increase of social exclusion since it might take very different forms and be measured through very different indicators: employment; incomes; social life…. In the city, major evolutions could have contradictory impacts on social exclusion: on the one hand, the specificities of the cities labour market reinforce social polarization and, on the other hand, informal networks inside the cities might soften such exclusion process.

Given the lack of empirical evidences on these different aspects at the city level, our project needs to produce more systematic empirical evidences on these past trends in Europe with some basic indicators concerning social polarization at the whole city level, socio-spatial polarization, social exclusion processes.

From the scientific literature, we identify several major driving forces on the social polarization in the city: **the economic evolutions, especially regarding the evolution of the job offers in terms of qualification** (Sassen ; Hamnett; Wilson; numerous monographic studies); the **socio-demographic evolutions** which have huge impacts on social exclusion (composition of the household for example); **the evolution of real estate market** which is strongly related to the previous factor through the gentrification processes (Madanipour et al., 1998; Mingione, 1999); **public policies** at the state and at the city-level (Esping-Anderson, 1990; Harvey, 1989; Musterd & Ostendorf, 2004).

We will examine these driving forces in more detail in section 1. In section 2, we will propose a methodology to assess the position of European cities according to social cohesion, which will be applied in section 3. The last section (section 4) focuses on the empirical analysis of the complex relationship between social cohesion and economic growth in European cities.

1. Past evolutions and main driving forces behind the process of social polarization in cities

1.1. Economic and labour market driving forces of social polarization in the city

The basic question is about the relationships between the economic evolutions – the "new forms of growth" – on the one hand, and the evolution of social polarization, on the other hand.

Interpretative frameworks have long remained dominated by considerations of the social and socio-spatial consequences of the decline of the fordist / industrial model. The decline of industrial manufacturing industry has been observed in all developed countries. Already during the fordist period, we observed a decline of industrial manufacturing activity in the city: the shortage of workforce during the golden sixties (full-employment period) for "taylorized production" and the growing space demand of new industrial architecture are the major causes of this divorce between the manufacture and the city in the sixties. The seventies crisis has accelerated the deindustrialization process of the cities leading to a social crisis. However, to a certain extent, deindustrialization is not the major process of social polarization in the last years because most of the manufacturing industry has already gone in most of the cities. In many European cities, even industrial suburbs are nowadays poorly industrialized. This is however less true for some German cities for example (see Working Paper on competitiveness). Also, it clearly appears that central and eastern capitals have been able to attract both medium-high level services and manufacturing industries at the same time.

In the last decades, the literature has emphasized more on the major restructuring of economic process occuring in many cities through the concept of metropolitanization. There is a large body of works in economic geography or spatial economy tackling with issues of economic growth of metropolitan areas in the contemporary post-industrial – or post-fordist – period (e.g. Fujita et al. 1999; Veltz, 1996; Storper, 1997; Taylor, 1998). These works notably highlight the new emphasis put on short-term profitability in knowledge-based sectors and the growing competition between firms for new, innovative products or services in advanced capitalist economies. These characteristics strongly emphasize high-skilled segments within the production process (such as R&D, marketing, consultancy, financial analysis, etc.), while low-skilled routine functions are subjected to a wide range of cost-minimisation strategies. This **professionalization process** in a more intensively **knowledge-based economy** is also to be understood in the **globalization process**. The literature emphasizes the growing importance of interconnections between cities especially in the most advanced services. In this perspecive the interconnectivity of the cities (space of flows) is supposed to become more important than the connection in the local environment with the Hinterland (Taylor, 1998). In this context, we observe the emergence of a very mobile world elite with very high salaries, strongly disconnected from their local (temporary) environment (Castells, 1996). Locations in large metropolitan environments are clearly favoured under such new conditions of economic production, notably given the possibility for firms to tap into a vast reservoir of highly-skilled professionals or specialist sub-contractors (e.g. Sassen, 1998) and the interconnectivity of these cities (Knox & Taylor, 1995).

However, the processes that lead to a social polarization of the labour market in the cities are still a matter of debate. Parallel to the growing demand for highly skilled labour, some authors also highlight that there is also a growing demand for low qualified personal services in low unionized, female, precarious and partial jobs (Sassen, 1998).

Others authors insist more on a general professionalization with lower and insufficient demand of low qualified labour (Hamnett, 1998), with the emergence of a spatially concentrated urban underclass (Wilson, 1987).

In the Marxian and regulation literature, the focus is on the new forms of regulation of the so-called flexible capitalism in regard to the fordist regime (Husson, 2008; Levy & Duménil, 2001). As compared to the analysis described above, the focus is less on the technological evolutions related to the knowledge-based economy or informational technologies, but more on the reorganization of the work after the blockages faced by the fordist economy (Harvey, 2006). Labour force shortage, high salaries and the high level of organization of the workforce explain at least for a part the decline of the profit rates at the end of the fordist period and the necessity to restore them through new forms of (de)regulation. Flexible capitalism is often considered as this new form of (de)regulation: it notably supposes a more flexible reorganization of the work (outsourcing process at different scales) and a growing competition between workers in a more globally integrated economy. In consequence, social polarization has been accelerated rather than initiated by technical innovations. In this perspective, the social polarization is not the result of new offer/demand equilibrium for qualified and unqualified workforce but a new political form of economic regulation to restore the profit rate which has been possible because of new power relations between capital and work in a period of structural unemployment. The fragmentation and segmentation of the production process has weakened (and made more flexible) the workers and produced worst situations for large segments of them than in the previous period.

From the literature, we can argue that the new forms of economic growth lead to growing social polarization through different mechanisms. From this literature, we can argue *that the more global and the more engaged in the knowledge-based economy a city, the more socially polarized it will be* – all other things being equal –.

1.2. Socio-demographic driving forces and real estate

In the process of social exclusion and social polarization, household composition plays a major role (OECD, 2008; State of European cities, 2008). It means that within stable economic and labour market conditions, social polarization and poverty increases only because of some socio-demographic trends, which are particularly marked in the cities. First, there is a general tendency of household size to reduce and the share of single-adults household to increase. This is due to long term social, economic and cultural trends in the European societies. Second, the risk of poverty is much higher for this type of household, especially mother-single household, even when they are working. Moreover, this process of household decomposition is particularly advanced in urban areas, where the share of single mother is much higher than average.

A second important process is the international immigration. Very roughly, we can distinguish two types of international immigration: from rich countries and from poor countries. The first one is globally balanced in the European countries, even if cities are particularly attractive for qualified workforce (ESPON 1.1.4; OECD, 2002). Immigration from poor countries had complex evolutions since the golden sixties (Van Hamme *et al.*, 2004). From the nineties on (and not before), Europe became an immigration continent. The intensity and the geography of this international immigration completely changed from the traditional patterns of European migrations. Outmigration countries of Mediterranean Europe (Greece, Portugal, Spain, and Italy) and Ireland became massive immigration country during this period. In all countries, immigration concentrates in the cities and particularly the biggest ones (ESPON 1.1.4; see also working paper on demography). There are several reasons for this, notably the networks of the migrants and the economic demand in personal service sectors, for example related to the population ageing. Related to this new economic demand, it is interesting noting that

female immigration for work has an increasing share of the total international immigration (OECD, 2007).

As a consequence, big cities concentrate immigrants from low and high-level of qualification reinforcing the social polarization process. At the same time, the poor immigrants concentrate in certain specific areas of the big cities reinforcing the pattern of socio-spatial polarization. However, to a certain extent, this concentration helps making work the solidarity networks inside some communities. It might also reinforce the emergence of specific economic activities sometimes called ethnic entrepreneurship (Musterd & Ostendorf, 1998).

Whether these processes very visible for the big cities are also true for middle or smaller cities is rarely tackled in the literature. Will the economic crisis reduce the immigration flows is another interesting question? The previous major crisis in the seventies did not stop immediately immigration flows towards Europe; this mainly happened during the eighties. Of course, we already see some countries – where the economic growth also relied on a cheap and massive import of workforce – changing their policies when economic conditions are getting worse. However, due to new conditions of mobility and strong push factors from poor countries, it is not sure whether European countries will be able to really limit the immigration flows even if they intend to.

A third important process is intra-urban migrations. These movements play a major role in the socio-spatial polarization process and its geographical shaping. Suburbanization and gentrification are the major paradigms to describe these intra-urban migratory patterns. *Suburbanization* dates back to the fordist period, when the space consumption was one of the major aspects to sustain the consumption as a whole (Harvey, 1989): the suburbanization process does not only sustain the construction activity but also many other forms of consumption, especially the car industry. This process has certainly not lessened in the postfordist period: middle class households with children continue to leave core cities to acquire unifamiliar house in the suburbs (see also the Working paper on demography). As a consequence, core cities often concentrate both social extremes, while in different neighbourhood: the poorest, including old and new immigrants, and the richest segment of the urban population. The intensity of the suburban process has been much related to financial conditions – interest rates in particular – but showed no tendency to slow down on medium term perspective. It means that the financial crisis could reduce this process to some extent but economic, social and cultural factors which favoured this process need strong political involvement to be reversed.
Gentrification paradigm describes the social and demographic transformations in the core cities – notably the historical centre – through renovation processes. It is often not contradictory to the suburbanization process because young middle classes without children are the most concerned, rather than older households with children. One of the consequences is the growing concentration of the most fragile populations in the most deprived and not (yet) gentrified neighbourhoods (Smith, 2002; Lees and al., 2007).

These evolutions cannot be understood without taking into account housing market prices. First, the rise of the housing market prices has a clear impact on the living standards and the level of poverty of the households, especially the most deprived. Second, suburbanization is constrained by the high prices of the ground for middle classes which are willing to become owner of their homes. Third, renovation process – often initiated by public powers – makes housing prices grow and lead locally to the "natural" expulsion of the most fragile populations. Finally, housing market explains the reproduction of the spatial configurations of the social inequalities in the cities (Marcuse & Van Kempen, 2000).

1.3. Political driving forces

One of the major determinants of social inequalities and social exclusion in the cities is related to public policies at two different scales: the state and the city levels.

The state level is the main scale through which welfare state functions operate. The type and the level of welfare state are central to explain the intensity of social redistribution within a society and, as a consequence, the level of social inequalities and social exclusion. While in many countries welfare state functions have been cut off and reoriented from the eighties on, we still observe major differences from one country to another (OECD, 2008). Esping-Andersen defines three different types of welfare state in the rich countries: the liberal, the social-democrat and the corporatist. The first is minimal and based on individual responsibility while the second is built on a Universalist and egalitarian conception of social protection. Corporatist regimes concern continental Europe (Belgium, Germany, Netherland…) and are characterized by the importance of intermediate institutions between the states and the individuals in the redistributive system. It seems obvious that social and even socio-spatial polarization within cities is lower in the social-democrat than in the liberal welfare states (Musterd & Kesteloot, 2003). However, in all these systems, the ideology of individual responsibility has developed and justifies welfare cuts off which have favoured increased social inequalities. This is also described as the shift from welfare to (more Anglo-Saxon) workfare regime.

The public policies at the city level are decisive on three different perspectives in the social inequalities trends and its spatial shaping.
First, urban municipalities are a part of the welfare state notably through the social housing system. Property regulations and the level of social housing play a major role in the socio-spatial polarization of the city: while Scandinavian or Dutch cities are less spatially polarized because of their high level of social housing, it is not the case for Belgian or French cities, where housing market is nearly entirely privatized (Badcock, 1997).
Second, cities played a growing role in accompanying the economic development. Some works have particularly emphasised the changing attitudes of urban governments vis-à-vis the regulation of economic growth, in particular the shift shift from a 'managerial / redistributive' framework to an 'entrepreneurial / neo-liberal' heavily focused on city-marketing strategies and large-scale flagship projects (Harvey, 1989; Van Criekingen & Decroly, 1998; Moelaert *et al.*, 2003; OECD, "Competitive cities", 2007). In this perspective, entrepreneurial policies ruled by the cities reinforce "natural tendencies" of the labour market notably by focusing on the attraction of advanced services or major events.
Third, and in accordance with the new entrepreneurial cities, the last decades have seen the development of social policies oriented toward place-based policies rather than houselholds- and individuals-oriented policies: urban renovation in the deprived neighboorhoods; social mix policies; attraction of prived investments through tax exemptions; flagship projects located in the deprived districts… However, some authors are very skeptical about the ability of these policies to solve social problems, that is to really have an impact on the most disadvantaged of the deprived neighborhoods which are targeted (Murie & Musterd, 2004). Several reasons may explain the inefficiency of intra-urban place-based policies regarding their social cohesion objectives: the weakness of neighbourhood effects in European cities does not always justify such policies because of lower level of spatial segregation than in US cities; the fact that these policies often fail to benefit to the most disadvantaged of the deprived neighbourhoods; in consequence, some authors also point to the fact that neighbourhood characteristics seem to be less important where welfare state is still highly developed (Murie & Musterd, 2004). This means that social policies focusing on individuals strongly limit the impact of the neighbourhood environment on individuals. Moreover, social mix policies often associated with place-based policies seem also to have pernicious effect when they focus on urban renovation and housing policies aimed at attracting more wealthy households.

In these cases such policies may induce gentrification and exclusion of the more fragile households because of growing housing prices, in contradiction with the official goal of improving their situation through neighbourhood effect (Musterd & Ostendorf, 2004).

1.4 A synthesis of the main determinants of social exclusion in the city

Inspired by the Esping-Andersen model based on the three pillars of social protection (the market, the reciprocity notably through the family and the redistributive functions of public bodies), Musterd and Kesteloot (2003) proposed to analyze the trends and the specific role of the pillars inside urban areas. From this analysis, they conclude that:
1°) labour market trends seem to have favoured social exclusion in the cities through professionalization (Hamnett thesis) rather than polarization (Sassen thesis) in most of the European cities;
2°) Welfare state of course softens social exclusion through redistributive policies. However, local bodies have increasingly become growth sustaining bodies rather than social ones. They focus more and more on the will to adapt local conditions to global economic demand;
3°) household structure and social networks play a major role in the concrete process of social exclusion. Some evolutions have contradictory results in political terms. For example, the concentration of immigrants – sometimes also on an ethnic basis – might at the same time favour social networks and soften exclusion process from both labour markets and welfare state redistributive policies and worsens the situation by the concentration of social problems and cultural specificities in some parts of the city.

2. Indicators, data and methodology

In line with the OECD approach, we could define 4 types of indicators related to the major dimensions of social cohesion: self-sufficiency, equity, health, participation to social life and social pathologies.

We will select indicators related to these specific dimensions of social cohesion. These indicators will be compared at the LUZ level, because cities have very different types of internal spatial structure. In social terms, it has huge consequences when comparing social cohesion between cities. While in some cities, the most deprived districts are located in the peripheral parts of the city, in other cities, poor districts are located near the centre. As a result, the LUZ allows a more homogeneous comparison between cities than figures based on core areas.

Inside the LUZ area, social cohesion can be tackled through different forms of aggregation of the data: average of the social indicators for the whole LUZ (average infant mortality, unemployment…); districts inequalities (level of the social indicators in the different districts of the cities); social inequalities at the individual (or household) level (income inequalities, inequalities in the access to the services…). The first types of indicators give an average quality of social life in the cities, the second gives an idea of how much social difficulties are concentrated in different areas while the third allows assessing inequalities at the individual level.

As much as possible, the data will be gathered through the *Urban Audit.* However, given the insufficiencies of data from the *Urban Audit*, we also developed alternative strategies in order to answer the main questions we are asking about social cohesion in the city. The idea is to make proxy of the LUZ from NUTS3 and/or NUTS2 classifications in order to use the more complete set of regional data that Eurostat provides at regional level. Of course, especially for the NUTS2 proxy of LUZ, it limits considerably the number of cities we can take into account in the analysis. But this number is however sufficient to assess

some aspects of social cohesion in the city as well as the relationship between economic welfare and social cohesion.

3. Social cohesion in the European cities

3.1. Self-sufficiency, health and social exclusion

Self sufficiency indicators

Most of the available self sufficiency indicators are related to the labour market. We will not consider labour market participation indicators. Indeed, these indicators are to a certain extent the result of social compromise. For example, should we consider that low labour force participation of old active in France and Belgium raise social cohesion problems? Certainly not, they are the result of social and political choices which might affect competitiveness but not social cohesion in itself.

We will thus focus on unemployment rates as the main indicators of self sufficiency. Of course, it is far from being the best possible indicator. One of the problems is related to international comparisons since labour markets very much depend on national regulations. In more flexible labour markets – such as United Kingdom – low unemployment rates may hide the problems of working poor. In other countries, low unemployment is the consequence of low female labour participation, for example in Portugal. So, we will also show this indicator in comparison to national average. This indicator is available through the *Urban audit* but we can provide a more complete picture from 1999 to 2007 by using NUTS3 proxies of LUZ.

The geography of unemployment is showing a complex pattern (Figure 1). First, it is the result of national differences: low unemployment of the UK and Netherland are to be opposed with much higher rates in Spain or Poland. Second, the map reflects strong regional differences which can also be observed at the city level: typically, east/west difference in Germany, North/south in Spain, Belgium or Italy is highly perceptible in the maps. Third, these maps raise the question of the difference between cities and the rest of the country as well as between major cities and the rest of the country. From the maps, we see no clear evidence that cities have higher or lower rates than average. Calculations confirm that, according to their countries, cities are facing very different level of unemployment rates (Table 1). In most of the cases, cities – and mainly big cities – show lower unemployment rates than average but by far it is not the case for all countries, for example Belgium or Austria. This is particularly the case in most of peripheral countries of Southern, Northern and Eastern Europe. Especially in the Central and Eastern Europe, we can see that the biggest cities are facing less unemployment than the rest of the country: the development gap between the central metropolitan region and the rest of the country appears here clearly in the labour market, also because a still huge part of the unemployed are coming from the rapidly declining agriculture. In the countries of north-western Europe however, we don't observe this gap: this result is interesting because it shows that in some of the richest European cities like London, Wien, Brussels, Paris, Amsterdam, unemployment rates are often higher than national average. It means that for these countries at least there is a decoupling between economic welfare and social cohesion in terms of labour market integration. It could be related to the presence of high masses of unqualified people, notably immigrants.

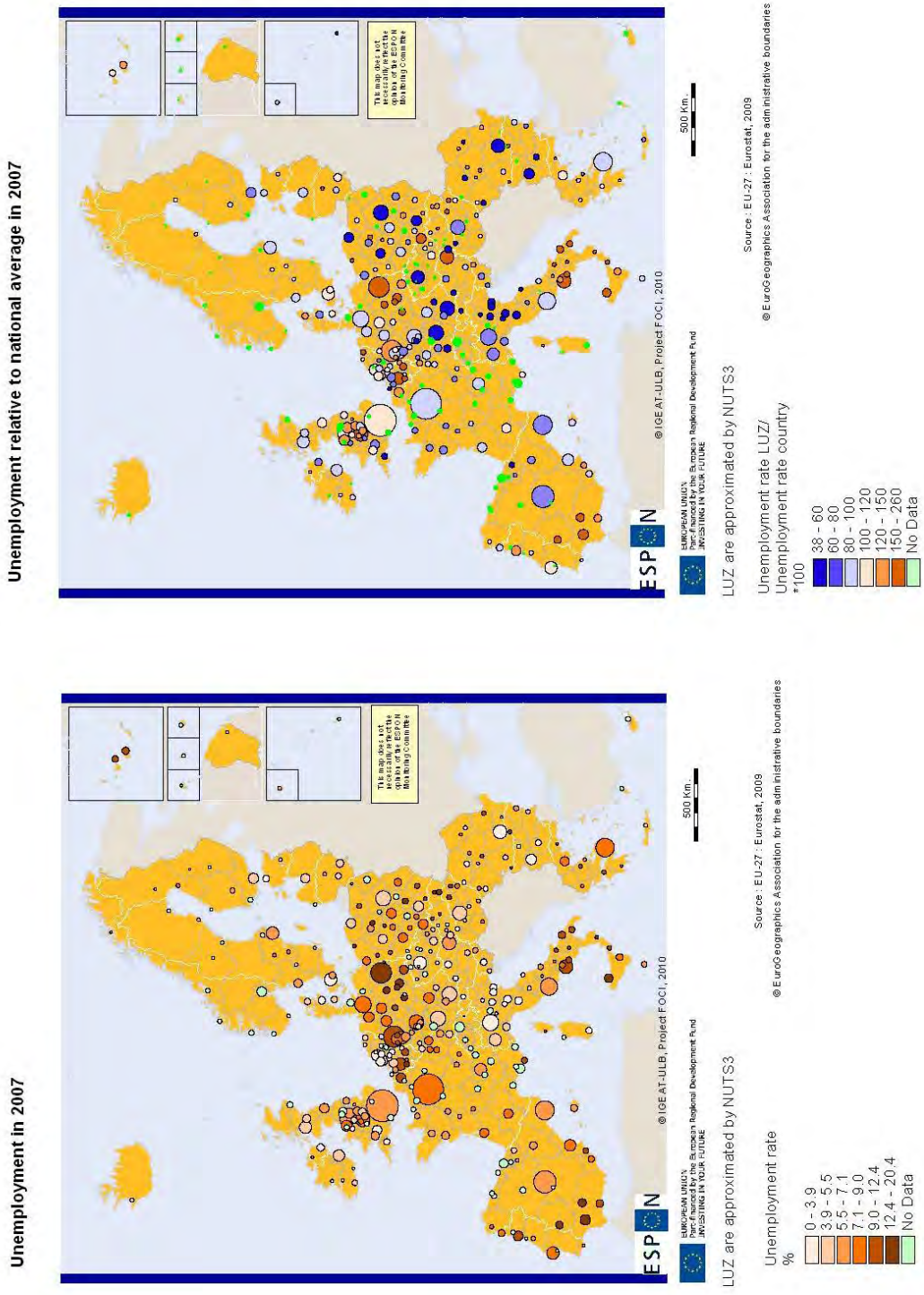


Figure 1. Unemployment rate by LUZ in 2007

	LUZ	Main cities	National mean	Gap between the LUZ with national mean	Gap between the main cities and national mean
AT	5,12	6,54	4,40	0,71	2,13
BE	8,61	10,61	7,46	1,15	3,15
BG	4,71	3,72	6,88	-2,17	-3,16
CY	3,74	3,70	3,91	-0,17	-0,21
CZ	4,85	2,81	5,32	-0,47	-2,51
DE	8,39	9,10	8,61	-0,23	0,48
DK	3,69	3,69	3,79	-0,10	-0,10
EE	3,88	3,66	4,66	-0,78	-0,99
ES	7,44	6,30	8,26	-0,82	-1,96
FI	5,52	4,92	6,85	-1,33	-1,93
FR	8,01	8,30	8,34	-0,33	-0,03
GR	7,31	7,03	8,28	-0,97	-1,25
HU	6,52	4,52	7,36	-0,84	-2,84
IE	4,11	4,13	4,57	-0,46	-0,44
IT	5,88	5,75	6,09	-0,21	-0,34
LT	4,47	4,30	4,30	0,17	-0,01
LU	4,75	4,75	4,07	0,68	0,68
LV	5,18	5,18	6,00	-0,81	-0,81
MT	6,05	5,95	6,44	-0,39	-0,48
NL	3,34	3,80	3,18	0,16	0,62
PL	7,51	6,14	9,60	-2,10	-3,46
PT	7,94	7,89	7,98	-0,05	-0,09
RO	4,71	3,38	6,41	-1,70	-3,04
SE	5,80	5,30	6,16	-0,36	-0,86
SI	4,00	2,82	4,82	-0,82	-2,00
SK	11,47	4,13	11,14	0,32	-7,02
UK	5,51	5,65	5,25	0,26	0,40

Table 1. Unemployment rates in the LUZ, in the main cities* and in the country, in 2007

* This includes all LUZ with more than 2 millions inhabitants and/or the main national city

3.2. Health indicators

Urban audit provides some health indicators but often incomplete and irrelevant. The best available indicator is infant mortality rate. This is a very good synthetic indicator of health. *Urban Audit* provides a very complete picture for this indicator.

The main gap is between Central/Eastern Europe and Western Europe, at the notable exception of the Czech Republic which shows low infant mortality rates. On the other side, it is also interesting to notice the rather high level observed in most of the UK cities. As for unemployment, we observe strong national effect. Regional effects are also perceptible in some cases for example between Northern and Southern Italy. In Eastern Europe, the capital city shows significant lower infant mortality rates, illustrating the development gap with the rest of the country.

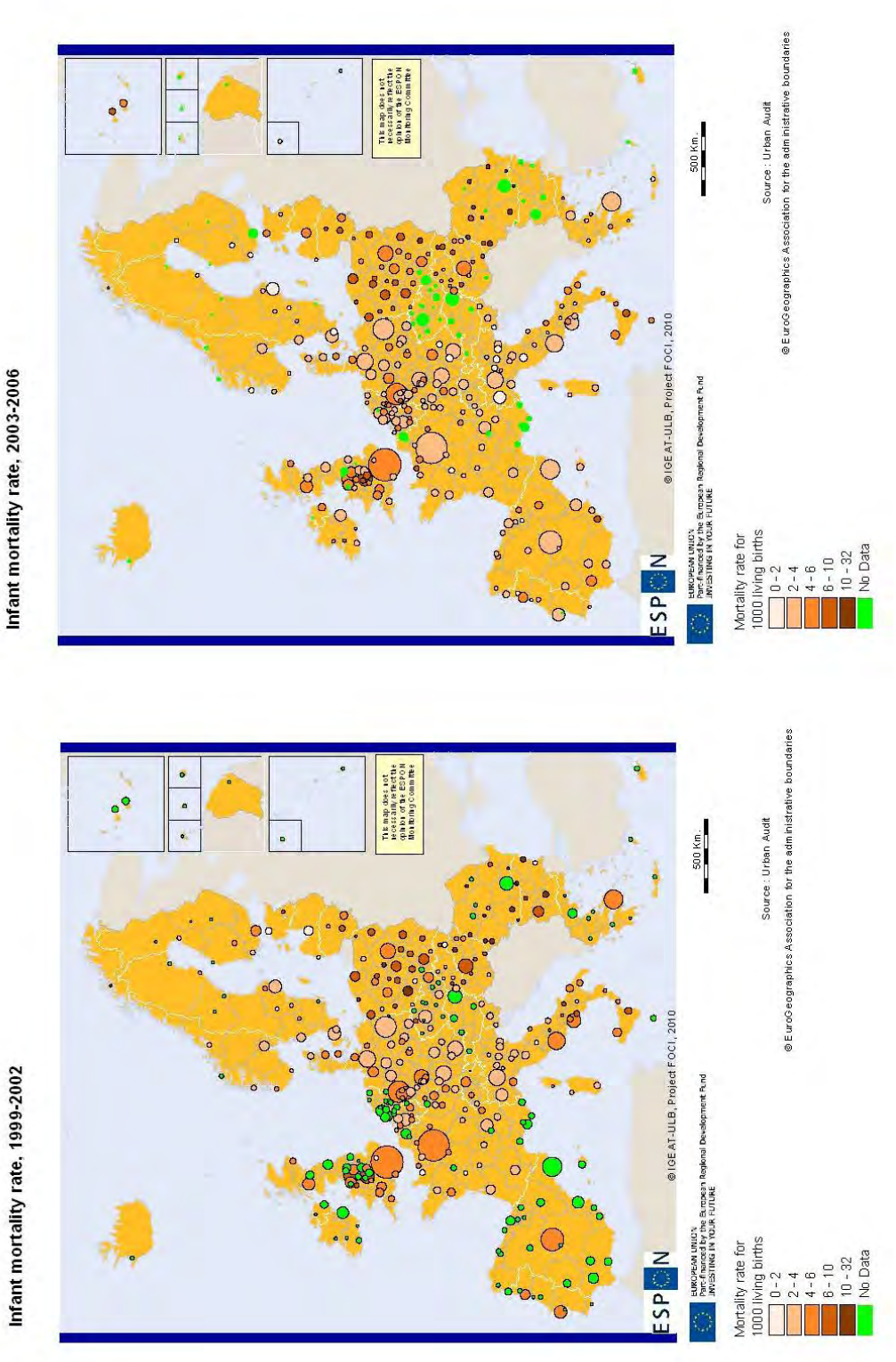


Figure 2. Infant mortality rate by LUZ in 2007

Remark: 1999-2002 data for Belgium have been corrected on the base of 2004-2006 data.

3.3. Participation to social life and social pathologies

Social pathologies are interesting indicators of extreme forms of social exclusion, which might for example result in violence. However, indicators are very incomplete on this theme. From our point of view, the best indicator is the rate of murder and violent deaths because it is less subject than other indicators to statistical bias due to the type of repression apparatus (and the statistical apparatus related to it).
Maps are showing huge geographical disparities among European cities according to two types of violent deaths: homicides and suicides (Figure 3). The main geographical determinant is still the national environment even if some regional effects are also observed. As far as homicides are concerned, the main geographical cleavage is between Eastern and Western Europe, the former which in some cases are 100 times higher than in some Western cities. By far, the Baltic countries have the worst indicators (not shown on the maps because the LUZ cannot be approximated by NUTS2 with a 50% of the population criterion). Concerning suicides, the geographical pattern is more complex even if, in average, Eastern countries have higher suicide rates.

Is there a big city effect for these indicators? Table 3 allows providing a first rough answer to this question. Considering only cities for which a NUTS2 approximation is possible, and countries which have more than one NUTS2, it appears that a big city effect can be observed in terms of social pathologies. While for homicides, big cities have in nearly all countries higher rates than the country, the contrary can be observed for suicide rates. This clearly indicates that cities have specificities in terms of social pathologies. But this city effect is still relatively low in comparison with the strong national differences that can be observed for those indicators.

Country	ratio between big cities homicide rate and national average	ratio between big cities suicide rate and national average
AT	1,27	0,94
BE	1,18	0,91
BG	1,13	0,69
CH	1,22	1,17
CZ	1,21	0,98
DE	1,08	0,99
ES	1,01	0,81
FR	0,73	0,51
GR	1,07	0,84
HU	0,99	0,86
IT	0,71	0,74
NL	1,23	1,15
NO	1,37	0,96
PL	1,30	0,97
PT	1,23	0,93
RO	0,62	0,44
SE	1,17	0,96
SK	1,39	0,99
UK	0,74	0,85

Table 2. Big cities'specificities in homicide and suicide rates according to national average, around 2002 (3-years average)
The cities included are those which allow a satisfactory approximation by NUTS2 (see figure 3)

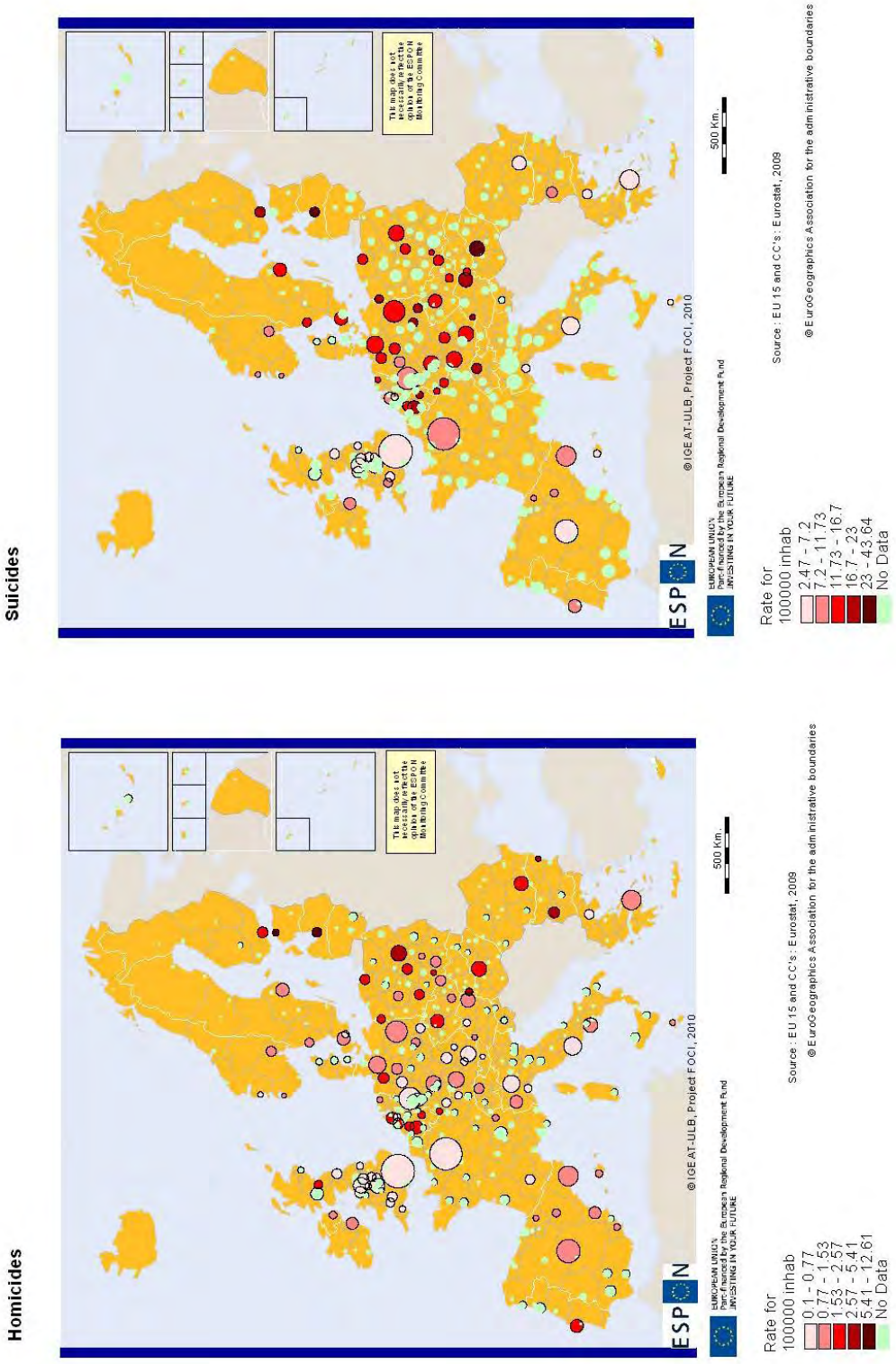


Figure 3. Violent deaths in major European cities around 2002 (3-years average)

- **Social exclusion, inequalities and equity indicators**

This dimension is the most relevant when it comes to analyse social cohesion in the city. Indeed, while cities – and moreover the biggest cities – have generally higher incomes and economic welfare than the rest of the country, it is worth examining whether this average economic welfare of the cities produces or not more social inequalities and specific processes of social exclusion. The literature provides evidences for this but it is of course necessary to test this hypothesis in a systematic way inside the ESPON space.

We select different indicators to test the hypothesis of a city's specificity in terms of social inequalities and social exclusion. Our general hypothesis is that given the dualistic structure of main cities labour markets, we could expect inequalities and social exclusion to be higher (Hamnett, 1996; Sassen, 2001).

- *Unemployment rates according to the diploma*

Unemployment rates by diploma give a similar geographical picture than the unemployment rates. This is why we will use here the gap between the unemployment of low qualified person (up to lower secondary school) and the expected unemployment rates given the average[5].

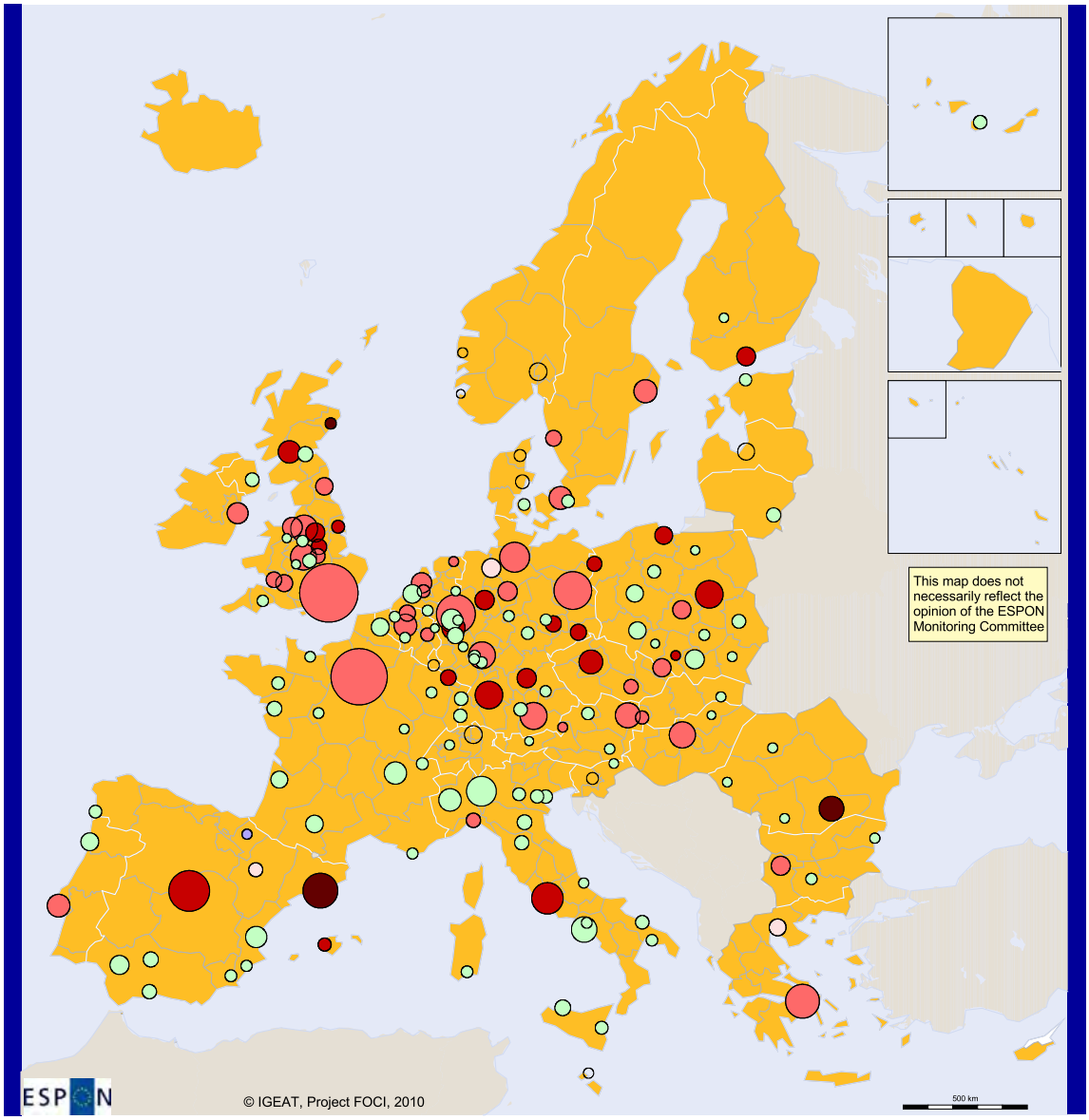
While we have observed see no general evidence of higher unemployment rate in the cities, the literature tells us that the gap between low and highly qualified could be higher in the big cities because of the specificities of the labour market, which require more and more qualified jobs. The Labour Force Survey is the only source to test this and it allows only working with big cities for which a NUTS2 proxy is reliable.

In nearly all European cities, unemployment rates are higher for the low qualified. However, the gap between low qualified and the rest has a strong geographical pattern: while it is very high in most of Eastern and German cities, it shows very little differences in Southern Europe where low qualified persons often have similar unemployment rates than average. Whether big cities have a specific behaviour is of course the main question raised here. The map we provide does not allow answering this question because of the strong contextual national effects. Indeed, low difference between the low and highly qualified can be interpreted in different ways often depending of the national market regulations and specific national behaviour in the labour market participation. For example, we can imagine that the difference observed in Mediterranean countries is the result of low participation in the labour market of the low qualified especially the aged woman, which is indeed the case. On the other hand, the low difference can also mean that the low qualified are force to find a job - even of very bad quality – because of strong incentives to do so. Here, a low difference neither means better labour market conditions for the low qualified. A comparison with national average is the only way to provide a first rough answer to our question of the cities' specificities according in terms of low qualified labour market participation. Our calculations do not confirm our basic hypothesis: on the contrary in many cities, including the biggest ones, the relative unemployment rates of the low qualified is lower than national average. This is also true for big world cities like London, Paris, Amsterdam, Frankfurt or Milan. Of course, major exceptions are also to be found especially the two biggest Spanish cities and some big

[5] Through a regression analysis between low diploma unemployment rates and average unemployment rates, we evaluate the residuals of the low diploma unemployment rates. This indicator is very correlated with the simple ratio between unemployment rate of low and higher diploma, but is more robust because it does not depend upon the average unemployment rate.

eastern cities. These results suggest that in relative terms at least, low qualified seem to benefit from more job opportunities in the big cities than in the rest of the country. This first rough answer needs of course to be confirmed, notably with more detailed case studies. Also, it tells us nothing about the forms of labour market participation of the low qualified in the cities. This question will be further explored by income inequalities data as well as with the analysis of the relationship between social and economic indicator (section 3).

Unemployment of low qualified compared to national average, 2006



Unemployment rate among low qualified in the LUZ/
Unemployment rate in the LUZ

Unemployment rate among low qualified in the country/
Unemployment rate in the country

- -0.75 - 0
- 0 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3.8

Regional level: LUZ proxy by NUTS2
Source : IGEAT, 2009
Origin of data: LFS, 2008

Figure 4. Relative low diploma unemployment rates according to the national average, in 2006

Note on the indicator: the indicator shows the unemployment rate of low qualified as compared to average unemployment rates in the LUZ. This rate is then compared with the same rate at the national level. It means: the higher the indicator, the higher the difficulty of low qualified to find a job as compared to rest of the country.

Incomes inequalities

Data in the urban audit cover a few countries only with some unreliable statistics such as the level of poverty in Copenhagen (72% of households receiving less than half of median income). Alternative calculation might only be produced by using enquiries such as SILC which allow a proxy of inequalities at NUTS2 level. But, this type of assessment is far beyond the possibilities of this project.

- **Socio-spatial inequalities**

One of the aspects of social cohesion in the city is related to the gaps between neighbourhoods. Whether these inequalities provoke more social difficulties in general is subject to scientific debate (Murie & Musterd, 2004). However, we raise the hypothesis that the concentration of social difficulties in some specific areas of the cities may indeed reinforce the social problems of the resident population. This is why it seems necessary to assess socio-spatial inequalities in the cities. However, it is important to insist on the fact that low neighbourhood inequalities do not mean necessarily a better social cohesion. The spatial configurations of the social problems are only one aspect of the social cohesion issue.

Urban audit provides statistics at the sub-city level. But this is an immense task and data are still quite incomplete. Because of these limitations, we have to remain very careful in the interpretation of the data. First, districts data are only available for the core city. This is a problem in terms of comparison given the fact that socio-spatial structure of the cities are very different from one city to another: in some cities, poor neighbourhoods are concentrated in the core city while in other they are located in the suburbs. Second, only few indicators are available for a sufficient number of cities. Third, despite the successful efforts to limit these differences, the size of districts is still unequal from one city to another and this might affect the measure of socio-spatial inequalities.

The availability of data obliges us to focus on unemployment rate to measure district inequalities. The figure 6 shows the weighted variance of unemployment rates by district. It shows huge differences in the socio-spatial inequalities in the cities: the highest levels are reached in UK, France, Belgium and some cities of southern Europe while we find low levels in most of Eastern countries (except Poland), in Nordic countries, in Western germany and Northern Italy. Low socio-spatial inequalities in Eastern cities are the result of real estate mechanisms and are still to a certain extent an inheritage of the communist period. In other parts of Europe, this low level can be explained by the high share of social housing (Nordic countries), as opposed to countries like Belgium where most of the housing is private with a great freedom of land use.

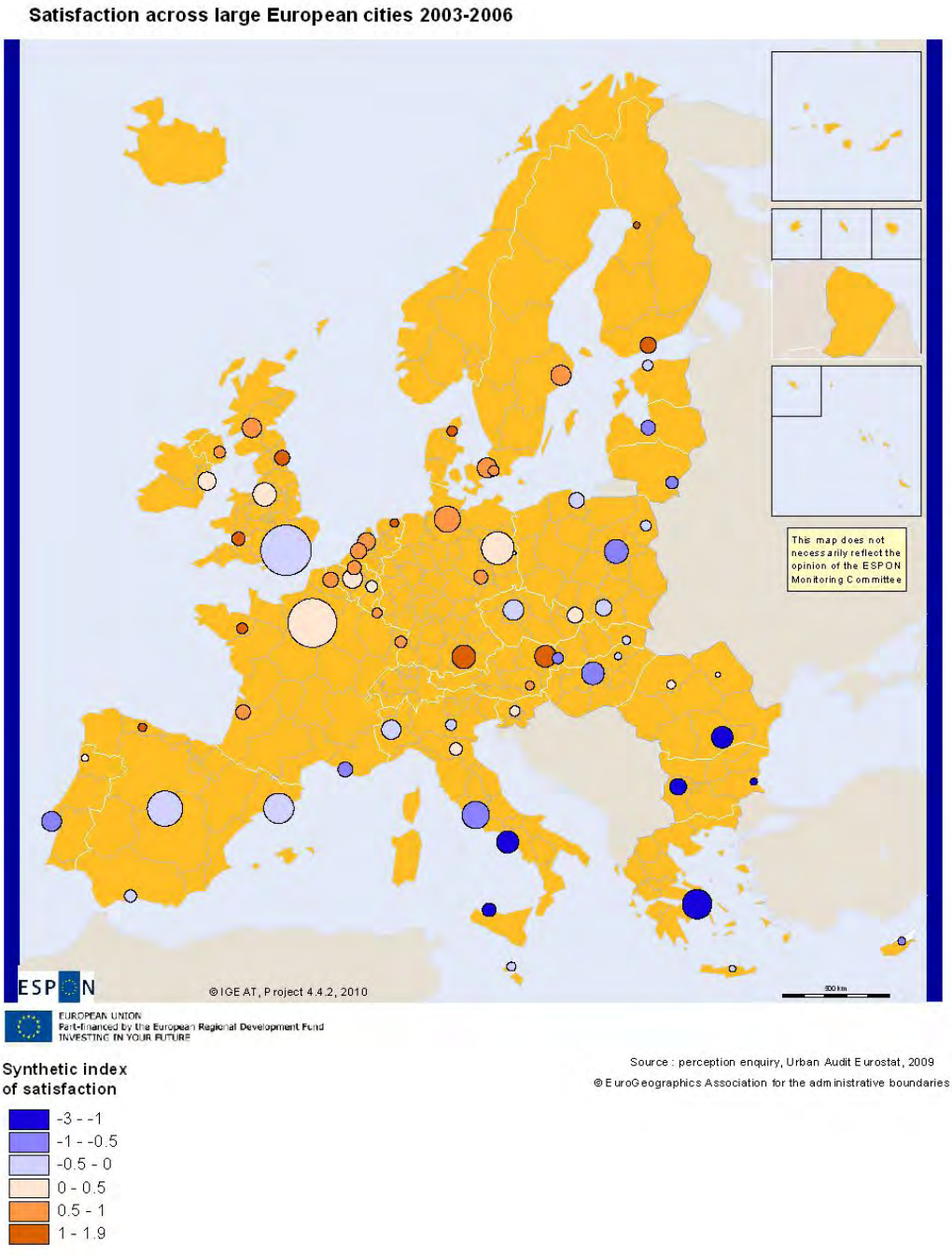


Figure 5. District inequalities in European cities

Note: For each city, unemployment rates of each district have been compared to the average. These differences are weighted by the total active population and summoned.

As a result, it gives a synthetic index of the intensity of the differences between districts in the core city.

3.4 Perception indicators

The perception survey gives for 69 large European cities average indicators of satisfaction for different themes: public services, environment, economic aspects…

For each theme, the data provide a synthetic indicator of satisfaction. Through a Principal component analysis, it is possible to provide a synthetic indicator of general satisfaction, but it is still necessary to provide information on main themes separately because these different themes do not necessarily provide a homogeneous picture: for example, the quality of public services is not perceived the same way according to the different aspects (transportation, hospitals, schools…). As a conclusion, it seems reasonable first to provide a general index of satisfaction (the score on the first component) and then to provide information on the main themes separately.

The figure 5 gives the score of each city on our general satisfaction index. Macro-regional oppositions clearly appear from the map, with Eastern and to a lesser extent Southern cities having lower satisfaction level than northern and north-western cities. This is interesting because it appears that the index of general satisfaction is relatively well correlated with GDP/head. However, inside the different macro-regions this correlation does not exist anymore. It means that to a certain extent the difference of satisfaction between cities in the 3 macro-regions of Europe is related with strong economic differences but inside these groups, where economic differences are less important, other factors seem to explain the general level of satisfaction. When controlled by the GDP/head to explain difference in satisfaction across the cities, the size of the cities seems to play a negative role on the satisfaction level. To better understand the picture observed, more sophisticated analysis should be necessary but data do not really allow such analysis.

The following maps give the picture for several dimensions of satisfaction, showing different geographical patterns according to the different aspects of daily life in the cities (Figure 6). Indeed, while the general index of satisfaction is to a certain extent related to the wealth level, some very important aspects – including financial ones – are showing very different picture: for example, housing problems are very important in Paris, London but also, for different reasons, in cities like Stockholm and Helsinki; while being the richest city in Europe, London has also very high share of persons with difficulties to pay the bills at the end of the month…

These remarks demonstrate the interest of crossing perception index with some objective measures of related aspects (Figure 7). Of course, there is often no single indicator related to the objective reality associated to the perception indicators. However, we show here some examples to illustrate the complexity of the perception indicators: while the perception of the access to jobs seem significantly correlated to unemployment rates the access to housing is not correlated to average prices; in the same way, the difficulty to pay the bills is not significantly correlated to the average production per inhabitant.

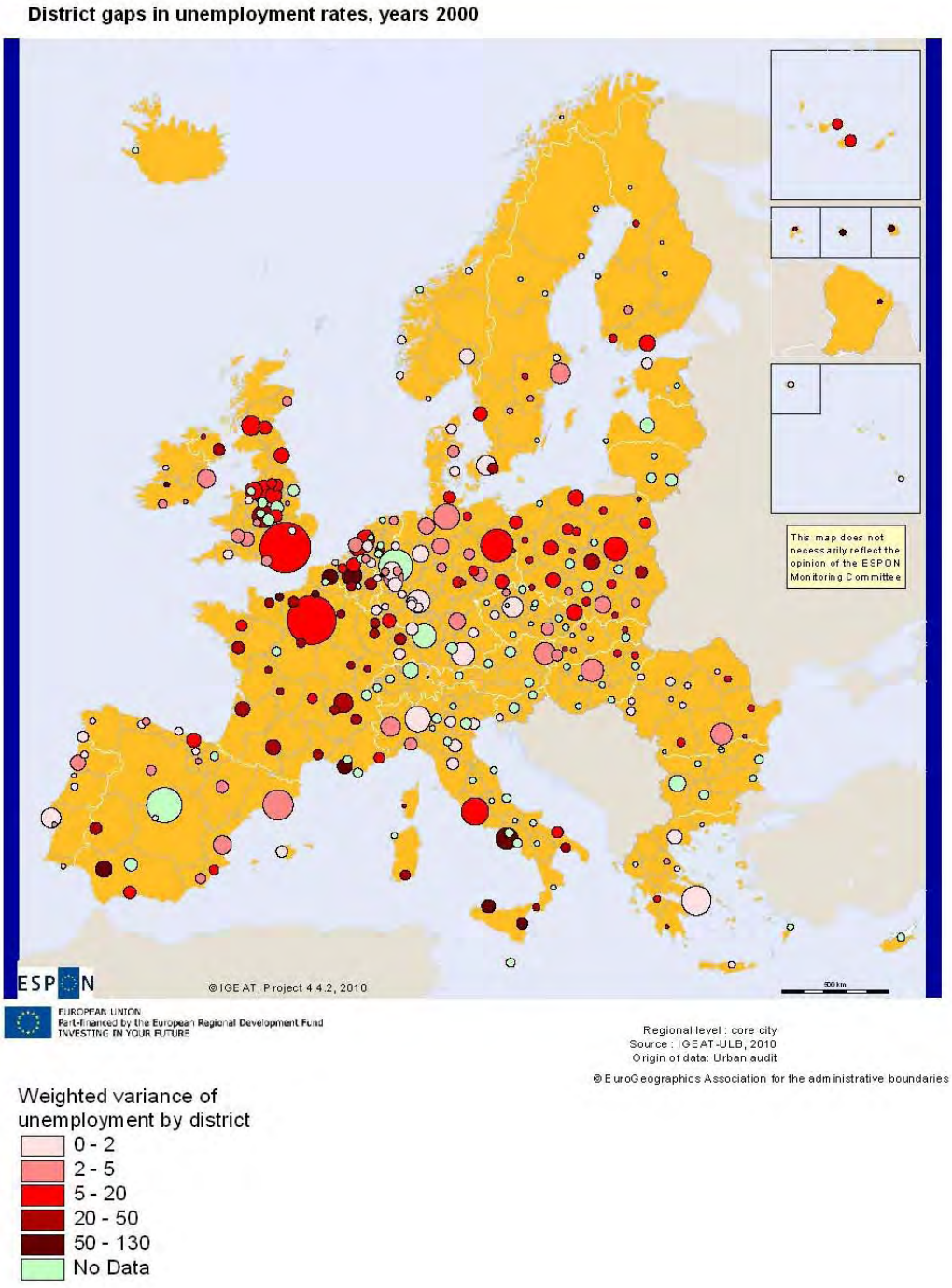
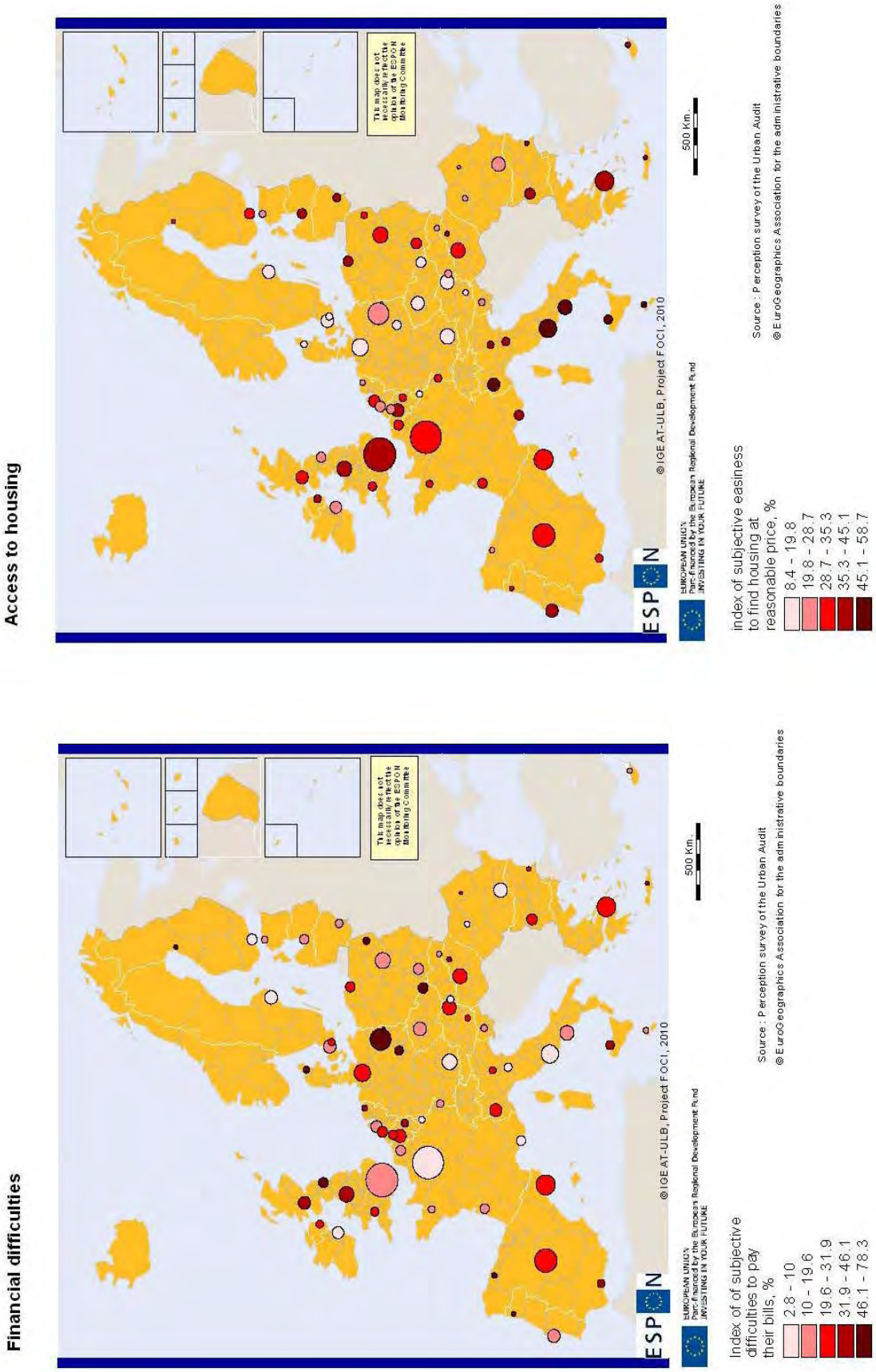


Figure 6. Average satisfaction across European cities, 2006
Source: Perception survey, Eurostat
Note on the indicator: Perception survey provides satisfaction level for different aspects. A Principal component analysis allows providing a synthetic index of satisfaction, which is mapped here.


Access to housing
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
500 Km
ESPON
©IGEAT-ULB, Project FOCI, 2010
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Index of subjective easiness to find housing at reasonable price, %
8.4 - 19.8
19.8 - 28.7
28.7 - 35.3
35.3 - 45.1
45.1 - 58.7
Source : Perception survey of the Urban Audit
©EuroGeographics Association for the administrative boundaries
Financial difficulties
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
500 Km
ESPON
©IGEAT-ULB, Project FOCI, 2010
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Index of subjective difficulties to pay their bills, %
2.8 - 10
10 - 19.6
19.6 - 31.9
31.9 - 46.1
46.1 - 78.3
Source : Perception survey of the Urban Audit
©EuroGeographics Association for the administrative boundaries

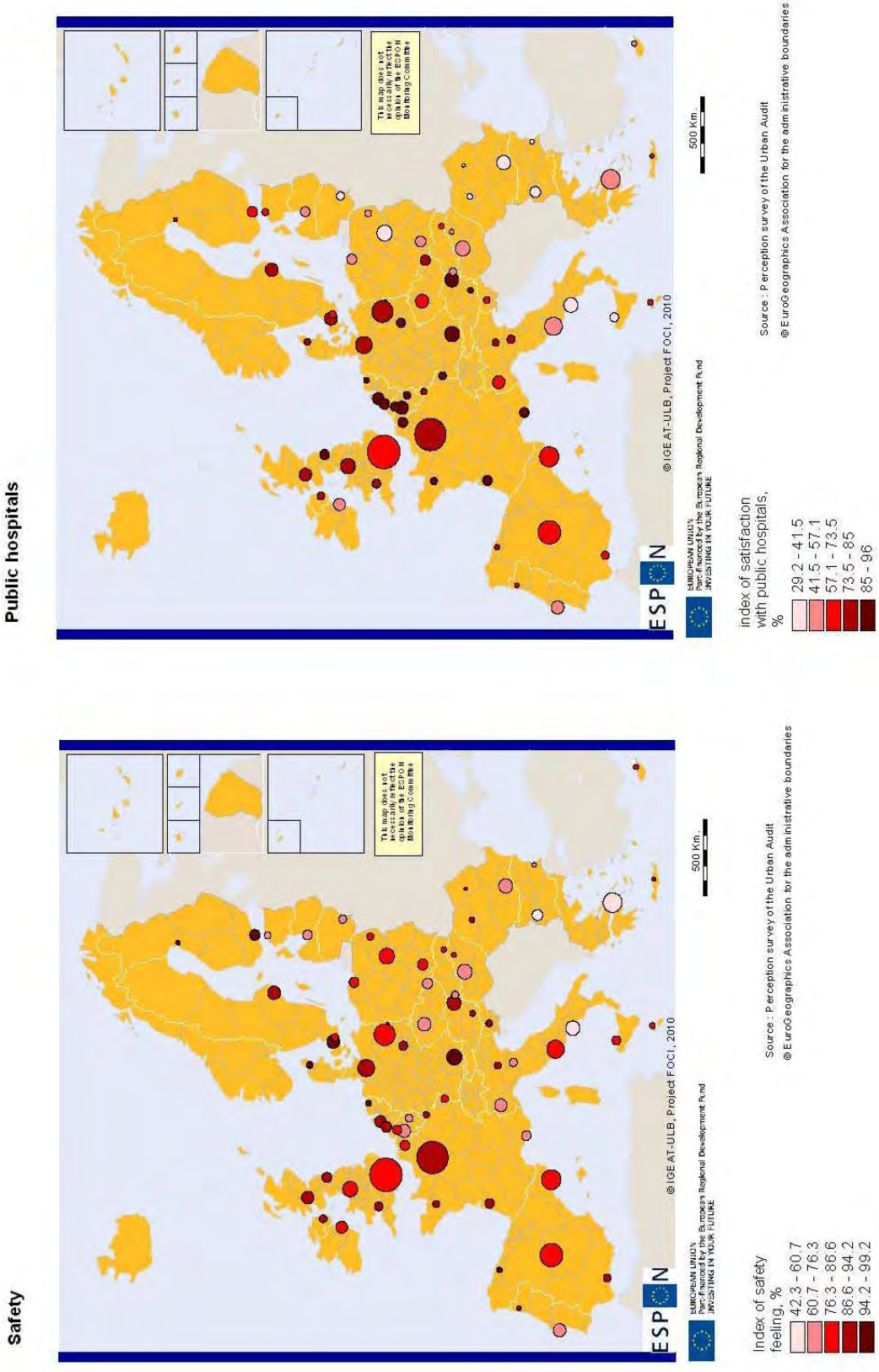


Figure 7. Satisfaction according to different aspects of daily life in large European cities

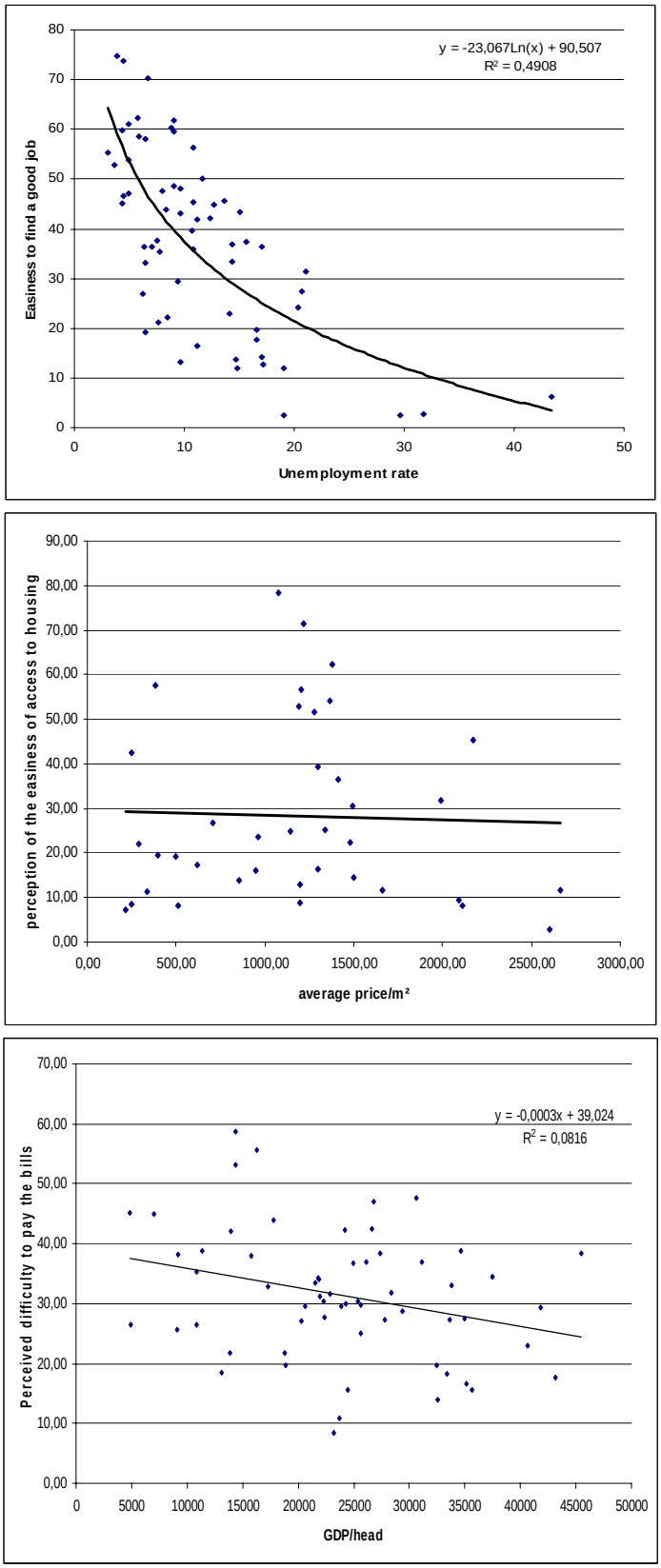


Figure 8. Comparison of satisfaction index in different fields with related objective measure: Easiness to find a job and unemployment rate; easiness to find housing and average price/m²; difficulty to pay the bills and GDP/head.
Important remark: these graphs should be interpreted with care since they do not always strictly refer to the same territory: perception survey concerns core cities while some indicators are only available at the LUZ level (GDP/head).

4. Economy and social cohesion in the city

One of the central questions is whether social cohesion still depends on economic wealth in European cities. From the literature, we can raise the hypothesis that within new forms of growth in the globalized and knowledge-based economy, social cohesion is more and more decoupled from economic performances. However our data do not allow giving a definitive and unambiguous answer to this question. On the one hand, social cohesion data are very incomplete in Europe. On the other hand, as we will see in our analyses, the answer depends on the social indicator we look for. Despite the poverty of the data, this analysis provides a unique assessment of this question in European cities.

Finally, the answer to this question has important policy implications since it gives indications on whether we can expect competitiveness policies to improve social cohesion, notably through trickle down effect.

4.1. Indicators and methodology

Economic wealth will mainly be measured through the most classical indicator, that is GDP/head in PPS. These data are nearly complete from 1995 to 2006 and enables us to measure an evolution (see the working papers on benchmarking of competitiveness).

Because of the availability of the data, we will focus on the following indicators of social cohesion:

- unemployment rates (according to European and national average) which is also the only indicator which allows to have a dynamic view;
- “development indicator”, mainly infant mortality rate;

Statistical analyses do not pretend to be explanatory and will only show whether or not social indicators are correlated with economic wealth (GDP/head). Because the social indicators cover different range of cities, statistical tests will be ran for different list of cities.

4.2. Economic wealth and unemployment

According to table 1, there is a significant but low correlation between GDP/head and unemployment rate in the years 2000. It means that to a certain extent there could be a relationship between the economic development and the unemployment for European LUZ: the higher the GDP/head, the lower the unemployment rate. Results are very similar when Eastern and Western Europe are divided, which means that these correlations are not related to the East/West gap inside Europe.

However, we could expect a stronger relationship in dynamic terms, especially because in there are strong evidences that, in a given territory, economic growth allows reducing unemployment rates. However, this is not the case. Several explanations can be proposed:

- unemployment rates are much related to the national context in which the city is embedded, notably because of the type of labour market regulations. From this, we could expect higher correlation when they are calculated according to national average. But figures change little when calculated according to national average. It means that this explanation is not the main one;
- unemployment rate is not only related to economic wealth but also to socio-demographic structures. For example, all things being equal the evolution of the age structure has an impact on the dynamics of unemployment rates. Moreover, the participation in the labour market differs significantly from one country to another or one city to another, for example concerning women;
- our main hypothesis is however that economic wealth is partly decoupled from labour market participation, mainly because the new forms of economic growth

are more and more intensive in knowledge, and could be more and more excluding for the low qualified population. The presence of low qualified population, notably immigrants, might therefore have a negative impact on unemployment.

It is not possible here to test these hypothesises because they would require many more data than available. However, we can still insist on the low relationship between economic wealth and unemployment across European cities, especially in dynamic terms. This result is important by itself because it tells that economic growth differential between cities does not explain differential in the evolution of unemployment rate. Even, when analyses are made according to national average, the correlation is nearly significant.

	All cities (LUZ) with a NUTS3 Proxy	All West European cities (LUZ) with a NUTS3 Proxy	LUZ > 1000000 inhab. (1)
GDP/head and unemployment in 2006	-0.482(**)	-0.435(**)	-,447(**)
GDP/head and unemployment according to national average in 2006	-0.440(**)	-0.383(**)	-,567(**)
Evolution of GDP/head and unemployment between 2001 and 2006	-0.008	0.033	-0.129
Evolution of GDP/head and unemployment according to national average between 2001 and 2006	-0.131(*)	-0.151(*)	-0.162
N	239	180	80

Significant ** at 0.01; * at 0.05

Table 1. Correlation (R Pearson) between economic wealth and unemployment rates, in the years 2000, in static and dynamic terms

(1) the analysis has been made on 80 cities of more than 1000000 inhab. allowing a NUTS3 proxy of the LUZ.

4.3. Economic wealth and social cohesion indicators

In addition, we propose here to assess the relationship between economic development and diverse social cohesion indicators across European cities.

We could expect that economic wealth is much better correlated with social indicators usually described as “development indicator” in the international literature: it concerns health indicator, education indicators or quality of the equipments (internet facilities…).

Indeed, the very important indicator of infant mortality rate is correlated with GDP/head. However, it seems that beyond a certain level of GDP/head, social or health indicators are not related to national incomes anymore. Indeed, when Eastern countries are excluded, the observed correlation disappears. It means that the correlation between GDP/head and infant mortality rate is only due to the gap between Eastern and Western Europe in both GDP/head and infant mortality rate. When we turn to education

indicators, we reach similar conclusions: correlation is weak and inexistent if we focus only on West European cities.

This result has political consequences since it means that at the level of development reached in the EU (at least the EU-15) social cohesion cannot be achieved through economic development strictly defined (that is economic growth) but relates to other factors, notably through the quality of public services.

	LUZ according to NUTS2 or NUTS3 proxy	N	all available Urban audit cities	N	excluding New Member States cities	N
Infant mortality rate	-,494(**)	45	-,426(**)	139	-0.041	97
Share of higher diploma	0.279	45	,399(**)	102	-0.012	68
Share of students leaving without diploma	-	-	-0.017	84	0.114	70
General level of satisfaction (1)	.431(**)	62			.387(**)	44
District gaps in unemployment (1)			-0.074	188	-0.090	146

Significant ** at 0.01; * at 0.05

Table 2. Correlation (R Pearson) between economic wealth (GDP/head) and some social indicators, in the years 2000.

(1) Data come from perception survey or the district statistics of the Urban Audit and only concern core cities while GDP level is defined at the LUZ level

Source: Eurostat, urban audit; Eurostat, Perception Survey; Eurostat, Regional Statistics. While *Urban Audit* data allow considering more cities, they are biased because only some countries are available for the indicators while NUTS2 proxy data allow a complete picture for cities allowing such proxy (that is 45 LUZ).

5. Conclusions

In this chapter we identified the main trends and main driving forces according to social cohesion in European cities. The growing social and socio-spatial polarization appears to be the most noticeable evolution of social cohesion in European cities. It relates to different driving forces:

- a professionalization and/or polarization of the job offer, especially in major cities, in a context of knowledge-based growth and globalization;
- the household de-composition and the concentration of deprived international immigration in cities play an important role in the social exclusion process;
- a shift from welfare policies toward entrepreneurial cities and from households-oriented policies towards intra-urban place-based policies (flagship project, social mix policies…).

It is very difficult to give a precise geography of these processes but it is certain that the national context is the main driving force behind this geography. It means that while these processes have been common to all European countries and cities, national differences are still decisive:

- social polarization is still limited in Nordic countries;
- North-western countries (Germany, Belgium, France…) have also growing but more limited social polarization. However, we find here huge differences in the intra-urban socio-spatial inequalities with for example limited neighbourhood differences in Netherland (because of the high share of social housing) and Germany as compared to Belgium or France;
- Eastern countries have gone through a growing social polarization (starting from relatively low level) but socio-spatial polarization is still limited by the characteristics of the housing markets, except in Poland;
- social polarization reaches the highest level in Anglo-Saxon and Mediterranean cities because of weaker welfare state.

What can we expect in the future according to these major trends and their driving forces?

1. The crisis has changed the conditions in the past few years. It is thus very difficult to tell whether the social polarization process will continue in the near future, while it is certain that the crisis will intensify social exclusion. The answer to this question mainly relates to the level of welfare state we may expect in the future. The issue of the crisis might either be new reduction of social redistribution because of the state of public finances or the emergence of a new social compromise. The former evolution has already been implemented in the countries which have been strongly hit by the crisis: Ireland, Baltic countries, Greece. The latter could take years to happen.

2. According to the socio-spatial polarization, we believe that its geographic reshaping – if not its intensity – will continue in the future. It mainly concerns “urban renewal” or “gentrification” which relates to the new attractiveness of core areas of the cities for the wealthy populations. This process often results in negative consequences for the most deprived populations. This conviction relates to the fact that this “renewal” process is the more intense in the most urbanized parts of Europe (“the blue banana”), especially in England, which in the past have often been the first to go through new intra-urban processes (such as suburbanization).

3. One of the main conclusions raised by our study, in line with the literature is that we observed a decoupling between social cohesion indicators and economic evolutions. It means that, having reached such a high development level, social cohesion in the European cities is no more related to the pure economic wealth of the population, except concerning the gap between Central-Eastern and Western cities. In this case, the persistent economic gap is still correlated with differences in social cohesion.

In line with these general conclusions, we propose some preliminary reflections about policy options. First it is important to recall that urban policies are not the main driving force in terms of social cohesion, and that the state level policies are much more decisive. Second, concerning urban policies, the cities are nevertheless in charge of some important aspects. It seems to us that social housing is one of the most important. High shares of social housing potentially reduces not only housing difficulties but also tend to limit socio-spatial inequalities, such as in Holland, which obviously limit the concentration of disadvantaged in specific areas. Third, urban social cohesion policies have been more and more oriented towards place-based policies. This urban policy orientation raises important issues, especially because such policies might fail to reach the most disadvantaged and may possibly have negative consequences on these populations, when the focus is on renovation of the public space without protecting the local residents.

Bibliography

Atkinson A.B. (2003), "Income inequality in OECD countries: data and explanations", Cesifo Economic studies, vol49, 4, p. 479-513.

Atkinson A.B., Marlier E., Nolan B. (2004), "Indicators and targets for social inclusion in the European Union", JCMS, vol 42, 1, pp47-75

Badcock B. (1997), "Restructuring and spatial polarization in cities", *Progress in Human Geography*, 21-2, pp251-262

Buck N. (2005), "Social cohesion in cities", in Buck, Gordon, Harding and Turok, *Changing cities?* Palgrave MacMillan, p. 44-61

Castells, M. (1996), *The rise of the network society*, Cambridge: Blackwell.

Cox R, Watt P. (2002), "Globalization, polarization and the informal sector: the case of paid domestic workers in London", *AREA*.

Donzelot J. (2004), « La ville à trois vitesses: relégation, périurbanisation et gentrification », in Esprit, N°303, pp 14-39.

Duménil G., Lévy D. (2001), "*Sortie de crise, menaces de crises et nouveau capitalisme*, *Une nouvelle phase du capitalisme?*, Syllepse : Paris.

Esping-Andersen *(1990), The Three Worlds of Welfare Capitalism*. Cambridge: Polity Press & Princeton: Princeton University Press.

Fujita M, Krugman P., Venables, A.J. (1999), *The spatial economy. Cities, regions and international trade*, Cambridge: MIT Press

Growing regions, growing Europe. Fourth report on economic and social cohesion. European Union. Regional Policy. May 2007.

Hamnett C. (1996), "Social polarisation, Economic restructuring and welfare state regimes", *Urban studies*, p 1407.

Hamnett C. (2003), "Gentrification and the middle class remaking of inner London 1961-2001", *Urban studies*.

Harvey D. (1990), *The condition of postmodernity*, Cambridge, Oxford: Blackwell.

Harvey D. (2006), *The Limits to Capital*, The University of Chicago Press, Chicago, 478 p..

Harvey, D (2005) *A Brief History of Neoliberalism,* Oxford University Press

Husson M. (2008), *Un pur capitalisme*, Editions Page Deux.

Jessop, B (1997) *Survey Article: The Regulation approach*, in the Journal of Political Philosophy volume 5, number 3, 1997 pp. 287-326

Kazepov Y (ed) (2004), Cities of Europe: Changing Contexts, Local Arrangement and the Challenge to Urban Cohesion, Blackwell Publishers.

Knox P.L., Taylor P.J. (1995), *World cities in a world system*, Cambridge: Cambridge University Press, 1995, 335 p.

Lees L., Slater T., Wyly E. (2007), *Gentrification*, London, New York: Routledge.

Madanipour, A., Cars, G. & Allen, J. (eds.) (1998), *Social Exclusion in European Cities. Processes, Experiences and Responses*. London: Jessica Kingsley.

Marcuse P and van Kempen R(eds) (2000), *Globalizing Cities: A New Spatial Order?,* Oxford: Blackwell, 2000.

Mingione E (1999), *Urban poverty and the underclass: a reader*, Blackwell, Oxford et Maleden.

Moelaert F., Rodriguez A., Swyngedouw E. (2003), *The Globalised City: Economic Restructuring and Social Polarisation in European Cities*, Oxford University Press

Moulaert F. (2002), *Globalisation and Integrated Area development in European Cities*, Oxford University Press

Musterd S and A.Murie (2004), *Social exclusion and opportunity structures in European cities and neighbourhood*, Urban studies, vol.41, n°8, 1441-1459.

Musterd S., Ostendorf (2004), "Social exclusion, segregation and neighbourhood effects", in Buck, Gordon, Harding and Turok, *Changing cities?* Palgrave MacMillan, p. 170-189

Musterd, S. and M. de Winter (1998), "Conditions for Spatial Segregation: Some European Perspectives", *International Journal of Urban and Regional Research*, 22:4, pp. 665-673.

Musterd & Kesteloot (2003), *The spatial dimensions of Urban Social Exclusion and Integration*, Fourth framework program

OECD (2006), Territorial Reviews: Competitive Cities in the Global Economy

OECD, International migrations outlook 2007, www.oecd.org/els/migration/imo

Parlement Européen (2008), *Régions en déclin : un nouveau paradigme démographique et territorial*.

Sassen S. (1998), *Globalization and its discontents*. New York: The New Press

Sassen, S (2001) *The Global City,* Princeton University Press

Smeeding T. (2002), « Globalization, Inequality and the Rich Countries of the G-20: Evidence from the Luxembourg Income Study (LIS) », *Working Paper No. 320, Luxembourg Income Study*.

Smith N. (2002), *New globalism, new urbanism : gentrification as global urban strategy*, Antipodes, Blackwell.

State of European cities Report. *Adding value to the European Urban Audit. European Union*. Regional Policy. May 2007

Swyngedouw E. (2007), *The Post-Political City* in: *Urban Politics Now: Re-Imagining Democracy in the Neoliberal City* (edited by BAVO) Nai Publishers Rotterdam

Vaattovaara M, Kortteinen M. (2003), *Beyond polarisation versus professionalisation ? a case study of the dvlpt of the helsinky region, Finland*, Urban studies.

Van Criekingen (2008), « Réurbanisation ou gentrification ? Parcours d'entrée dans la vie adulte et changements urbains à Bruxelles », *Espaces et sociétés*, n°134.

Van Criekingen M., Decroly J.-M. (1998), *Vers de nouvelles politiques urbaines: le modèle entrepreneurial*.

Van Hamme G., Vandermotten C., Medina P., Wayens B. (2004), *Migrations in the European Union: from the last decades to the new trends*, Edition Maison de la géographie, 120p.

Van Kempen E. (1994), *The dual city and the poor: social polarisation, social segregation and life chances*, *Urban studies*

Veltz P. (1996), *Mondialisation, villes et territoires: l'économie d'archipel*, PUF, Paris, 264 p.

Wilson (1987), *The truly disadvantaged: the inner city, the underclass and public policy*. Chicago, IL: University of Chicago Press.

Chapter 4 – Benchmarking of cities competitiveness: an approach combining different sources

Gilles Van Hamme and Moritz Lennert, IGEAT

1. Of the concept of territorial competitiveness

Competitiveness is one of the fundamental notions in European (and other scales) policy making, as witnessed by the Lisbon strategy, and in its territorial form, as regional or urban competitiveness, it has been the main focal point of attention of territorial development policy discussions. However, the notion in itself is quite contested and it is, therefore, important to reflect on it before plunging into an attempt to empirically assess the competitiveness of European cities.

The notion of competitiveness comes from the business world in which several companies compete in a bounded market for market shares. The entire organisation of each enterprise targets the sole objective of selling its products. If a company is not competitive it will lose market shares and, in the extreme case, go out of business.

Several authors analysing regional competitiveness have highlighted fundamental differences between companies and regions in this respect (Krugmann, 1997; Martin *et al.,* 2006) : a first difference concerns the notion of bounded markets. As Krugman points out, trade and competition between regions (or nations) is not necessarily a zero-sum game as markets can grow because of this trade. A second important distinction concerns the viability of the competing entity. Contrary to firms, regions cannot go out of business, they continue to exist even if their economic production decreases. This poses a fundamentally different challenge to regional policy makers than firm executives face.

These critiques do not go far enough, however. It is important to underline that the *raison d'être* of regions is obviously fundamentally different from that of companies. Regions are not “created” for creating and selling products. Regions just are and the main “objective” of regions is not to sell products on a market, but to ensure adequate living conditions for its inhabitants. Where a company has to sell its products or disappear, a region can live happily in complete autarchy, and so does not depend on markets for its survival. Obviously, no region in Europe is in this situation today, and trade is an important part of regional economies today (with most people clearly benefiting from this trade in a logic of division of labour), but by putting the sole emphasis on (external) trade, most theories hide this fundamental difference between companies and regions. To put it differently, people in a region can produce themselves whatever they need. Trade is “only” a means to increase productivity through division of work. And a non-negligible part of regional economies cannot be traded, such as personal or public proximity services

Another fundamental problem with the notion of territorial competitiveness (and the first arguments above in the exact same way) is the question of definition of the relevant territories. A company is clearly defined and delineated (even though there might be subcontracting structures with complete dependencies of some firms on others which makes this a bit more complicated), but regions and cities are not. Even though a firm’s competitiveness is also influenced by outside factors and decisions, it is an autonomous and bounded entity. Regions and cities are not bounded, nor are they generally autonomous, they are not even defined other than by more or less arbitrary

administrative or statistical delimitations. One can argue that cities can be understood as functional areas that can be delineated, for example, by their commuting space, but this does not make them into autonomous and clearly bounded actors. The economic activities that take place within a specific territorial delineation (administrative or functional) are organised and decided at very different scales and in many different places within and outside the region because the actors of economic production are not limited by its boundaries. This issue is reinforced by the difficulty of measuring regional economic production and its factors through statistics organised by the aforementioned delimitations.

More importantly than the issue of geographical delimitation is the question of responsibility and action. A company has clear decision-making structures with certain persons able to influence the entire organisation. This is obviously not the case for regions which thus cannot be considered as actors, but more as containers of actions by very many, diversified and sometimes conflicting actors which each act at very different scales. Isolating one of these actors at one specific scale, e.g. the regional government/governance structures, as the most determinant is highly problematic, if not outright wrong.

Finally, while all members of a company work productively with the goal of selling the company's products, this is obviously not the case for territories in which large parts of the population are unproductive in the GDP sense (people not active in the GDP-valorised economic sphere, elderly, sick, children), but are still an integral and important part of the region. This raises the question of definition or rather of measurement of competitiveness, often approached through (total) GDP or productivity growth. If one takes two regions with the same total population and same productivity levels, but one with a lower activity rate than the other, the latter will obviously have higher GDP, and higher GDP/capita, and thus generally considered as more competitive, but with many more people having to work in the economic sphere. However, if one extends the notion of quality of life to go beyond income and employment, and if one considers human society and its interactions as going beyond the economic sphere, thus including family care, voluntary work, etc, one might consider the former region as more competitive, as it allows a large part of its population to live and take part in society without creating GDP, thus raising the question of other factors of quality of life than the only measurable one, i.e. income. However, as redistribution of income is often not organised at regional, but at national level, the debate is more complex than a “choice” by one “region” on its own. The current search for measures “beyond GDP” witnesses of the growing concern, including among policy makers, about this question.

It is also important to note that the debate about *factors* of competitiveness only focuses on one side of the economic equation: supply-side. While even on these issues national forms of economic regulations still seem to play a major role (education system, labour market regulations, etc) demand-side policies (mostly determined at national level) such as social redistribution policies and more generally, the distribution of revenues between labour and capital play a major role in explaining the economic evolution of regions and of cities.

2. How to operationalise competitiveness at urban level ?

All these issues make working on the notion of regional or urban competitiveness a difficult endeavour. There is, nevertheless, a strong political desire to operationalise the concept and this project should respond to this desire concerning cities. We will explain our more concrete approach and its theoretical background in the following section. However, when trying to progress in this direction, we have to keep in mind both that analyses of specific factors of cities competitiveness only explain a limited share of the

variance of urban growth and that cities as political entities generally have very limited manoeuvring space notably in those domains that seem to influence growth the most. In the following we propose two theoretical approaches, before looking at some empirical evidence.

Cities as regions

We can assimilate general key-drivers of regional competitiveness to cities by reflecting upon the available policy levers at urban level. Hence, we will build on existing works about regional competitiveness to see the implication for cities. ESPON 3.4.2 identified nine "key drivers of competitive performance" at regional scale. On that basis, we begin by assessing what levers exist at that scale to influence them (table 1).

Driver	Levers at city level
Economic diversity / specialisation	The mix of activites in a city is difficult (and some would argue even dangerous) to steer politically. State-aid rules have reduced the ability of public authorities to lead industrial policies. The literature can show some success stories of cluster-oriented policies, but there are just as many failures, and factors of succes can often only be identified a posteriori, making the formulation of clear policy recommendations difficult, as path dependency seems to play an important role here.
Human capital	The main lever concerning human capital is the general education system, and with the exception of a few city-states, this is not the competency of city level governance structures. Cities may attract better qualified people, for example through housing policies, but such approaches are generally to the detriment of other, more fragile parts of the population. Moving up a scale, attractiveness policies of one city might lead to the loss of population in another city or area, thus instigating a zero-sum game which higher governance levels have to be aware of.
Connectivity / accessibility	Connectivity at European and national scale is generally not decided at city-level, except of cities lobbying transportation and network companies. More local and regional connectivity can, however, often be influenced at the city level and can constitute an important factor of the integration of a hinterland, the capture of human resources, etc. Risks of backwashing have to be taken into account, though.
Quality of life	This is probably one of the main factors relevant at city level. Cities can influence many factors of quality of life, be it the build and natural environment, mobility within the city, urban aesthetics, accessibility to services, etc. How much this factor actually influences competitiveness remains an open question. Ideas on the attraction of a creative class have been seriously questioned by many empirical analyses.
Innovation / Creativity	Cities that have the ability to invest in higher education and research can attempt to create the necessary momentum for launching specific research clusters. However, as already mentioned in the part on specialisation, the literature cannot at this stage identify a priori the factors determining success or failure of such attempts, as path dependency seems to play an important role.
Strategy / Vision Mobilisation / Inclusion	On these two issues, strategy and mobilisation of actors on common projects, city governments can play a role as mediator and as animator of such visions. How much of this can actually create economic dynamics, instead of being more a consequence of it, is not clear from the literature.
Synergy / Proximity /	Issues of synergy or "milieu" are also highly path dependant and the literature is not clear on how governance can influence the creation of these

Milieu	characteristics. No recipe exists as these factors are highly place-specific.
Implementation capability	The governance capability is an important factor, and one that seems to play an important role, notably in central and eastern Europe. The capability of a city to influence any of the above factors depends on the competencies of its civil servants in the relevant fields and in their capacity for integrated and strategic planning. Here cities obviously have a role to play in the education of their employees and the maintenance of institutional knowledge.

Table 1. The relevance of the city level for different factors of competitiveness

As already mentioned above, all these factors only look at the supply-side of economic growth factors. Even at the city-level, however, it is necessary to go beyond this competitive supply-side approach. Big cities are large autonomous entities in economic terms. The largest part of their economies concern untradeable services. Progresses made in these sectors have the same impacts on cities' economies than those catering to external markets. The relationship between competitiveness – in the narrow sense of expanding external markets for the economic actors of the cities – and global economic performances of a city is a complex question, however: in line with the economic base theory many theorists insist on the fact that the competitive specialized segments of the economies play a leading role in explaining global performances.

The urban as a specific field of competitiveness

Cities are the result of agglomeration effect and of the drivers of this agglomeration effect. As a result, Cities are specific and cannot be apprehended as regions or nations in terms of competitiveness. Agglomeration effects are the heart of the *new economic geography* (Krugman, 1991, 1995). The economists finally look at the real world and notice that cities are a reality and that development is unequal across space. However the *new economic geography* has not been very explicit about the mechanisms of the agglomeration effects. Basically, agglomeration is the result of the interaction of increasing returns and transportation costs. However, the sources of increasing returns are not very specific in the Krugman's work (Boddy, 1999). Moreover, the scales at which the agglomeration effects operate are not explicitly specified. According to Boddy (1999), pure increasing returns are mainly related to fixed start-up costs and operate at a broad regional scale, generating centre/periphery pattern, while localised external economies such as labour pooling, specialized inputs and technological spillovers operate at a finer scale – regional or city scale, which is the scale we are dealing with in this study. As far as these localised external economies are concerned, "bigger is better" (Turok, 2005): the size allows a bigger labour pool, which makes easier to find specialist skills, a better access to a diversified range of inputs and suppliers – especially a whole range business services – and a better flow of information and ideas. We can add to these classical *marshallian* externalities, aspects such as the quality and diversity of al types of infrastructure (physical, cultural), and a better accessibility and connection with the rest of the world.

Parr and Budd (2000, p.603), summarise the different types of externalities relevant to location as follows:

> **Localisation economies** "refer to the advantages accruing to firms in the same activity which result from their joint location. On the revenue side […] are the possibilities for the cross-referral of business among firms and the emergence of particular specialisations within the activity; while, on the cost side, the advantages include the existence of a pool of skilled labour, the availability of specialised business services specific to the activity under consideration and

access to high-quality information, often on an informal basis." This is the typical notion of marshallian or industrial districts or clusters.

Activity-complex economies "refer to economies that emerge from the joint location of unlike activities which have substantial trading links with one another. In the case of manufacturing, such economies typically occur within industrial complexes, involving structures of a vertical or convergent nature." This type is typically found in conjunction with large enterprises and their subcontracting and supply networks, but can also be found in some cases of diversified clusters of SMEs.

Urbanisation economies "are concerned with the range of advantages to the individual firm which result from the joint location of firms in different and unrelated activities." Such advantages include "[...] the availability of well-developed transport and communication facilities and municipal services [and] of specialised business services not specific to a particular activity, as well as the advantage of urban amenity (broadly defined) and the derived or indirect advantage of a pool of qualified labour." Quite importantly, they highlight that "urbanisation economies tend to increase with the size of the urban concentration".

In this logic, the two first types of economies are not specific to cities, but can be found in specialised districts. It is, thus, the third type of externalities (also called Jacobsian externalities)[6] which seems a particular advantage of urban agglomerations, and more so of the larger ones. However, exactly how these externalities come to play and interact and what might be critical quantitative thresholds for different elements is not known, again leaving the concept in a vague state, and thus difficult to operationalise.

In the perspective of the global cities literature (Castells, 1996; Taylor et al., 2006) the context of globalization and new information technologies gives big cities the decisive advantages of interconnectivity. In Sassen's view, one of the major theoreticians of the global city perspective, globalization and new information technologies "contains both a dynamic of dispersal and of centralization. The massive trends toward the spatial dispersal of economic activities at the metropolitan, national and global level which we associate with globalization has contributed to a demand for new forms of territorial centralization of top-level management and control functions" (Sassen, 2002). The extent of spatial concentration can be explained by the "extent to which the dispersal occurs under the conditions of concentration of control, ownership and profit appropriation", which means that economic concentration is the key of the dual spatial process of dispersal/concentration. This vision is particularly interesting because it does not necessarily tell that big cities will perform better than the others but shed light on the possibility that they concentrate more power and commanding functions, and that their competitiveness relies on this specific capacity. Indeed, for other authors also, congestion effects may play a counter effect to agglomeration (Glaeser, 1998), which can result in a decentralization process at different scales. To a large extent, these congestion effects are related to quality of life (pollution, insecurity, cost of commuting…).

For many theorists – from the global cities to the urban competitiveness literature via the new economic geography –, agglomeration effects to the benefit of the big cities is an evidence. In a long term perspective, this process of concentration has certainly been observed. However, it seems highly related to the type of accumulation regime of the capitalist economy. During the fordist accumulation regime (1950-1975), the spatial pattern of growth has been a decentralization process which can be observed at different scales, notably the national and urban scales. Indeed the taylorization process of the manufacturing industry has allowed the deindustrialization of the (big) cities to the benefit of some regional poles. In the flexible accumulation regime (1980 onwards) which

6 Based on Jacobs (1969).

arises from the eighties, big cities seem to have recovered their decisive advantages. The return to core business for the firms induces the necessity of outsourcing: in this context, big cities have the advantage of being able to provide a diversified range of specialized business services. In the same time, “metropolitan cities benefited from a centralization of strategic control and R&D functions” (Turok, 2005, p38), and of their interconnectivity in the global cities network.

However, concentration linked to agglomeration seems highly related to the type of accumulation regime of the capitalist economy. During the fordist accumulation regime (1950-1975), the spatial pattern of growth in Western Europe has been a decentralization process, while in the flexible accumulation regime which arises from the eighties, big cities seem to have recovered their decisive advantages. This economic recovery of (big) cities has been described as the metropolitanization process.

Several factors explain this re-concentration of wealth. First, in a context of more flexible accumulation, the city offers a range of services an enterprise needs when recentering on their *core-business*. The city brings together all those players within a more horizontal economy than before. Second, in the context of a knowledge-based economy, the city offers a large and diversified basin of qualified (and also low-qualified), flexible and available workforce. Third, the context of globalization and new information technologies give big cities the decisive advantages of interconnectivity. In this perspective the economic concentration of control is the key of the dual spatial process of dispersal of basic or production activities vs. concentration of strategic functions. This vision is particularly interesting because it does not necessarily affirm that big cities will perform better than the others but sheds light on the possibility that they concentrate more power and commanding functions, and that their competitiveness relies on this specific capacity.

Congestion effects may play a counter effect to agglomeration, which can result in a decentralization process at different scales. To a large extent, these congestion effects are related to quality of life (pollution, insecurity, cost of commuting…). However, the current literature is not very clear on their actual impacts. We, thus, do not really know whether or not there are certain thresholds of urban concentration which lead to a decrease in economic performance.

3. Revealed competitiveness: GDP per head and GDP growth

GDP per head in 2005

This map first highlights the gap between Eastern and Western Europe in terms of GDP per head. Second, it shows lower GDP per head in Southern cities. Third, in Eastern and Mediterranean countries, big metropolitan areas have at least reached the average GDP per head EU level, except for Sofia and Bucharest.

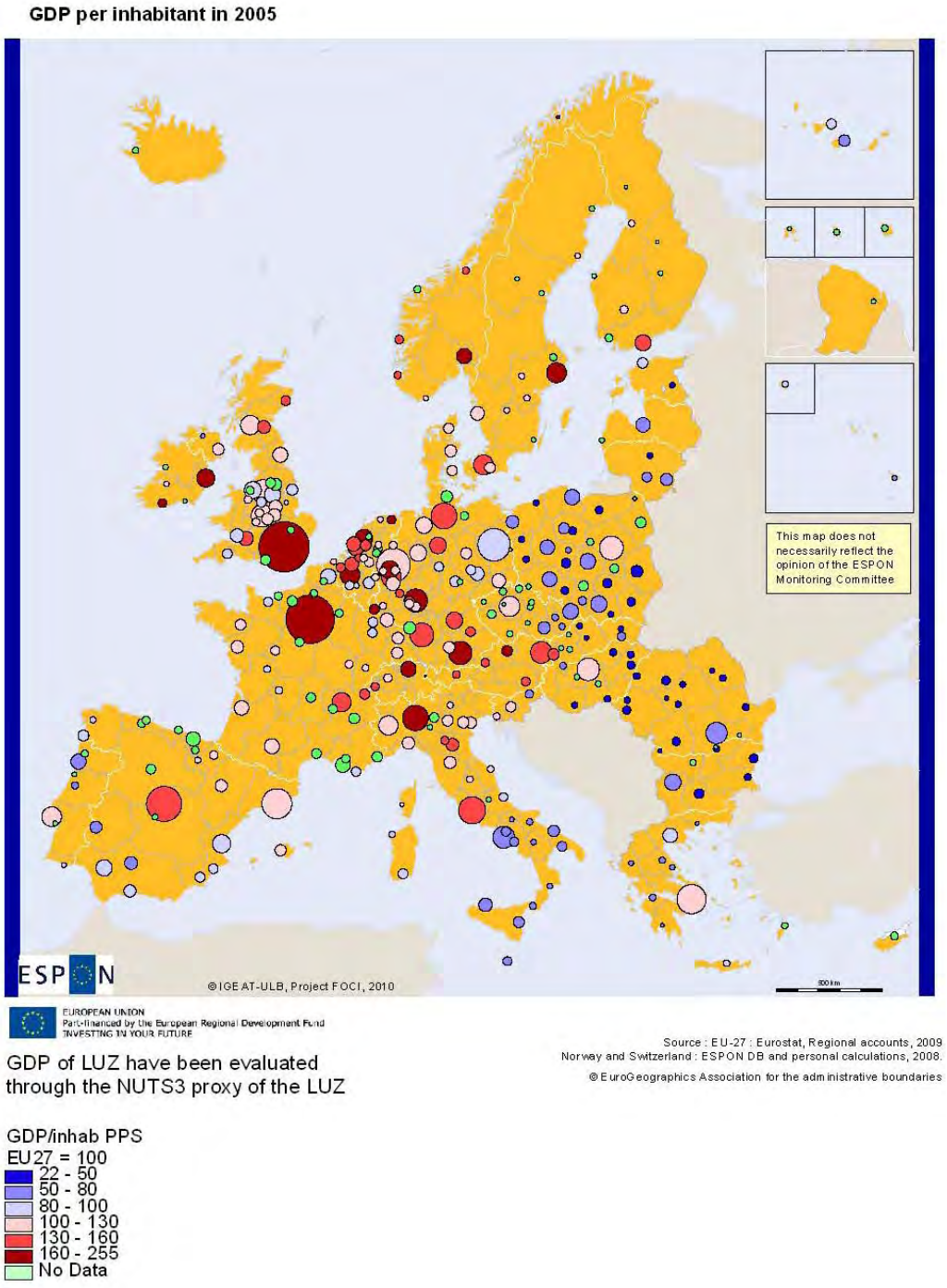


Figure 1. GDP per inhabitant in 2005

Table 2 confirms the very important differences between cities, in terms of GDP/inhabitant, even within the same country which is the result of a long history of agglomeration and concentration of resources.

	EU27+2	EU15
Share of inter-national variance (i.e. of variance of per country means)	48%	22%
Share of sum of intra-national variances	52%	78%

Table 2. Share (%) of the variance in GDP/inhabitant (pps) between cities in 2005 (NUTS3 approximations of Urban Audit cities), decomposed as variance

between all cities within each country and variance between per country means of city GDP/cap levels.

Source: Eurostat

Evolution of the GDP per head between 1995 and 2006

The picture of urban economic growth in the 1995-2006 largely reflects macro-regional and national dynamics. According to the general process of catching up in Eastern Europe, Eastern cities had much higher growth rate than Western cities. Inside the EU-15 space, strong differences appear between German, Italian or Swiss cities, on the one hand, and Irish, Spanish and to lesser extent British cities on the other hand, largely in line with national economic dynamism during this period. This interpretation is confirmed by the variance analysis on cities economic growth for this period. Table 1 shows that between 1995 and 2006 most of the variance of the GDP growth of the cities is due to national differences, while the growth differential between cities inside the countries only accounts for 26% of the total variance. From this perspective, we also observe a very big difference between the end of the nineties and the 2001-2006 period: during the latter, the importance of the national level is much higher than during the former (see also Figure 3).

	1995-2006	1995-2001	2001-2006
Share of inter-national variance (i.e. of variance of per country means of urban growth rates)	74%	59%	82%
Share of sum of intra-national variances	26%	41%	18%

Table 3. Share (%) of the variance in total GDP (pps) growth between cities (NUTS3 approximations of Urban Audit cities, n=224), decomposed as variance between all cities within each country and variance between per country means of urban GDP growth rates. Data for Romania and Bulgaria not taken into account as it does not allow the longer time series.
Source: personal calculations on the base of Eurostat and Espon DB data

Due to the importance of the national context, it is interesting to draw the map of relative economic growth according to national rather than EU average (Figure 4). This map shows in general, but very clearly in Eastern Europe, a process of concentration of wealth in big cities, mainly the first national cities. However, as shown in Table 2, the metropolization process – simply defined as a higher growth rate in big cities – is mainly to be observed during the nineties and slow down in the years 2000. According to national average, we even observe slower growth rates in the big/main cities of Western Europe during the 2001-2006 period; even in Eastern Europe, the polarization process in favour of the capital region is slowing down in the years 2000. This result is also coherent with Table 1 since, during the second half of the nineties, the strong process of metropolization – concentration of wealth in the main city(ies) – went together with a more limited impact of national context on urban performances.

		1995-2006	1995-2001	2001-2006
Evolution regarding EU average	EU27+2	8,0	6,9	1,1
	NMS	33,8	15,5	18,3
	EU15+2	1,5	4,4	-2,9
Evolution regarding national averages	EU27+2	5,8	5,7	-0,1
	NMS	33,7	24,9	7,9
	EU15+2	6,6	6,6	-0,4

Table 4. Evolution of the GDP per inhab. (PPS) of the main European national cities* according to European and national average, 1995-2006

* The first national city of each country has been considered, as well as Rome in Italy, Barcelona in Spain, Frankfurt, Hamburg and Berlin in Germany. Results are very similar if we consider other range of cities, for example the 50 biggest cities of Europe whatever their position in their national context.

Source: personal calculations on the base of Eurostat and Espon DB data

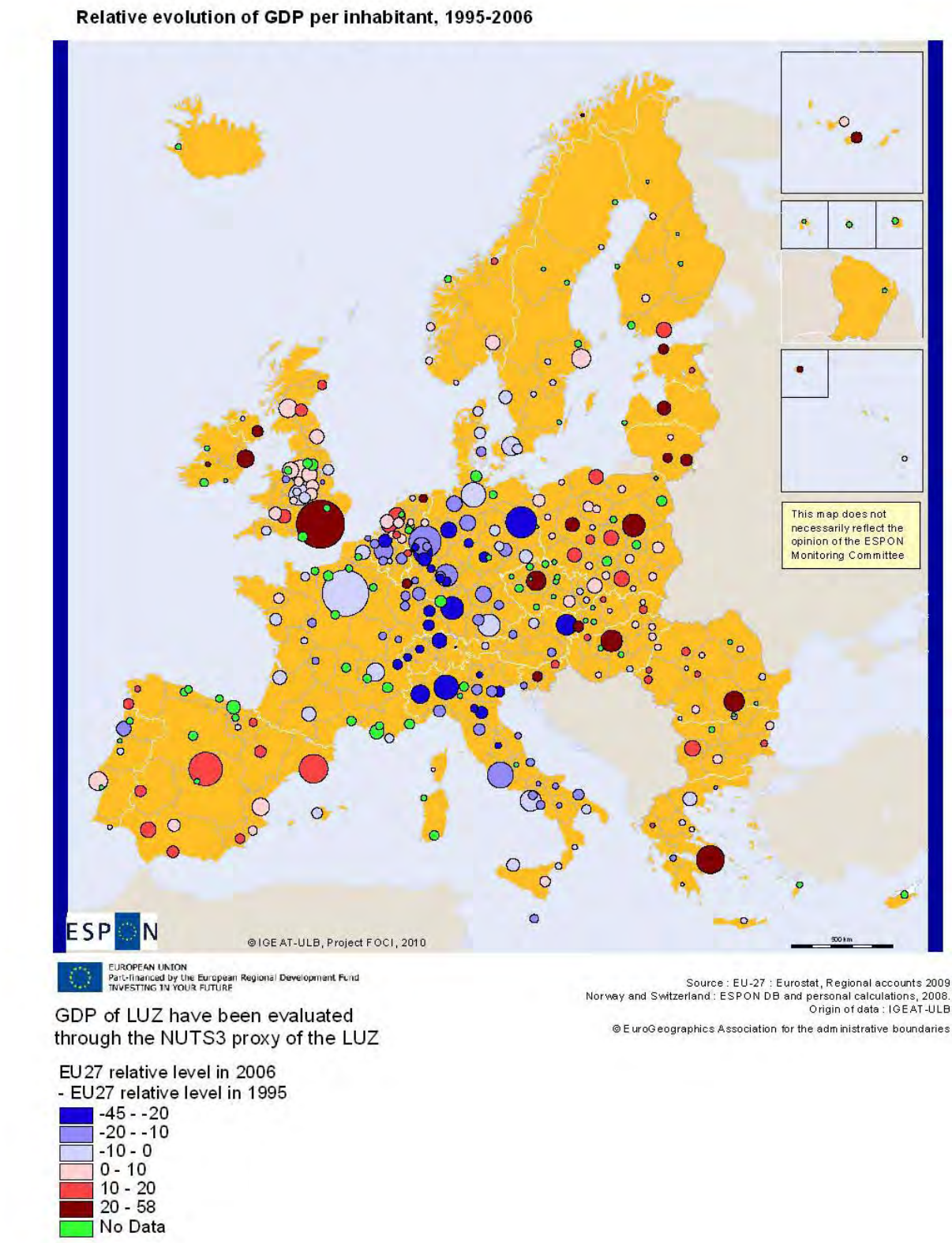


Figure 2. Relative evolution of GDP per inhabitant, 1995-2006

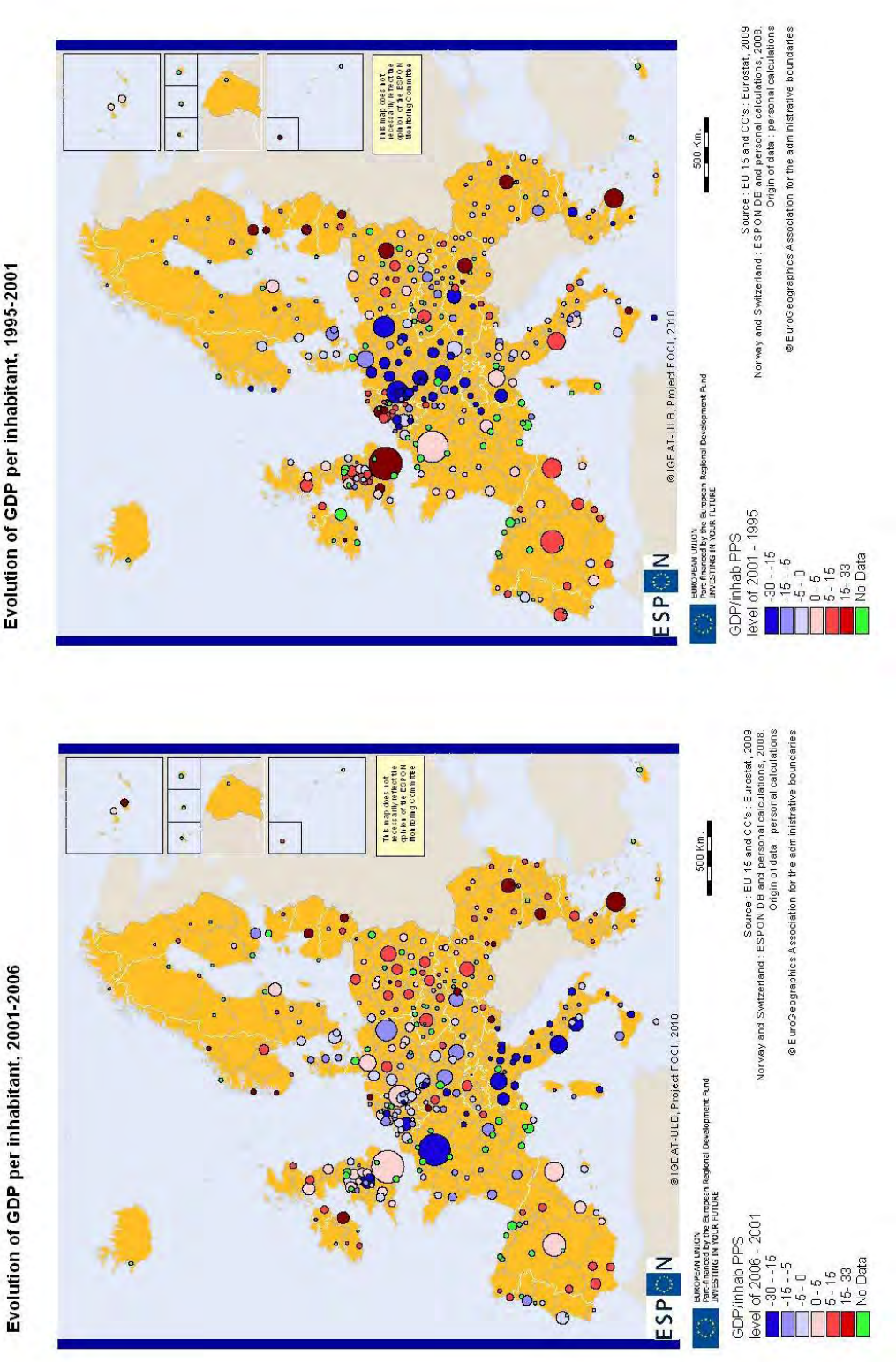


Figure 3. Evolution per inhabitant, 2001-2006 – 1995-2001

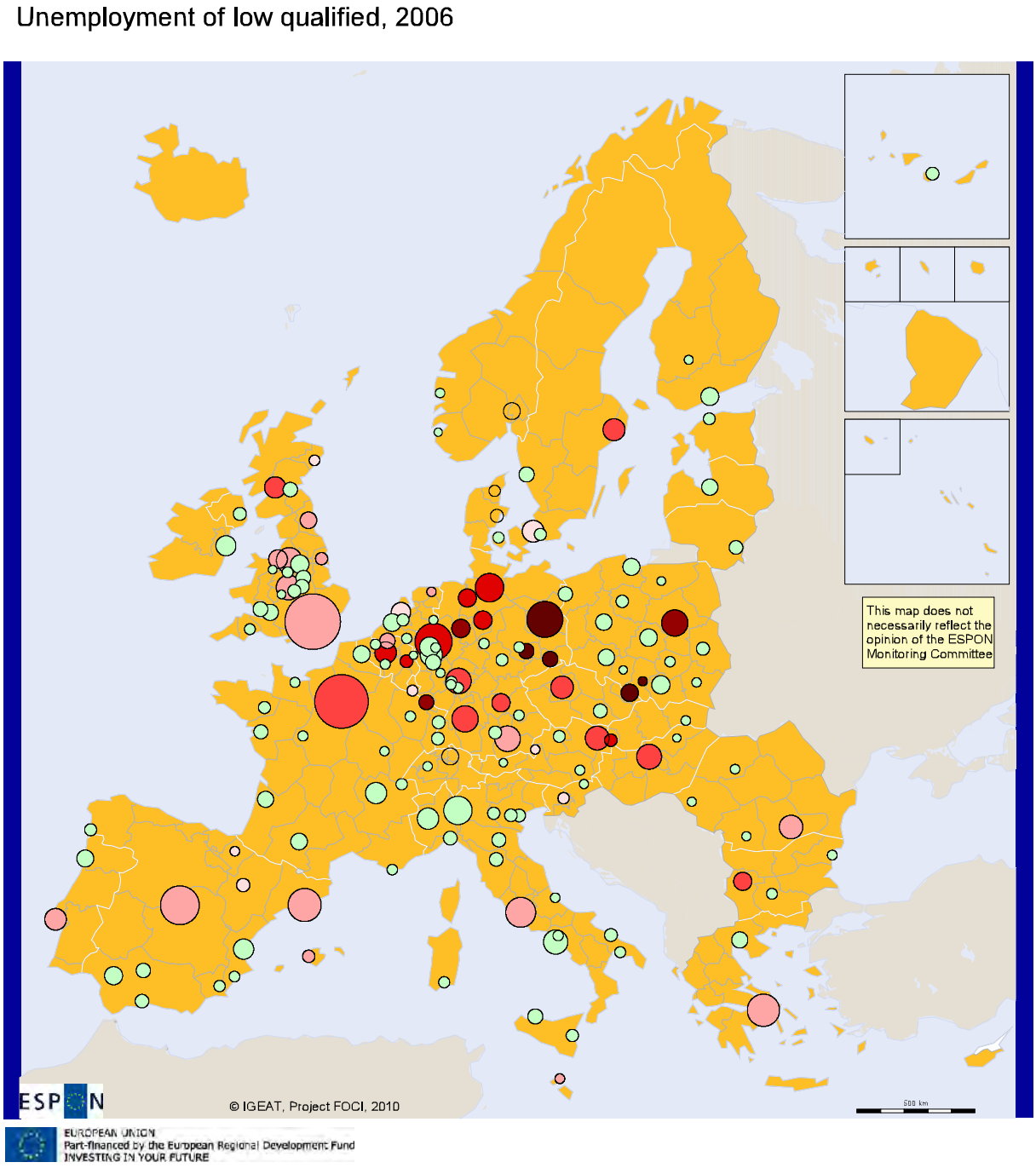


Figure 4. Relative evolution of GDP per inhabitant in comparison to national average, 1995-2006

4. Basic factors of competitiveness

4.1. Economic structure

Different sources can be used to study the economic structures of European cities:

- Eurostat provides economic structure in six economic sectors at NUTS 3 and NUTS 2 level. It allows to produce data for the LUZ approximated by NUTS3;
- We built a matrix of economic structure in 25 sectors combining NUTS2 and NUTS3 according to the country (for the methodological details on this matrix, see ESPON342 or the DG Regio study on regions vulnerable to globalization). These data allow to provide data for the LUZ according to NUTS2;
- AMADEUS provides the sector of all European enterprises at the NACE4 level. These data allow providing statistics according to the LUZ definitions. They also allow defining the specialization and diversity of the urban economy according to different levels of classification.

Data	Sector	Source	Scale	Number of LUZ
Matrix 1	6 main sectors	Eurostat	LUZ approximated by NUTS3	254 Urban Audit cities
Matrix 2	25 sectors (NACE 1 with disaggregated manufacturing industry)	IGEAT with Eurostat and national data	LUZ approximated by NUTS2	Around 50 urban audit cities
Matrix 3	NACE 4	AMADEUS	LUZ	All Urban audit cities

4.1.1. High level services and Industry in 2006

With the first set of data, we propose two important indicators of the economic structure in European cities: the share of high level services – which include finance, business services and real estate – and the share of manufacturing industry, including Energy and construction. None indicator can be considered as a competitiveness indicator, they reflect major geographical divides within economic structure of European cities. High level services are clearly more present in the large and rich metropolitan areas of Western Europe, the highest level is to be found in the four major world financial cities in Europe (London, Paris, Amsterdam and Frankfurt). This map also shows a clear centre/periphery pattern at both European and national level. The share of industry has a much more complex geographic pattern. Of course, the lowest percentages are to be found in the big financial and business centres of Europe. But we must underline that in some parts of Europe, the manufacturing industry remains important even in the richest cities: this is the case in Germany and Northern Italy but also in some Scandinavian cities. By contrast, most of Mediterranean cities, with relatively low GDP per inhabitant have low share of manufacturing industry. Finally in Eastern Europe, some small and medium cities have the highest share of industry while the most developed capital regions have already gone through a deindustrialization process.

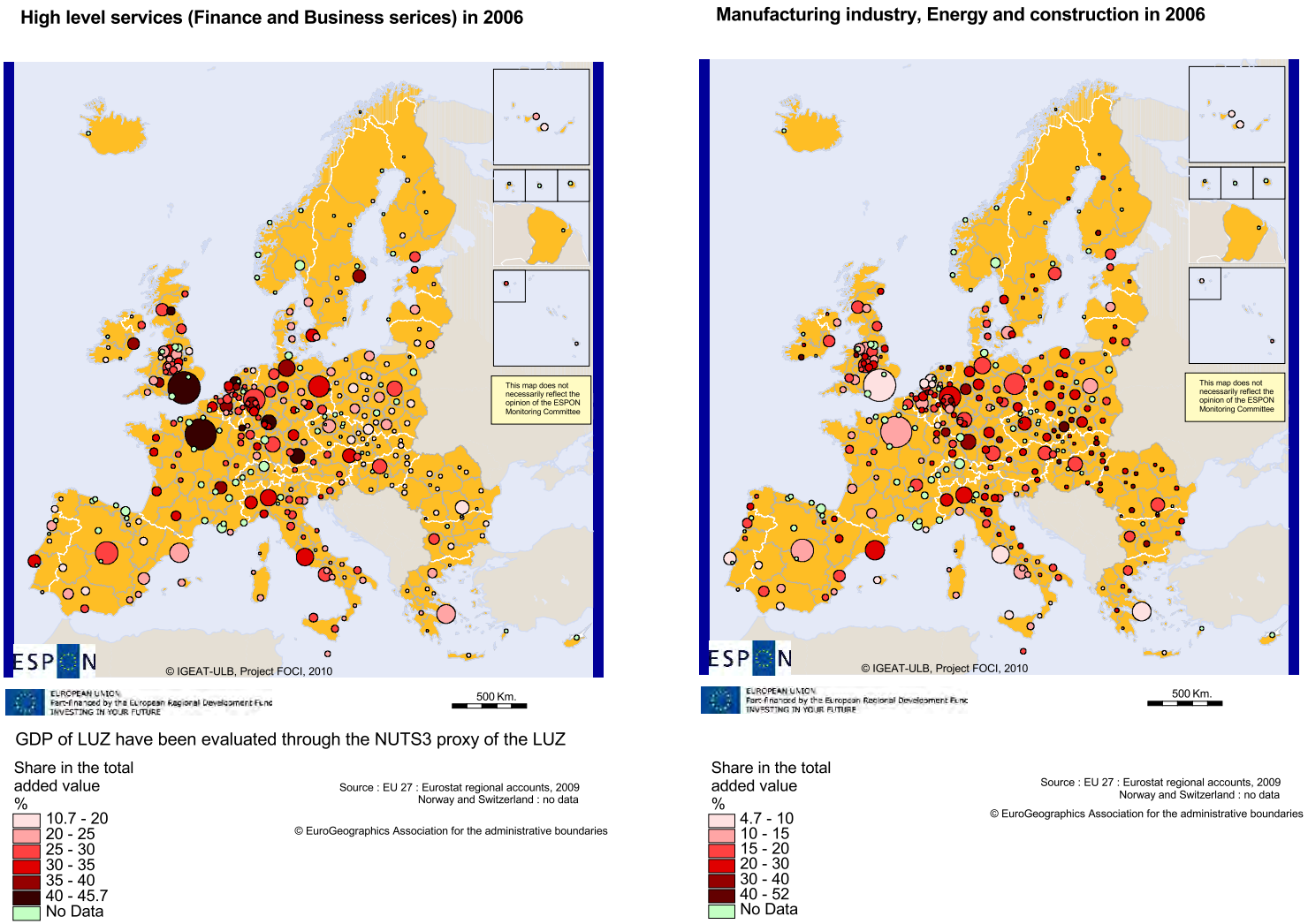


Figure 5. Economic structure of European cities: high level services and manufacturing in 2006

4.1.2. Toward a typology of European cities according to their economic structure

We start from the sectoral structure of cities economy for around 250 cities that can be approximated by NUTS3. Data come from Regional accounts and cover 6 sectors in 2006: agriculture, manufacturing industry and energy, construction, trade and transportation, financial and business services, other services (mainly administration, health, education and personal services).

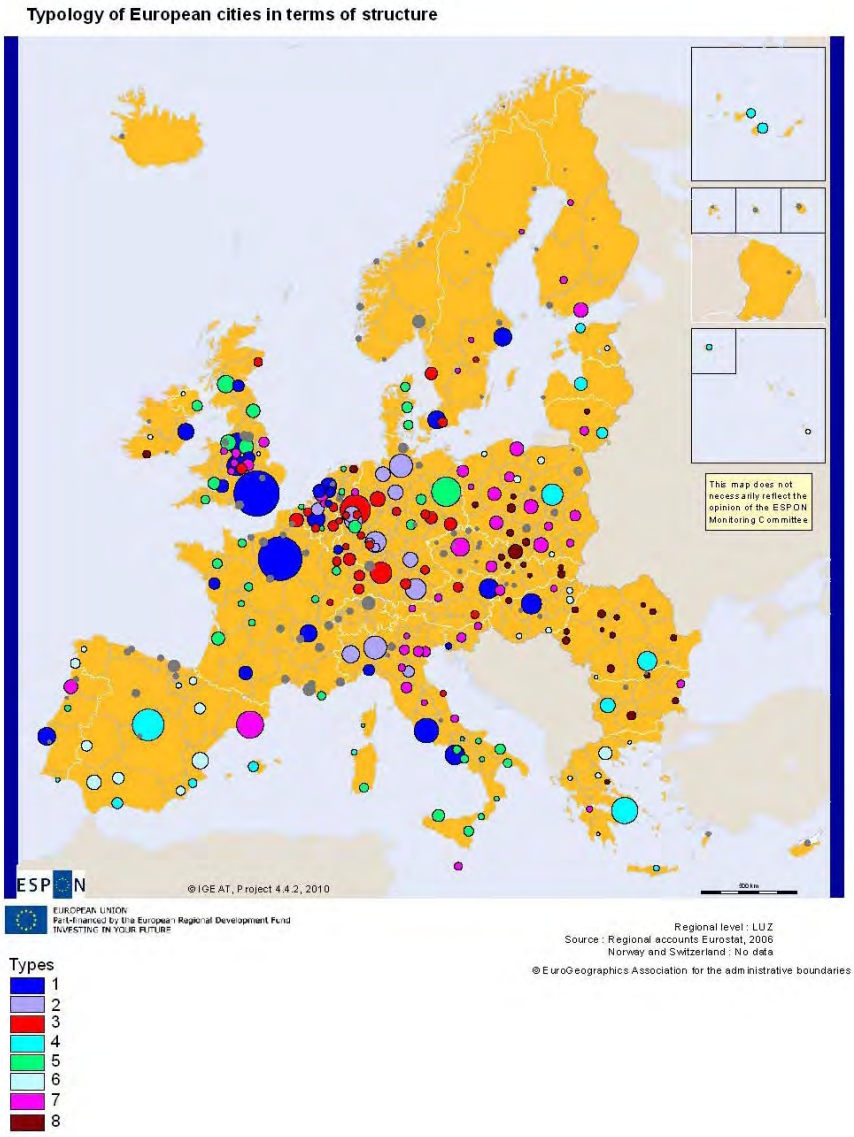
The first step is to synthesize the data through a Principal Component Analysis. The three first components take 80% of the initial information into account, respectively 36, 25 and 20%. These 3 components can be interpreted as follows (table 1):

- the first opposes services concentrated in big European or world cities, especially high level services to production functions. It means that cities which concentrate finance and business services generally have low share of industry or construction (as well as agriculture in their hinterland);
- the second component clearly opposes manufacturing cities to basic market service cities;
- the third component opposes non market services such as administration, education or health to market services such as trade and transportation.

Sector (Nace code)	Component 1	Component 2	Component 3
Agriculture (AB)	0.675	0.144	0.425
manufacturing industry and energy (CDE)	0.561	-0.792	-0.038
Construction (F)	0.493	0.615	0.140
Trade and transport (GHI)	0.248	0.594	-0.686
Finance and business services (JK)	-0.872	-0.086	-0.250
Other services (L to P)	-0.570	0.312	0.671

Table 5. Correlation between the variables and the three first components

On this base, we propose to cluster European cities. It results in a typology of 8 groups of European cities according to their sectoral structure (**Figure 1**). Types 1 and 2 group together big metropolises with high share of high level function. The latter has generally lower share of high functions and keeps a solid manufacturing base: it mainly concerns big German and North Italian cities. In type 1, some cities like Lisboa, Napoli, Budapest or some medium French and English cities have indeed lower of high function but are included because of other similarities with the biggest commanding cities. Type 3 distinguishes from the previous one by lower share of high function but even higher share of manufacturing than type 2: it includes many West German cities. Type 4 includes more peripheral capital cities with high share of basic market services (Athens, Sofia, Bucharest, Madrid, Warsaw, and Baltic capitals). In this group, Madrid has however much higher share of high functions than the other cities. Type 5 includes cities characterized by high share of non market services, mainly peripheral cities of big rich countries (East German cities, South Italian cities, small and medium French and British cities). Type 6 groups together cities with high share of basic market services (trade), notably from Spain. Type 7 is near the average with a manufacturing specificity: we find here cities from “Third Italy”, Porto and medium Polish cities. Barcelona is also part of this group but is not far from the red type 3. Finally, type 8 includes all small Central and Eastern cities with very high share of manufacturing industry.



		Economic structure: share of (%)					
	Share (%) of each type in total European added value	agriculture	manufacturing industry and energy	construction	Trade and transport	Finance and business services	Other services
Type 1	36.2	0.4	11.4	5.0	22.1	37.7	23.3
Type 2	13.5	0.4	20.9	3.2	21.8	35.8	17.9
Type 3	12.3	0.8	25.5	4.7	18.3	27.4	23.4
Type 4	7.2	0.9	11.9	9.1	32.3	24.6	21.1
Type 5	12.3	2.0	14.7	6.3	19.8	27.2	30.0
Type 6	4.4	4.5	19.2	11.6	22.7	19.1	22.9
Type 7	11.9	1.4	23.3	6.8	25.0	23.6	19.9
Type 8	2.3	4.0	37.1	7.0	20.8	14.9	16.1
Total		1.1	17.2	5.7	22.4	30.9	22.7

Figure 6. Typology of European cities in terms of structure

4.1.3. Synthetic indicators of economic structure for the biggest European cities based on more refined sectoral disagregation

In order to synthesize the economic structure of the cities, we run a Principal Component analysis on the 25 sectors of the NACE1 classification. The 4 first components take more than half of the initial information into account and we also observe a gap between the fourth and the fifth component.

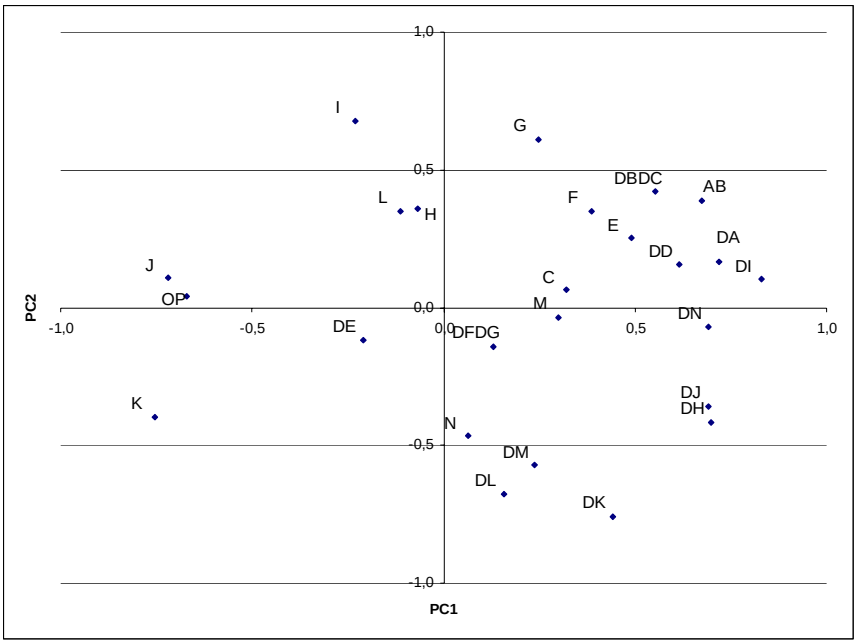
	Total	% of Variance	Cumulative %
1	6,4	25,5	25,5
2	3,8	15,0	40,6
3	2,2	8,7	49,3
4	2,1	8,4	57,7
5	1,5	5,8	63,5
6	1,3	5,1	68,6
7	1,2	4,7	73,3
8	0,9	3,7	77,0

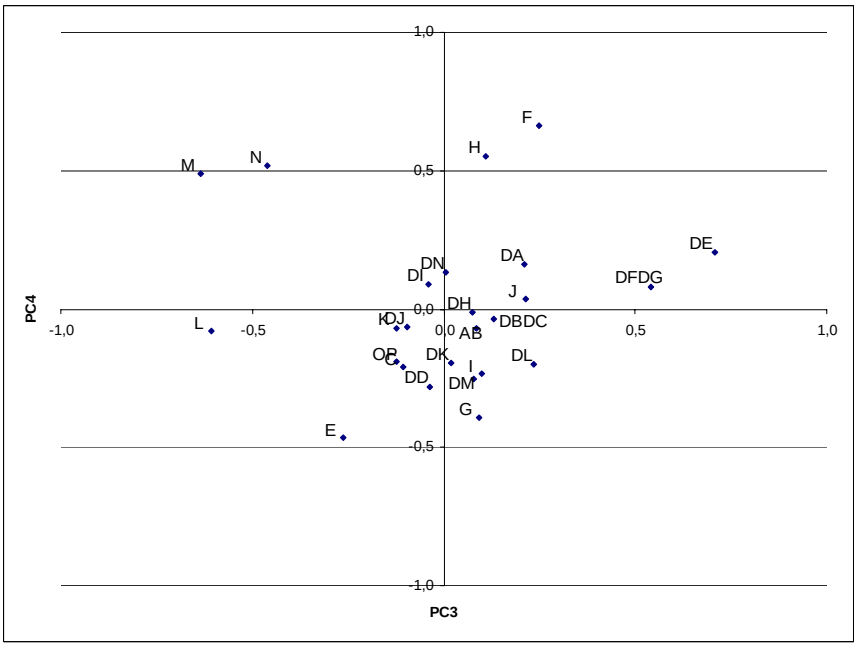
Table 6. Share of variance taken into account by the first eight components

From the graphs presented below, we can interpret these four components as follow:

- the first component highlight the opposition between service cities with high share of business services, the highest scores being in London and Paris, with more basic industry oriented cities;
- the second component opposes cities with high share of technological manufacturing industry to basic services oriented cities;
- the third component isolates cities with high share of public services (administration, health or education);
- the fourth component is difficult to interpret and opposes construction, hotels-restaurant, health and education to trade and Energy sectors.

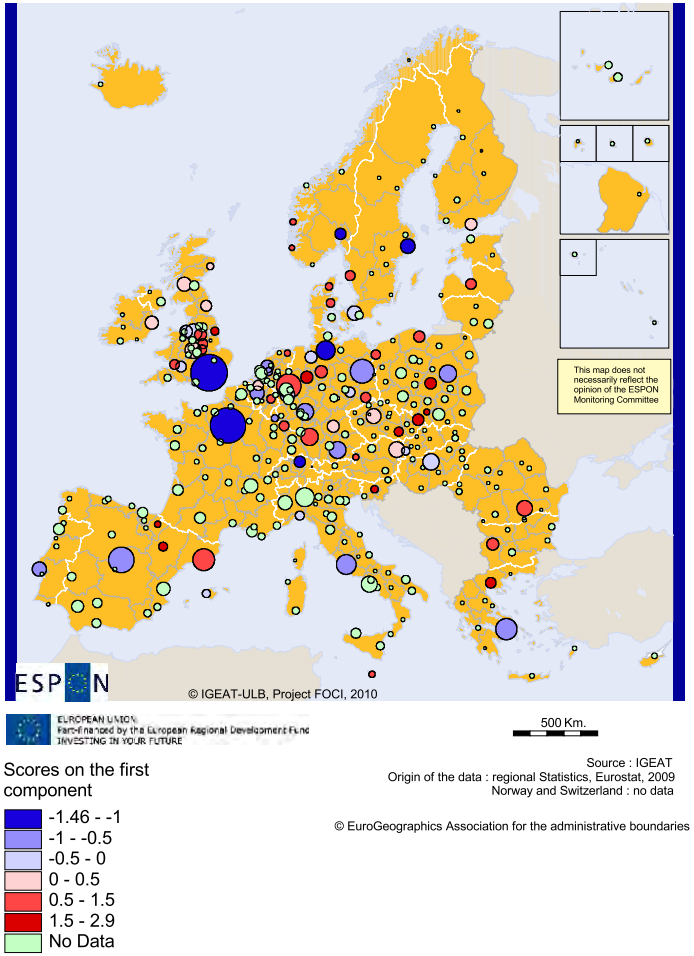
The spatial picture of the two first components is similar than the one proposed by figure 5: big business international service cities are highlighted (PC 1) as well as cities which keep a strong manufacturing base, in the technological sectors (see PC2). High scores on the second component are showing cities with high percentage of market-oriented basic services.





Graphs 1 and 2: Position of the sectors on the 4 first components

Economic structure: High level service-oriented (in blue) cities versus other cities



Economic structure: High technological cities (in blue) versus basic services-oriented cities

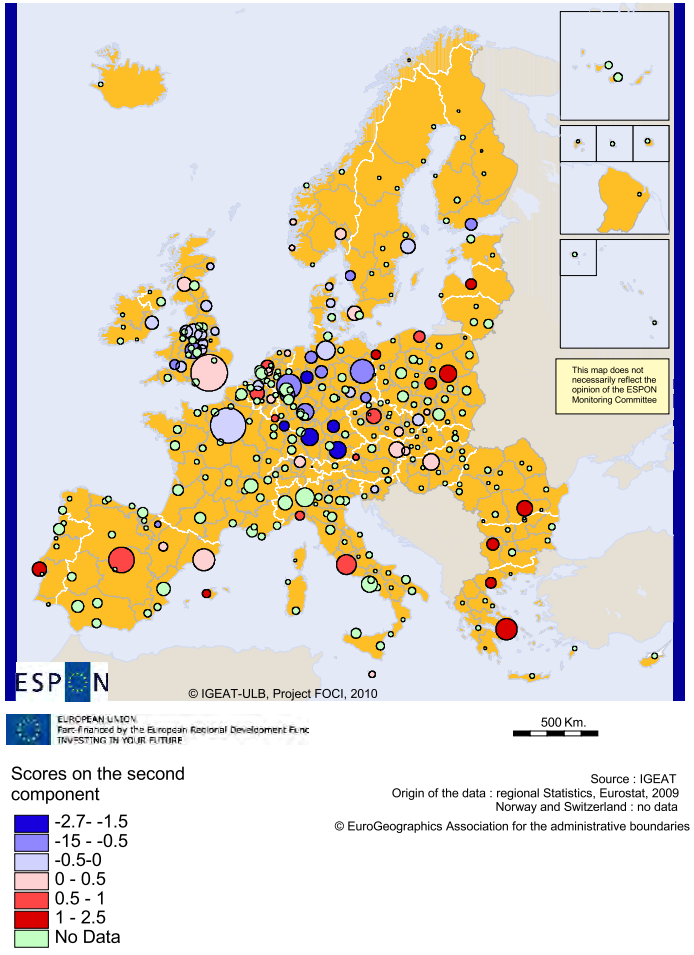


Figure 7. The two first components in the PCA on 25 sectors for large European cities, 2004

4.2. Human capital

4.2.1. Qualification of the workforce

Data about qualification are very partial, even when approximated by the level of diploma. Censuses are generally the best sources but data are incomplete and sometimes not reliable from one country to another. The most homogenous and reliable source is the labour Force survey but it only allows to get data at NUTS2 level with a certain margin of error. Eurostat provides data on this basis but it only enables us to have statistics for a limited number of generally big cities.

Qualification of the active population

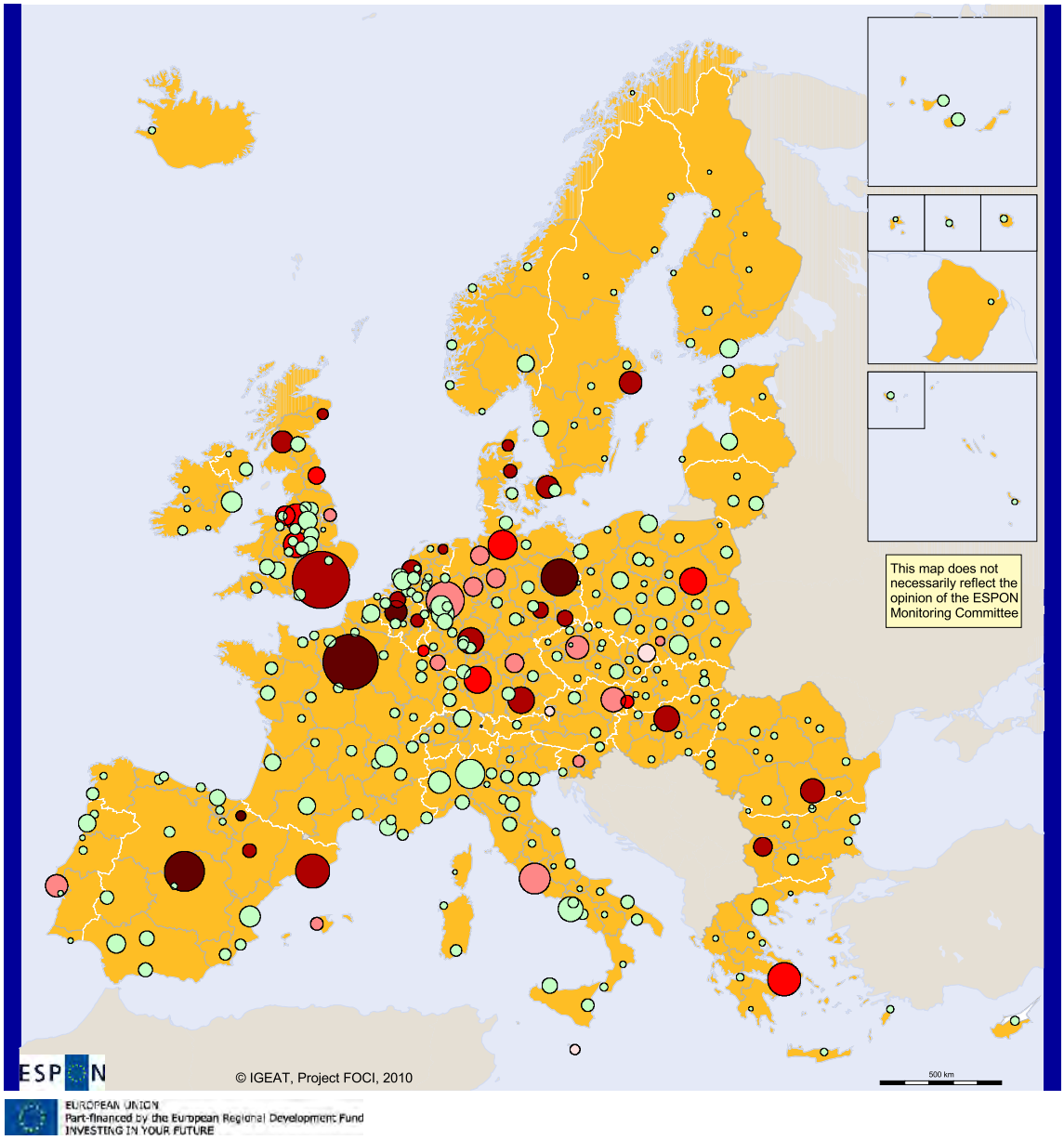


Figure 8. Qualification of the active population

4.3. Accessibility

Accessibility indicators are provided for the core cities by the Urban Audit for the last period (2003-2006). Data are based on core cities approximated by NUTS3. This is why some cities are missing: some core cities cannot be approximated satisfactorily by the surrounding NUTS3. Four indicators are available: air, road, rail and multimodal accessibility. The picture is of course a very expected one with higher accessibility in core Europe and lower scores in non capital regions of peripheral Europe.

Multimodal accessibility of the core city

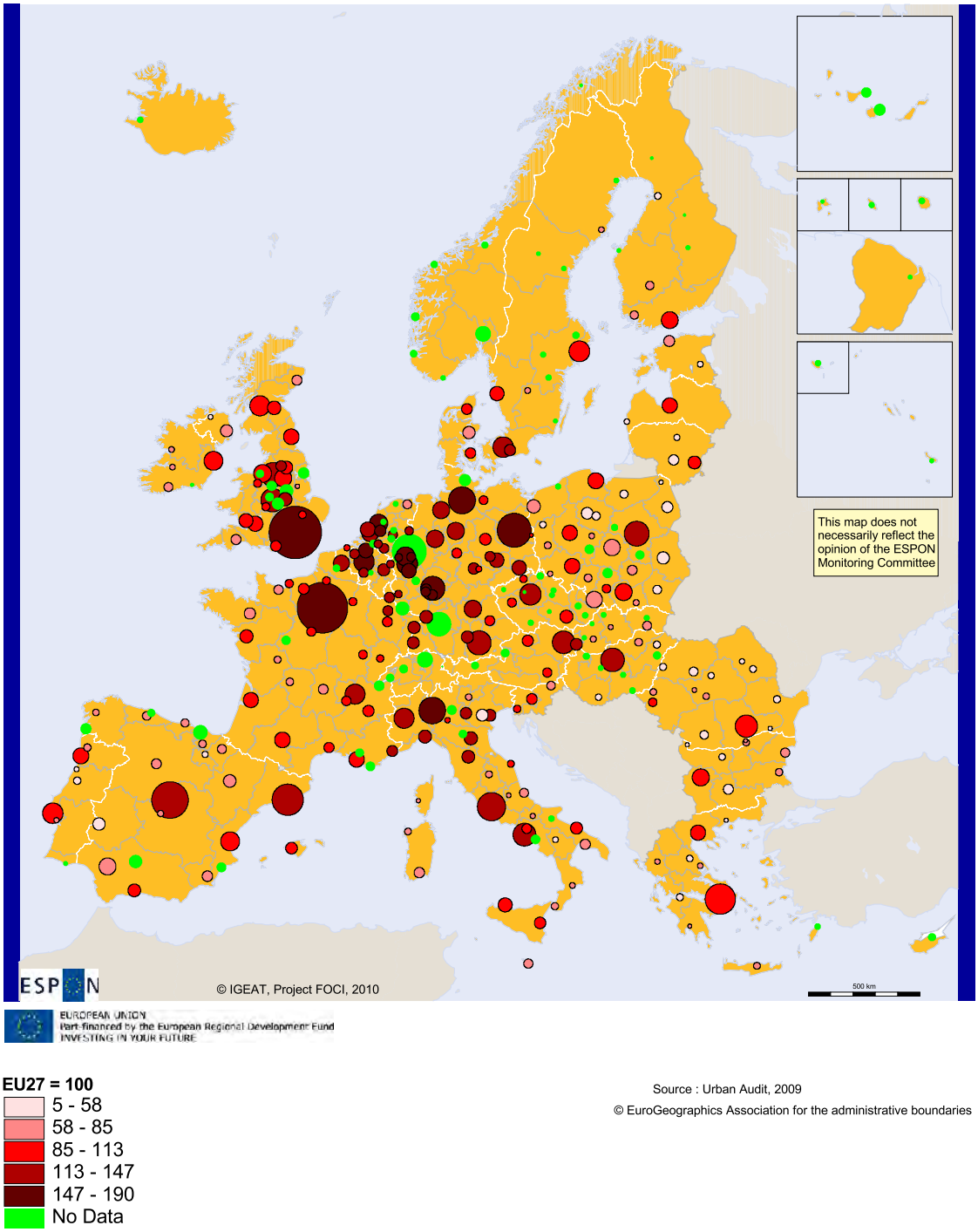


Figure 9. Multimodal accessibility of the core city

5. Modern factors

5.1. Cultural milieus

Entrepreneurship

While there is no satisfactory indicator of entrepreneurship, we can consider the share of non agricultural self-employed as one possible indicator. On the one hand, it illustrates a kind of reservoir of entrepreneurs since new businesses are often created by self employed. On the other hand, it is also a sign of backwardness, for example when self employed are located in basic services. Through the labour force survey, NUTS2 data are available but, of course it only enables us to produce data on a limited number of cities.

Self employed in 2005

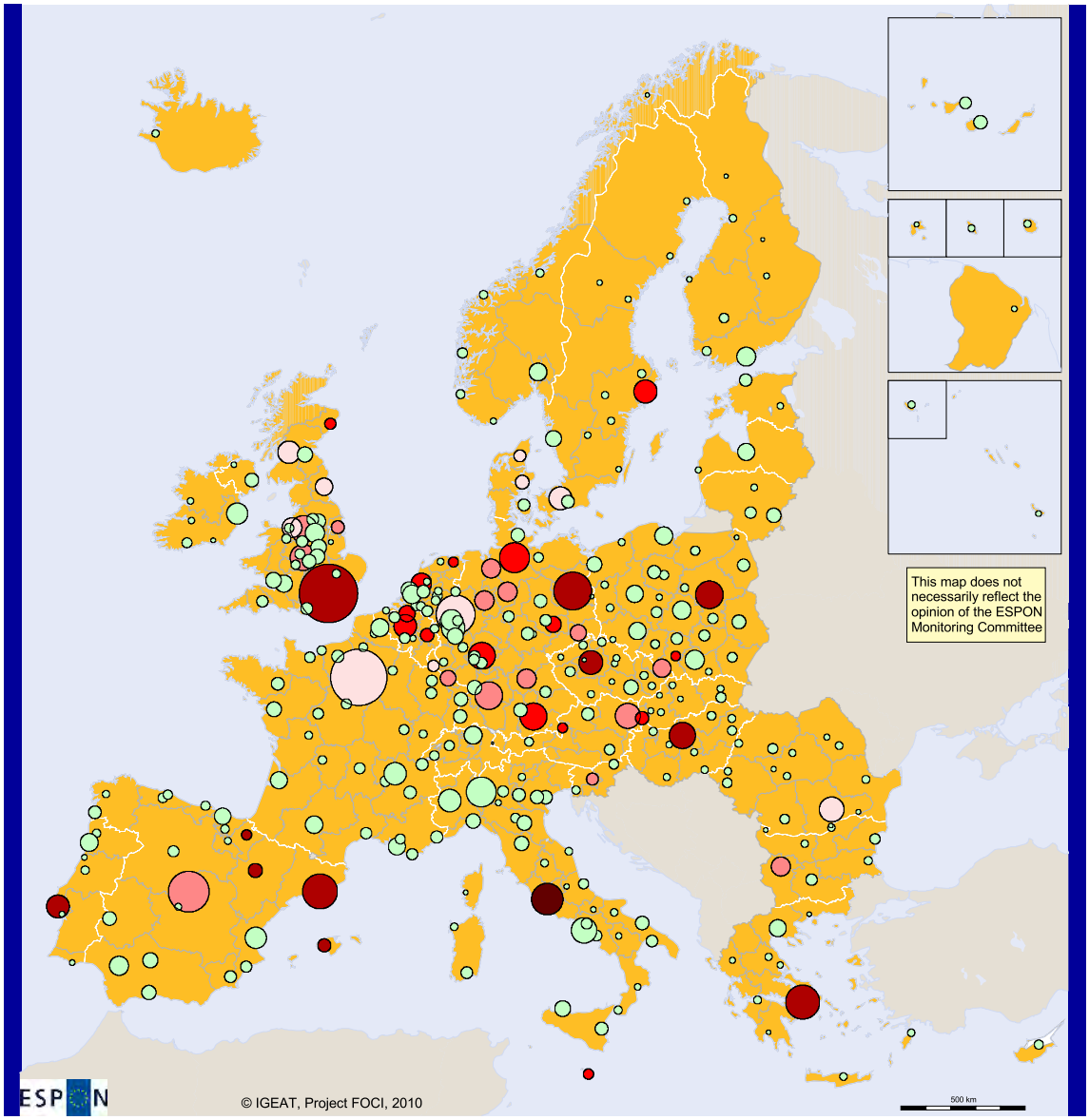


Figure 10. Self-employed in 2005

5.2. Innovation

We propose here three indicators of innovation (R&D; scientific personal; patents) for the cities which allow a NUTS 2 approximation.

Research and Development

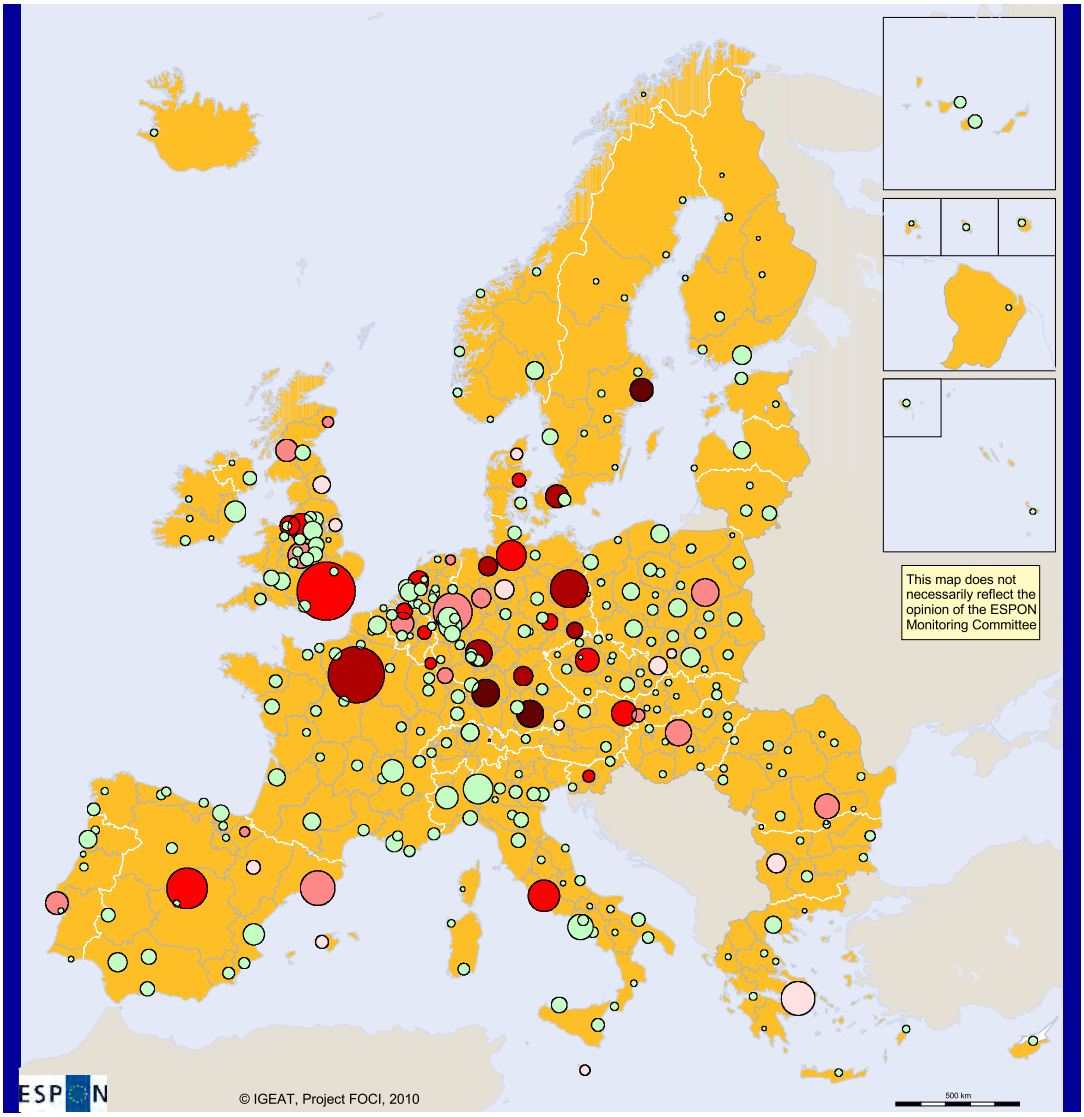


Figure 11. Research and development

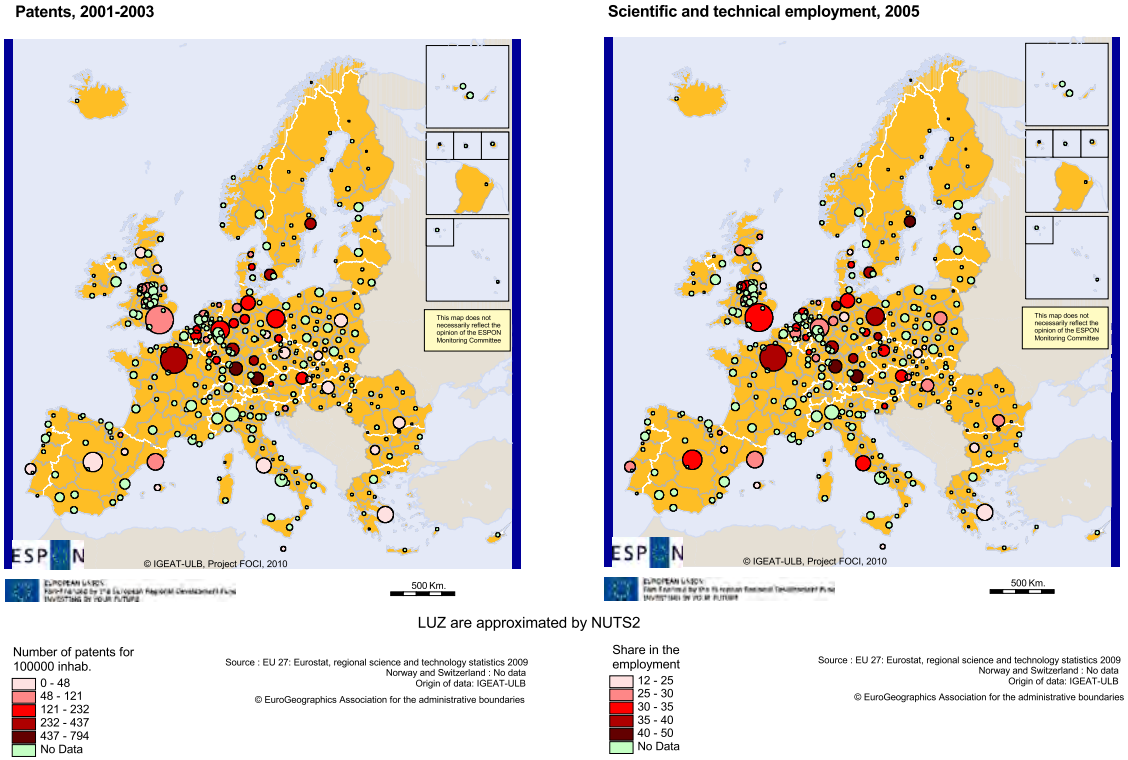


Figure 12. Innovation indicators across European cities.

6. Urban specific factors

Commanding functions

In Figure 13, we show the total sales of enterprises whose headquarters are located in European LUZ, among the 2000 biggest world enterprises. This figure illustrates the high level of concentration of commanding functions inside the European space: after London and Paris, the two world cities, we find Amsterdam, Munich and Zurich as secondary poles, while peripheral metropolitan areas are nearly absent except Rome, Madrid, Stockholm and Helsinki. Commanding functions of the biggest transnational corporations are nearly inexistent in East European cities. While this picture is to a certain extent similar to the spatial concentration of financial services, it shows some significant differences: the level of concentration is higher; some cities play a more important role in finance than direct commanding functions (Frankfurt or Brussels for example).

Other urban specific factors are deeply analysed through network analysis and accessibility in the next chapters.

Transnationals headquarters in 2005

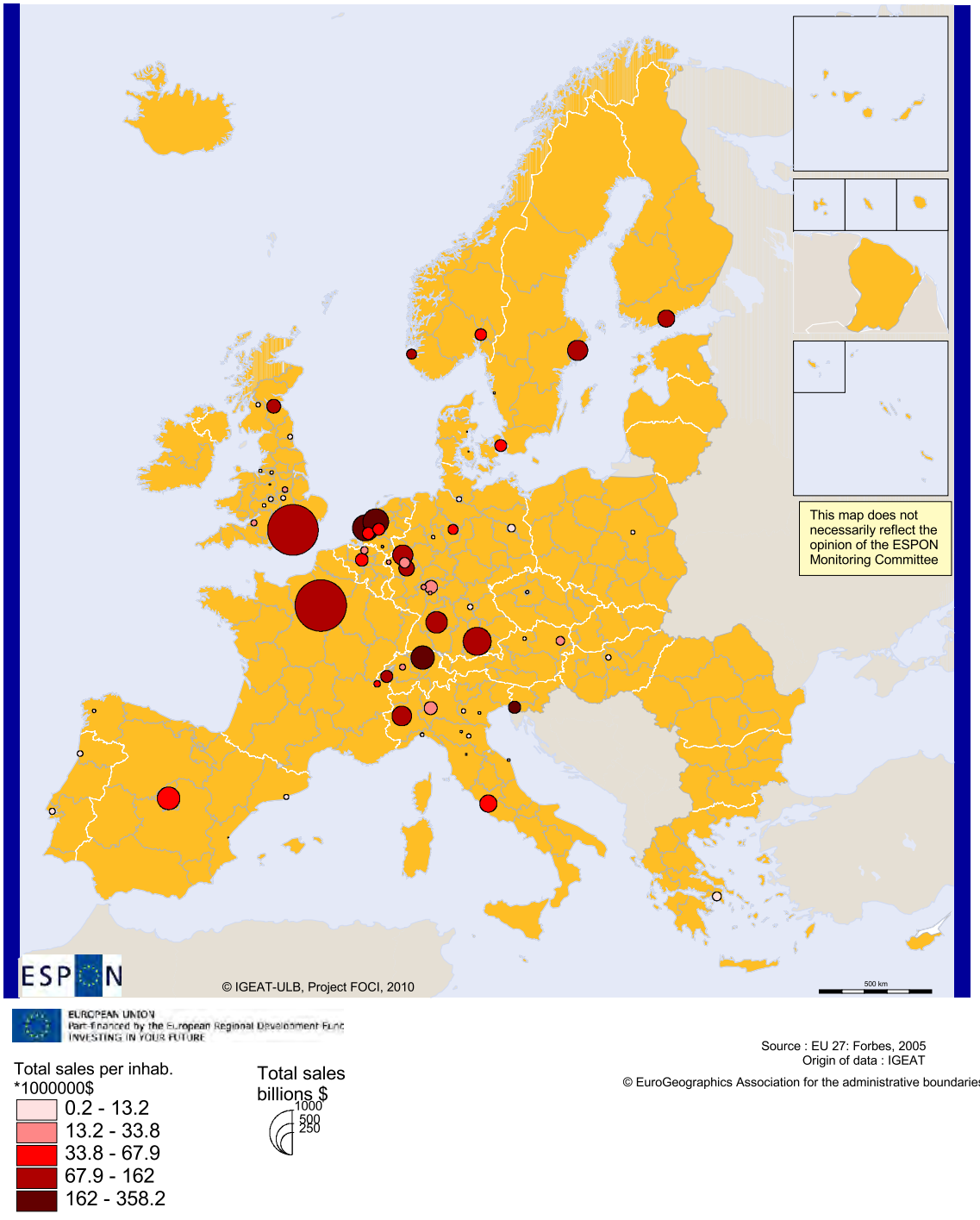


Figure 13. Transnational headquarters ine 2005

Bibliography

Beaverstock J., Smith R., Taylor P. (2000), "World city-network: a metageography?", *Annals of the association of American geographers*, vol 90, pp. 123-134

Boddy M. (1999), "Geographical Economics and Urban Competitiveness: A Critique", *Urban Studies*, 36: 811-842.

Castells, M (1996), *The Rise of the Network Society*. Oxford: Blackwell

CEPII Report for the DG for Trade, European Commission (2006), *Sectoral and Geographical Positioning of the EU in the International Division of Labour*, 65 p., (http://www.cepii.fr/anglaisgraph/reports/pdf/2008/re2008_02.pdf)

DG REGIO report, European commission (2003), *A study on the factors of regional competitiveness*, 184p. (http://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/3cr/competitiveness.pdf

Glaeser E. (1998), « Are cities dying ?», *Journal of Economic Perspective*, 12, pp 139-160

Husson (2008), *Un pur capitalisme*, Lausanne, Editions Page Deux, Xp.

Krugman P. (1992), *L'économie internationale*, Bruxelles, De Boeck-Wesmael, 862p.

Krugman (1997), *Pop internationalism*, MIT Press

Martin R., Kitson M., Tyler P. (2006), "Regional competitiveness: An elusive yet Key Concept", *Regional studies association*, New York, pp. 1-10.

Parr, J, and Budd, LC (2000) 'Financial services and the urban system: an exploration', *Urban Studies*, vol. 37, no. 3, pp. 593-610.

Sapir J. (2009), *Les racines sociales de la crise financière, Implications pour l'Europe*

Sassen S. (1996), "Cities and Communities in the Global Economy", *American behavioural scientist*, vol. 39, pp. 629-639

Sassen S. (2001), *The global city: New York, London, Tokyo* Princeton, N.J.: Princeton University Press. 2d ed

Sassen, S. (Ed.) (2002), *Global Networks*. Linked Cities, London, Routledge

Taylor, P. J., B. Derudder, P. Saey and F. Witlox (eds) (2006) *Cities in globalization*, London:

Routledge.

Turok I. (2006), "Cities, Regions and Competitiveness", *Regional studies association*, New York, pp. 79-94.

World Bank (2009), World Development report 2009, Spatial disparities and Development Policy.

Chapter 5 – Accessibility measures for assessing urban competitiveness

Sandra Bozzani-Franc, Alain L'Hostis, Université Paris-Est, LVMT, Inrets

Transport, being an indispensable support for economic and social interaction, has a major role to play in the structuring of urban regions all over Europe. Accessibility is one of the basic factors of competitiveness, but also of access to services, while at the same time it is one of the major sources of pollution and of energy consumption.
Accessibility is one of the major factors of city development. Accessibility constitutes a necessary condition for the economic and spatial development, and accessibility is one of the key sectors where public action plays a major role in infrastructure as well as in service provision in interaction with the transport operators. Developing tools that are able to assess the quality of the accessibility is then a major stake for decision help dedicated to urban stakeholders.
In addition accessibility represents a necessary condition for the development of exchanges between cities and between cities and their hinterlands. Measuring accessibility constitutes a step in the study and the identification the potential for development of cities; it also allows for identifying those links that already permit the development of cooperation between cities and those links that lack the minimum service provision to support polycentric development.
The analysis of transport services across Europe will give much importance to the air mode as the privileged long distance mean to link cities. If we consider that the intensity of the links decreases with distance, we observe that proximity OD pairs are of major importance to city development, and to polycentric organisation. On these shorter distance high-speed rail, and to a lesser extent conventional rail, can play a prominent role.
Most of the recent and dramatic development of the air mode in Europe has to be credited to the rise of the low-cost airline model. Recent literature shows that the low cost airline model seems to benefit to medium or small size airports serving intermediate cities. This hypothesis will be investigated through the analysis of the contribution of the low-cost airlines to the present accessibility.

1. Metropolises and communication: the role of high speeds

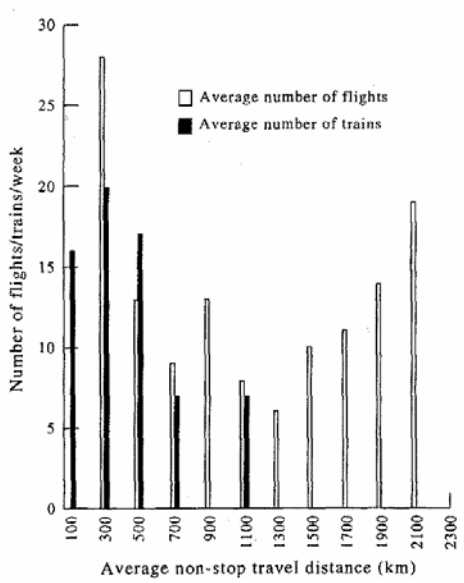
The spatial option of polycentrism chosen in the ESDP involves the two objectives of any spatial planning strategy, which are supporting the economic development and supporting a territorial cohesion by spreading the potential for development. For several centres to emerge the strategy relies on the development of strong urban centres all over Europe. Metropolitan European Growth Areas are those urban centres that should be considered as the basic structure for urban polycentrism in Europe. Metropolises are urban entities that communicate with other metropolises in long distance networks (Sassen 1991).
The development of communications between metropolises, which correspond to a fundamental need for any metropolis, has major spatial and territorial implications. If metropolises can be defined as urban entities that communicate on a global scale, the air mode constitutes the major passenger transport system associated with globalisation (Sassen 1991). Concretely one could wish to support metropolitanization processes thought the development of international long distance, by privileging inter-continental transport air mode. The importance of schedule convenience in choosing specific flights for business travels has led airlines over the years to increase both the number of non-stop service and the frequency of service to key destinations (Park et Ha 2006).

Nevertheless, the density of metropolises in Europe constitutes an opportunity for territorial development, in that it allows for the development of intra-European transport networks dedicated to the metropolises development but that could also serve spatial

cohesion purposes. In that sense the assessment the quality if links in the European urban system corresponds to two objectives, the support for economic development in metropolises and the support of spatial cohesion at the scale of the urban network.
We want to analyse the quality of the communication system between European metropolises corresponding to the needs of the metropolises economic functioning (Taylor 2004). We will focus on the needs of metropolitan superior urban economic functions of firm headquarters, superior service and financial firms and research and development centres. This groups partially corresponds to the "symbolic analysts" (Beaverstock et al. 2010), or the "creative class" (Florida 2003), as the social group corresponding to the metropolitan economic dynamic.
For a long time now sociology researchers have highlighted the importance of weak ties, i.e. relations with acquaintances as opposed to relations with friends and relatives, in the processes of evolution of individuals (Granovetter 1983). Recently, after theoretical developments made in the domain of networks analysis, these approaches have been diffusing in the field of geography (Rozenblat et Mélançon 2009). This direction of researches indicates that in order to understand the territorial dynamics, the study of major flows highlighting the hierarchical relations, should not prevent from considering the minor relations, sometimes on longer distances, since the can constitute the support for thematic cooperation between distant cities. Hence our analysis will not focus on major existing transport flows but rather develop an accessibility approach.

2. Analysing air and rail networks in Europe

Accessibility through fast transport systems, a key feature of the metropolitan fact, is all but independent of the sustainability issues. A particular focus can be put on sustainability by studying the respective roles of road, train, high-speed train and planes in their contribution to metropolitan accessibility. The introduction of high-speed inter-city rail has reportedly led to a significant decline in air travellers on certain city pairs (Park et Ha 2006). In addition, recent researches have shown the key role that can be played by the high-speed rail and air association to develop city accessibility (Bozzani 2005). To which extent the rail mode can substitute to less sustainable modes road and air remains an open question that we propose to investigate in the light of European urban development.
Janic studied the quality of service in the European railway network, highlighting the speed of relations, the frequencies and the delays according to the hierarchical level in the network (Janic 1996). This analysis focussed on the quality of the transport service.
Janic studied the two networks air and rail in Europe, comparing the distances of relevance of each mode (Janic 1997). In this paper he considered trains between locations and flights. Since most long distance trains and flight link major cities, this dataset can be considered as relevant in the analysis of the accessibility of (major) cities at the European scale. The number of existing trains on origin-destination (OD) pairs is maximal for distances of 300 km, which is also the case for air. For shorter distances one can find more trains than flights, while beyond 500 km, air becomes the dominant mode.



Cattan (Cattan 1995) has shown that the analysis of flows in the air and rail networks in Europe reveal privileged relations between cities potential support for territorial cooperation, and also helps identifying the barriers that a voluntarist transport policy could aim at overcoming.

3. A timetable database

Concerning the collective transport systems –rail and air– the main data considered is the timetable information. The assumption is made that short travel times and high frequencies are necessary but not sufficient to guarantee the daily accessibility level, and that an adequacy of timetables to mobility rhythms must be tested.

The data necessary to compute these indicators are timetables for the air transport system and for the rail transports system.
Concerning air transport we have used the OAG database of flights operated in the winter 2009.
Concerning the rail system an automatic query of the major cities and major rail nodes has been executed on the Deutsche Bahn website[7]. It covers all direct trains between cities in Europe for a typical weekday of the winter 2009. The base of the urban grid is constituted by the Urban Audit list of cities. Currently further investigations are conducted to assess the possibility to complete the database to include smaller cities, in order to develop a detailed analysis at the scale of city-hinterland relationships. The territorial base includes all countries of the ESPON space up to Moscow.
Extra data is used to connect transport nodes –station and airports– to cities, in order to attain a door-to-door approach. In addition several nodes where air to rail transfer is possible have been introduced. The criteria to introduce such possibility rely on the presence of long distance trains inside airports. Therefore, we have not introduced dedicated airport-city rail link in the analysis.

4. Time geography and the concept of contactability

The time-geography framework refers to the works conducted around the geographer Hägerstrand (Hägerstrand 1970). The question raised in this domain of research is the necessity of considering time when one wants to analyse space (Chardonnel 2001). This framework is relevant when one wants to analyse “the interrelationships between

[7] The website : http://www.bahn.de/

activities in space and time, and the role of transportation and communication technologies in facilitating and constraining these relationships" (Miller 2004).
Contactability is defined by Haggett (Haggett 2001) as the possibility to contact people in a distant city. The contractibility is considered, in a regional scale by Swedish geographers Hägerstrand and Tornqvist when it is possible to meet for 4 hours during a normal weekday. This indicator refers to an idea of spatial cohesion inside a territory.
Contactability analysis in a regional space was studied with specific indicators allowing for daily journey-to-work between majors cities (L'Hostis, Menerault, et Decoupigny 2004).
In the ESPON project on transport and territorial cohesion contactability indexes were developed under the aspect of daily accessibility. These indicators have been reused in several contexts including the definition of global integration zones as proposed in the ESPON atlas (ESPON et BBR 2006). This illustrates the potential of such indicators to help propose a spatial support for territorial cohesion concepts.
We will now propose a series of indicators to assess the relations between cities, based on the measure of contactability.

5. Indicator of daily accessibility from a city: contactability

According to the time-geography theoretical framework initiated by Hagerstrand, and the concept of contactability, the quality of the link between two poles can be assessed through the possibility to go from the pole A to the pole B, to have enough time for an activity related to work, education or other purposes, and to come back to pole A in a single day. Reciprocally, one can assess the possibility for a city to foster an event gathering people from remote metropolises. The same criteria are used but inversely, to allow for people from city A to get to city B, and to held a meeting there. The indicator expresses the attractiveness of city B to organize a conference, an event with several persons.

A high level on this indicator will be necessary to develop a congress activity of a city.

This direction of the relation is also useful for universities, research centres, firm's headquarters and superior service and financial firms that need to gather persons from several remote cities, for seminars, colloquium and board of administration.

Consequently, and following the approach adopted in earlier works (Mathis et al. 2004), we propose to evaluate the possibility of single day business trip with 6 hours available at destination and within the time windows 6h-22h and 5h-23h, in a door to door approach and detailed as follows.

Structure of the return trips:

First take-off: 6h30
First arrival: 6h40 on Bruxelles-London (without considering GMT)
First departure back: 6h40 + 8h30 = 15h10
Last possible departure flight (in case of a ten minutes flight): 21h50

Structure of the rail return trips:

For the case of trains:
First departure: 5h45 (45 minutes + security time to the station)
Must stay 6 hours plus 2 x 45 minutes = 7h30 between times of arrival and departure
First departure back: 5h45 + 7h30 = 13h15
Maximum time of arrival of the returning train: 22h15

These criteria can be used to define a minimum service provision for the functioning of city networks and applies on the links in the network.

This family of indicators deals with intermodality by allowing to compare modal accessibilities (rail, air, road), and intermodal accessibility (air-rail), but also by taking into account the initial and terminal parts of the trips.

The indicator of contactability is displayed on the following map.

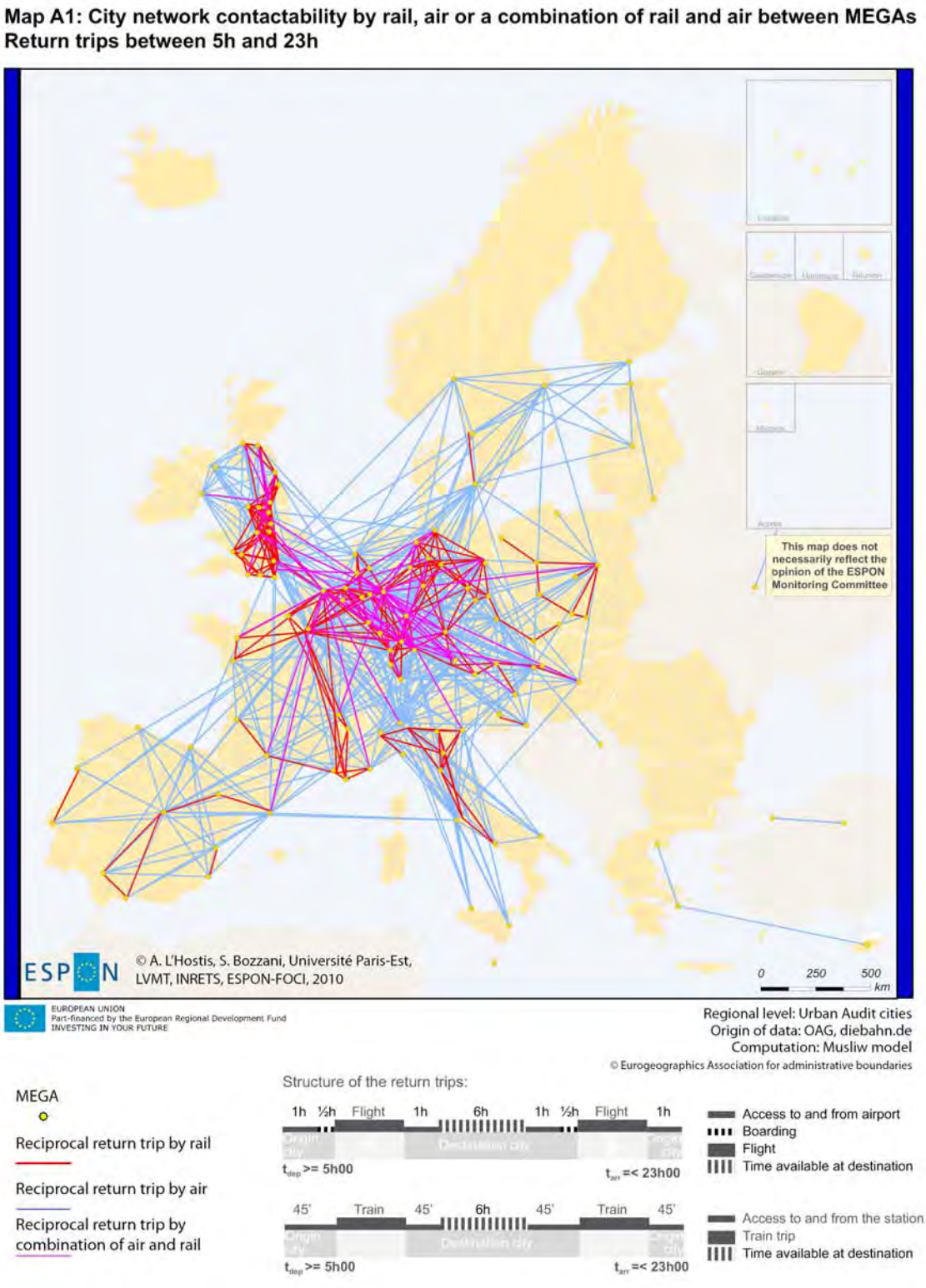


Figure 1. City network contactability by rail, air or a combination of rail and air between MEGAs Return trips between 5h and 23h

In this map, between any two cities, the modal combination that leaves the most time available at destination is chosen.

The map displays lines when a reciprocal relation is possible, i.e. when A to B and B to A relations are possible through the network. Unidirectional relations are not displayed for reasons of visual simplification.

Several key elements can be seen on this map. We can discuss the spatial distribution of the links and the transport mode distribution throughout Europe.
First element the very high importance given to rail, especially when we consider that links appearing on the map express the best spatio-temporal performance; this means that rail is able to compete with air for a large set of proximity relations. The high level of the role of rail in the inter-metropolitan relations is remarkable. One must notice though, that the national logic is very present as can be seen in the Italian case; the high-speed rail line opened recently between Naples and Milan allows for strong integration of the national city network with rail. Nevertheless Italian cross border links rely mostly on the air mode.
The second element is the high level of integration of most of the European space. The Iberic peninsula is strongly linked to the Pentagon, and the relations towards eastern countries like Poland or Hungary are clearly shown, even if their intensity is much lower than what can be seen inside the Pentagon. The integration of the Eastern Balkans proves more difficult; in this part of the territory the peripheral character and a lower density of MEGAs lead to a much less intense level of potential relations.
Thirdly the combination of rail and air plays a decisive role in the integration of the network. In order to better discuss this point we proposed to measure in each MEGA the number of other reachable MEGAs by each modal chain.

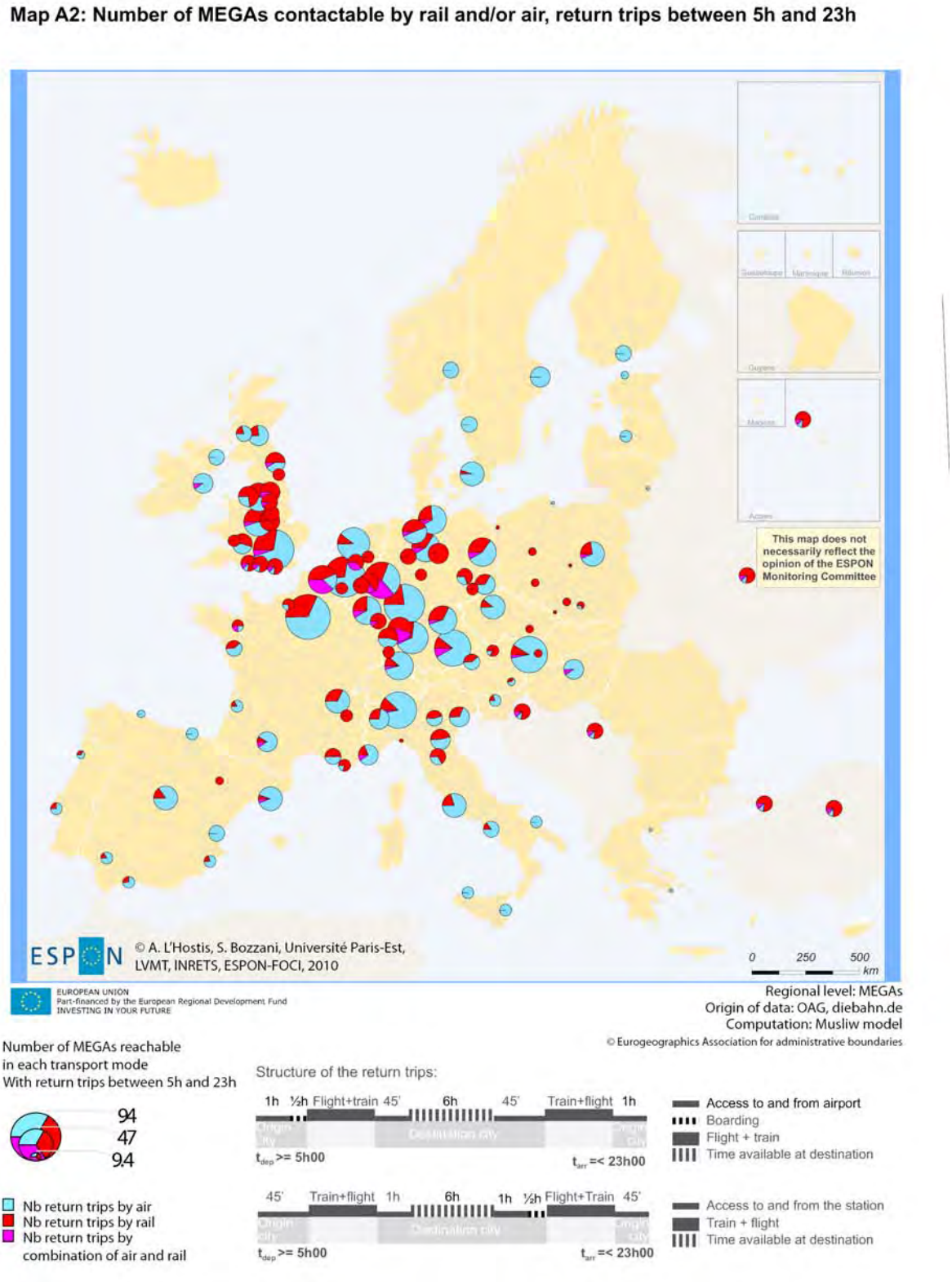


Figure 2. Number of MEGAs contactable by rail and/or air, return trips between 5h and 23h

The role of each modal chain in each cities give indications on the transport modes determinants of cities accessibility. For a metropolis air is the privileged transport mode for inter-metropolises linkages. For those metropolises that do not posses an international strong airport, accessibility level is not necessarily poor as in the case of the couple Copenhagen/Malmoe. Copenhagen is a city equipped with a large airport and air counts for more than a half of its 43 possible inter-metropolitan links. From Malmoe 24 MEGAs can be reached almost all through a rail-air combination that takes benefit of the proximity with the Copenhagen airport linkd with the rail Belt bridge.
Several intermediate MEGAs like Lille, Den Haag, German Ruhr and Rhein cities benefit of high levels of accessibility by the combination of high-speed and classical rail and efficient connection to airports. It is clearly an opportunity to build high levels of intermetropolitan accessibility without relying only on airport equipment. The indicator clearly demonstrates the potential of rail for this type of cities. Successful cases supposes to consider the position regarding the high performance rail network, the efficiency of the rail/air exchange poles.

6. The hierarchy of MEGAs according to potential emission and reception factor

The return trips can be used to determine the number of other MEGAs than can be reached from an existing city. When counting the number of reachable MEGAs potential emission and reception indexes can be build.
The potential emission and potential reception indices express the possibility to emit return-trips and receive return daily travels. The emission index expresses the possibility for travellers residing in the MEGA to reach other MEGAs for a business day trip between 6h and 22h. Reciprocally the reception factors express the possibility to hold a meeting inside a MEGA with people arriving from as many distant MEGAs.
The table shows the hierarchy of air platforms but also the imbalances between emission and reception functions. Large cities tend to have better emission than reception index.
The following map expresses the indicators of emission and reception indicators in the case of 5h to 23 hours return trips between MEGAs.

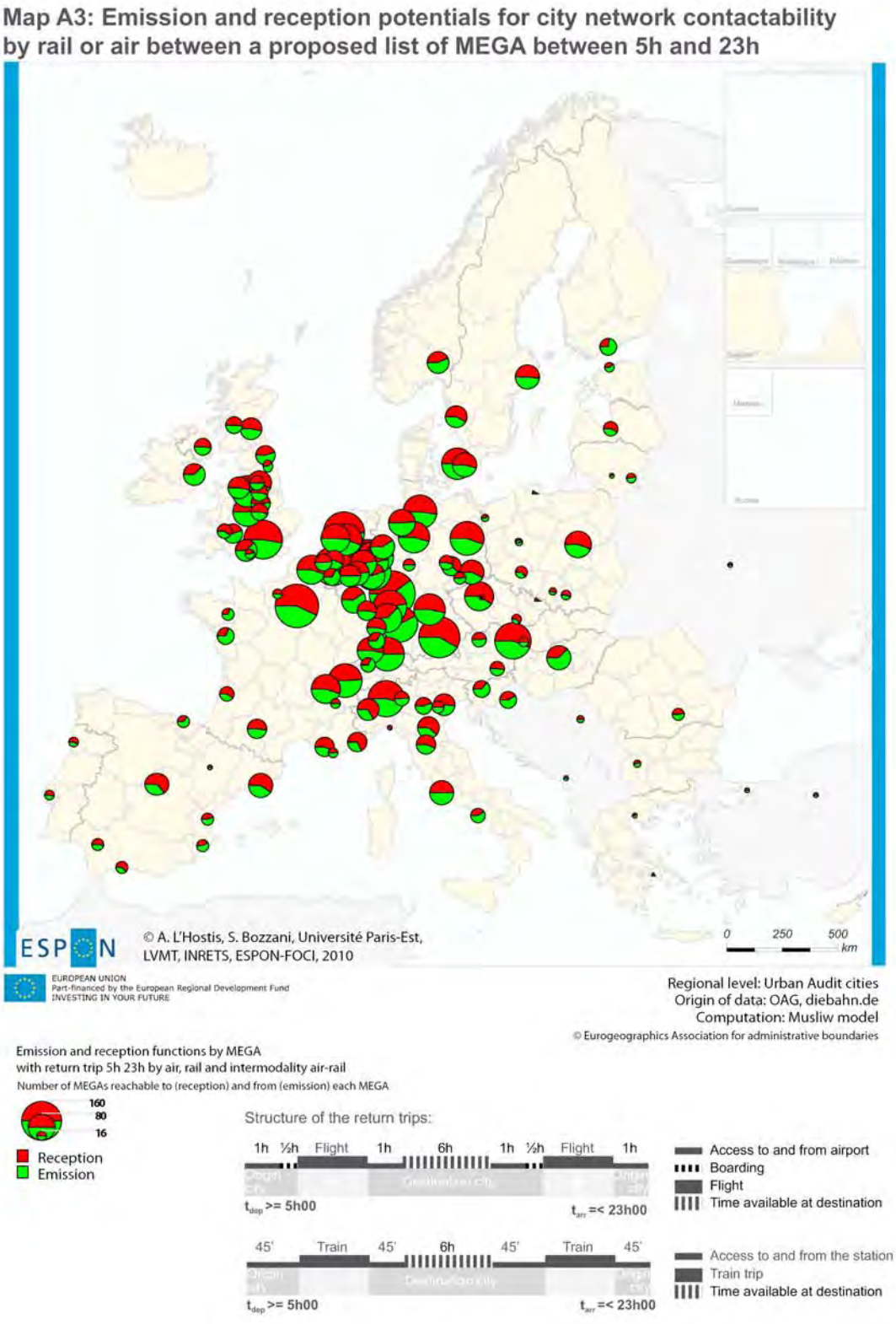


Figure 3. Emission and reception potentials for city network contactability by rail or air between a proposed list of MEGA between 5h and 23h

The tendency to see larger cities having a stronger reception potential than emission potential is here confirmed, despite notable exceptions like Francfort.

7. Rail for inter-metropolitan links

If air is the privileged transport mode for inter-metropolitan links, the return trips analysis shows that this type of business trips represents an opportunity for high-speed rail.
Indeed the mode combination leaving the longest available time at destination give a high importance to the rail mode, which competes with rail on distances ranging to 300 km or more in the case of high speed rail. To deepen the analysis of the potential of rail in inter-metropolitan links we produced a map of rail only relations. Between MEGAs one can find 1075 relations where rail make it possible to realise a return trip between 5h and 23 leaving 6 hours available for a meeting at destination. If we consider the number of 807 relations by rail that are better than the use of air or intermodality, we see that the potential for the use of rail is not overestimated by the global measure; it is even possible to envisage more rail for inter-metropolitan links, a tendency that is likely to evolve positively with the development of the high-speed rail network.

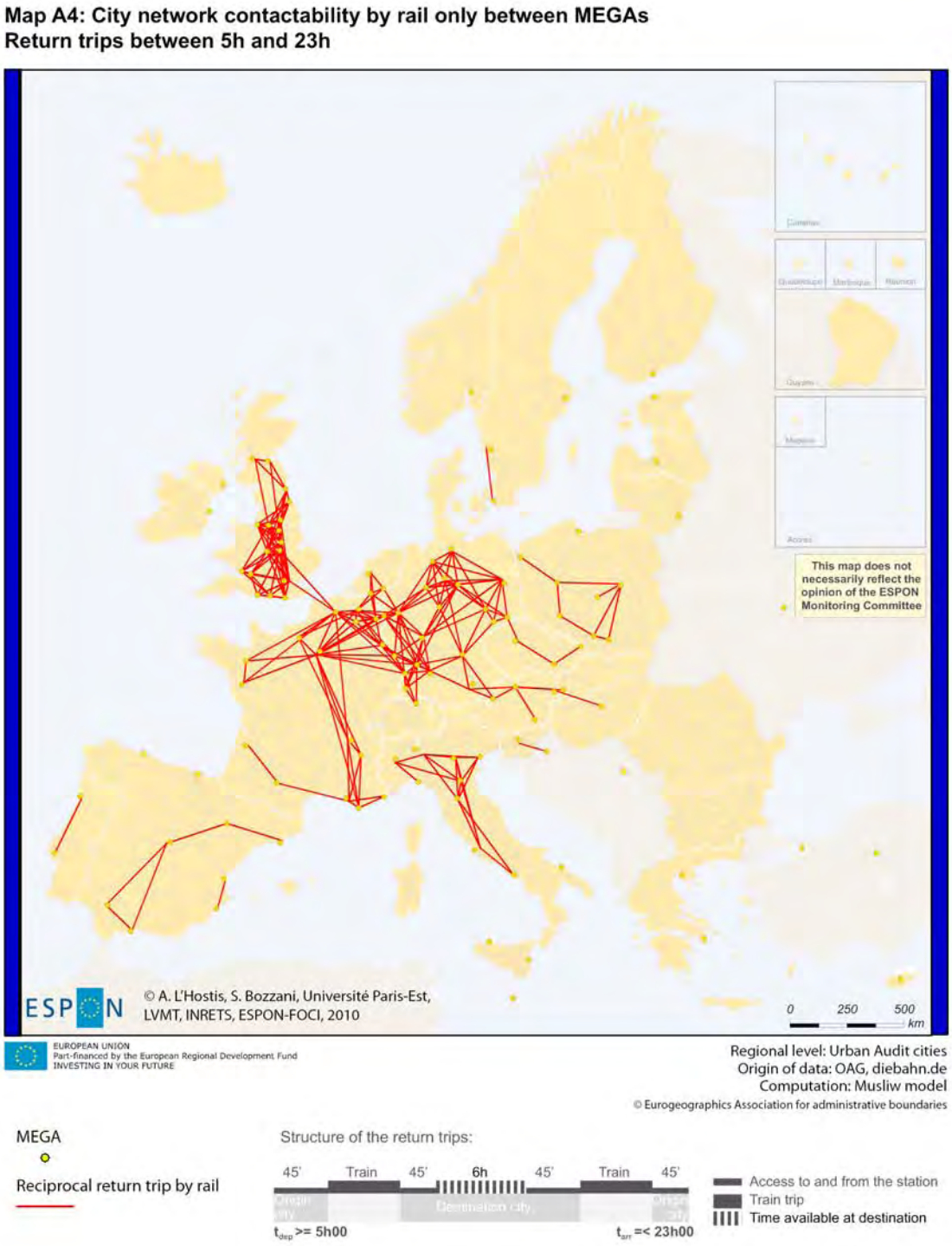


Figure 4. City network contactability by rail only between a proposed list of MEGA between 5h and 23h

The map shows a high level of rail connection in the pentagon, with notably cross-alps relations possible, a better integration of the Spanish city network. As on the multimodal map, the national integration of the city networks is high in different situations:

- Dense city network and dense rail network: United-Kingdom, Benelux
- Dispersed city network and high-speed rail: France, Spain, Italy

It is worth noticing that crossborder relations are not as well deserved as intranational ones due to a combination of factors: longer distances, physical obstacles like Alps an Pyrenees, missing links in the high-speed rail network as between France and Spain or Spain and Portugal. This map can be interpreted as in support of the development of the Tran-European railway network, which, with well positioned services, will allow for a better integration of the European city network.

8. Relating TEN-T rail corridors projects and missing rail contactablity links between metropolises

Several present missing links can be identified by examining the map A4 representing rail only return trips between metropolises.
Crossing of the Pyrenees could turn to rail when completion of the high-speed rail links between Perpignan and Barcelona in the East and Bordeaux-San-Sebastian in the West are completed and relevant service is set up.
Crossing of the Alps by rail for inter-metropolises contactability need probably waiting for the opening of the base tunnel to allow for high-speed rail between Lyon and Turin, and Milano beyond and the completion of the first TEN-T corridor, the Berlin-Palermo railway axis.
The Nordic triangle should most probably benefit from higher-speed rail in order for rail to surpass air transport for the daily relations between Oslo, Malmoe, Stockolm
In central Europe, many state borders remain visible on map A5. Rail is present in intra national inter-metropolises daily relations, but is much less present in international relations, even in case of relative close proximity in kilometre distances. This situation concerns the Polish Silesia cities and their Czech republic neighbour Ostrava. The polish system is clearly organized around its capital with a major role given to rail. Ostrava is linked by rail with Praha, but despite relative proximity with Silesia, no daily international relation is possible by air or rail. The TEN-T corridor 23 of the railway axis Gdansk–Warsaw–Brno/Bratislava–Vienna would contribute to fill this gap.
This case of marked international borders concerns also the Berlin to Szczecin relation. The city of Szczecin benefits from only one reciprocal return trips relations with the Polish capital. The weakness of its airport does not allow for contactability with international cities.
Another illustration is provided by the lack of rail connection between Hamburg and Copenhaguen. Here the TEN-T corridor of the Fehmarn belt railway bridge could provide the support for improved relations.
The borders are also visible between Brno in Czech Republic and Wien and Bratislava. Here again, the development of international rail infrastructure and services would be needed to support a a better modal performance from rail over air.
These missing links by rail are all international. This shows the case for European transport policy in favour of cohesion of the European territory on the one hand and in favour of a more sustainable transport mode on the other hand.

9. The potential of rail-air intermodality for secondary cities linked to large airports

The map A5 is an extract of the global multimodal contactability map representing only the 37 intermodal reciprocal return trips between metropolises. This map shows the six European intermodal air-rail systems.

Map A5: City network contactability by a combination of rail and air between MEGAs cities, return trips between 5h and 23h, the European Intermodal systems

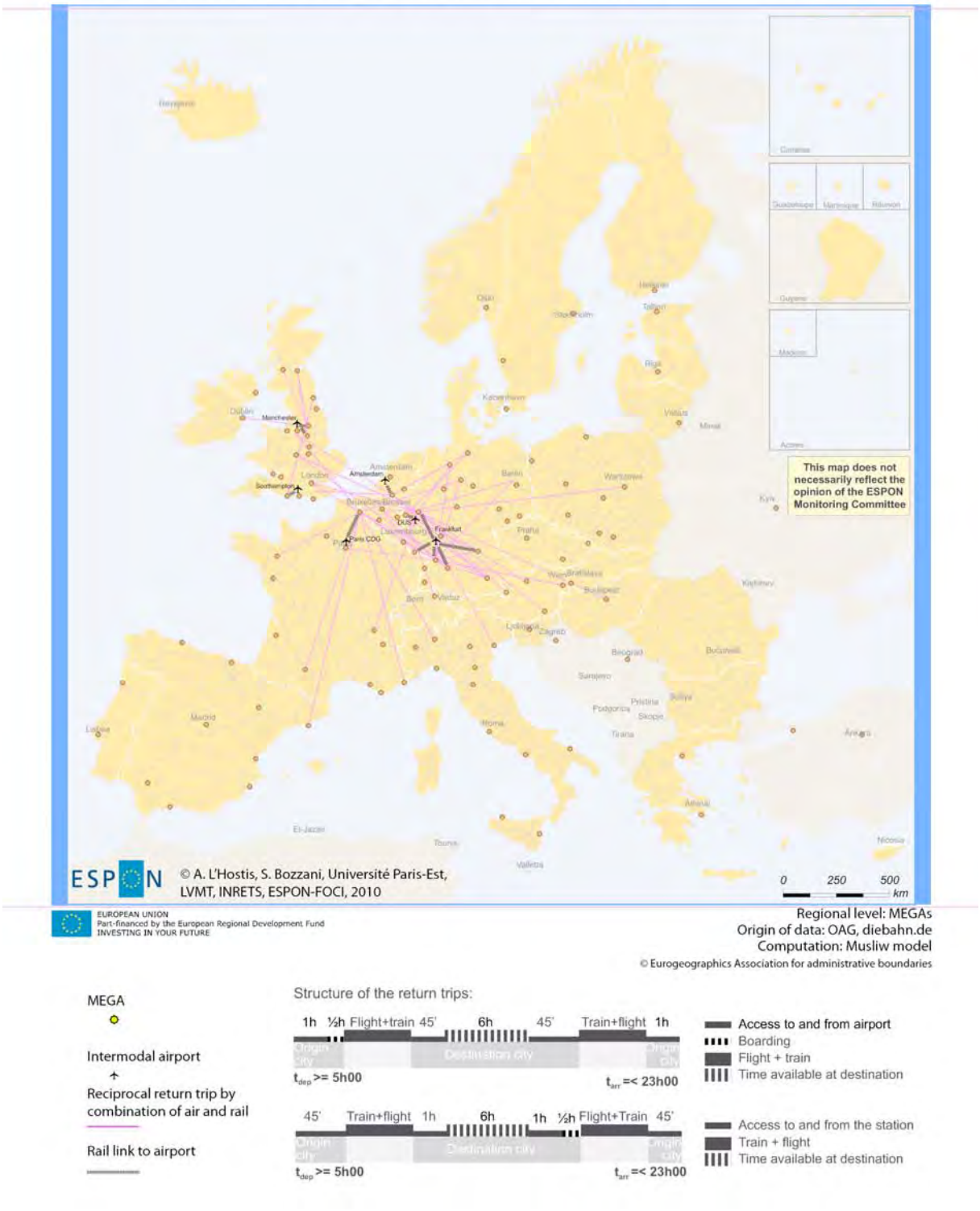


Figure 5. City network contactability by a combination of rail and air between MEGAs cities, return trips between 5h and 23h, the European Intermodal systems

The most comprehensive intermodal system can be seen around the major Frankfurt airport with cities of Karlsruhe, Saarbruck, Stuttgart and Bonn. This last city, representative of the accessibility of the Ruhr urban area benefits significantly from the airport of Frankfurth, by means of a very efficient and direct high-speed rail link to this major international airport.
The other case where high-speed rail and air intermodality plays a significant role in a metropolis accessibility is Lille. The northern French city benefits from a contactability to 9 European cities with this intermodal system with the Parisian airport of Charles de Gaulle out of a total of 23 contactable cities.
In the Netherlands Tilburg can access to the Amsterdam Schiphol airport and benefits from a significant long distance accessibility.
In the United-Kingdom, Leeds gain a significant accessibility by using train to the Manchester airport. And Bournemouth benefits from its rail connection with the Southampton airport.
Some European metropolises do not benefit from strong international airport but can access to large airports belonging to a neighbouring larger metropolis. The necessary conditions for this to occur are the existence of a long distance railway station located inside a major international airport. In addition the presence of high speed rail is susceptible to allow for a spatial extension of the accessibility provided by a major airport as can be seen in the case of the couples Frankfurt_Ruhr and Paris-CDG-Lille.
This result invites to support the connection of the upper level airport system and the high-speed rail network. This could allow for cities that do not posses a strong international airport to build and accessibility level equivalent to that of a much larger metropolis. The message here is that the possession of an international airport is not the unique way to build an international accessibility.

10. The role of low cost airlines

Low cost airlines are an strongly emerging new actor in the European air industry landscape (Dobruszques 2005). They represent 35 % of all flights scheduled in the winter 2009 in the OAG database.
In inter-metropolitan accessibility, low cost airlines play a particular role. It is widely accepted that low cost airlines are more present on smaller airports than on major platforms where heritage airlines have build dominant positions. In addition, most low cost airlines focus on leisure market, leaving heritage airlines dominate the business travel. Consequently, the inter-MEGAs relationships should stay in majority under the influence of major airlines. Nevertheless, with the strong emergence of low cost model, especially in intra continental links, challenging the historical players, what is the importance of theses new actors?
To determine low-cost and heritage airlines we used reference works by Dobruszkes (Dobruszques 2005), and reference websites specialised in low cost ticket sales[8].

[8] Belvedair.com, bravofly.com and flyc.com, flylowcostairlines.org.

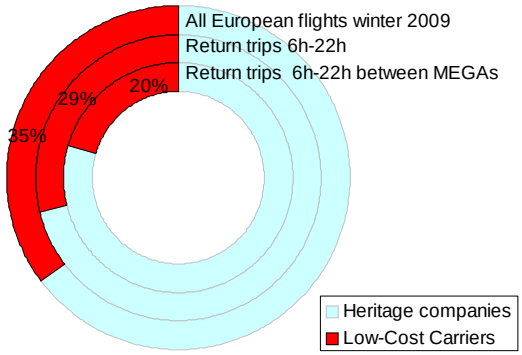


Illustration 1: Percentage of low-cost flights and return trips between airports and MEGAs

The preceding illustration indicates the percentage of flights operated by low-cost carriers in the data base and among the flights selected for realising the return flights between all airports and finally between MEGAs operating the flights used in the return trips between 6 and 22 hours. Basically the analysis confirms the major characteristics of the supply of the low cost carriers. They are becoming major actors in the European airline industry but, so far, they are not the major actors for the business inter-metropolitan relationships. This segment of the market is mainly operated by heritage airlines with strong positions on major airports associated with the largest and most accessible metropolises in Europe.

11. The contactability by air and rail among Urban Audit cities

We propose to deepen the analysis by extending the contactability indicator towards the cities of the Urban Audit[9]. As in the previous analysis we have studied the possibility to realise daily return trips by means of trains and/or planes between cities. It must be noticed that we have not considered cars, despite its relevance for this type of trips especially between neighbouring cities when long distance modes, air and high speed trains, are not relevant. This shortcoming of the indicator in terms of realism is balanced by the identification of the potential for rail mode a substitute for road in the perspective of the greening of transport modes.
The following map shows the return trips accessibility, from 5 to 23 hours, considering air, rail and the combination of both. If we refer to the equivalent MEGA map we can observe a greater density of links all over Europe. Nevertheless, because of the too large number of links, this cartography technique shows shortcomings in terms of analysis, and we will use the summary map.

[9] The 362 cities of the Urban Audit were considered with the exceptions given in the table below:

Larisa	GR	Balikesir	TR	Kocaeli	TR	Saint Denis	FR	Gozo	MT
Volos	GR	Bursa	TR	Manisa	TR	Pointe-a-Pitre	FR		
Ioannina	GR	Edirne	TR	Siirt	TR	Fort-de-France	FR		
Kavala	GR	Hatay	TR	Zonguldak	TR	Cayenne	FR		
Kalamata	GR	Kastamonu	TR	Wirral	UK	L'Hospitalet de Llobregat	ES		

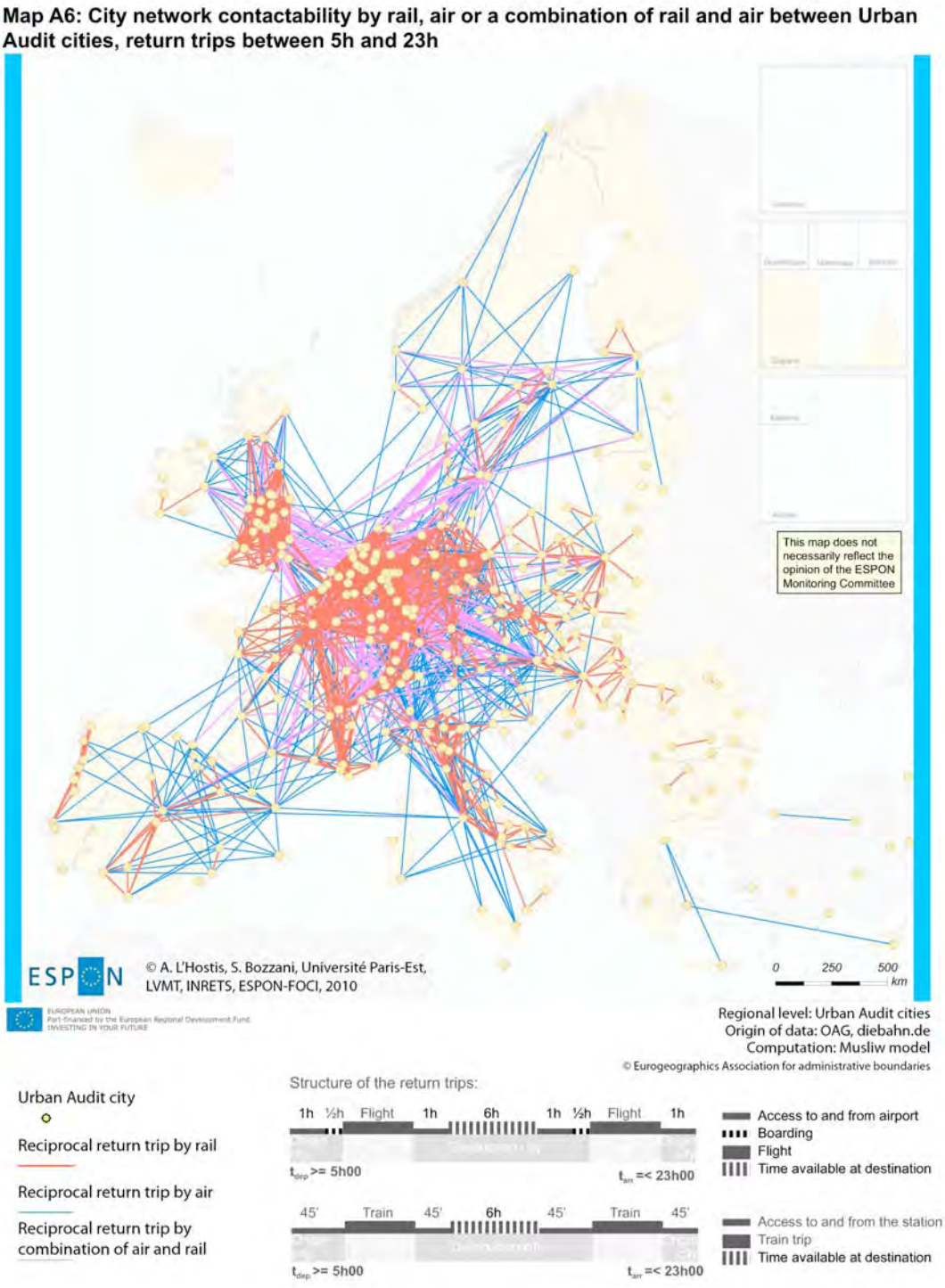


Figure 6. City network contactability by rail, air or a combination of rail and air between Urban Audit cities, return trips between 5h and 23h

The following map indicates for each city of the Urban Audit list the number of distant cities reachable for a business trip and shows the respective parts of each transport chains. The map shows clearly that the dominant mode among Urban Audit cities is rail. Second rank cities like Le Mans, Ancona, Katowice or Middlesbrough often benefit of poor air services as compared to first rank cities like Frankfurt, Vienna or Copenhagen. But they can rely on the rail system to build contactability levels of relatively high

importance.

Map A7: Number of Urban Audit cities contactable by rail and/or air, return trips between 5h and 23h

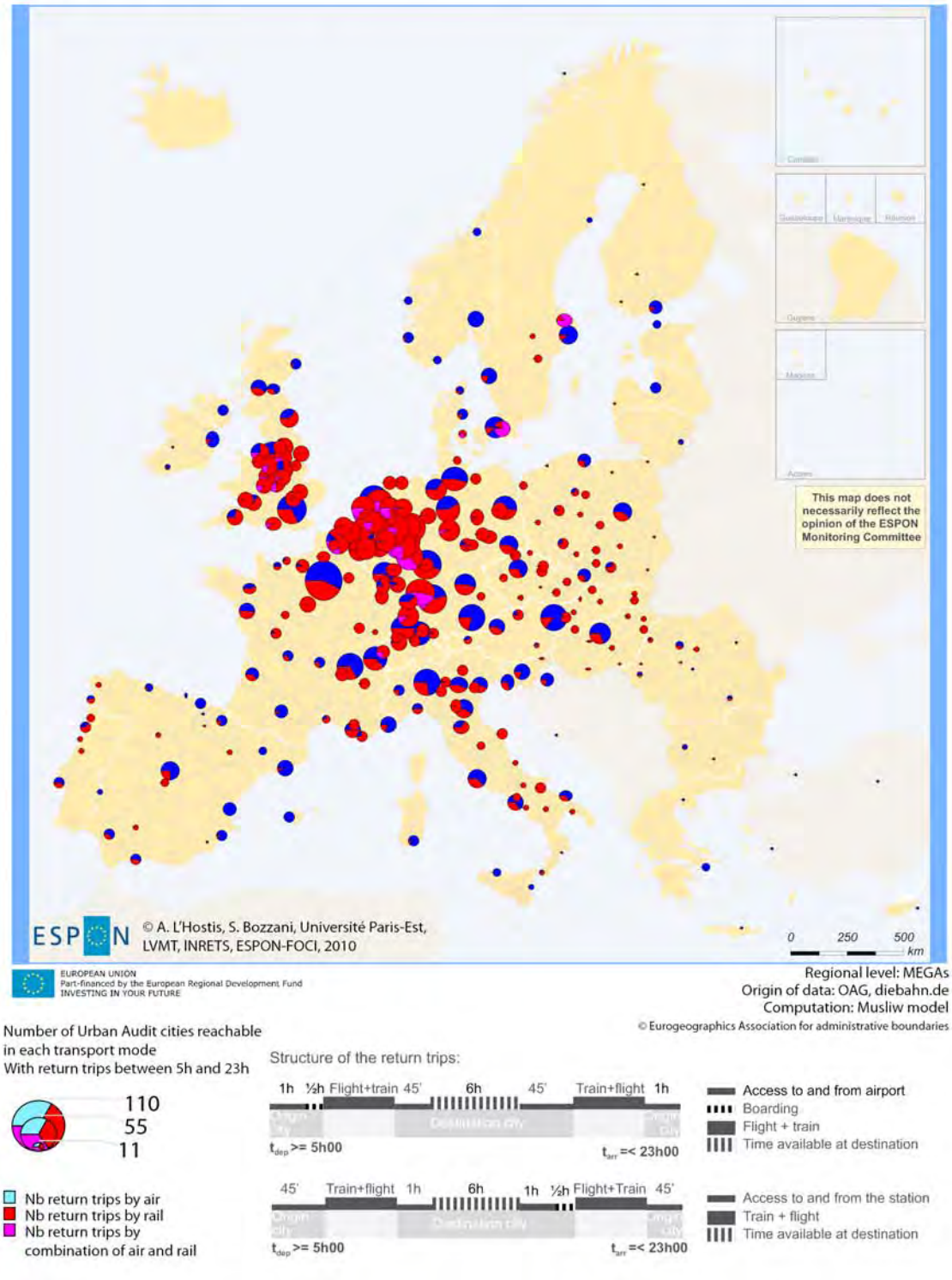


Figure 7. Number of Urban Audit cities contactable by rail and/or air, return trips between 5h and 23h

The map highlights those European regions were second rank cities, well connected by rail and separated by relatively short distances or separated by longer distances but served by an efficient high speed rail service can develop high contactability levels. This can be seen in England, in the Benelux and Ruhr, in Central Germany, in Northern Italy, in Western France and in Southern Poland. The rail system provide the support for daily communications between these cities at the local or regional scale.
The second observation that the map provides, confirms the analysis already developed regarding the articulation of the rail and air modes. Several major air hubs, like Paris, Frankfurt, Birmingham, Amsterdam, Copenhagen are able to, thanks to a good quality interconnection with classical rail or high-speed rail, contribute significantly to the accessibility of secondary centres located in the environment but not belonging to the functional area.
The indicator shows how rail can efficiently diffuse the long distance accessibility levels that the air system can provide. The rail system can benefit to secondary cities that can not pretend to develop a major air hub, in contributing to a significant level of contactability.

12. Conclusion

Accessibility, analysed through the prism of contactability is a key component of city economic functioning. The indicators developed in this contribution highlight the possibility given to metropolites to reach distant metropolises through high speed transport. The indicator can be interpreted both ways, according to the emission or reception functions. Both are important to support the functioning of economic activities in cities.
Investigations have focused on two directions, a discussion on the cohesion of the territorial city network, and a discussion on the role of types and modes of transport.
The main messages given by the map is that of an extremely strong integration of the urban network in the centre part of Europe and to a lesser extent to some privileged peripheral spaces like the Iberic peninsula or the Nordic space. On the other hand some eastern countries and the Balkans appear not so well connected. This is due to a lower density of metropolises and to poorer connections by fast transport modes.
Regarding modes and types of transport the analysis let two points emerging. Firstly we confirm a fact already documented in the literature, that low cost airlines model, which is gaining influence all over Europe tend to be les present in the inter-metropolises segments than in the overall transport supply. Inter-metropolises contactability by air is mainly provided by heritage airlines. Secondly, and more surprisingly, we observe the very high importance of railways in the structuring of the European metropolises network. Rail, and particularly high-speed rail, competes successfully with air on a very significant number of origin-destination pairs. Rail is also very important in intermodal chains, combining the two modes. This third message expresses the possibility given by intermodality to provide high levels of accessibility to cities like Lille, Malmoe, Den Haag, German Ruhr and Rhein that do not possess strong international airport but get access to it through rail. We measure here the fact that airport equipment is not the only way to support metropolis accessibility.
The great care given in the building of the indicator to allow for equitable comparison between air, rail and intermodal chains permits to show that the potential for inter-metropolitan contactability with rail in Europe is very high and likely to grow with the foreseen development of the European high-speed rail network.

References

Beaverstock, Jonathan V., Ben Derudder, James Faulconbridge, et Frank Witlox. 2010. *International Business Travel in the Global Economy*. http://www.ashgate.com/default.aspx?page=637&title_id=10198&edition_id=12677&calcTitle=1.

Bozzani, S. 2005. L'Intermodalité air-fer à grande vitesse au service du rayonnement métropolitain: étude de l'articulation modale à l'aéroport de Roissy-Ch. de Gaulle

au départ de Lille. *Cahiers Scientifiques du Transport* 47: 61-88.
Cattan, Nadine. 1995. Barrier Effects: The Case of Air and Rail Flows. *International Political Science Review/ Revue internationale de science pol* 16, n°. 3 (Janvier 1): 237-248. doi:10.1177/019251219501600304.
Chardonnel, S. 2001. La Time-geography: les individus dans le temps et l'espace. Dans *Modèles en analyse spatiale*, 129-156. Traité Information Géographique et Aménagement du Territoire, Série aspects fondamentaux de l'analyse spatiale. Paris: Lavoisier.
Dobruszques, F. 2005. Compagnies low cost européennes et aéroports secondaires: quelles dépendances pour quel développement régional? *Les Cahiers Scientifiques du Transport*, n°. 47: 39-59.
ESPON, et BBR. 2006. *ESPON atlas, Mapping the structure of the European territory*. BBR.
Florida, Richard. 2003. Cities and the Creative Class. *City and Community* 2, n°. 1: 3-19. doi:10.1111/1540-6040.00034.
Granovetter, M. 1983. The Strength of weak ties: a network theory revisited. *Sociological Theory* 1: 201-233.
Hägerstrand, T. 1970. What about people in regional science? *Papers of the Regional Science Association* 24: 7-21.
Haggett, P. 2001. *Geography, a global synthesis*. Harlow: Prentice Hall.
Janic, M. 1996. The Trans European Railway Network Three levels of services for the passengers. *Transport Policy* 3, n°. 3 (Juillet): 99-104.
———. 1997. Comparison of the quality of rail and air networks in West, Central and Eastern Europe. *Transport Policy* 4, n°. 2 (Avril): 85-93.
L'Hostis, A., P. Menerault, et C. Decoupigny. 2004. Assessing spatial planning policy with accessibility indicators: the case of Lille's metropolis scenario. Dans *Transport developments and innovations in an evolving world*, 293-312. Advances in spatial sciences. Berlin: Springer.
Mathis, P., E. Bock, J.-B. Buguellou, J. Coquio, L. Guimas, A. L'Hostis, S. Bozzani, et al. 2004. *Transport services and networks: territorial trends and basic supply of infrastructure for territorial cohesion*. http://www.espon.eu/mmp/online/website/content/projects/259/652/index_EN.html.
Miller, H.J. 2004. Activities in Space and Time. Dans *Handbook of Transport 5: Transport Geography and Spatial Systems*. Pergamon/Elsevier Science. C:\Travail\Bibliographie\Articles\Accessibilité\Miller Activities_Space_Time Handbook of Transport.pdf.
Park, Yonghwa, et Hun-Koo Ha. 2006. Analysis of the impact of high-speed railroad service on air transport demand. *Transportation Research Part E: Logistics and Transportation Review* 42, n°. 2: 95-104. doi:10.1016/j.tre.2005.09.003.
Rozenblat, Céline, et Guy Mélançon. 2009. A Small world perspective on urban systems. Dans *Handbook of Theoretical and Quantitative Geography*. Lausanne: FGSE.
Sassen, S. 1991. *The Global City: New York - London - Tokyo*. Oxford: Princeton University Press.
Taylor, P. 2004. *World city network, a global urban analysis*. Oxon: Routledge.

Chapter 6 – The position of cities in research networks in converging technologies

Marie-Noëlle Comin, Denise Pumain and Céline Rozenblat (Géographie-cités-IGUL)

1. Creation of a data base on cooperative research networks in converging technologies: methodology and meaning of these new indicators

Technological innovation has acquired in Europe, as in the rest of the world, an increasing strategic importance for economic competition. It also plays a crucial role in the structuring and dynamics of the settlement systems: within the emerging "knowledge economy" the main dynamical feature that characterizes the evolution of systems of cities seems to be competition for collecting knowledge and innovations. Contrary to the largely widespread idea according to which innovation may locate indifferently, various empirical studies stress the importance of cities as nodes of accumulation, production and diffusion of scientific and technological knowledge. Thus, from the analysis of scientific collaborative networks we can derive some critical insights regarding the wider geography of European cities' interactions.

In order to study the most innovative scientific sectors, we focus on NBIC technologies (nanotechnology, biotechnology, information technology and cognitive science) commonly named "converging technologies". Such technologies are believed to drive the future innovation wave expected to emerge by 2020 (Nordmann, 2004). There are three principal types of indicators for studying technological flows between cities: (i) patents documents include references to previous patents (citation). According to A. B. Jaffe et al. (1993) patent citing earlier patents reveal knowledge flows between localized inventors. (ii) The co-authorships networks related to joint publication activities indicate intense working relations and then potential knowledge flows between localized authors. The main difficulty with these two indicators is to collect data related to the cities where innovative actors are located. (iii) In our analysis, we consider scientific and technological collaborative linkages between the organizations engaged in innovation processes (namely research organizations: public research centers, universities and firms' research centers) within European funded research and technology development projects (RTDs) dedicated to converging technologies.

Data were collected from the EC database CORDIS RTD-PROJECTS (Community Research and Development Information Service) drawn from the 2nd to 6th European Framework Programs for Research and Technological development (or FPs) (the 1st FP is much too incomplete to be used): the CORDIS data base provides information about the evolution of European research supports from 1986 to 2006. CORDIS data give information about the real location of the organizations that are involved (it is not the location of organizations' headquarters). Indeed, institutions can have several research centers located in different cities. That is why we choose to identify the precise location of each of the research centers (laboratories) that are really involved in projects dedicated to NBIC. We can thus create urban networks, by aggregating CORDIS data at the city level for measuring the links which are created between cities by these networks (see J. Hoekman et al 2008 -for UE 27 regional study-; Rozenblat and Cicille 2003 ; Besussi, 2006; Rota, 2008; and Comin, 2009 about scientific urban networks). The resulting FUAs database is named NBIC-Euro database for research networks and SPANGEO database for multinational firms.

Critical steps of the methodology used for building the NBIC-Euro database are made explicit below.

2. A methodology for selecting projects that are exclusively dedicated to NBIC technologies from the database CORDIS

The projects in the CORDIS data base include a description of the coordinator and participants with their geographical location as well as technical details and a short description of their objective (figure 1). Extraction of relevant projects from the database CORDIS was made through key-words selected from the literature on NBIC (figure 2). The projects dealing with research on NBIC were not identified through the official keywords listed in the programs but were extracted after a full semantic analysis of the text of each project.

PROJECT DESCRIPTION:	**PROJECT DETAILS:**
Objectives: NanoTemplates STREPS project will push the Frontiers of Science of a unique range of nano- objects made by further extending nanotechnology developed in two EU RTD projects [NanoPTMS & GMR - BE95-1761 & NanoPTT - G5RD -CT1999-00135]. It will seek an advantageous property discontinuities arising from the nano-regime and explore these through a range of novel nano-systems to identify promising areas for further development. The project will be underpinned by IPR from previous EC projects employing UCL technology based on heavy ion bombardment and track etching of polymers for nano-object fabrication. Fundamental studies of the track etching and patterning processes will be made. Nanoporous substrates (pores down to 10nm), polymeric and metallic nanowires and nanotubes in various forms (nano-objects), including particulate and embedded within coatings and self-supporting films, will be developed (UCL, Epigem, CNRS). Alternative route to nanoporous arrays will also be investigated by using AFM tip generation of pores (CNRS) in spin-coated films. The characterisation of the nano-objects will be performed and specific properties will be measured. It is intended to screen optical, magnetic and chemical properties. The response of magnetic metallic nanowire arrays to high frequency fields will be investigated (Thales, UCL), whilst CRF and Thales will explore the magnetic properties of the nano-structures. Spin dependent phenomena in magnetic nano-objects will be investigated by UCL and CNRS to explore ultimate limits of magnetoresistive effects and potential long- term applications to quantum computing. UNEW and Epigem will integrate nano-objects in microfluid nanosystems and measure biomedical properties. CRF and Durham will explore nano-objects in the form of light sources comprising light emitting polymer diodes (OLED). Confinement effects will be explored to identify benefits for the emission spectrum as well as the light extraction mechanism. ***Achievements:***N/A ***General information:*** N/A	***Project Acronym:*** NANOTEMPLATES ***Project status:*** Execution ***Start date:*** 2004-09-01 ***End date:*** 2007-08-31 ***Duration:*** 36 months ***Project Reference:*** 505955 ***Project cost:*** 2408236 EURO ***Project Funding:*** 1500000 EURO ***Programme Acronym:*** FP6-NMP ***Programme type:*** Sixth Framework Programme ***Subprogramme Area:*** Expanding knowledge in size dependant phenomena. Engineering techniques for nanotubes and relative systems ***Contract type:*** Specific Targeted Innovation Project ***URL:*** N/A ***Subject index:*** Scientific Research, Industrial Manufacture ***Other Indexes:*** N/A ***Record control number:*** 74330 ***Quality validation date:*** 2007-06-11 ***Update Date:*** date de la dernière mise à jour
COORDINATOR:	**OTHER PARTICIPANTS:**
Organization name: Université Catholique de Louvain ***Contact person:*** Etienne FERAIN (Dr) ***Tel:*** +32-10473560 ***Fax:*** +32-10451593 ***E-mail:*** Contact ***URL:*** http://www.ucl.ac.be ***Address:*** Chemistry and physics of high polymers, 1 Place de l'Université, Louvain-la-Neuve, BELGIQUE-BELGIË ***Region:*** N/A ***Organization Type:*** N/A	***Organization name:*** THALES ***Contact person :*** NGUYEN VAN DAU Frédéric ***Tel:*** +33-0169339092 ***Fax:*** +33-0169330740 ***E-mail:*** Contact ***URL:*** http://www.thalesgroup.com ***Address:*** Thales Research & Technology France, 45, rue de Villiers, Neuilly-sur-Seine, FRANCE. ***Region:*** N/A ***Organization Type:*** Industry […]

Figure 1. Example of the description of a project in the database CORDIS: the project « Templates for engineered nano-objects for use in microwave, electronic devices and biomedical sensing application

Source: CORDIS, http://cordis.europa.eu/search/index.cfm?fuseaction=proj.simpledocumentlucene&HD_ID=7522684&CFID=2025173&CFTOKEN=76789124

Nanotechnology:	Nanotechnology
	Nanoscience
Biotechnology:	Biotechnology
	Genetic engineering
	Bioengineering
	Bioinformatics
Information technology:	Information technology
	Information systems
Cognitive science:	Cognitive science
	Cognitive neuroscience
	Neurosciences

Figure 2. Key words used to select projects dedicated to NBIC technologies

As a result, the NBIC-Euro database contains 3675 projects dedicated to NBIC. Then, a first result emerge: in twenty year of Framework Programs, the European Union funded much more projects belonging to biotechnology than projects belonging to others technologies forming the "convergent technologies". But over time, the share of projects belonging to biotechnologies tends to decrease while those of nanotechnology and cognitive science were increasing (figure 3).

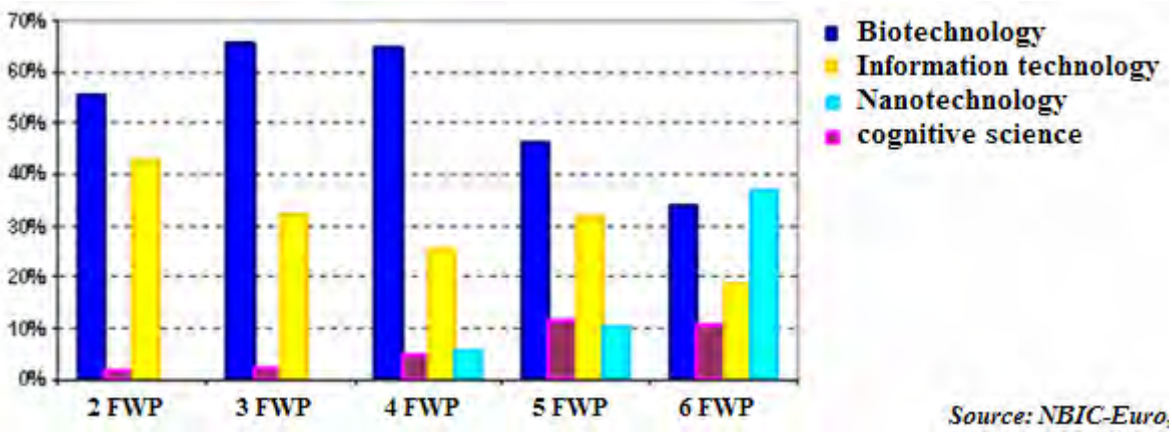


Figure 3. Evolution of the shares of the four main disciplines in NBIC projects (1986-2006)

As descriptors in our database, we collected the dates of beginning and end of each of the 3675 projects and also the name and objectives of the European programs they belong to.

We also made a typology of the European Framework Programs instruments or actions in order to classify NBIC projects. The point is to underline the type of scientific activities the consortiums do. Figure 4 shows that the NBIC-Euro database contains a large majority of collaborative research projects. This is a good point for our research because conducting a research supposes long term interactions between consortiums' partners and thus ensures technological spillovers between them. In the perspective of urban systems, these technological spillovers may strengthen the technological base of a city.

Activities	% of NBIC Projects (1986-2006)	Description
Produce, demonstrate and validate new knowledge	62	International collaborative research
Activities of research's coordination and support	18	Events (Conferences, meetings, workshops…)
Marie Curie Actions	14.5	Training, mobility, fellowship and reward
Not mentioned	5.5	-

Figure 4. Types of activities conducted in NBIC projects
Source: NBIC-Euro

About the consortiums' partners, we collected their names and location (complete postal address), and also the function they have in the projects (coordinators or participants). The partners are located in 9299 research centers. We define the legal status of the centers in two types: public or firms according to the typology of Melin B. et Esterle L. (2004)[10]. Figure 5 shows clearly that the participation of public research centers in NBIC projects is higher than the participation of firm research centers, and more over it tends to increase over time.

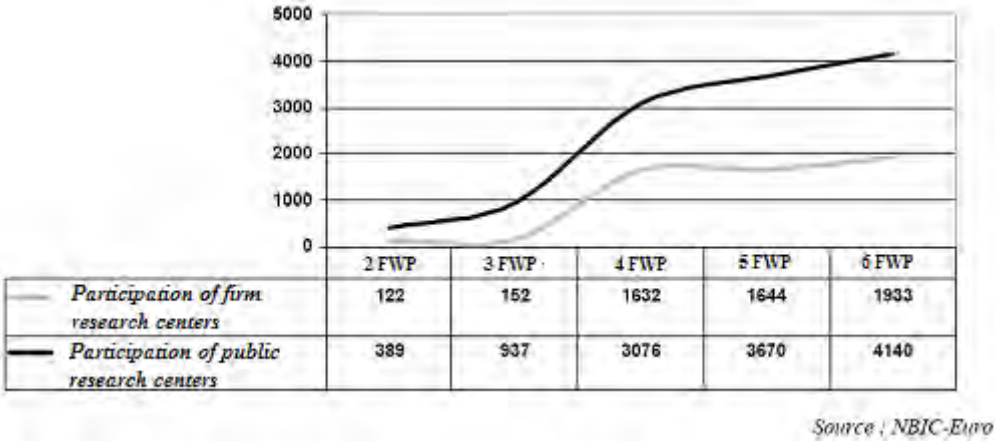


Figure 5. Evolution of public and firm research centres participation in NBIC projects (1986-2006)

2.2. Method for assigning projects to urban areas

For our research, we have defined cities as functional urban areas. Each institution appearing in the networks have been geographically localized and then aggregated to the urban area they belong to. More specifically, in Europe, there is no universal definition of

[10] Melin B. et Esterle L. 2004, Rapport d'analyse des participations françaises au cinquième Programme-Cadre pour la Recherche et le Développement Technologique en Europe (1999- 2002), Etude réalisée pour le ministère de l'Education nationale, de l'Enseignement supérieur et de la Recherche, Direction de la Technologie, Bureau des programmes communautaires de recherche. Décembre 2004, 19 p.

FUAs. Generally, FUA is defined as a core municipality and its adjacent commuting areas (ESPON 2007). At the moment, we did not select *a priori* a list of cities, but we have collected all names of the localities that were mentioned in the source data bases about financial or research networks. Then, we observe that even small towns and/or extra-European cities can have subsidiaries or research centers involved in the European networks. Consequently, we have developed two different methods to aggregate research centers to the FUAs they belong to: (i) First, we consider only FUAs defined by ESPON Project (1.1.1. and 1.4.3.) in order to build a data base that is comparable with other studies. It is a good method, but it means excluding a large part of smaller cities and/or extra-European cities involved in urban networks. (ii) Second, we have defined our own homogenous definition of FUAs in order to deal with all cities involved in research networks (even small and/or extra-European cities). To define our FUAs, we consider morphological urban areas (MUA) as the cores of FUAs (according to Géopolis database (Moriconi-Ebrard, 1994) completed and updated by the laboratory Géographie-cités, Paris, France) and then we aggregate the mentioned localities surrounding these cores. The aggregation of the fringe is made through thresholds of distance to MUAs centers because we don't have data allowing us measuring the travel-to-work areas for all European cities involved in the research networks. We can assert that the distance thresholds fixed here (figure 6) are deliberately very restrictive in order not to integrate localities that would be totally independent from the MUAs with which they could be connected, what constitutes the major risk of our aggregation method.

Number of inhabitants in MUA	**Thresholds of distance to MUA**
Between 10.000 and 50.000 inhabitants	30 km
Between 50.000 and 100.000 inhabitants	50 km
More than 100.000 inhabitants	70 km

Figure 6. Distance to MUA centers thresholds to define FUA

As a whole, the NBIC-Euro database includes FUAs with 10 000 inhabitants and more, only five of them (Suomussalmi, Argostoli, Horta, Kardla and Lerwick) have less than 10 000 inhabitants. The NBIC-Euro database contains 9299 research centers located in 799 functional urban areas distributed between 117 countries. Among all functional urban areas, 512 of them are located in UE 27 (figure 7)

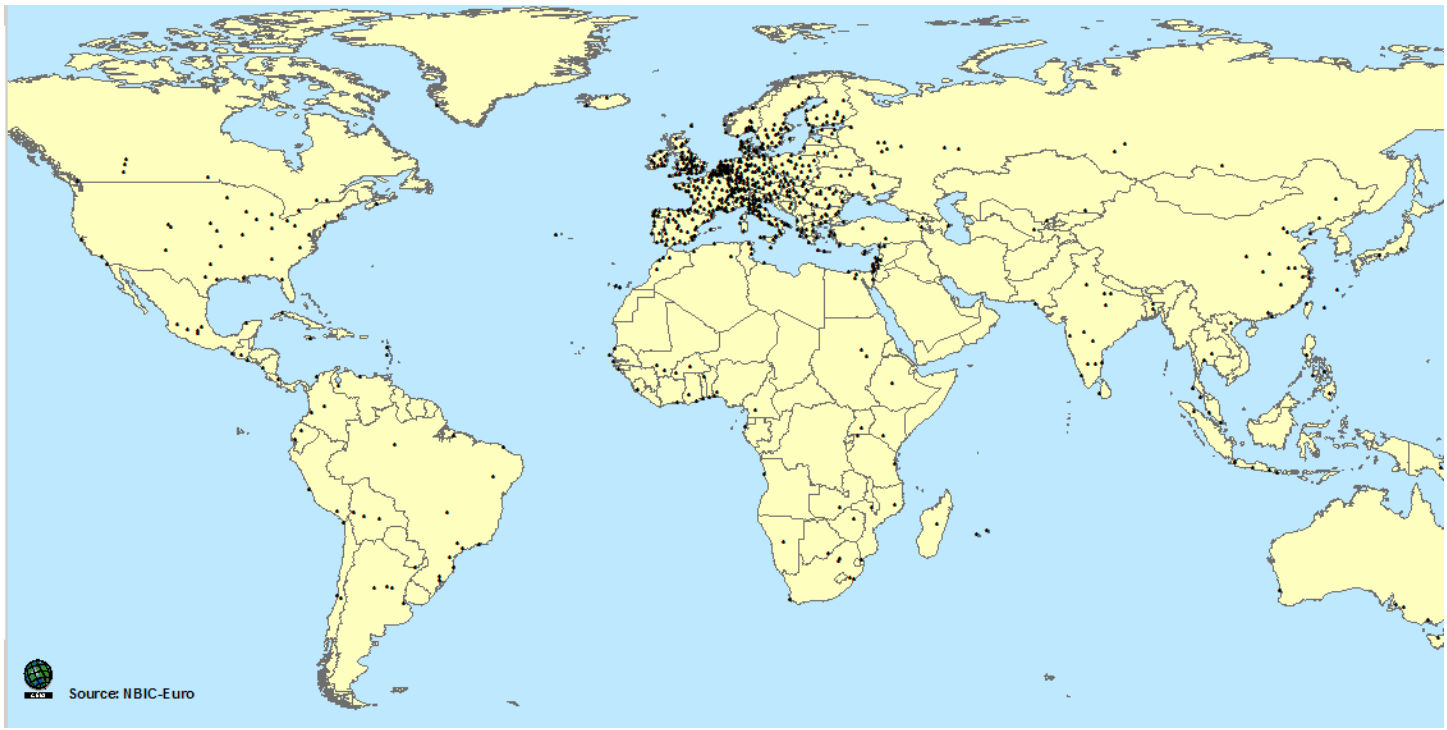


Figure7. Location of NBIC-Euro FUAs (1986-2006)

However, the distribution of functional urban areas in the European Union is highly contrasted. Indeed, they concentrate especially in the European megalopolis. Furthermore, the capital cities of European countries and more generally the large European metropolises are all involved in the research networks under study (figure 8).

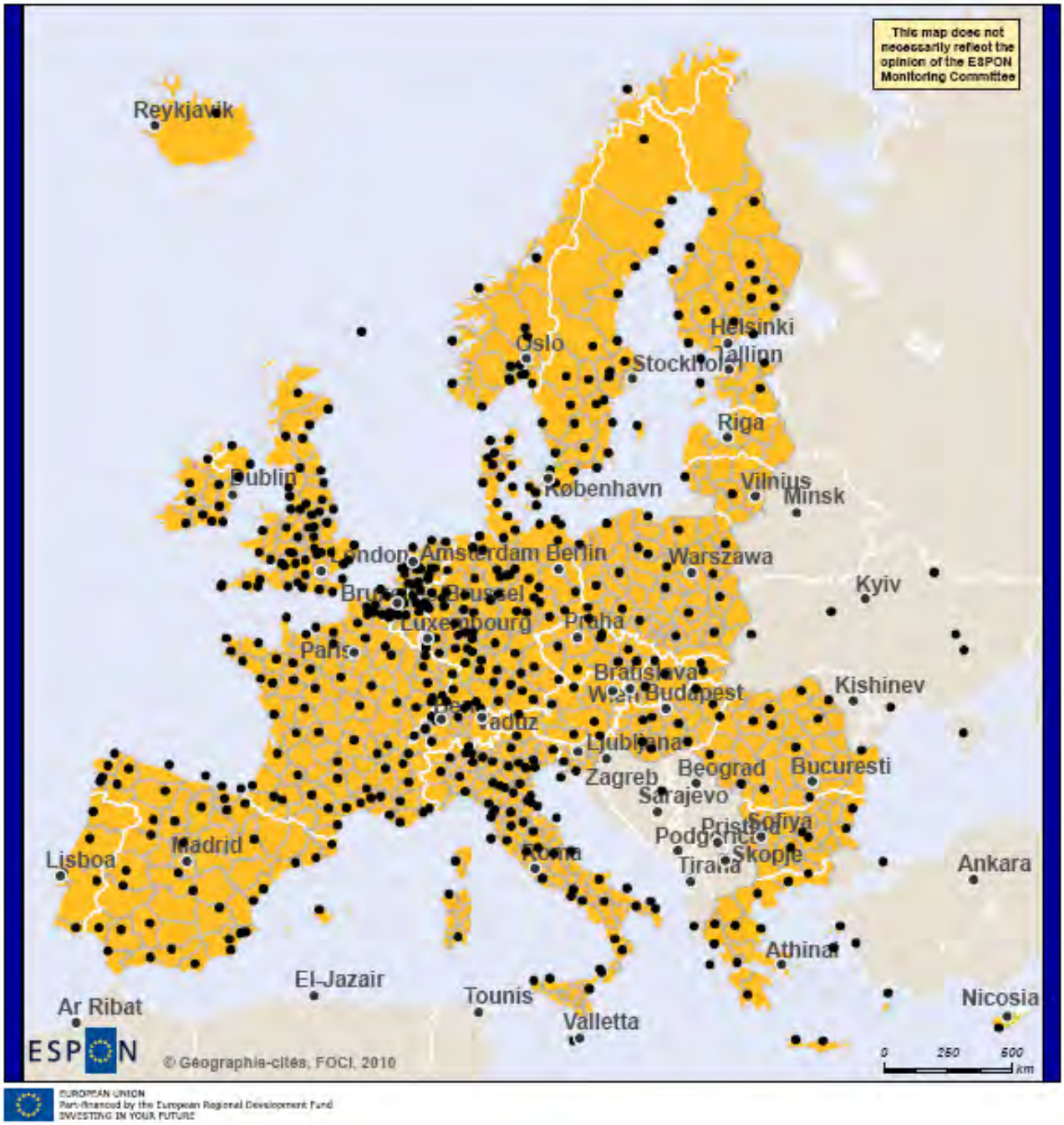


Figure 8. European FUAs involving in NBCI projects (1986-2006)

3. Measurement of the position of cities in innovative networks

3.1. State of the art

A graph is a symbolic representation of a network and of its connectivity. A graph G is a set of nodes (n) connected by edges (e). The construction of a graph depends on data and analyses. Graphs can be weighted or not, directed or undirected (Berge, 1958). Several indices and measures are used for measuring the relative importance of nodes within a graph. Each of them describes different aspects of the positions of a node within a graph. Here we propose a short presentation of the principal indices we will use table 1:

- It is possible to measure the attraction of some cities within a weighted directed graph by extracting all the strongest links for each pair of cities (Nystuen, Dacey, 1961). The

more one or more cities attract the "**largest flows**" of each pair of cities, the more they **polarize** the graph.

- Two indices of centrality developed by L. C. Freeman (1977, 1979) can be used for describing the relative importance of cities within undirected graphs. (i) **Degree centrality** is defined as the number of links incident upon a node. It measures the relational activity of a city. (ii) **Betweenness centrality** measures the potential intermediary role of cities within a network: the more a node occurs on many shortest paths between other nodes within the graph, the higher is its betweenness centrality. While the Degree centrality measures the local centrality of a node compare to its direct neighbors in the graph, Betweenness Centrality evaluates global centralities according to the entire network. Both of them can take into account different weights of the links.
- Measures for weighted directed graphs enable to analyze the hierarchical relationships between connected cities. (i) The number of edges directed into a given node (or **indegree**) can be interpreted for networked cities as the extent to which a city is commanded by other cities (ii) Conversely **outdegree** (the number of edges directed out of a node) describes the degree of commandment activities on a given number of cities within networked cities. These two indices measure local centralities because they only take into account direct connections of each city. (iii) At this local scale, cities dependency is the balance between indegree and outdegree and reveals its specific relational role within the network.
- The variety or specialization of cities can be seen at least in two ways: (i) the **variety** of **geographical orientations** of cities connections (within or outside their country or Europe) evaluate their range and influence at different scales; the **variety of types of networks** (firms activities or research thematic) is a measure of their specialisation. In general, a higher variety means a positive structure of links leading to highest likelihood of innovation emergence and adaptive socio-economic structure. But also, cities will be compared regarding to their influence at each scale, which would be measured by the average distance between the city and its directly linked cities.

Type of graphs	Measures	Description
Undirected weighted graphs	Degree	the number of links incident upon a node
	Betweenness centrality	Sum of the occurrences of a node on shortest paths between other nodes in the graph
	polarization	Major flow
Directed weighted graphs	indegree or outdegree.	The number of edges directed into a node or the number of edges directed out of a node
	Dependency to another city	Highest indegree
	relational role	The difference between in and out degree of a given city, divided by the sum of in and out degree of this city
Directed and Undirected weighted graphs	variety/specialization	Specialized orientations of cities connections
	Scale specialization	Geographical scale orientations of cities connections (National, European, Worldwide).
	Interaction range and Radiation	Average distance between a city and its connected cities for different scales or different specializations

Table 1. Principal relational indices qualifying cities situations within networks

These indicators enable us to examine the positioning of cities within the two types of economic networks under study (financial links in multinational firms networks, and specialized research networks for the next wave of innovative activities).

3.2. Measuring the position of European cities in the innovative networks[11]

It is self-evident that cities' position in the converging technologies research networks highlights the geographical structure of the European production of new knowledge facilitating economic competitiveness of cities in the actual "knowledge economy". The main features of the network are presented through the evolution of the values taken by the indices of connectivity (table 2). Undoubtedly, there is a general increase in the connectivity of the network, since the number of links was multiplied by a factor thirteen in twenty years while the number of nodes (i.e. cities involved in NBIC collaborative networks) increased only by a factor four. But the density of the network remained rather stable with a rather low value (only about 15% of all possible links are actual connections). This observation, combined with low values of the shortest path and diameter of the network, reveals a typical small-world structure of the network of co-participations (undirected weighted graph) as well as for the network where links measure the number of directed links between a coordinator and other participants (directed weighted graph).

11 Here the results correspond to the undirect nework of cities.

	Indices of connectivity	2 FWP	3 FWP	4 FWP	5FWP	6 FWP	2 to 6 FWP
Undirected weighted graph	Number of nodes (nodes=cities)	200	290	496	594	570	795
	Number of links (links = cities' co-participations)	2761	5986	10401	18988	25537	38074
	Density of the giant component (%)	14	14	9	11	16	12
	Diameter of the giant component	4	3	4	4	3	4
	Shortest path of the giant component	2	2	2	2	2	2
Directed weighted graph	Number of nodes (nodes=cities)	200	290	495	591	570	794
	Number of links (links = coordination)	743	1418	3443	4779	5240	11740
	Density giant component (%)	2	1,5	1,5	1,4	1,6	2
	Diameter of the giant component	5	5	6	5	5	5
	Shortest path of the giant component	2,4	2,3	2,3	2,2	2,1	2

Table 2. Indices of connectivity : a synthesis
Source : NBIC-Euro

3.2.1. Large cities are the hubs of the network

In graph theory, the degree (k) of a vertex (or node) is the number of its connections with other vertices. All cities (or vertices) in the graph have not the same degree. The more a city collaborates with others, the higher is its degree (direct links).

The average degree is 73 which mean that in average a city collaborate directly with 73 other cities. This result confirms that the connectedness of the graph is rather high and underlines the interdependences of cities in scientific and technological research. Nonetheless, the median degree is 24 (50% of cities collaborate with less than 24 other cities and 50% collaborate with more than 24 cities) and the dispersion (measured by STD) is rather large 112.

This large dispersion throw interest on studying which type of cities has high degrees and which type of cities has low ones. In order to study the relational role of the network of cities co-participations in NBIC projects we first computed the Degree Centrality.

On figure 9 the best connected cities or the cities with highest degrees appears to be the large cities (among the 20 first highest degrees, 14 are state capital cities with more than 1.000.000 inhabitants). Paris has the maximal degree with 760 and London has the second highest degree (674), and then Madrid (668), Athens (653), Helsinki (624) and Copenhagen (611). Among the 50% of cities which collaborate with less than 24 other cities there are only four cities which have more than 500.000 inhabitants (in Ukraine). This can be explained by the geographical situation of these cities on the margins of Europe. 88% of the other cities with a Degree centrality below the median have less than 100.000 inhabitants. Note that there are 31 cities which are not connected to others (they are excluded from the giant component), these cities are small cities: two thirds of them have less than 25.000 inhabitants.

As a whole, we can summarize these results by the synthetic index of Bravais-Pearson correlation coefficient between the number of participations of cities and their population,

which is very high (0.79). Although not surprising, this result is a confirmation of the geographical urban theory, according to which “city size” has a very broad meaning, representing and summarizing a full variety of indicators about the number, variety, and complexity of urban functions. These indicators of “stocks”, represent accumulation over time of flow values that are produced through a variety of relationships within networks, thus the degree of centrality of cities within these network is in accordance with the importance of their position in an urban hierarchy of sizes. We insist that it was not obvious before analyzing the data that the city rankings within networks of specialized research in NBIC should follow that hierarchical principle. The result is a confirmation of another theory about innovation in urban systems, according to which large cities are more liable to capture innovation in its first stage.

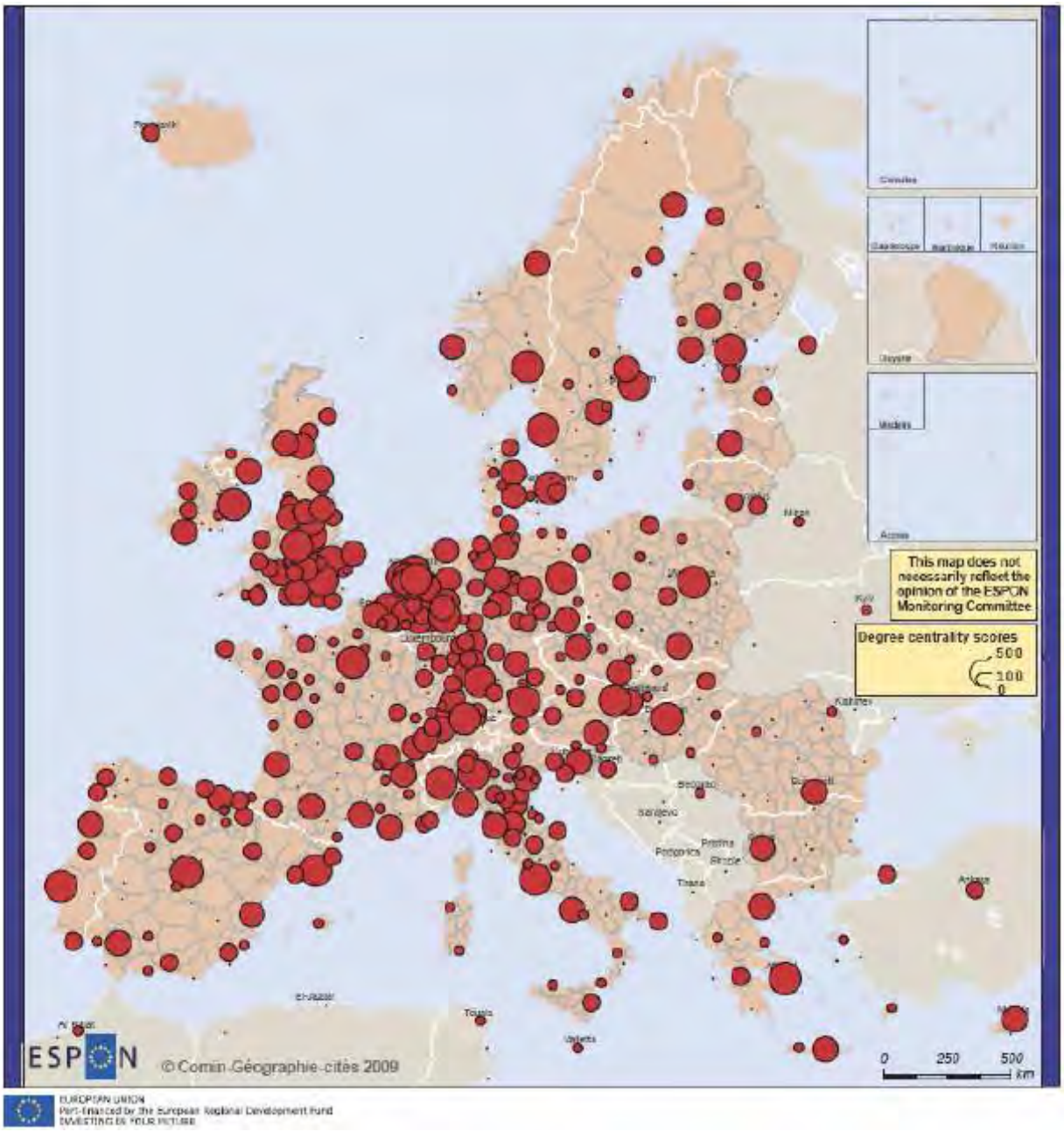


Figure 9. Participation of European cities to the research networkds about NBIC (Degree Centrality, 1986-2006)

Notes: calculated with Pajek software. Network construction: scientific and technological collaborative links between FUAs. NBIC technologies projects. Data come from the EC database CORDIS RTD-PROJECTS drawn from all Framework Programmes for Research and Technological development, from 1986 until 2006. Undirected and unweighted graph. Source: NBIC-Euro database

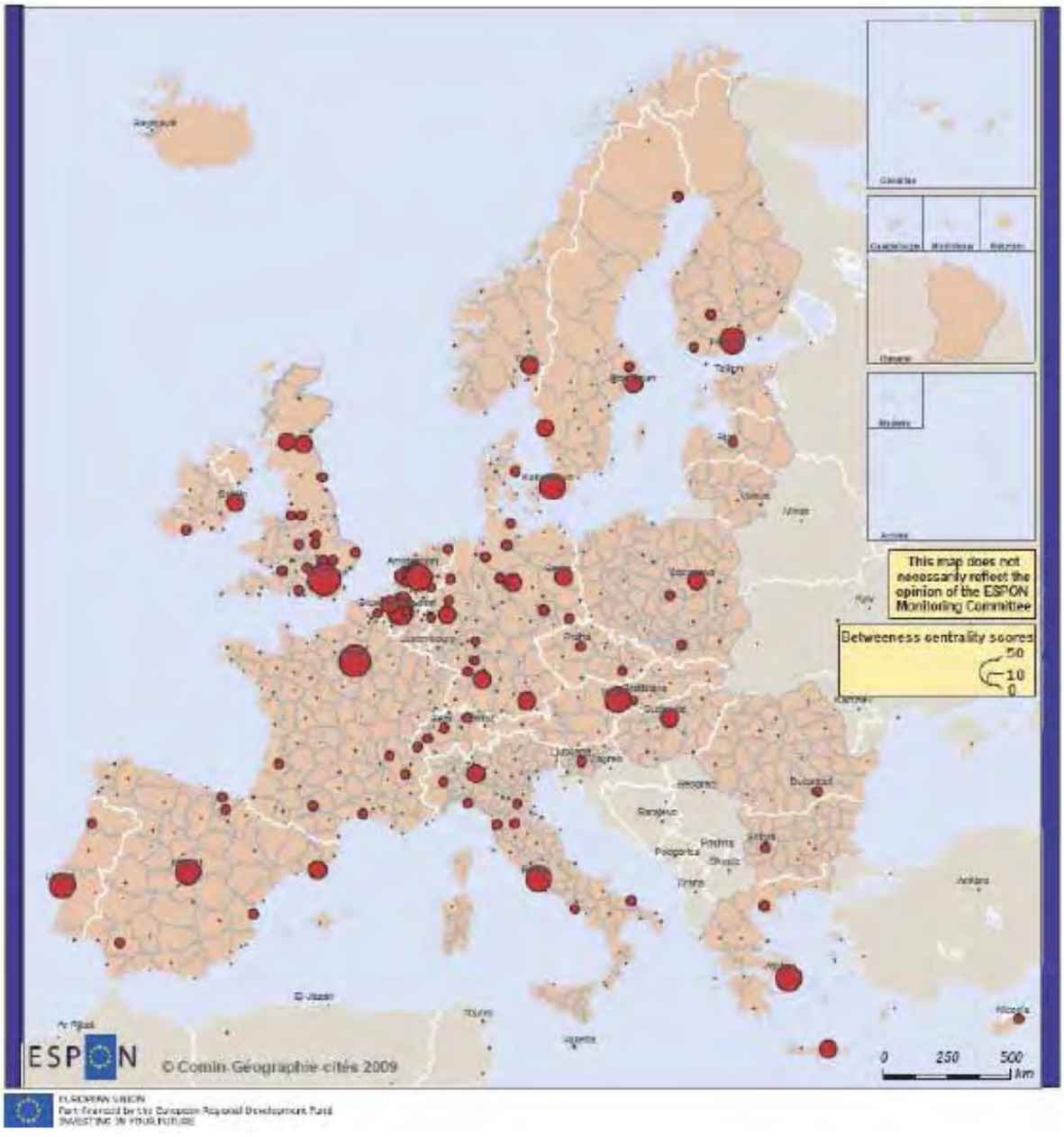


Figure 10. European cities centrality within scientific and technological networkds dedicated to NBIC (Betweenness Centrality, 1986-2006)

Notes: betweenness centrality measures the potential intermediary role of cities within a network: the more a node occurs on many shortest paths between other nodes within

the graph, the higher is its betweenness centrality. Here, betweenness centrality (X 1000) calculated with Pajek software. Source: NBIC-Euro database

Another measure of centrality within networks gives even a sharper view of the very prominent role of large cities regarding the adoption of technological innovations. While the degree measures a centrality locally, the index called “Betweenness Centrality” gives a more global view of the role of cities within the whole research network. It measures the total number of shortest paths between pairs of cities that pass through a given city. It measures the centrality or the influence of a vertex in a graph: a city is more central or has more influence if it is a link in many collaboration chains between other cities in the network.

Beetweeness Centrality indicator clearly identifies a subset of major urban actors in innovative research networks on NBIC. Figure 10 shows that Paris and London, and more generally European national capital cities have strategic positions within scientific networks dedicated to NBIC, which can be interpreted as their potential capacity to control the circulation of knowledge spillovers that flow between European cities.

Bravais-Pearson correlation coefficient between Degree distribution and Betweenness centrality is high (0.72). A closer analysis of the results reveals that the high value of the Bravais-Pearson correlation coefficient is more due to cities belonging at the top of the urban hierarchy (larger cities) than to the cities belonging at the bottom of the urban hierarchy (small cities). Even if small towns can succeed in getting a sufficient number of participations, they fail to enter the restricted club of highly controlling urban positions within the innovation networks. Indeed, Betweenness Centrality highest scores do rank cities in the same order as the Degree Centrality index for the twenty first cities.

The evolution of these relative positions in the network brings information about the trend in cities competitiveness for innovative activities. Table 3 shows the evolution of the distribution of the centrality indices. The Bravais-Pearson correlation coefficients are all high, and then we can conclude that there is a significant stability of the ranking of central cities (in terms of Degree or Betweenness centrality) during the course of the successive Framework Programmes.

Degree centrality					
	FWP 2	**FWP 3**	**FWP 4**	**FWP 5**	**FWP 6**
FWP 2	1	0,86	0,85	0,77	0,72
FWP 3	0,86	1	0,89	0,81	0,78
FWP 4	0,85	0,89	1	0,89	0,86
FWP 5	0,77	0,81	0,89	1	0,91
FWP 6	0,72	0,78	0,86	0,91	1

Betweenness centrality					
	FWP 2	**FWP 3**	**FWP 4**	**FWP 5**	**FWP 6**
FWP 2	1	0,83	0,89	0,78	0,78
FWP 3	0,83	1	0,83	0,79	0,74
FWP 4	0,89	0,83	1	0,87	0,88
FWP 5	0,78	0,79	0,87	1	0,89
FWP 6	0,78	0,74	0,88	0,89	1

Values are significantly different from 0 and they have a signification superior alpha=0,05

Table 3. Evolution of correlation between centrality measures (Bravais-Pearson coefficients)
Source : NBIC-Euro

A last useful mention is that the observed graph is much more centralized than a random network which would be constructed with the same number of edges, the same number of nodes and the same mean degree than the network of cities co-participations in NBIC projects (table 4). This information is crucial here, because the more a graph is centralized, the higher the central nodes are needed to maintain the connectivity of the graph. For our network, it means that central cities are hubs in the network and that they are crucial to link European cities together.

	Network of cities co-participations in NBIC projects		Random graph	
	Degree centrality	Betweennes s centrality	Degree central ity	Betweenn ess centrality
FWP 2	0,62	0,13	0,03	0,008
FWP 3	0,59	0,12	0,03	0,004
FWP 4	0,53	0,09	0,02	0,003
FWP 5	0,51	0,05	0,02	0,001
FWP 6	0,60	0,05	0,025	0,001
FWP 2 to FWP 6	0,58	0,05	0,02	0,0009

Table 4. The centralized structure of the graphs (2-6 PCRD)

Note : Random network made with Pajek: in the basis of the same number of edges, the same number of nodes and the same mean degree than network of cities co-participations in NBIC projects

These results so far show that the centrality in the undirected network dedicated to NBIC projects is organized in a hierarchical structure in accordance with cities population. Moreover, the network of cities specialized in scientific and technological activities are characterized by their interdependence, whatever their size. Thus the network mainly connect (i) large cities which concentrate the infrastructures traditionally facilitating material and immaterial flows and which are inserted in world networks of information; these cities are hubs in the network. (ii) and specialized cities which are characterized by their capacities of creation or training (innovative milieux, technopoles…). These cities can be more or less central in the graph, but they are certainly the ones which adapt very quickly their knowledge bases in order to keep their position in the network or to reach a better one.

Then these results raise the following question: are small and medium cities developing strategic positions in the network in order to compensate their weak centrality? We shall try to answer this question below.

3.2.2. Strategic positions of medium and small cities in order to capture original knowledge spillovers.[12]

Results so far have underlined the crucial role of large cities as hubs of the network. But does that mean that medium and small cities do not plenty benefit from their integration to NBIC European collaborative projects? Here we show that belonging to the periphery of the network can provide some advantages.

Following the works of H. White[13] and M. Granovetter[14], R. S. Burt (1992)[15] analyzed the structure of networks and more precisely the zones of networks that have only few links: the *structural holes.* He developed the concept of *structural autonomy* of nodes in

[12] Here we use weighted oriented graphs

[13] White, H. C., 1981. - "Production market as induced role structures", in S. Leinhardt, Ed.- Sociological methodology. - San Francisco: Jossey Bass Publishers. - 1-57.

[14] Granovetter, M.S., 1982. - The strength of weak ties : a network theory revisited, in Mardsen, P. V. et Lin, N., Ed. - Social structure and network analysis. - Beverly Hills: Sage.

[15] Burt, R., 1992. - Structural holes : the social structure of competition.- Cambridge: Harvard university press.

networks, as being the ideal position of a node for having original information and opportunities before the other nodes of the network. This position requires being located in a *structural hole*, i.e. to be a bridge between contacts that are not connected together. The more a node is connected to other nodes which are not connected together, the higher is its *structural autonomy* (under the condition that non-redundant nodes are, besides, well connected to the network)

Then, from this concept we identify the European cities which are positioned in structural holes. The hypothesis here is that cities do not create relationships at random, but try to organize strategically their relationships (or links of co-participations of NBIC projects) to optimize their position in the network of the scientific co-participations. This hypothesis implies that even if observing NBIC-Euro aggregated data at city level, we can detect the strategies of the individual and collective actors who compose the scientific environment of a city (D. PUMAIN 1998). The structural position of cities within the research networks as measured on a collective entity can receive this kind of interpretation, without the risk of "ecological fallacy", because the "behaviour" behind participating in research consortia is necessarily proactive, there is a very high probability that the collective behaviour here directly reflects the simple aggregation of individual or institutional initiatives. Especially, the orientations of the local governance may be granted for a responsibility when a town succeeds in getting a broader autonomy in networks than it would be expected according to its size.

Then this concept of *structural autonomy* seems to be relevant for studying innovative networks for distinguishing cities which develop a strategy to obtain this intermediary role, via weak links, in order to be able to capture information and opportunities of innovations and to have the control to diffuse them to the other nodes of the network.

Then we try to answer the following question: do weakly connected cities (or not central cities) position themselves in *structural holes*?

To calculate the degree of *structural autonomy* of a given node, we used the index of *dyadic constraint* (R. S. BURT, 1992). *Dyadic constraint* examines the advantage or disadvantage of the position of each city in their neighborhoods for the presence of structural holes. This index constitutes a measure of the pressure which a node i can exercise on a node j. The degree of constraint on a city is conversely proportional to its autonomy: the stronger is the constraint, the less numerous are the opportunities of alternative solutions in terms of contacts in the network, and the lower the city's autonomy is. Thus the *dyadic constraint* of a city is measured as a function of the relative weights of links between the cities compared to all connections among the cities.

The index of *dyadic constraint* between two cities i and j (Cij) varies from 0 to 1. The higher this value, the lower is the *structural autonomy* of the city:

$$c_{ij} = \left(p_{ij} + \sum_{k,k\neq i,k\neq j} p_{ik}p_{kj}\right)^2$$

Where :

pij = the number of direct connections between cities i and j :

$$p_{ij} = \frac{a_{ij} + a_{ji}}{\sum_k (a_{ik} + a_{ki})}$$

aij : value of edge (i,j)
aji : value of edge (j,i)
aik : value of out-degree of i
aki : value of in-degree of i

$\sum_{k,k\neq i,k\neq j} p_{ik}p_{kj}$ *: the measure of undirect connections between cities i and j :*

k : vertex directly connected to i

From this measure we calculate the *aggregate dyadic constraint* of a city I (Ci) which is the sum of the *dyadic constraints* across all adjacencies.

$C_i = \sum_j c_{ij}$

Low aggregate dyadic constraint is hypothesized to be associated with high structural autonomy, and high aggregate dyadic constraint is hypothesized to be associated with low structural autonomy. Unconnected cities have a structural autonomy =1

Figure 11 represents the *structural autonomy* of European cities displaying a different order than the usual hierarchical structure in the network. This turnover is described by table 5 which shows the 26th first cities with the higher *structural autonomy.*

With the exception of Paris (which has the higher *structural autonomy*) the 8 first cities are all medium size, under 1.000.000 inhabitants. Moreover the largest European metropolises have low ranks as London at rank 25th, or Vienna, Copenhagen and Athens respectively at 12th, 13th and 24th ranks. Other medium size European cities as Leipzig, Tampere, Torbay, Poznan, Mainz, and Saarbrucken rank high in the hierarchy of structural autonomy.

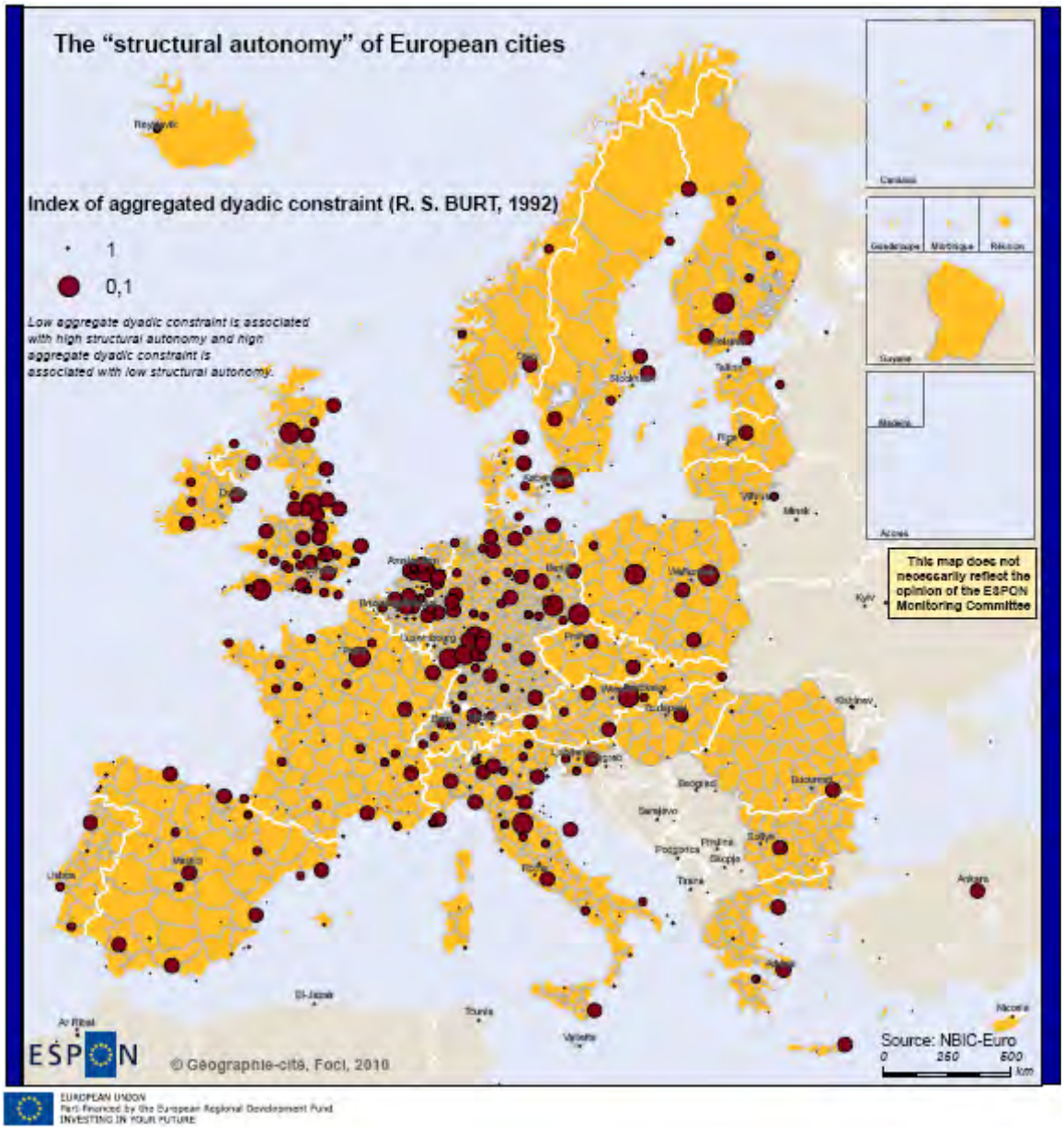


Figure 11. The structural autonomy of European cities

Rank	Cities	Population	structural autonomy (x 1000)	Rank	cities	Population	structural autonomy (x 1000)
1	Paris	9849666	37,93	14	Dresden	714360	46,44
2	Leipzig	577700	41,25	15	Leeds	1468000	46,48
3	Tampere	214000	42,43	16	Utrecht	532821	46,52
4	Torbay	94000	42,56	17	Munster	267000	46,86
5	Poznan	631000	42,88	18	Goteborg	457000	47,10
6	Mainz	477000	43,31	19	Sheffield	635000	47,17
7	Florence	898303	43,76	20	Innsbruck	176382	47,39
8	Saarbrucken	360487	44,37	21	Nijmegen	211924	47,46
9	Warsaw	2083000	44,65	22	Aberysthwyth	10000	47,56
10	Glasgow	1067000	44,67	23	Dijon	240414	47,77
11	Kaisers-lautern	98000	44,79	24	Athens	3027000	48,08
12	Vienna	1868850	45,10	25	London	7689000	48,24
13	Copenhagen	1337000	45,67	26	Manchester	2341000	49

Table 5. The 26 first cities with the highest structural autonomy

Notes : S A = structural autonomy measured by the aggregate dyadic constraint (x 1000).
Weighted direct graph of cities co-participations in NBIC projects (2-6 FWP)
Source : NBIC-Euro

We can thus suppose that the high *structural autonomy* of these cities can be explained by strategic position in the network. But what kind of strategy is used? As an example, in order to (partially) answer this question, we analyze the city of Poznan (Poland) which receives the 5th rank in our classification.

Poznan is the second financial center of Poland and since 1995 it has one of the biggest science and technological park of the country, in particular for information technologies and chemistry: the presence of the university of technology of Poznan and the university Adam Mickiewicz who supply at the same time research, innovation and training of researchers and engineers are takings advantage by innovative firms, and particularly Microsoft which developed locally partnerships with Intel (for the equipment) and Supercomputing and Networking Center (specialized in information technologies).

Furthermore, the European scientific policies strengthened the international visibility of Poznan science park (and probably its capacity to be well positioned in the network created by Frameworks programs) by implanting an European Innovation Relay Centre which has for main activities to assist companies in finding partners whatever type of partnership (SME as well as universities and (public or private) research laboratories) technology transfer, the exploitation of the results of technological research and\or finding information relative to the European financing (Polish Information and Foreign Investment Agency, http: // www.paiz.gov.pl)

Thus, from this example, we can demonstrate that cities with high *structural autonomy* present some advantages for attracting non-redundant contacts to capture original knowledge through the network. This confirms our hypothesis according to which some cities in the periphery of the network develop strategies to be advantageous positioned in NBIC co-participation networks. As a result, it seems to be relevant to take into account these cities in the analysis of the driving forces of European urban development.

Another factor is critical to understand future urban evolutions: it is the specialization of cities in converging technologies.

4. Measuring cities specialization in converging technologies

The formation of urban specializations is a second process that introduces positive anomalies within the hierarchical diffusion of the co-participation that we revealed by centrality measurements. How can we reveal urban specializations in converging technologies? Do the European cities exhibit specific technological profiles? To answer these questions, we analyze the scientific orientation of the European cities within their participations in NBIC research projects. First, we examine the specialization of cities in converging technologies through a comparison with their population size. Second, we analyze the specialization of cities according to the level of their participation in each technology belonging to converging technologies (nanotechnology, biotechnology, information technology and cognitive science)

4.1. The specialization of cities in converging technologies compared to their population size

Although there is a slight indication of non linearity in the relationship between population size and the number of participation in dedicated consortiums, we measure here in a classic way the intensity of specialization according to an hypothesis of simple proportionality to the population. The number of participations of each city in NBIC research projects (1986-2006) (i.e. the degree identified above as a measure of centrality in the network) was divided by their population, allowing observing the scientific activity of cities without size effect. Of course the city size has to be considered again as a proxy to its importance as a whole, its advantage is to be identically defined for all locations and to represent a potential benchmark for assessing the relative importance of any kind of urban activity. This measure provides an index of the level of specialization of the city in R&D on converging technologies.

The map (figure 12) emphasizes the major role of university centers in the formation of clusters that are highly specialized in converging technologies. This first insight is confirmed by the table 6 ranking the 10 most specialized cities. These ten cities are university cities, thus it seems to indicate that the presence of a university in cities constitutes one of the main explanatory factors of the specialization of cities in research about converging technologies within the framework of the PCRD. Furthermore, this figure allows distinguishing two types of specialized cities:

- Small cities having few participations in the NBIC research projects such as Aberystwyth (23 participations in NBIC projects) where is located the university of Wales and Valetta (14 participations), capital city of Malta where is located the national University. These figures may be “accidental” when considering the numbers of participations of other cities considered as specialized, that are about ten times higher.
- Medium size cities renowned for their universities and hosting significant industrial and scientific districts. These cities have an important number of participations (Cambridge, Louvain, Heidelberg, Oxford, Uppsala) and can be considered as "centers of excellence" which can compete with most large European cities.

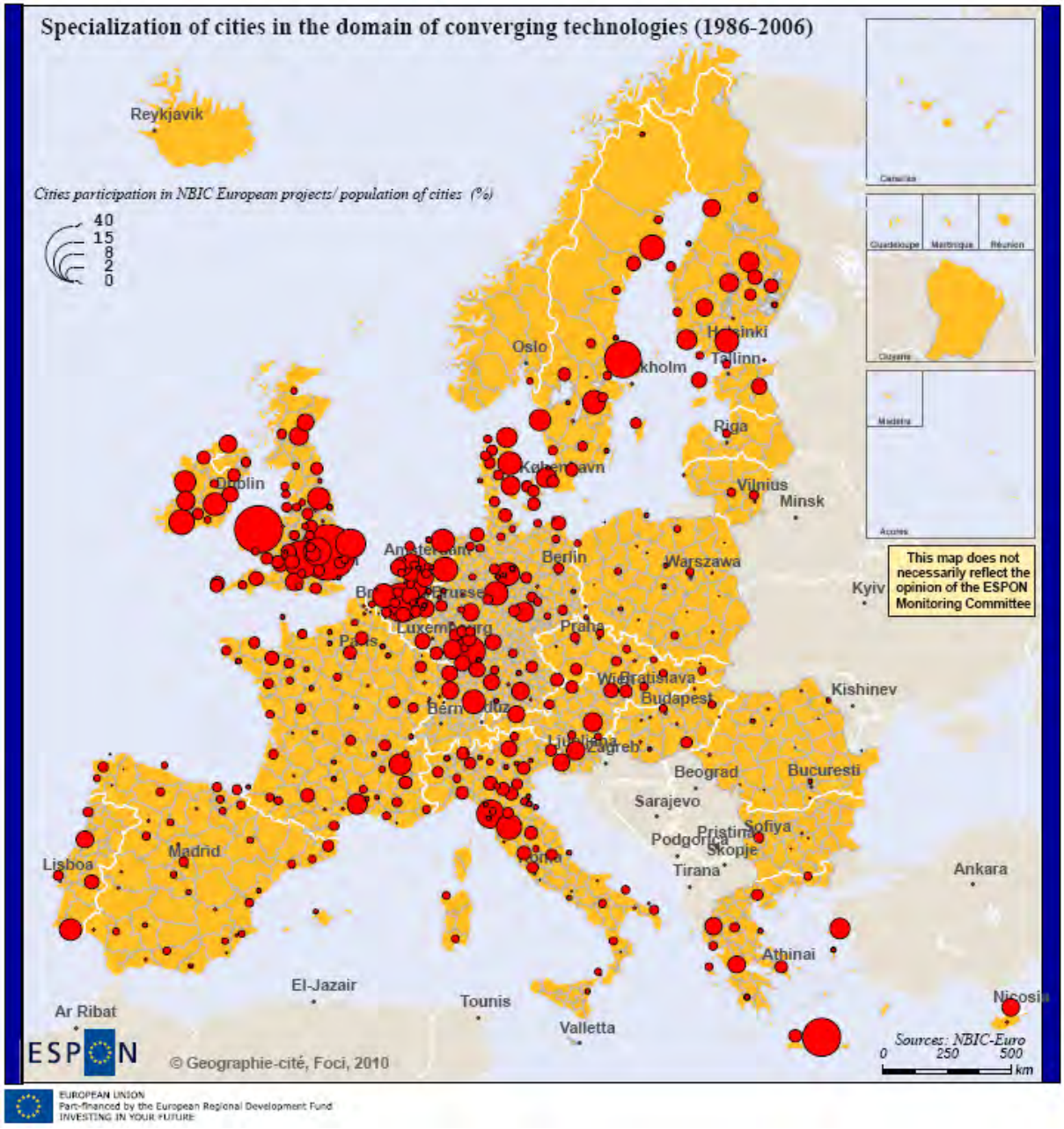


Figure 12. Specialization level of European cities in converging technologies

Cities	inhabitants	Number of Participation in Biotech	Number of Participation in Nanotech	Number of Participation in cogno	Number of Participation in Info techno	Sum of participations	Number of participation /1000 inhabitants
Lulea	43000	92	32	16	33	173	4,02
Cambridge	102000	156	70	45	45	316	3,10
Aberystwyth	10000	17	0	1	5	23	2,30
Valetta	6500	2	1	1	10	14	2,15
Heraclius	111000	125	19	5	25	174	1,57
Louvain	145000	92	55	16	57	220	1,52
Uppsala	102000	89	15	25	20	149	1,46
Oxford	114000	103	26	18	13	160	1,40
Heidelberg	200000	134	11	33	14	191	0,96

Table 6. The 10 most specialized cities in converging technologies (1986-2006)
Source : NBIC-Euro

Where are located the very specialized cities (or in other words the European centers of excellence) in NBIC? From figure 17, we can see that the most dynamic cities are especially located in the North of Europe, in particular in the **Scandinavian countries** (*for Sweden : Lulea, Uppsala, Umea, Linkoping, Göteborg, and at a lower level Stockholm ; for Denmark : Arhus, and at lower level Copenhagen, Alborg, Odense ; for Finland : Helsinki and at lower levels Kuopio, Turku, Jyvaskyla, Oulu, Tampere)*. In the **United-Kingdom** *(Cambridge, Aberystwyth, Oxford, Norwich, Bedford and at lower levels: York, Edinburgh, Aberdeen, Dundee, Southampton, Cheltenham)* ; in **Benelux** (*for Belgium : Leuven, Gent and at lower level Mol ; for the Netherlands : Utrecht, Enschede-Hengelo, Groningen, and at lower levels Leiden, Eindhoven, Nijmegen, Amsterdam, The Hague*) ; in **Germany** *(Heidelberg, Brunswick, Constance, Göttingen, and at lower levels : Jena, Kaiserslautern, Freiburg, Munich, Marburg, Aachen, Innsbruck, Wurzburg, Karlsruhe, Stuttgart*) and in **Ireland** *(Cork, Carlow, Galway and at lower levels Limerick, Londonderry, Dublin).*

in **France**, Grenoble is highly specialized and at a lower level Montpellier and the conurbation of Genève-Annemasse. In **Austria**, Graz is the most specialized city. In the **South of Europe**, specialized cities are located in **Italy** *(Pisa, Sienna et Trieste, Portoferraio et Trento)* and in **Greece** *(Heraclius, Mytilena, Ioannina, Patras*. In the **Eastern Europe countries**, only Tartu, Kardla (Estonia) and Ljubljana (Slovenia) distinguish themselves from the other cities by their performance, whereas in the majority of the Eastern Europe countries and in Spain, no city appears as specialized.

So even if cities involved in NBIC projects are disseminated all over Europe, few of them have a strong dynamism (or a strong specialization) in the research about converging technologies. These cities are in majority the most active university centers and large cities.

These results thus tend to show that cities participation to the projects dedicated to converging technologies tends to strengthen the position of the existing European

scientific "centers of excellence" and thus to strengthen their dynamism and their attractiveness.

These results are not surprising because economic studies agree about the fact that “knowledge infrastructures " as universities, research institutes and science parks are the main factors to attract the most innovative research. Of course the existence of such infrastructure is not per se an explanation of the successful positions in research specialization. Behind any distinctive urban achievement, there are always feedback effects between the initiatives and strategies of many actors and their concretization into institutions. In other words, it may not be sufficient to declare a technological park for creating a specialization in NBIC in any local spot, but once a given amount of initiatives have emerged locally it is very likely that this kind of infrastructure will help any further development. The cities that were quoted here have all the infrastructure, but of course there are many other towns owning a technopark that do not emerge here among the specialized cities. The same could be said about the other factors involved in the literature, as the skills of the population, the financial system, the networks of exchange in regions and the networks of institutions which intervene in the innovation process.

Figure 12 represents a general level of specialization in NBIC technologies, without identifying what kind of activities are responsible for this. In order to differentiate cities according to their specialization, we examine the specialization of cities in each technology constituting converging technologies, i.e.: nanotechnology, biotechnology, information technology and cognitive science.

4.2. The specialization of cities by technology

A first important result of this study is that the majority of cities participated in projects dedicated to the four technologies altogether. This is in agreement with the process of technological convergence, but it is remarkable to observe it at the level of all urban locations: the researches in the four kinds of technologies appear together everywhere. Among the 116 cities having more than 50 participations, Bergen in Norway and Norwich are the only exceptions by missing any participation in projects dedicated to nanotechnologies.

We used multivariate analysis to identify the main technological orientation of these 116 European cities that have more than 50 participations (1986-2006). We choose the method of hierarchical cluster analysis (HCA) on the numbers of participations of each city in the four technologies, using a Chi square distance for a direct comparison of the city profiles. This analysis put forward which cities have a higher share of their participations in some of the four technologies, compared to the average repartition in all cities.

On figure 13 cities are represented according to their presence in 5 groups that belong to two higher classes separated mainly by the preferential orientation towards information technologies and to a lesser degree towards the biotechnologies and the cognitive sciences

In each of these large classes, there is one profile representative of cities with a high diversity of technologies. These two groups concentrate the cities we have identified as being the most specialized or dynamic within the network. The large diversification of their profiles illustrates that the movement of technological convergence has emerged at first in these dynamic cities, according to a hierarchical process. All cities belonging to these two groups are relatively concentrated on the North of Europe.

- The first profile (pink disks on the map), entitled "Very diversified participations, with a slight weakness in the cognitive sciences", corresponds to cities that are very dynamic for three technologies with a slight preference for information technologies and

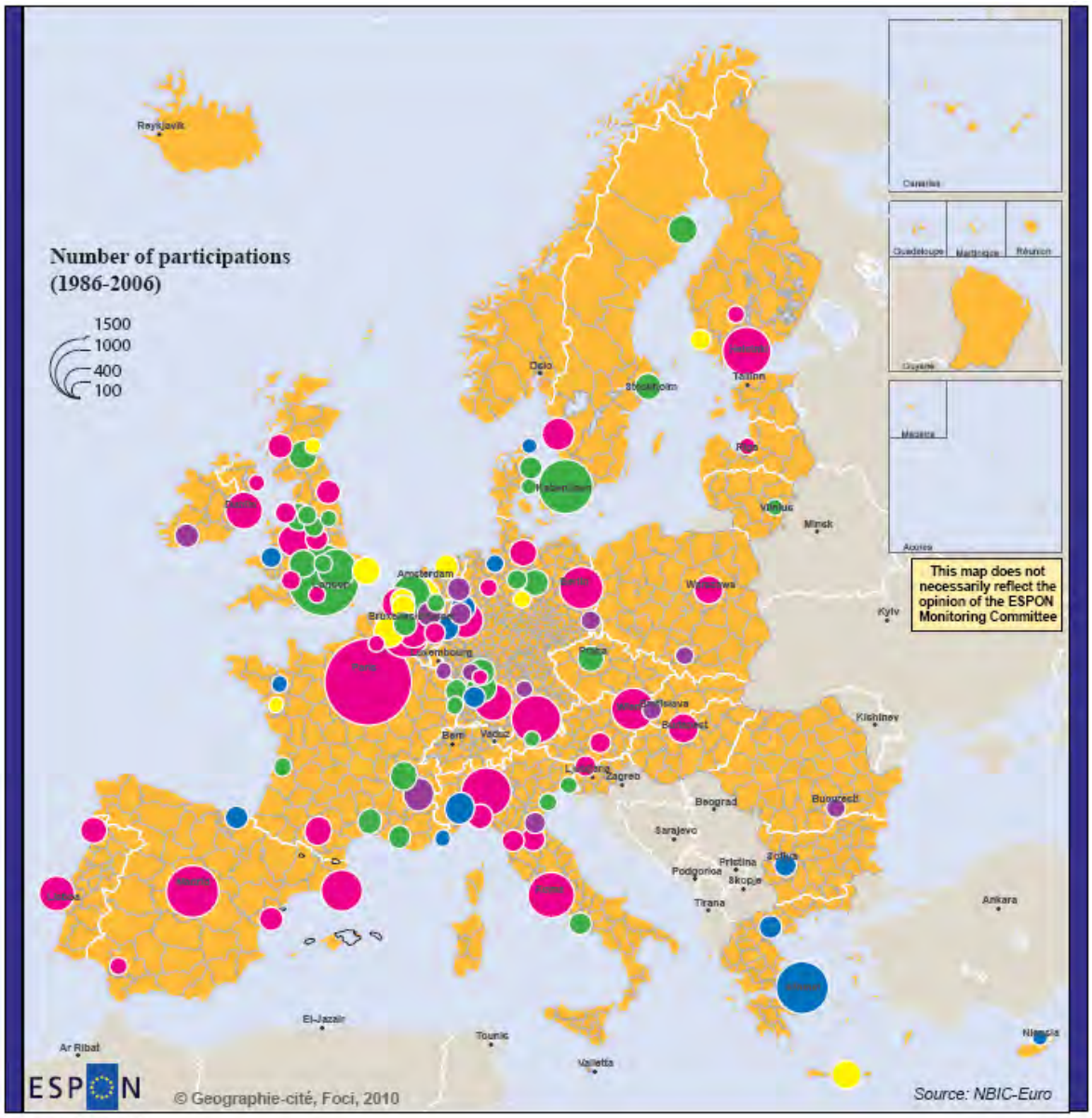
nanotechnologies. This profile includes 43 cities that have common characteristics: they are (i) State capitals (13 cities): Paris, Madrid, Helsinki, Brussels, Rome, Berlin, Vienna, Dublin, Lisbon, Budapest, Warsaw, Ljubljana, Oslo and Riga. (ii) Large metropolises such as Milan, Munich, Barcelona, Stuttgart, Göteborg, The Hague. The only exceptions are European scientific poles: Leuven, Lausanne, Pisa, Darmstadt and major scientific poles, Bielefeld with its university and a technological park, Tampere with its university of technology (Nokia owns a research center there), and Brighton that is endowed with two universities, and a big business innovation centre.

- The second profile (in green on the map) entitled "Very diversified participations, with a slight weakness in the information technologies" concerns cities that are dynamic in three technologies (and in particular the biotechnologies and the cognitive sciences), but a little weak in the information technologies. This profile corresponds to 34 cities which are also large cities (State capitals: London, Copenhagen, Stockholm, Amsterdam, Prague and Vilnius; and large metropolises such as Lyon, Manchester and Antwerp) as well as European major scientific poles, among which the most important: Cambridge, Oxford, Heidelberg and Lulea, or of more modest scientific importance such as Marseille, Odense, Innsbruck or Padua.

Next to these technological diversified profiles, three other profiles are more specialized. Cities belonging to these specialized types have research infrastructures that are dedicated to the technologies in which they specialize. These infrastructures have a real influence over their technological orientation:
- 14 cities (blue disks) specialized in the information technologies ("Participations preferentially dedicated to information technologies") are generally localized in the South of Europe. They are (i) three State capitals (Athens, Sofia and Nicosia); (ii) industrial cities which have universities of technology and more or less renowned research centers (Essen, Bremen, Trondheim and Alborg); (iii) and cities having technological poles dedicated to information technologies: Bristol, Aachen and Karlsruhe, Nice (Sophia Antipolis), Rennes (high-tech city (science park) Rennes Atalante), Turin, Salonique, Bilbao (technological Park of Biscaye).

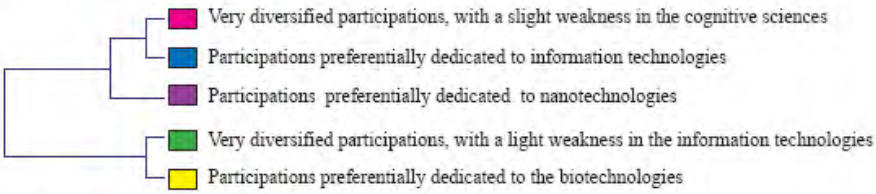
- 12 cities (yellow disks) are specialized in the domain of biotechnology. These cities are especially located in the North of Europe, in particular in the Benelux. They appear to be university towns: Utrecht, Heraklion, Groningen, Rotterdam, Turku, Göttingen. Some other cities have a park of activity dedicated to the biotechnologies: Ghent, Norwich, Leiden (Bio Science Park), Aberdeen (Aberdeen Science and Technology Park), Dundee, Nantes (Atlanpole).

- 13 cities (purple disks) are specialized in nanotechnologies. They are on the whole located in the European megalopolis. This profile includes two capitals of the Eastern European countries: Bucharest and Bratislava. The other specialized cities have (i) technological parks in the domain of nanotechnology (Grenoble (Minatec), Eindhoven (Campus High Tech), Dresden, Cork, Enschede-Hengelo, and Bologna); (ii) universities or research centers with lead researchers in this scientific domain: Düsseldorf, Mainz, Nuremberg and Sarrebruck.



The technological orientation of the European cities

Set of 116 cities cities with more than 50 participations (1986-2006)
Method of the hierarchical ascending classification (HAC), chi² distance, Ward method



Average participations of the cities (%)

	Biotechnology	Nanotechnology	Cognitive sciences	Information technology
	44	16	7	33
	31	14	5	50
	32	35	4	29
	56	14	10	20
	76	7	5	12

Figure 13. The technological orientation of European cities (1986-2006)

Conclusion

In this report, we have presented a synthetic image of the research networks that were built between European cities through research consortia in converging technologies. This accumulated mapping of cutting edge innovation demonstrates the strength of the structure of the urban system in assessing the potential competitiveness of European cities: the research in NBIC, which is announcing the next wave of technical innovation (as anticipated for 2015-2030), is distributed in all countries following two schemes. The major centers are the largest European capitals and economic centers. Their role is to integrate almost all other European cities within networks that accompany the diffusion of the knowledge and the know-how. Other major centers of less general economic importance but with very specific profiles regarding the knowledge economy appear as specialized nodes that could anchor further technological developments, since the next economic cycle will remain tightly associated with research activities.

These results are moreover remarkable because while referring to a very peculiar sector of the urban activities, they do confirm the two main generic processes already identified in urban theory that are structuring the systems of cities, i.e. 1) hierarchical differentiation including metropolization and 2) selection of a few specialized cities. This major observation confirms the general resilience of the processes that are shaping the urban systems, ensuring together their role of driving forward the territorial system as a whole in all its parts and their function of adaptation to the new social and technological ways in a competitive economy. The new nature of contemporary development including the universal diffusion of knowledge economy and the globalization of most activities did not change this fundamental aspect of urban dynamics.

Chapter 7 – Competitiveness: European cities in worldwide multinational firms networks

Multinational corporations invest in many cities, reinforcing urban economic capital through the integration of located plants in the strategic competitiveness of the whole companies (Rozenblat, Pumain, 1993; Castells, 1996; Taylor et al., 2004; Rozenblat, 2004, Rozenblat, Pumain, 2007). They also increase interdependencies between cities by the way of financial links, global value chains and strong relationships leading to diffusions of various technologies, production modes, enterprises cultures (Gereffi, 1996; Gereffi et al., 2005). Specifically with financial links, different kinds of controls and powers of headquarters on their subsidiaries put cities where they are located, in dominant/dominated positions regarding directly connected cities, as well as in the whole network taking into account indirect paths of subsidiaries to many other cities.

As general information is available at the scale of countries with FDI (Foreign Direct Investments [CNUCED]), this kind of information doesn't exist at the level of cities. So, in order to measure the positions of FUAs through such corporation networks, we built a database including all the direct and indirect subsidiaries of the first 3.000 worldwide companies groups by their turnover (400'000 subsidiaries for 2007 and 750'000 for 2010). We referenced each branch's location by FUA for Europe and by the equivalent for other parts of the World, when the location was comprised inside or close to a city (Orbis, BVD, 2007, 2010). This step is essential if one want to be able to analyse comparable cities (1). Then we evaluated, by Graph theory measures, the position of cities in these networks (2). These networks enable us to build indexes of centrality for European cities (FUA) in Europe and in the world (3).

1. A georeferenced database on networks of multinational enterprises between FUAs

a. Building the data of flows of multinational firms between cities

The databases on multinational enterprises on the urban scale are difficult to obtain. There are two complementary and opposite approach to observe the role of cities in the networks of large multinational companies. The first way is to identify the located companies in each city. The second way is to rebuild networks of firms in the international arena by conducting a survey on groups. In this case, one has only part of the settlements foreigners in every city, but circumscribed better global strategies of the group. Unlike the previous case, surveys of groups can address the spatial interdependence among subsidiaries located in different cities. Thus, we identify each group by all its locations, the internal structure that links their functions and their activities. It's in the confrontation between networks of firms and the properties of the urban systems that one can articulate the relationship between business strategies and global networks of cities invested.

We privileged this second approach since 1990 and renewed in 1996, each time by reconstructing the spatial networks of hundreds of large multinational firms (Rozenblat, 1992, 1993, 1997, 2004; Rozenblat, Pumain, 2007). Globally, only the team from Loughborough (UK), directed by Peter J. Taylor and David Walker, engaged a large program of work in a similar approach but only for business services (GaWC: Globalization and World Cities). Beaverstock et al. 2000; Taylor, Hoyle, 2000, Taylor et al, 2001, Taylor Walker, 2001). They repeated the process in 2000 and in 2008 on 100 groups of services (Taylor et al., 2002, 2010).
Having closely reviewed since 1988 the various databases available internationally (including Kompass and Dun & Bradstreet), it seems that even today they remain

incomplete. Indeed, Benaroya and Bourcieu (2003) who is working on a file subsidiary of Dun & Bradstreet provides information on the country of location, deplored the incomplete information they have. A work in progress, with managers of IAMM (Mediterranean Agronomic Institute of Montpellier) on the databases of the food industry, which was followed by a second project in another part of the firms in the industry Automotive (Bohan, Gautier, Rozenblat, Koenig, 2007), allowed us to test the validity of a third database: Orbis produced by Bureau van Dijk (BvD). After multiple manual checks, the information provided by this base has been found as very complete, unlike the first two other ones. But the access was incomplete and we had to complete it for a second agreement in 2010. Subsidiaries of these groups again were reconstituted in 2010. This time, an agreement involving more BVD companies will provide the base faster. It be added to new groups being appeared among 3,000 leading companies worldwide in 2010.

The 3,000 leading companies worldwide admitting reciprocal affiliations, we finally consider the sample of 1 600 groups who gather. The final database includes about 750 000 affiliates around the world and contains the following information for each subsidiary:
- the name of the subsidiary undertaking;
- Establishment of its city code with a geographical "nesting" (continent, country, region, city) which will be set up and viewed in the context of urban agglomerations (Moriconi, 1993; Pumain et al., 1992) to within the project ESPON FOCI (2008-2011)
- its NACE activity (which may be different from that of parent company. This code identifies the branches specialized groups (eg Cosmetics for food industry) far as to identify purely financial subsidiaries;
- The turnovers and the number of employees of each subsidiary are unfortunately incomplete so they are difficult to use comparatively.
- Its financial link with the mother company just superior (the "trails" of filiation, which may allow up to 40 links from the top headquarters (as Shell), are the subject of a separate relational database) and there may be several mother companies for a unique branch, the % of affiliation of each relationship is accurate.

b. Methodology of measurements

Based on methodology developed, these reticular data can give rise to different types of organizations that rely on the results obtained in management science on the types of governance of enterprise groups (Frankfurt et al., 1995). Locations, on the one hand, and three types of networks of cities, carrying different meanings, are obtained by the aggregation of these organizations that can be studied by group, by segment, by origin or as a whole. If the "qualitative" and "quantitative" methods are mainly statistics, we complete them by concepts and measures, borrowed from recent developments in graph theory "small worlds" which are very suitable for studying such networks of cities. Thus, measures are developed for each graph enterprises (micro-level graphs), at the aggregated level of city (FUAs) (network "macro"), measures the position of each city or very interconnected groups (clusters) across.

The practical analysis of networks has been effected by such tools developed within the project SPANGEO (2005 - 2008) http://s4.parisgeo.cnrs.fr/spangeo/spangeo.htm. This project is on the adaptation measures commonly used by physicists, biologists and sociologists to geographical problem: the question of including capital gains and graphs weighted. Various indices of centrality and clustering classifications, have been revisited. Thus indices of centrality of "cohesion", or hierarchy of transitivity could be developed and tested empirically on cities (Newman, 2000; Melancon, 2006, Auber et al. 2003; Amiel et al., 2005 ; Rozenblat et al., 2007). They reveal both the centrality in dense stars, groups or bridges between groups at different geographical scales (Rozenblat et al., 2007). Indices on graphs aggregated by "natural" or "geographic" clusters have been implemented (including whether to build indexes of participation clusters, or for measuring aggregate data by agglomeration). An approach to multi-level clustering has

been developed including graphs of Transportation (Amiel et al. 2005; Ducruet, Rozenblat, 2008; Rozenblat, Melancon, 2009). All these measures, as well as visualization or topographical topological graphs were integrated into a software analysis and visualization of graphs (TULIP, free software and sources developed by the Laboratoire Bordelais Research Computers [Labri] and originally intended to graphs in biology: http://www.tulip-software.org).

c. Main vision on networks of multinational firms

Each group is seen as a (quasi) tree, owning subsidiaries which themselves own other subsidiaries and so on. It results a sample of 400.000 subsidiaries located all over the world, linked by 600.000 financial links, which are directly or indirectly owned (at least at 10%) by the main first 3.000 groups. These subsidiaries are precisely located to define Metropolitan areas (FUA in Europe according to the ESPON definition), they are defined by their activity sector (NACE), their turn-over and number of employees when it is available, and by their owners and subsidiaries.

First of all, the position of Europe in the World in such networks is very strong (Tab.1 and Tab.2). More than the half of the total subsidiaries' links of the World, occur inside Europe, either inside each country, either between two European countries. Going further, the three quarters of the total ownership concern Europe or Europe and the rest of the world (Tab.2). These gigantesque proportions are easily explained by the high degree of fragmentation of Europe in the history, which nevertheless has supported the industrial revolution, resulting to a high number of independent firms which had to develop agreements or to merge, especially at the end of the XXth century to face globalization. Then, according to its national and industrial history, the European industrial system is much more complex than the Asiatic or the North American ones. The urban system supports this complexity and conversely, the urban system is very influenced by the developments of the economic networks complexity. Then it creates a very diverse and strong core for emerging and reinforcing networks between the numerous European cities, from the smallest ones to the biggest metropolises.

TOTAL	**Continent subsidiary**						
Continent Owner	Pacific Oceania	Eastern Asia	Europe	South America	North America	Western Asia	Total
Pacific - Oceania	2 803	319	1 361	111	143	40	5 546
Eastern Asia	141	30 401	5 856	1 367	3 110	45	44 128
Europe	4 271	21 305	322 445	11 351	25 499	580	468 581
South America	203	1 716	3 202	3 491	1 745	22	13561
North America	1 244	10 971	30 029	8 626	108 275	190	178 107
Western Asia	31	16	92	29	9	519	752
Total	8 737	64 943	367 799	25 060	138 869	1 402	606 810

Table 1 Subsidiaries links of multinational firms by continent (values)
Source : IGUL-2010 - Origine of Data : ORBIS, BvD, 2007

% TOTAL	Continent subsidiary						
Continent Owner	Pacific Oceania	Eastern Asia	Europe	South America	North America	Western Asia	Total
Pacific - Oceania	0.5	0.1	0.2	0.0	0.0	0.0	0.9
Eastern Asia	0.0	5.0	1.0	0.2	0.5	0.0	7.3
Europe	0.7	3.5	53.1	1.9	4.2	0.1	77.2
South America	0.0	0.3	0.5	0.6	0.3	0.0	2.2
North America	0.2	1.8	4.9	1.4	17.8	0.0	29.4
Western Asia	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Total	1.4	10.7	60.6	4.1	22.9	0.2	100.0

Table 2. Subsidiaries links of multinational firms by continent (%)
Source : IGUL-2010 - Origine of Data : ORBIS, BvD, 2007

This complexity can be found in part at the international scale, especially through the study of FDI flows, where the amount of monetary investments are especially underlined (Dickens, 1992, 2002; Mucchielli, 2008; CNUCED annual reports). But what cannot be found in FDI studies are first, the complexity of inter-connections between numerous individual firms (in particular by indirect ownerships) and second, the local urban effects of agglomeration economies that support and interact with these ownership networks.

d. Local ownership

In particular, the local complexity created by many enterprises, located very closed to each other, and financially linked together, is rarely taken into account (because of the lack of data). Figure 1 represents the proportion of these “local links” where owner and subsidiaries are located in the same metropolitan area. At the world scale (fig. 2), it seems obvious that this phenomenon concerns especially European and Asian cities, but very few American cities. This difference comes from different reasons. For China, the way multinational firms settle is most of the time by buying state Chinese enterprises or building a green field enterprise in join venture with the national state. For Japan and Taiwan, conglomerates (or *Keiretsu*) were the way to build the new economy in globalization. In the meantime, Hong-Kong built its economy through the crossing and meeting of service and financial firms organizing trade of “made in China” products. For Europe, the European Community construction, permitted enterprises to exchange investments and to group their weight in order to fight at the European and global scale. Especially London and Great Britain cities are very concerned by this phenomenon (64% of the subsidiaries owned by enterprises planted in London are local, 75% for Leeds, 84% for Middleborough or 90% for Lincoln). Great Britain is the world financial system where every firm of the world pretending to play at the global scale has to be settled, especially for North American firms, to create contact with European and Asian firms (Sassen, 1991; Taylor et al., 1996, 2000, 2004). In one hand, this could be interpreted as a very positive effect because more a milieu is complex, more it has got chance to adapt to crisis and to promote emergence of innovations. It is what dramatically lacked to the soviet system and every Eastern countries has seen increase the complexity of their productive system thanks to foreign subsidiaries and also thanks to the recent emergence of local firms (Stark, Venables, 2006). But in the other hand, every firms being linked to every other ones, it creates a vulnerability of “domino effect” allowing a

very speed diffusion of lack of investment, that we just experimented with the actual crisis of the stock exchange.

Figure 1

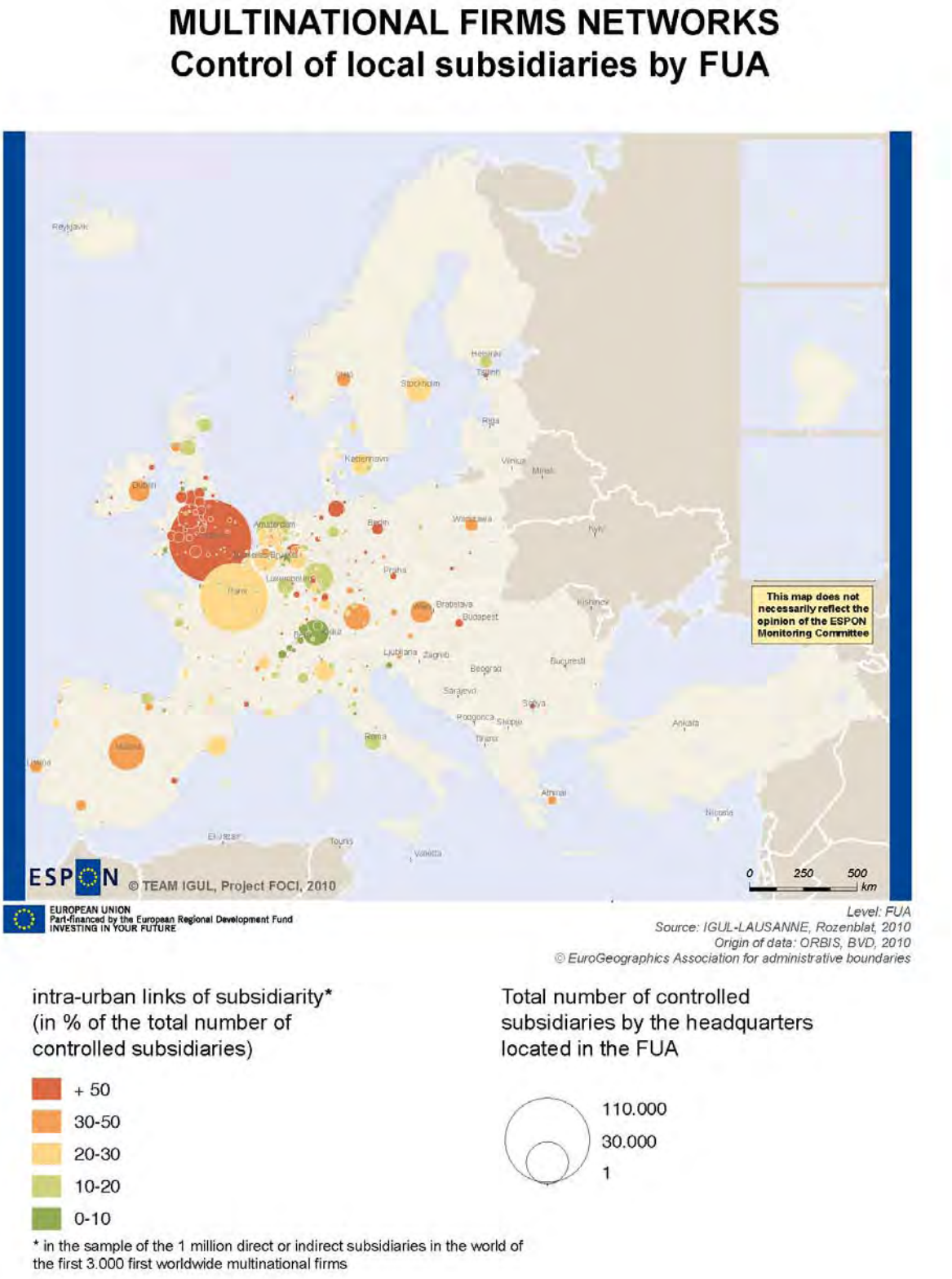


Figure 1. Multinational firms networks. Control of local subsidiaries by FUA

Figure 2

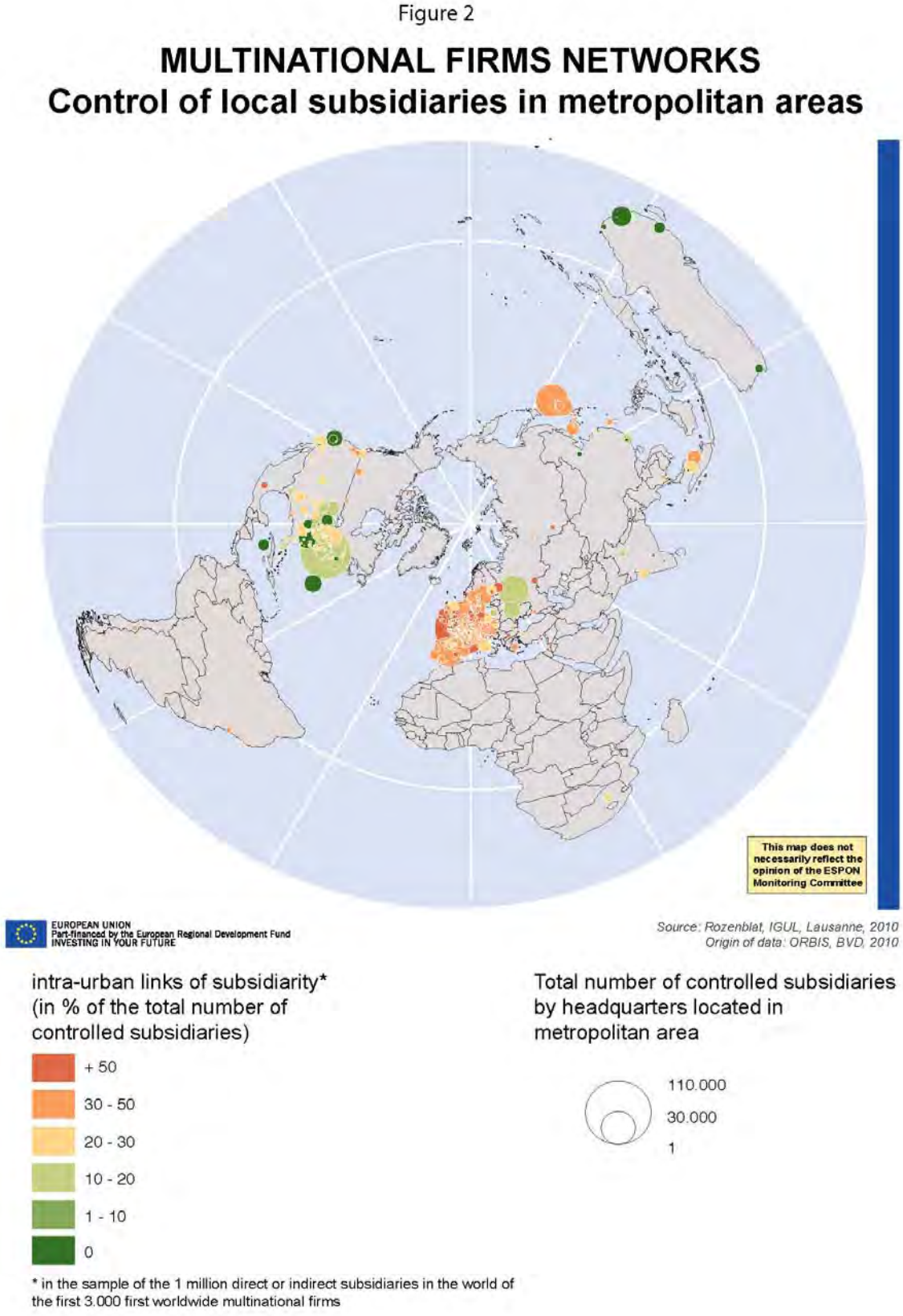


Figure 2. Multinational firms networks. Control of local subsidiaries in metropolitan areas

When one cancel the local links, one obtain a matrix crossing all cities involved in the plants the 3.000 first groups of the world. It concerns 250.000 subsidiaries, which are spread in 1.500 metropolitan areas of the world, and some 10.000 places outside metropolitan areas but which concern only 2% of the total number of subsidiaries.

2. The network of cities

A matrix of the main links of cities through the system of multinational firms can then be represented by a graph, showing the intensity between each couple of cities (by the number of subsidiaries on one city controlled by headquarters of the other city) (Fig.3). We choose to measure here the total number of subsidiaries controlled from each city (out-degree: represented by the size of the nodes) and the global centrality of each node measured by the Betweeness centrality (number of shortest paths of the whole graph passing by this node). Then the representation allies a local measure of the centrality (out-degree) and a global measure of centrality (Betweeness Centrality). The position of each node in the visualisation is calculated according to the intensity of relations between the other nodes: the cities whose exchange more subsidiaries are closer than the cities not exchanging so much. Nevertheless, two cities can be positioned closely without any exchange if they both exchange a lot with the same third cities.

This representation shows at the center, the cities forming the core of the global localizations of multinational firms. If Paris, London and New York dominate, they are embedded in a dense network of cities formed essentially by European, American and only some few Asian cities (Tokyo, Seoul, Taïwan and Shanghai).

In general, closest cities exchange more than those, which are more distant and many geographical proximities remain in the graph. Inside Europe the number of linked cities decrease according to a regular function of the distance (Fig.4).

At the scale of the world, two third of the links occur inside each continent, meaning also that the globalization more occur until now at the continental scale (or free trade zones) than really at a total worldwide scale (Dunning, 2002). Of course, some exceptions appear with distant cities exchanging more because of specialization effects: Baltimore and London, or Boston and Frankfurt. At the European scale, Paris is much more central than London. By their privileged links, they share European cities in two groups. Cities of Scandinavia but also Athens, exchange more with London, while southern and Eastern European cities exchange more with Paris. But this division is not so strong in particular regarding the high density of relations linking European cities to each other.

Cities share together very close destinies, being closely linked to each other by the same global actors. There are then places with some functions for the industrial business system and they offer the conditions to access to the power. The position of their firms in the multinational networks confer some resources of power, which is not localized and static, but a dynamic process involving several actors in interaction. The headquarters owning their subsidiaries is a part of this power. The cities where headquarters are located encompass people and institutions, which possess the decision power and attract other people and institutions ambitioning to possess the same.

Figure 3

World cities centralities in the networks of multinational firms

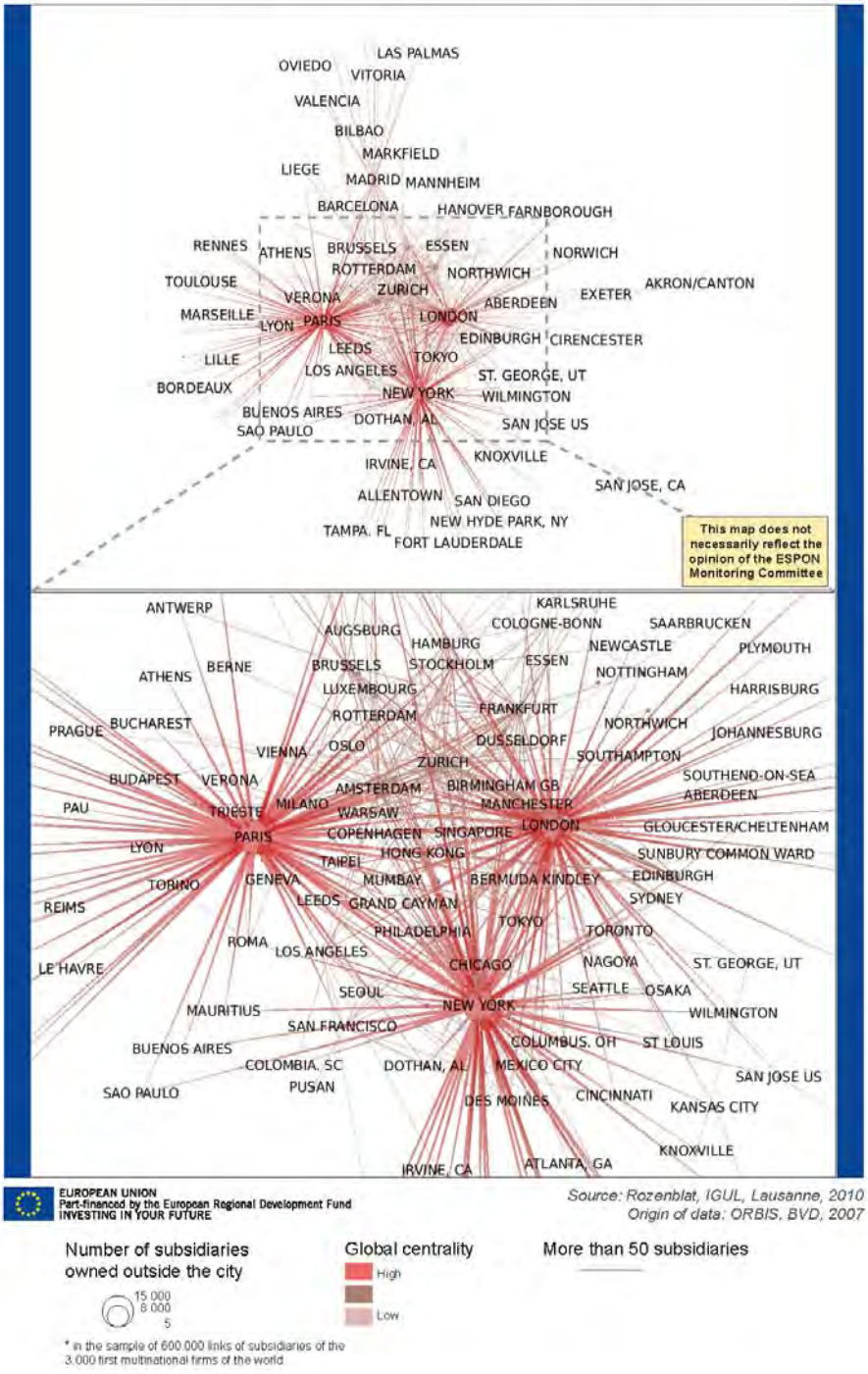


Figure 3. World cities centralities in the networks of multinational firms

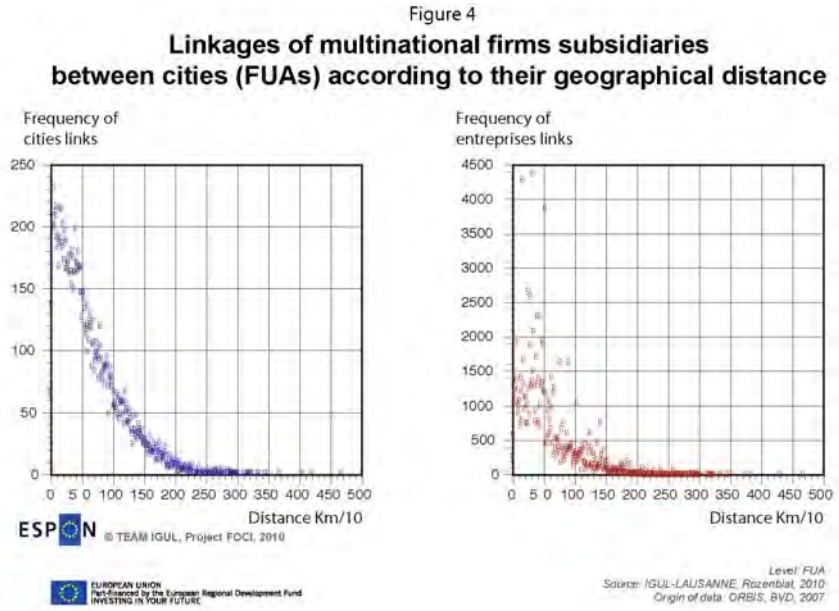


Figure 4. Linkages of multinational firms subsidiaries between cities (FUAs) according to their geographical distance

3. The position of cities inside the networks

a. The power position of cities

The balance between controlled subsidiaries from a city and the subsidiaries located in this city but controlled from outside, is a good indicator to measure the dominant places against the dominated ones (Fig. 5). At the World scale, European cities seem to be more controlling subsidiaries than controlled from outside, excepted for the Eastern European cities. It's the same phenomenon observed in North America and in Nord-East Asia, while South East Asia receive more than control also.

At the scale of Europe (Fig. 6), the more dominant European cities are still Paris and London in the size of their number of controlled subsidiaries outside their own boundaries. In general, the dominant position is correlated to the size of the cities, but sometimes, small places can also be observed in a very dominant relative position. Especially, borders-cities like Geneva, Basel, but also Trieste and Arnhem own much more subsidiaries than they welcome ones controlled from outside. Their peripheral position was a disadvantage when borders where relatively closed, but it was already an advantage as a bridge to and from the other side. This last advantage remains and even is increasing thanks to the visibility to and from each part of the border, a local knowledge of both cultures, both practices and institutions. Beside these border cities, other small cities hosting from long time very big enterprises are in the best position of independence thanks to their hosted headquarters (like Clermont-Ferrand for Michelin, Lausanne for Nestle, Exeter for Devon Partnership NHS Trust or Pistoia for Pistoia Alliance in chemical/biotechnology). Nevertheless, in the last cases, a too strong specialization around one company could be negative for the development and the renewal of the cities for middle and long term. Hosting external branches can also bring some dynamic to the local environment.

Figure 5

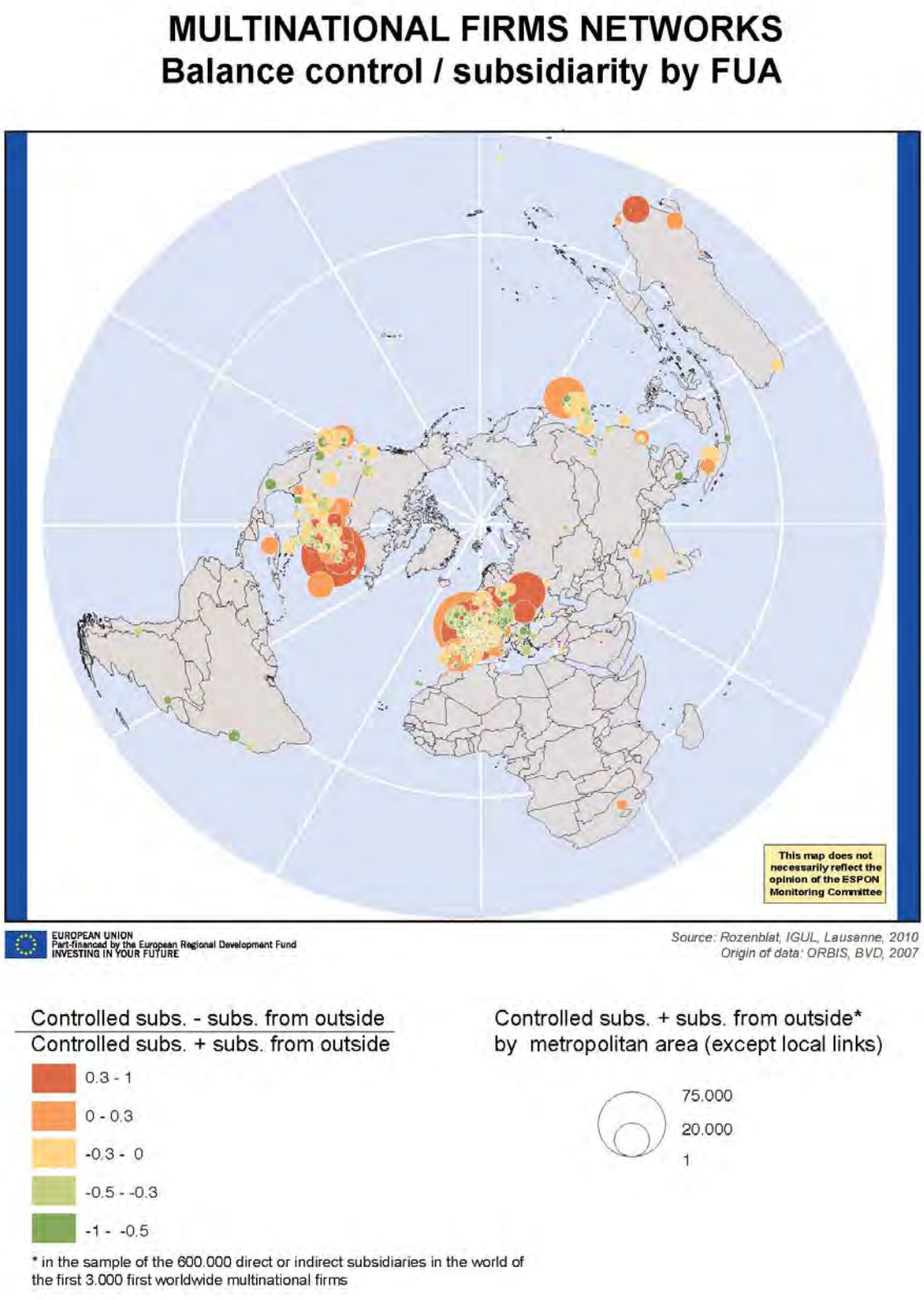


Figure 5. Multinational firms networks. Balance control / subsidiarity by FUA

Figure 6

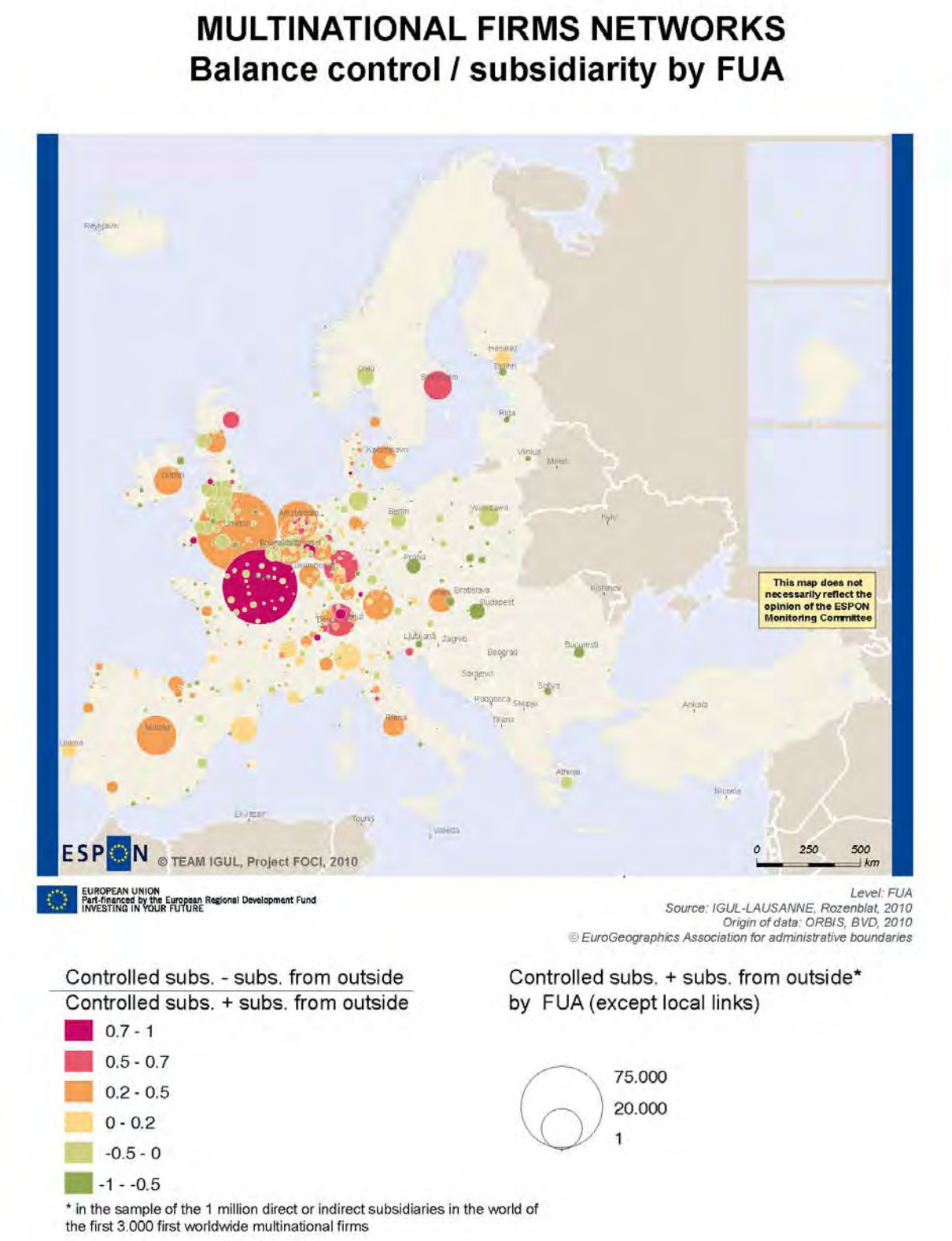


Figure 6. Multinational firms networks. Balance control / subsidiarity by FUA

In particular, cities began in the 90's to promote their qualities in order to attract foreign companies. It was viewed as a competitive factor to offer international functions and international companies in order to attract skilled workers and increase the level and the quality of life (Begg, 1999). In fact, the integration in the global networks of companies is essential to have access to the international arena in order to promote the local economy. Clusters, assembling local and international companies, were organized by local government in "technopoles" then called "clusters" (Porter, 1996; Markusen, 2000). These clusters not only contain economic resources but must also give access to infrastructures like airports, congress centres and to high-level cultural events. This short-term history has got a high importance for today and for the future of European cities to be integrated in the globalization which represent the *sine qua non* condition to wish a future development and renewal in adequacy with the global trends.

b. International orientation of cities' linkages

The map of the host of foreign subsidiaries in FUAs (Fig.7) reveals the supremacy of London in Europe to attract foreign companies. Paris, which is ranked second only reach one quarter of the number of the London's foreign subsidiaries (5.000 against 20.000). In particular, London host many American companies (35% against 23% for Paris) (Fig.8) and Asian companies (6.6% against 3.6%) (Fig.9) and relatively much less European companies than the rest of European cities. It confirms that London is like a bridge of American companies in Europe, but much less integrated in Europe by the European firms' networks than Paris (70% for Paris and 55% for London) (Rozenblat, 1993; Rozenblat, Pumain, 2006).

Beside this well-known duality of London and Paris, for the rest of the European territories, a Capital cities effect dominates, particularly strong in Central Europe. The capitals concentrate most of the foreign subsidiaries: it's truth for classical "primatial" national urban systems where one city dominates and concentrates much more wealth and services than the other ones, like in France, Great Britain, Greece or Portugal. But it is also truth to a lesser extent for Spain, where Madrid concentrates much more foreign companies than Barcelona, and in Switzerland where Zurich dominates largely Geneva and the other cities. This phenomenon is exacerbated in Eastern new members capitals, where the uncertainty of the administration and the ignorance of the country has lead companies to settle first in the capital. The strategy is to be to be closed to the institutions, closed to the banks in order to build a professional local network and to acquire information, and then only find a more appropriate plant for production. The capital plays a role of bridge between abroad and the national cities. Only strong federal countries like Germany have got much more equilibrium between the openness of their metropolises to direct foreign companies. They have thus better visibility from abroad and are more rapidly integrated in new diffusion of knowledge and practices. But the cities situated in concentrated countries also can have a good access to these networks, provided that capital cities play a good role of bridge in direction to the whole country. So, measuring here only the direct foreign subsidiaries links is not enough to understand the process of diffusion of this integration in the globalization. A further approach on the indirect links will give a more depth image of this uneven openness of the urban economies in the globalization and the capacities of capitals, but also of transversal links between middle size cities, to diffuse this advantage to other cities.

The integration of Eastern European cities is facilitated by Western companies' investments. The Figure 10 shows the cities where eastern subsidiaries are controlled. If Paris, Amsterdam, Zurich and German cities, possess a lot, it doesn't represent a high part of their own total ownership. At the opposite, Wien is much more oriented to Eastern Europe and of course, European cities themselves (even outside their own countries).

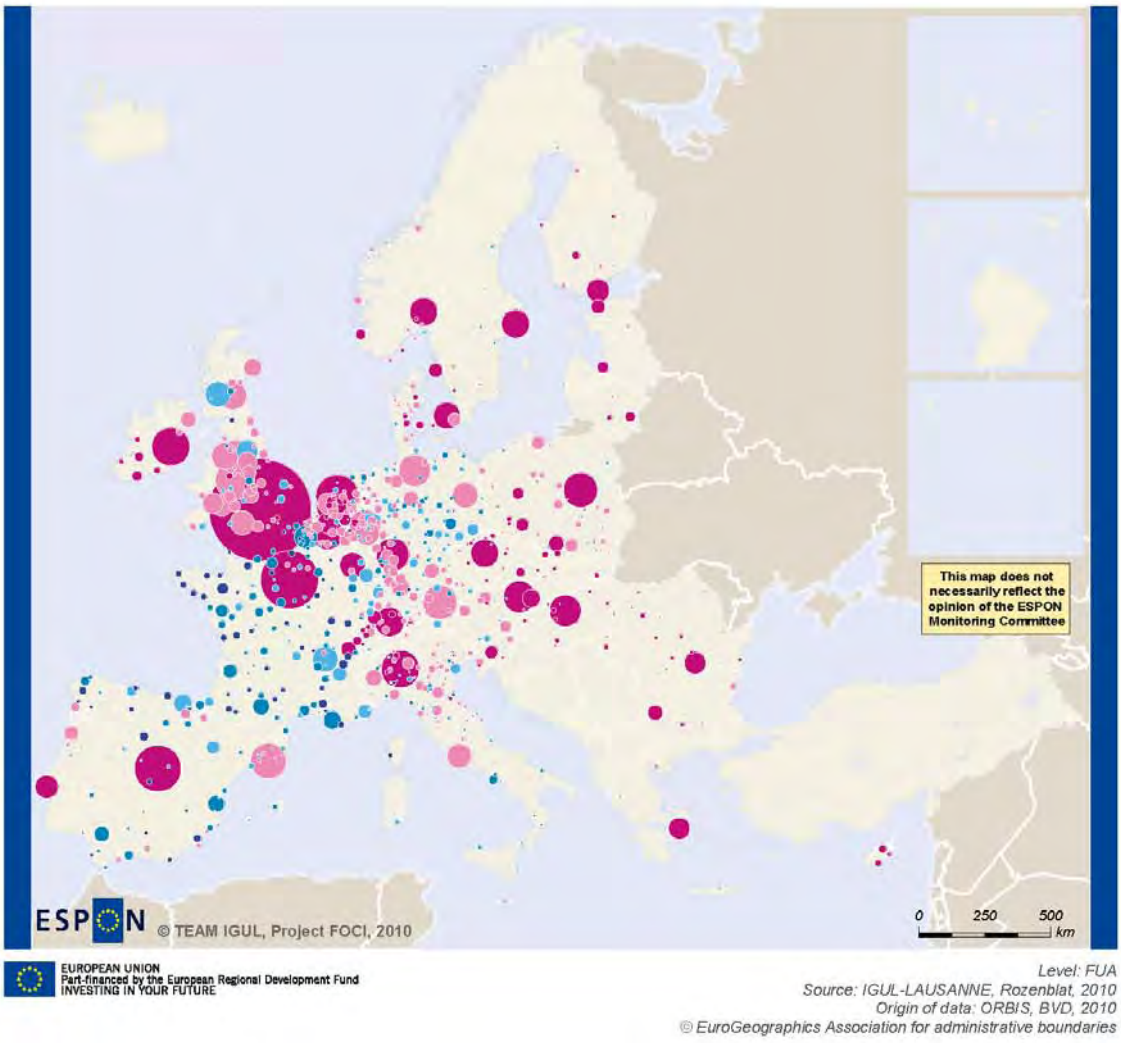


Figure 7. Multinational firms networks. Location of foreign subsidiaries by FUA

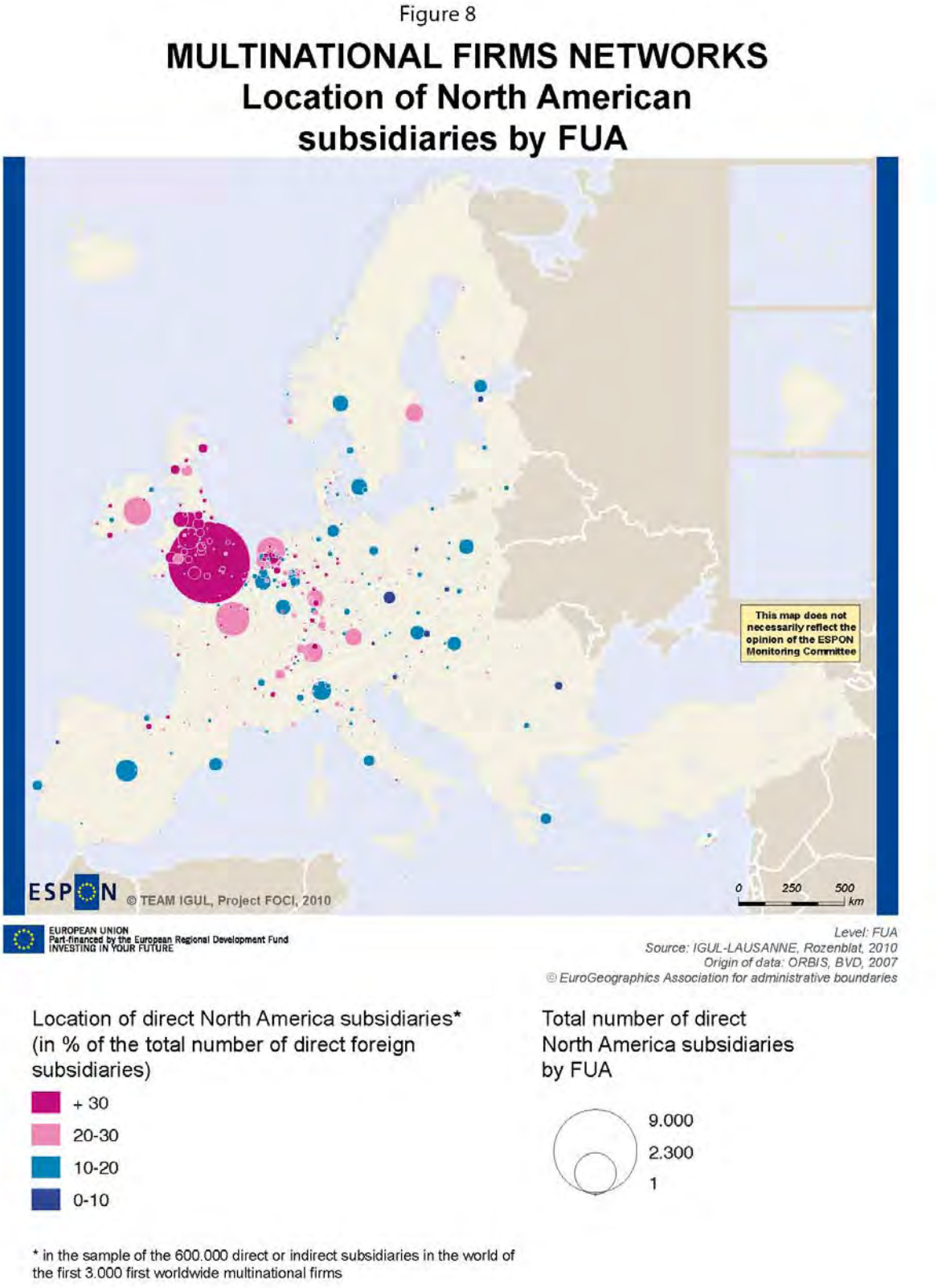


Figure 8. Multinational firms networks. Location of North American subsidiaries by FUA

Figure 9

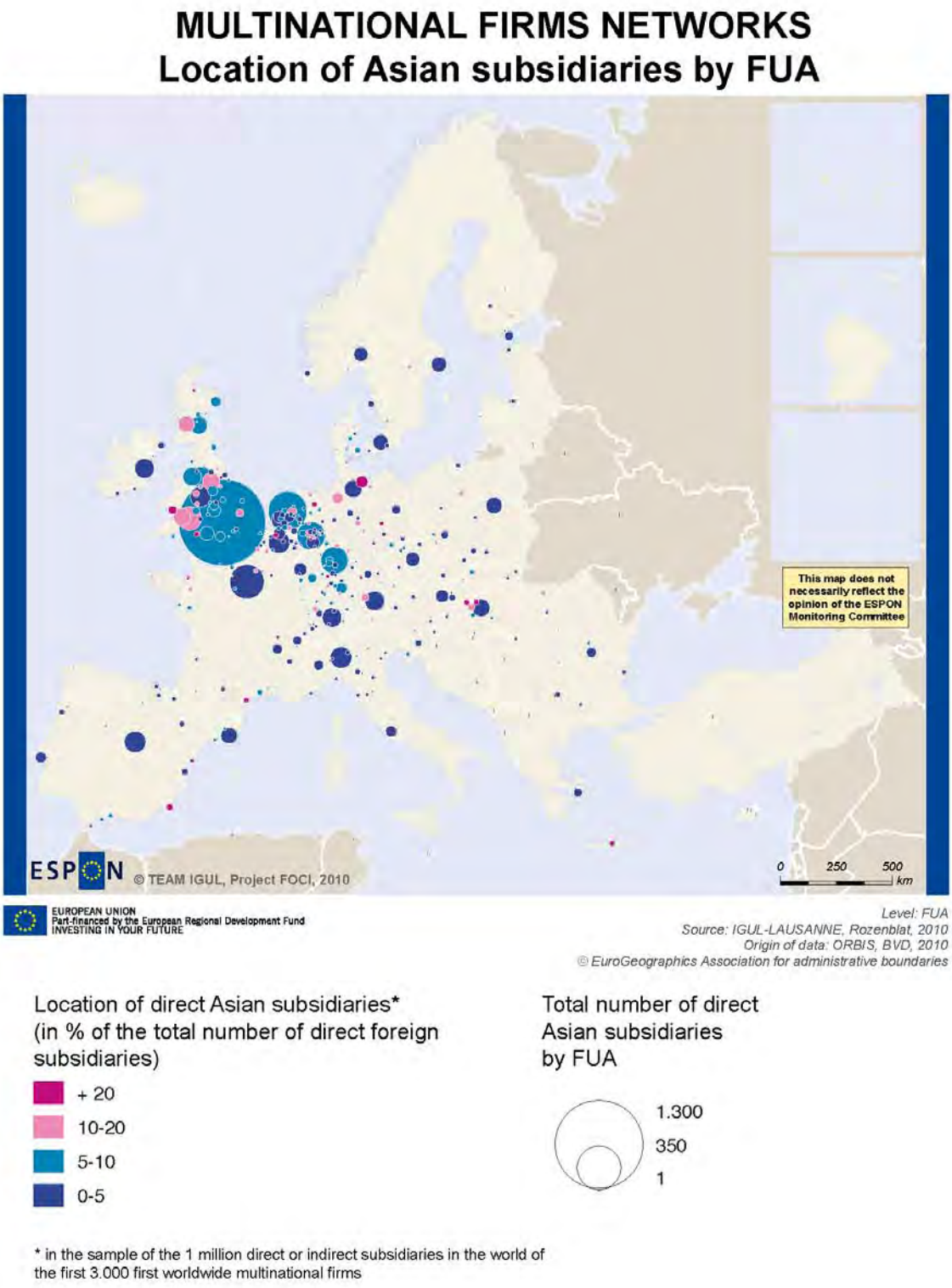


Figure 9. Multinational firms networks. Location of Asian subsidiaries by FUA

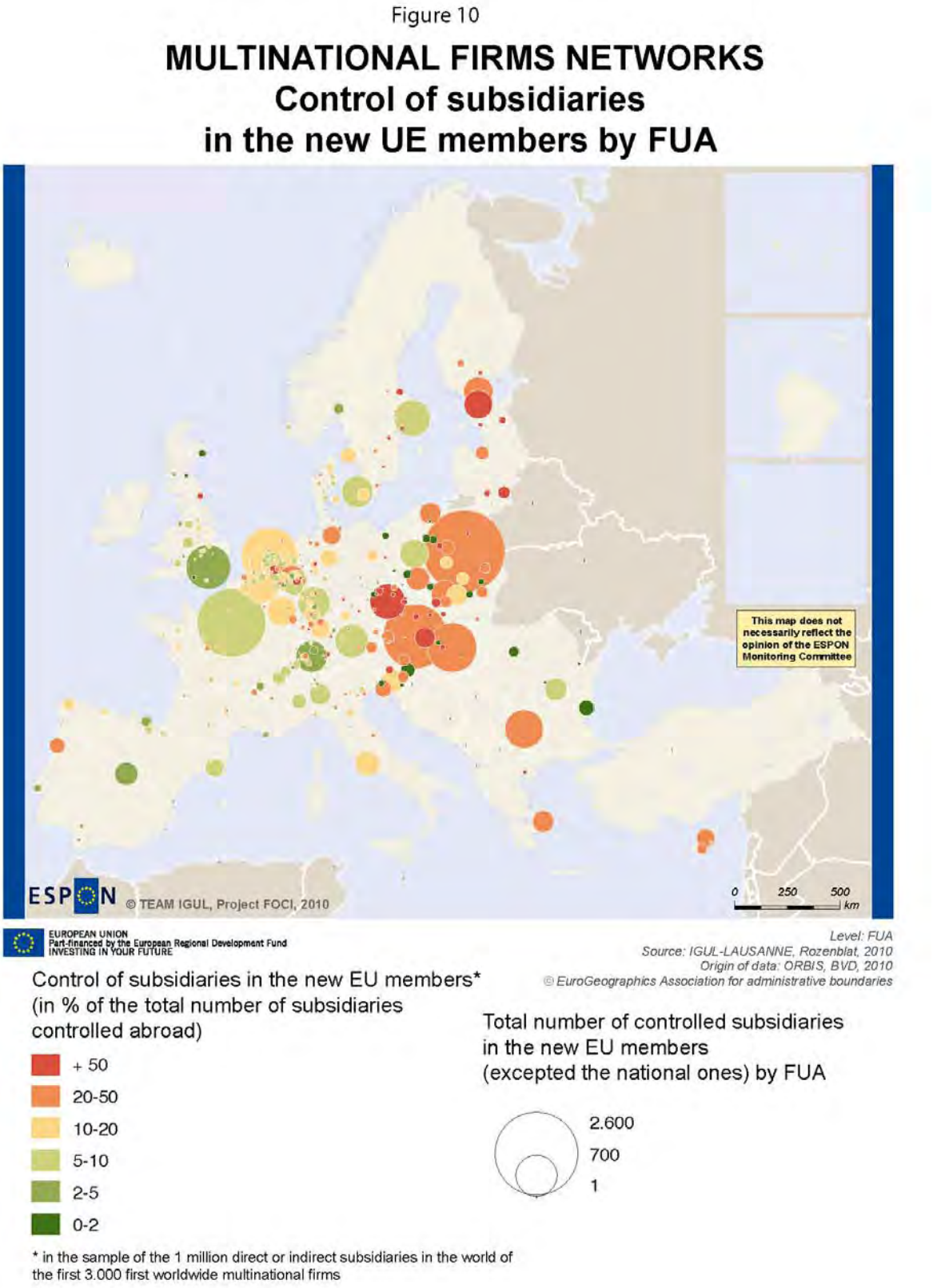


Figure 10. Multinational firms networks. Control of subsidiaries in the new UE members by FUA

The integration of European cities in the Global system of cities is then very deep. London is an important bridge between world cities and European cities. In particular, as we've seen, it host many American and Asian firms. Paris is more oriented to European cities, but also very central in the world, thanks to its numerous relations with European cities. Also, the ownership of headquarters of Paris, Brussels, Luxembourg and Milano is more oriented to North America (Fig.11) while London or Torino firms privilege more Asian cities (Fig. 12).

This system of exchanges of subsidiaries is then complex and multi-scale: Europe / World, Western Europe/ Eastern Europe, exchanges between European countries and inside each country. The balance and the connection between all these level are the condition of the harmonized development of competitiveness of European cities.

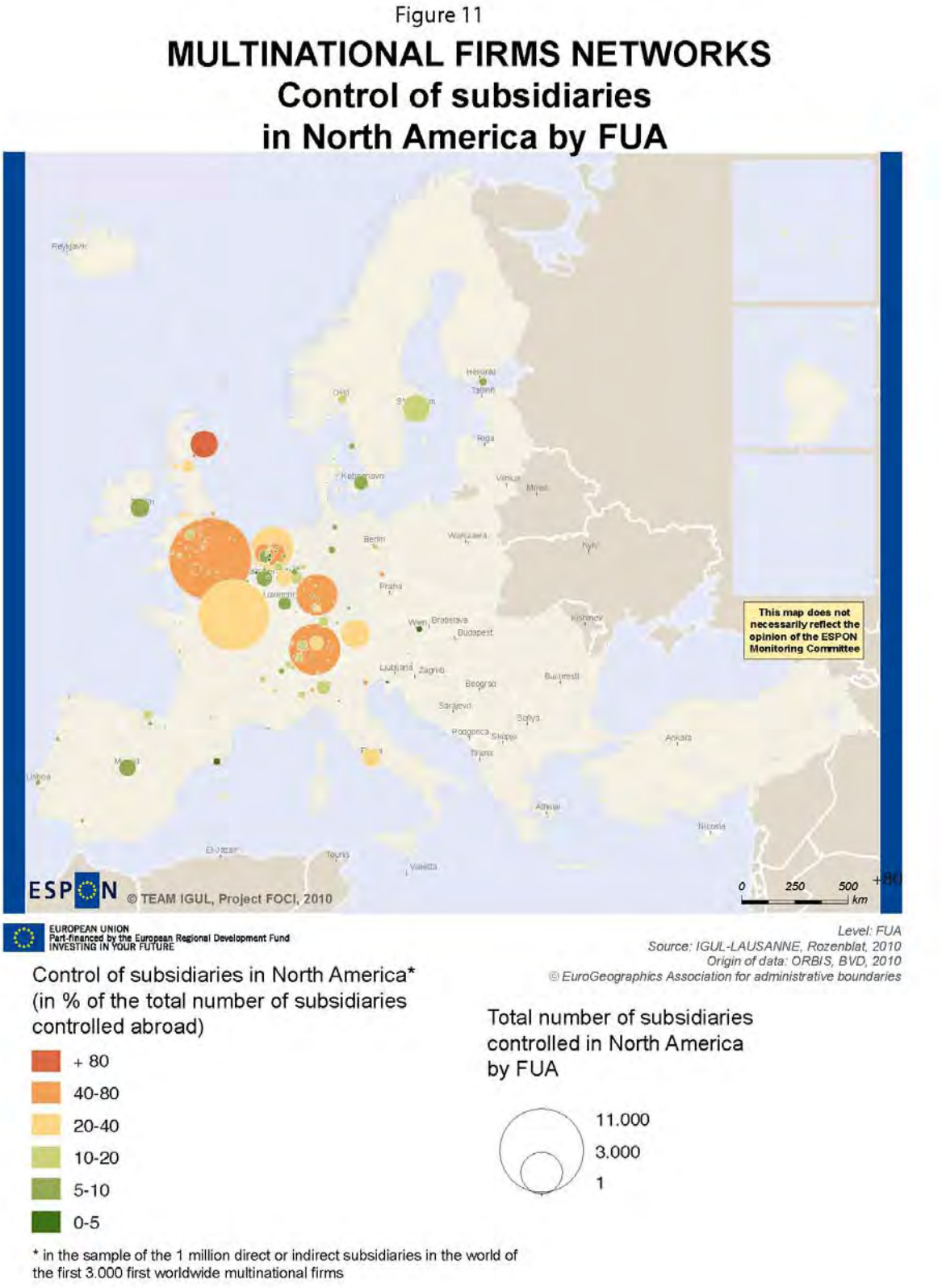


Figure 11. Multinational firms networks. Control of subsidiaries in North America by FUA

Figure 12

MULTINATIONAL FIRMS NETWORKS
Control of subsidiaries
in Asia by FUA

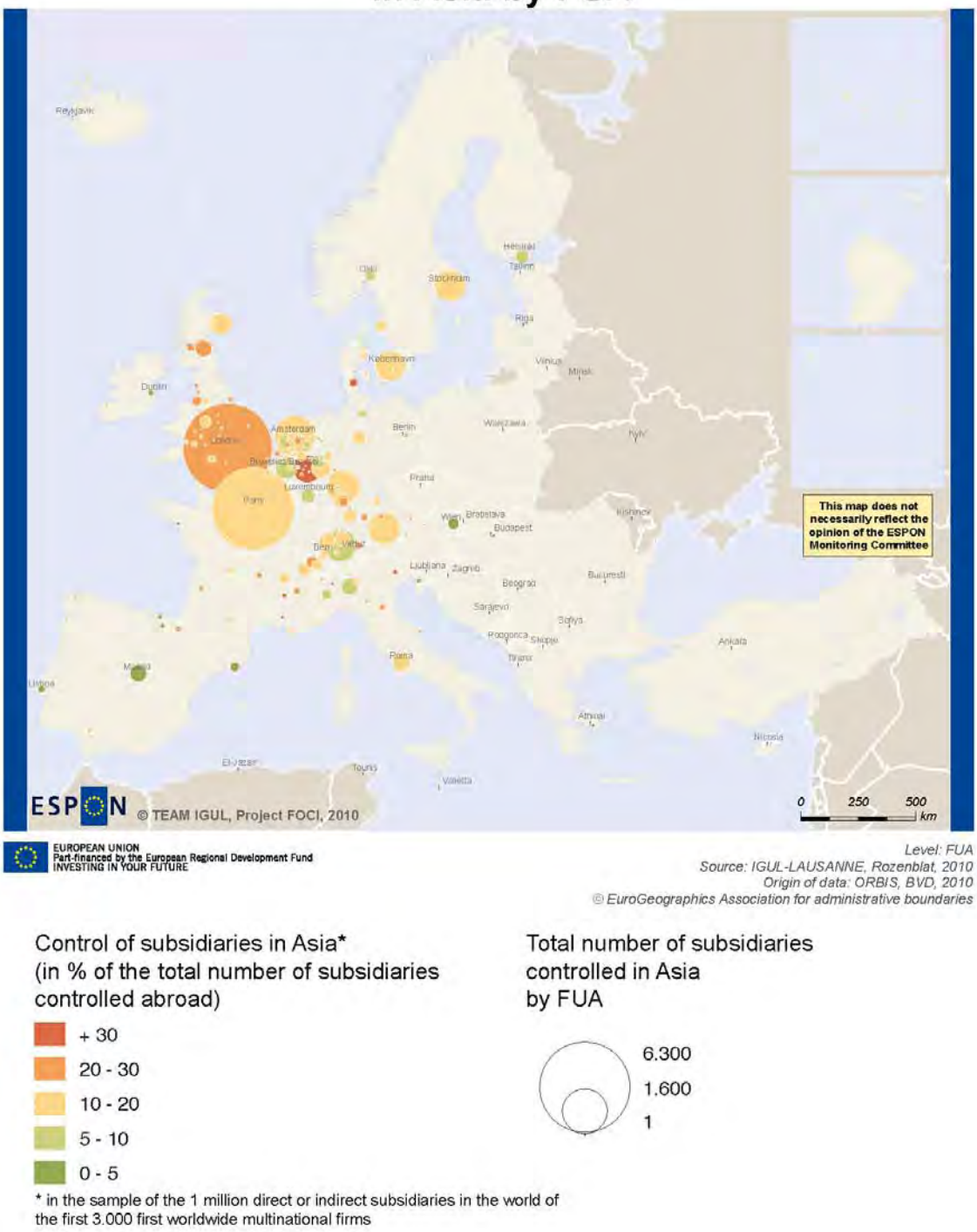


Figure 12. Multinational firms networks. Control of subsidiaries in Asia by FUA

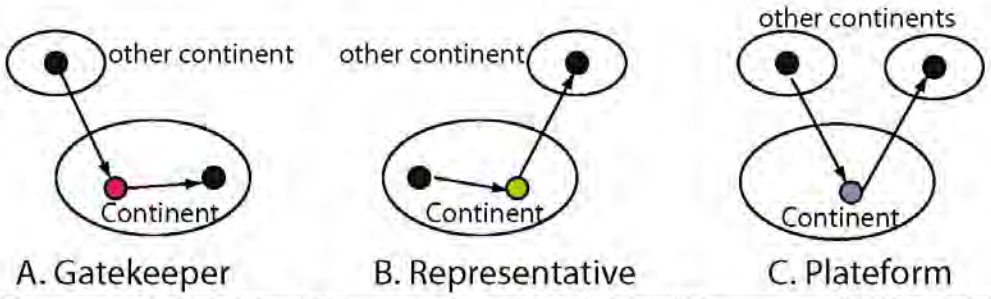
c. Intermediate cities between scales

Intermediate cities at the inter-continental level

Multinational firms networks use some step in internationalization. In particular for overseas investments arriving in Europe, some places are privileged to receive the investment, spreading it in a second step to the continent: they represent "*continental gatekeeper places*" (Tab. 3, Fig.13a). Leaving from Europe to the world, also some "*continental representative places*" offer to multinational firms the means to reach places outside Europe (Fig.13b). Finally, some places play the role of intermediary between other continents, in general for financial or organizational function. They represent "*international platforms*" (Fig.13c). We measured for the sample of the 3'000 networks of Multinational firms, the frequency by cities (FUAs) of these three kinds of patterns of paths in ownership links.

Table 3

Continental intermediate cities in the world



RANK	CITY	CONTINENTAL GATEKEEPER	CITY	CONTINENTAL REPRESENTATIVE	CITY	INTER-CONTINENTAL PLATFORM
1	LONDON	17589	NEW YORK	14581	PARIS	5104
2	PARIS	9858	PARIS	6000	LONDON	4048
3	AMSTERDAM	4774	LONDON	5512	BERMUDA KINDLEY	3967
4	EDINBURGH	4050	TOKYO	3873	MEXICO CITY	3482
5	MUNICH	3278	FRANKFURT	3719	AMSTERDAM	2401
6	ZURICH	3069	ZURICH	3113	ZURICH	1935
7	NEW YORK	2884	MUNICH	2523	MUNICH	1560
8	ROTTERDAM	1940	CHICAGO	1829	ROTTERDAM	1096
9	HONG KONG	1658	MADRID	1826	NEW YORK	838
10	BIRMINGHAM GB	1195	SAN FRANCISCO	1767	TOKYO	685
11	TAIPEI	1178	BRUSSELS	1623	GENEVA	606
12	STOCKHOLM	1175	DALLAS	1582	GRAND CAYMAN	529
13	LUXEMBOURG	1164	CHARLOTTE	1304	HONG KONG	453
14	DUBLIN	1138	STOCKHOLM	1105	ENSHEDE	433
15	MANCHESTER	1059	STUTTGART	997	DETROIT	416
16	SYDNEY	1027	AMSTERDAM	990	SINGAPORE	353
17	DALLAS	1024	CINCINNATI	987	JOHANNESBURG	347
18	FRANKFURT	918	BOSTON	928	EINDHOVEN	339
19	DUSSELDORF	917	MINNEAPOLIS	886	SAN ANTONIO	325
20	TOKYO	887	BALTIMORE	874	STOCKHOLM	322
21	GENEVA	837	SYDNEY	806	DUBLIN	320
22	ENSHEDE	792	TORONTO	772	MANCHESTER	315
23	SEOUL	778	ST LOUIS	750	BOSTON	304
24	COPENHAGEN	726	HARTFORD/SPRINGFIELD	744	LUXEMBOURG	280
25	CHICAGO	725	DENVER	738	EDINBURGH	276
26	ESSEN	684	ROTTERDAM	721	TAIPEI	263
27	SINGAPORE	650	TORINO	710	CHICAGO	255
28	JOHANNESBURG	638	LUXEMBOURG	708	LAGOS	236
29	DETROIT	606	LOS ANGELES	706	FRANKFURT	212
30	BERMUDA KINDLEY	582	MILANO	694	SEOUL	202

EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE

Level: FUA and Urban areas
Source: IGUL-LAUSANNE, Rozenblat, 2010
Origin of data: ORBIS, BVD, 2007

Table 3. Continental intermediate cities in the world

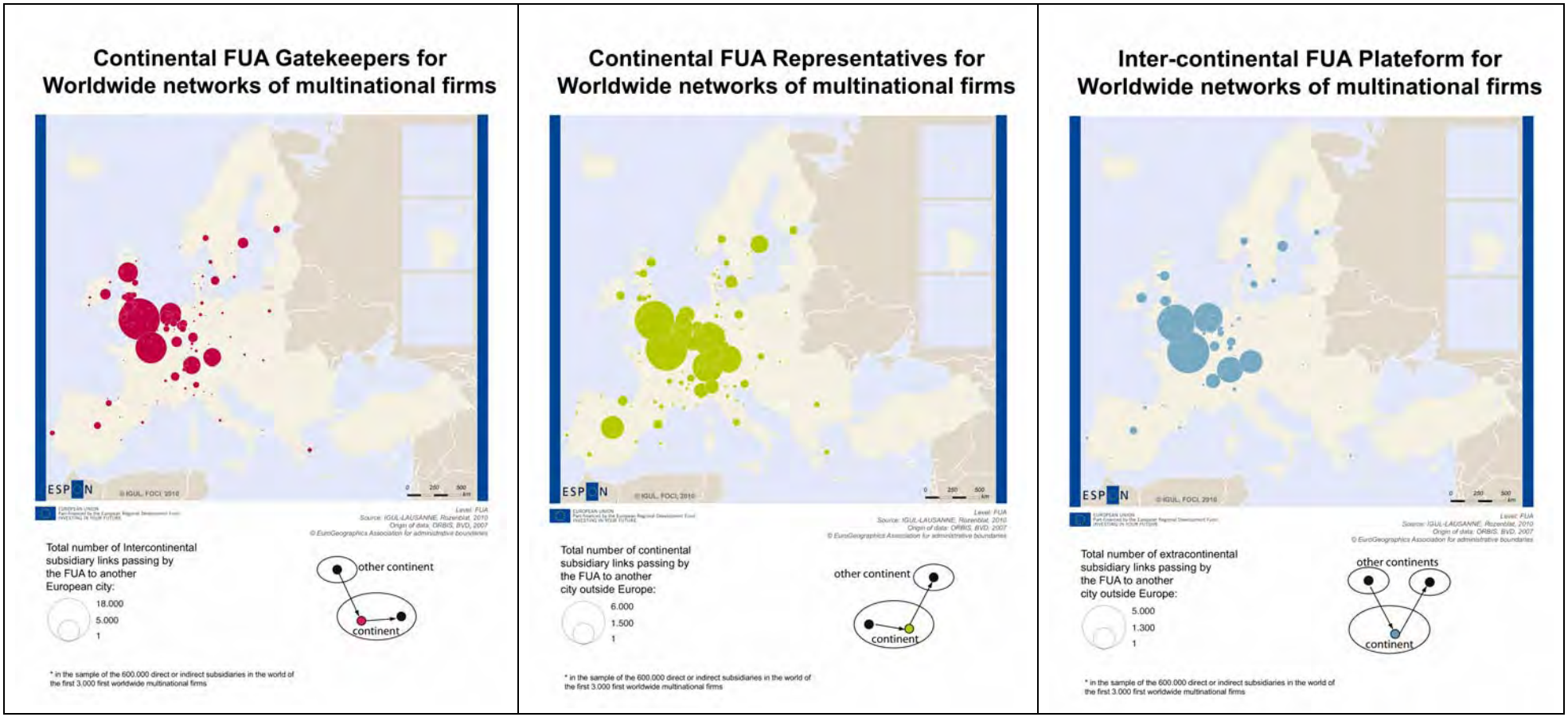


Figure 13. Position of European cities as intercontinental (a) gatekeepers, (b) representatives and (c) platforms

A- Continental gatekeeper cities

European cities dominate for the role of continental gatekeeper in the World (Tab.3, Fig.A). The multi-level organization of European Union, begun before the explosion of firms internationalization of the 70's to 90's, explains the special development of this pattern in Europe, reflecting the implantation of European Headquarters sub-controlling the continental organization of the firms (Dunning, 2000; Doz et al., 2001).

London largely dominates especially with the host of North American and Asian headquarters in Europe, especially from New York (Merrill Lynch, Pepsico, Citygroup or Colgate Palmolive amount the more famous ones), Tokyo (Matsushita), Kyoto (Toyota), Mumbai (Tata). This role of London is well known for long time, but it's the first time one can show this evidence at the urban level and at the worldwide scale. Paris represents the half of the weight of the London's function. They both observe a much better score than New York, because of course of the European specificity of this kind of pattern previously explained. Comparatively, the US pattern is much more organized in a direct way, where the plants must be localised. For US, only New York appears in the 16 first ranks. Amsterdam, Edinburgh, Munich and Zurich appear much better than one expect according to their size. Amsterdam and Zurich (and lower: Luxembourg), like London, host many financial headquarters, but Edinburg is the relay for investments in design, agro-food or oil all over Europe. Munich has got also a multi-activity role for scientific and technical activities, and for manufactures.

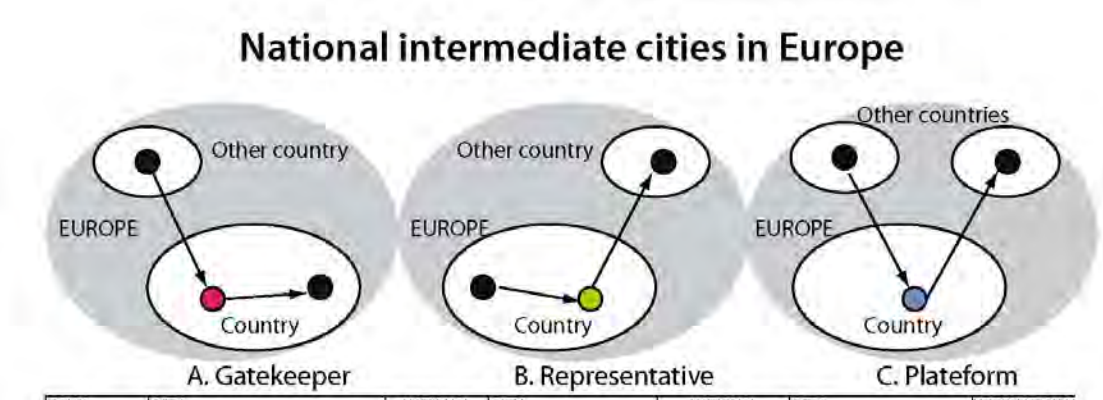
B- Continental representative cities

The opposite role of "representative city" for ownership of companies outside the continent gives more importance to New York, but also to other American cities like Chicago, San Francisco, Dallas or Charlotte, which concentrates many American insurance companies (Table 3, Fig.13b). Paris and London are at the same level, just after London. London offers an ideal stepping stone for European banks to invest overseas, like Deutsch Bank (Francfort), Credit Suisse (Zurich), Bayerische Hypo-und Vereinsbanks (Munich), BNP Paribas (Paris), or Standard Life Investments (Edinburgh). Paris, thanks to Euronext, also offers good conditions for banks to invest overseas, but also seems to diversify more (EADS or GUCCI Group, from Amsterdam).

C- Intercontinental platform cities

Playing a role between other continents is also important in order to place Europe in the multi-polar world (Table 3 Fig. 13c). London and Paris, again dominate the game before Bermuda Kindley. Both serve essentially for US companies to diffuse in Middle East, Asia or Africa, and it's the same for Amsterdam, Zurich or Munich, which are lower.

Intermediate cities at the inter-national level inside continents



RANK	CITY	NATIONAL GATEKEEPER IN EUROPE	CITY	NATIONAL REPRESENTATIVE IN EUROPE	CITY	INTERNATIONAL PLATFORM IN EUROPE
1	LONDON	11977	PARIS	3939	PARIS	5997
2	PARIS	6624	LONDON	2512	BRUXELLES/BRUSSEL	4413
3	MADRID	2554	FRANKFURT AM MAIN	2021	ZURICH	2626
4	BRUXELLES/BRUSSEL	1763	STOCKHOLM	1528	STOCKHOLM	2437
5	BARCELONA	1461	HELSINKI	835	MUNCHEN	2301
6	STOCKHOLM	1372	MILANO - BUSTO ARSIZIO	708	LONDON	2138
7	MILANO - BUSTO ARSIZIO - COMO	1214	TORINO	702	AMSTERDAM	1790
8	DUBLIN	1144	WIEN	657	MADRID	1677
9	BIRMINGHAM METROPOLITAN ARE	1063	MADRID	610	MILANO - BUSTO ARSIZIO -	1541
10	MUNCHEN	994	KOBENHAVN	607	DUBLIN	1354
11	AMSTERDAM	941	TRIESTE	603	LUXEMBOURG	1054
12	WIEN	680	AMSTERDAM	504	TRIESTE	599
13	KOBENHAVN	554	OSLO	495	WIEN	576
14	FRANKFURT AM MAIN	533	DUSSELDORF	490	STUTTGART	524
15	STUTTGART	530	BERLIN	423	KOBENHAVN	474
16	OSLO	469	MANNHEIM	399	HELSINKI	328
17	ZURICH	456	MÜNCHEN	337	WIESBADEN	323
18	HELSINKI	457	HANNOVER	321	BASEL	286
19	HAMBURG	391	ZURICH	318	DEN HAAG	278
20	ABERDEEN	351	ROMA	272	MALMO	252
21	ROTTERDAM	314	GÖTEBORG	258	GENEVE	231
22	MANCHESTER METROPOLITAN AR	309	BRUXELLES/BRUSSEL	243	BARCELONA	224
23	DEN HAAG	308	CLERMONT-FERRAND	240	ROTTERDAM	193
24	EDINBURGH	302	MALMO	237	FRANKFURT AM MAIN	172
25	GLASGOW	301	NURTH	234	OSLO	146
26	YORK	300	STUTTGART	227	DUSSELDORF	145
27	BURTON ON TRENT	287	ROTTERDAM	212	ATHINAI	144
28	ATHINAI	283	HAMBURG	201	KOLN	123
29	WARSZAWA	264	KOLN	200	GÖTEBORG	118
30	TYNESIDE METROPOLITAN AREA	261	DUBLIN	172	WARSZAWA	102

Table 4. National intermediate cities in Europe

e. Insertion into dense regional networks: toward a regional polycentrism

Multinational firms insert into regions and participate to the local or regional interdependencies between territories. The distinction in the whole matrix of local links (less than 100 km) underlines these phenomena (Fig.14). Of course, to locate a plant or a subsidiary in a neighbour, it must be some local centres, cities or towns. So the denser zones appear where the urban framework is basically denser.

Comparing to the European urban framework (Rozenblat, 1995, 2009), some possible links appear while other ones whose might appear do not. For example, Toulouse region in France linked to Barcelona, while there's not a so much dense urban network there. The same phenomenon can be underlined at the Eastern border of Germany, for Madrid with Castille region, for Bretagne region in France, or for Denmark. At the opposite side, some "potential" regional urban framework do not support enough networks like in Poland, Hungary, Romania and Bulgaria. There, a very regular urban framework could support a regional development of multinational firms networks. But for this, the regional centres must offer minimal infrastructure supply, in order to attract qualified people and remain accessible from abroad.

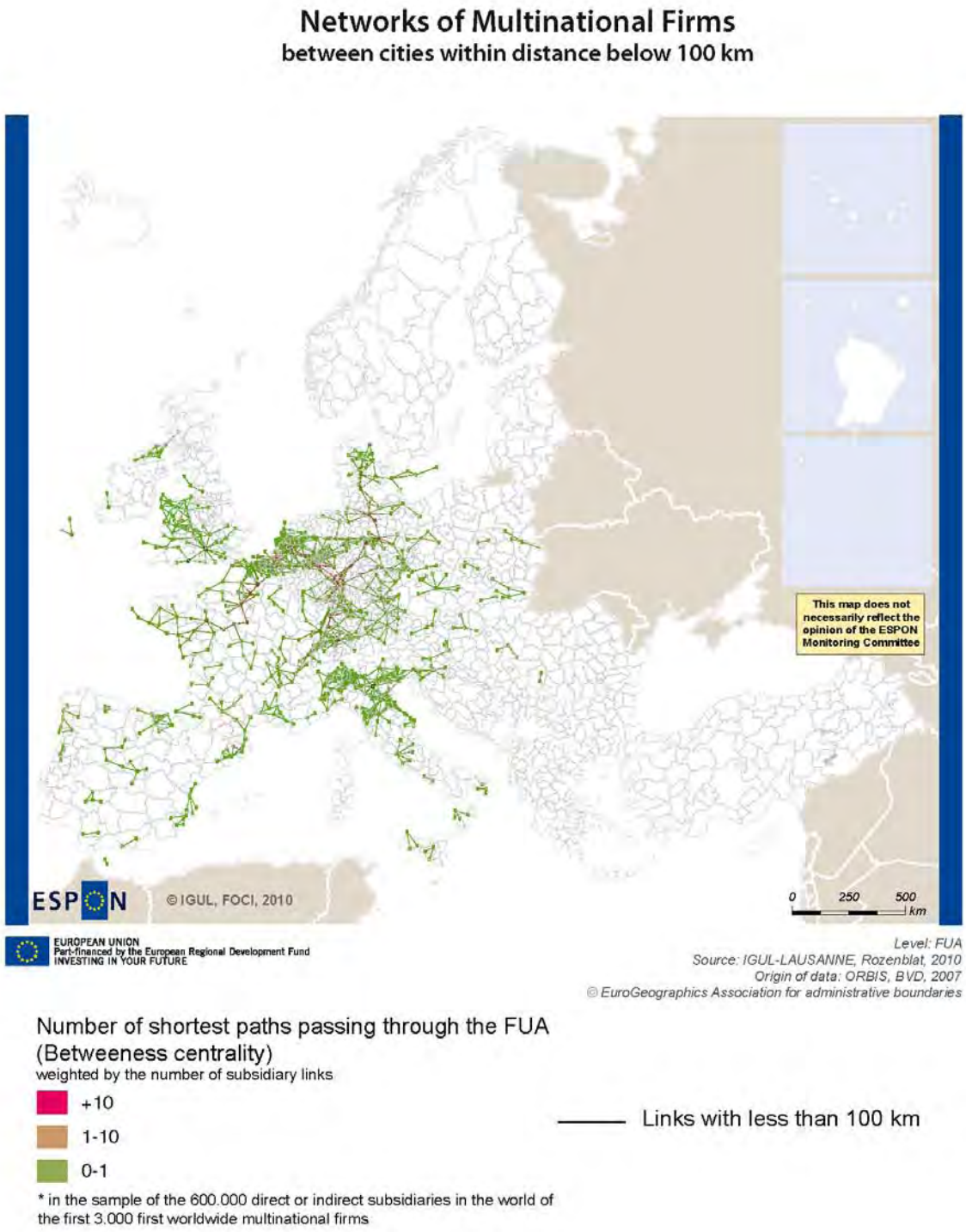


Figure 14. Networks of multinational firms networks between cities within distance below 100 km

Chapter 8 – Competitiveness of European cities: a synthesis of the firm and research network data

Contribution by Céline Rozenblat (IGUL), Marie-Noëlle Comin and Denise Pumain (Géographie-cités) August 2010

After a brief reminder of the literature commenting on the usefulness of network data for assessing the level of competitiveness, we propose a typology of European cities based on the data extracted from the CORDIS and ORBIS data bases (FOCI 2009, Chapter 3.1)

1. Relevance of network data for assessing the cities' competitiveness

The centrality of cities in the global economy constitutes an important component of urban competitiveness (Begg, 1989). Most of studies have measured the various centralities of cities according to their *accumulated stock* of population, wealth and portfolio of activities. For instance, global cities are defined as leaders in advanced producer services (Sassen, 1991; Taylor, 2001). But other measurements of urban centrality have been based on their *position in various networks*, mainly **multinational firms' subsidiary networks,** which are recognized as powerful actors in the globalization process. Multinational firms are supposed to confer power to cities not only through their locations but also through their *connectiveness* (Allen, 1999, 2008; Taylor, 2004, Rozenblat & Pumain, 1993, 2007; Alderson & Beckfield, 2004; Wall & van der Knaap, 2009). This power is enhanced by several urban accumulation processes improved by the location of multinational firms, such as activity support, employment growth, investment, and technological and social innovation spillovers. These processes are an essential component of urban adaptation to socio-economic changes through firms' external relations. Global centrality clearly denotes a positive local urban resource (for a comprehensive review, see Bathelt *et al*., 2004). Thus, these worldwide networks provide crucial resources for urban development.

Conversely, systems of cities form a set of resources for multinational firms (Neal, 2008). Cities allow multinational firms to connect and to take advantage of inter-firm and social networks, thanks to spatial proximity to other agents and to some organized sets of agents, while reducing transaction costs, fostering access to the networks, and increasing transactional mutual values (Williamson, 1975, 1985; Zajac & Olsen, 1993). These social and economic networks span at a variety of geographical scales.

Existing empirical measurements of urban centrality within global networks of firm subsidiaries are usually calculated on the basis of corporation network samples: sums of firms are made on both nodes (cities) and links (between one or more cities) (Pred, 1974, 1977; Cohen, 1981; Rozenblat & Pumain, 1993, 2007; Taylor, 2001; Derudder, 2006; Alderson & Beckfield, 2004). This methodology has been questioned, primarily because it does not take into account the multiplier effects like direct or indirect local interactions between firms whose support agglomeration economies and network economies within cities (Rozenblat 2010). These local intra-urban interactions increase the effective weight of inter-urban linkages, because they improve their efficiency: when one single relation incorporates a city composed of substantial interactions between

foreign or local actors, the benefit is multiplied in proportion to the ability to mobilize these local interactions. Local interactions between multinational firms consist in different levels of involvement in local networks: subcontracting, industrial or technological strategic alliances, access to markets, use of a skilled workforce and local know-how, use of services, institutions, infrastructures. However, being localized in a city allows a multinational firm to reach industrial or social networks that are not only local but also on different geographical and economic scales. Cities allow multinational firms to connect and to take advantage of inter-firm and social networks, thanks to spatial proximity to other agents and to some organized sets of agents, while reducing transaction costs, fostering access to the networks, and increasing transactional mutual values (Williamson, 1975; Powell, 1990; Zajac & Olsen, 1993). These social and economic networks span different geographical scales.

Research networks also are considered as revealing potential capacities of cities to invest in future technological and economical development. Within Europe, the PCRD research networks are of particular interest for detecting simultaneously the processes of territorial integration through research activities that are preparing the development of new products and services (Breschi and Cumano, 2003, Besussi, 2006, Rota, 2008). The relative position of cities in such networks reveals their ability to enter the next cycle of innovation through the established linkages between research centers and high tech start-ups, not only at local level (as implied in the concept of cluster) but within the whole global economic space. The position in research networks appears somehow as a pre-figuration of the position of cities in the early process of adoption of future innovation (Comin, 2009).

From our empirical observation about both the stocks of a variety of activities in cities (Paulus, 2004) and their position within corporation (Rozenblat, 2010) and research networks (Comin, 2009) we have developed *an evolutionary theory of urban systems* connecting three fundamental processes of change within systems of cities: the capture and diffusion of innovation waves throughout systems of cities, the related distribution of urban growth leading to persistent urban hierarchies and the relocation and substitution processes up and down the urban hierarchies leading to broad linkages between city sizes (or accumulated wealth and skill) and their economic specialization (Pumain et al., 2006 and 2009). Scaling laws of different exponent values reflect the consequences of qualitative and quantitative differences in the flows of investment (value chains) and information that are conveyed between cities of different sizes during the emergence, maturity and obsolescence of each large innovation cycle through the established or emerging networks of social interaction.

Predicting the future evolution of cities is a very difficult exercise for two major reasons. First, it is well known that complex systems have in their dynamics, including so many interactions and fluctuations, the potential to bifurcate, or to develop emerging structures, that hamper attempts to precisely predict the short term local evolutions as well as the long term changes in their global structure. It is thus hard to declare exactly which city will actually succeed in capturing such or such innovation in the next decades among all those that could pretend to that according to their potential in terms of stock of skills and connections to information networks. Second, the accumulated knowledge about the processes of socio-economic innovation allows rather good predictions about the hierarchical (defined according to accumulated skills and wealth) and spatial (center-periphery) positions of cities that could take advantage of the next leading activities but it is obvious that the precise content of the new products or services that will actually emerge is impossible to know in advance, thus the precise location of investments among

the potentially adaptable cities is impossible to determine. All what can be done while attempting at defining cities competitiveness is thus to establish lists of possible candidates to successful adoption of the next cycle of innovation.

In order to characterize the potential ability of a city to take advantage of the next innovation cycle we suggest thus to use *the best possible predictive method* acknowledging the above described dynamics. A first set of potentially successful cities is selected according to their hierarchical position within the networks conveying information and investment in the leading activities of the next decades. This provides a ranking of cities correlated to the probability that they actively participate to the innovation cycle. A second step is a qualitative assignment of cities in different types of leading activities. This provides a classification of types of cities that may benefit from the further development of some specific sector of the economy.

2. Composite positions of European cities in multinational firms and research networks

It seems important to identify what is the position of European cities on these networks in order to assess their potential ability to benefit from the high returns of the existing and next waves of technological and future innovation. We have selected five economic orientations that are supposed to drive the economic development in the next decades according to recent literature: FIRE activities (finance, insurance and real estate); High tech including converging technologies (NBIC); advanced business services; cultural industries; transportation and logistics (see annex 1). For each economic orientation, we measured the number of subsidiaries of these activities controlled from each city (excluding the local links of ownership). The position of European cities in the networks that will probably convey the economic impulses of the first half of 21th century is measured in two ways: quantitatively we describe the hierarchy of cities according to a composite index of their connections within the global economy of leading activities (section 2.1); qualitatively we identify the economic specialization of European cities within these networks through a cluster analysis of their relatives profiles: whatever the level of their participation, this method indicates which economic sector is at best responsible for the city's position (section 2.2).

2.1 The hierarchy of cities according to their participation in global and European networks

In a quantitative way, the total number of connections in a variety of networks is a first indicator of *cities general integration in global and European networks.* A ranking of European cities has been constructed from their indices of centrality in several networks. We have selected in this respect meaningful indicators from the CORDIS and ORBIS databases. Computed from CORDIS, we have considered two indices of centrality in the European system of cities that are the total degree of each city (i.e. the total number of links between the city and other cities sharing the same research networks) and its betweenness centrality (i.e. topological index of intermediation) in all NBIC research networks. From ORBIS, we considered the total degree of cities in the networks of the multinational firms they own (thus according to the location of headquarters) for each of the five economic sectors mentioned above.

All indicators are positively correlated and can be summarized by the first factor of a principal component analysis made on these seven indices. We have represented the global position of European cities in economic and research networks according to their coordinates on this first factor of the PCA, ranking them in five classes that exhibit a visible hierarchical pattern (figure 1). The global cities Paris and London have the highest ranks, far ahead from six other European cities well integrated in global networks of leading activities: Madrid, Stockholm, Amsterdam, Zurich, Helsinki, Dublin; 16 other cities ranking from 9th to 24th rank still have noticeable international participation (table 1). Most of cities, 200 out of 271, have only a modest participation in these research and economic networks.

Figure 1

Hierarchy of FUAs according to their participation in global and European networks

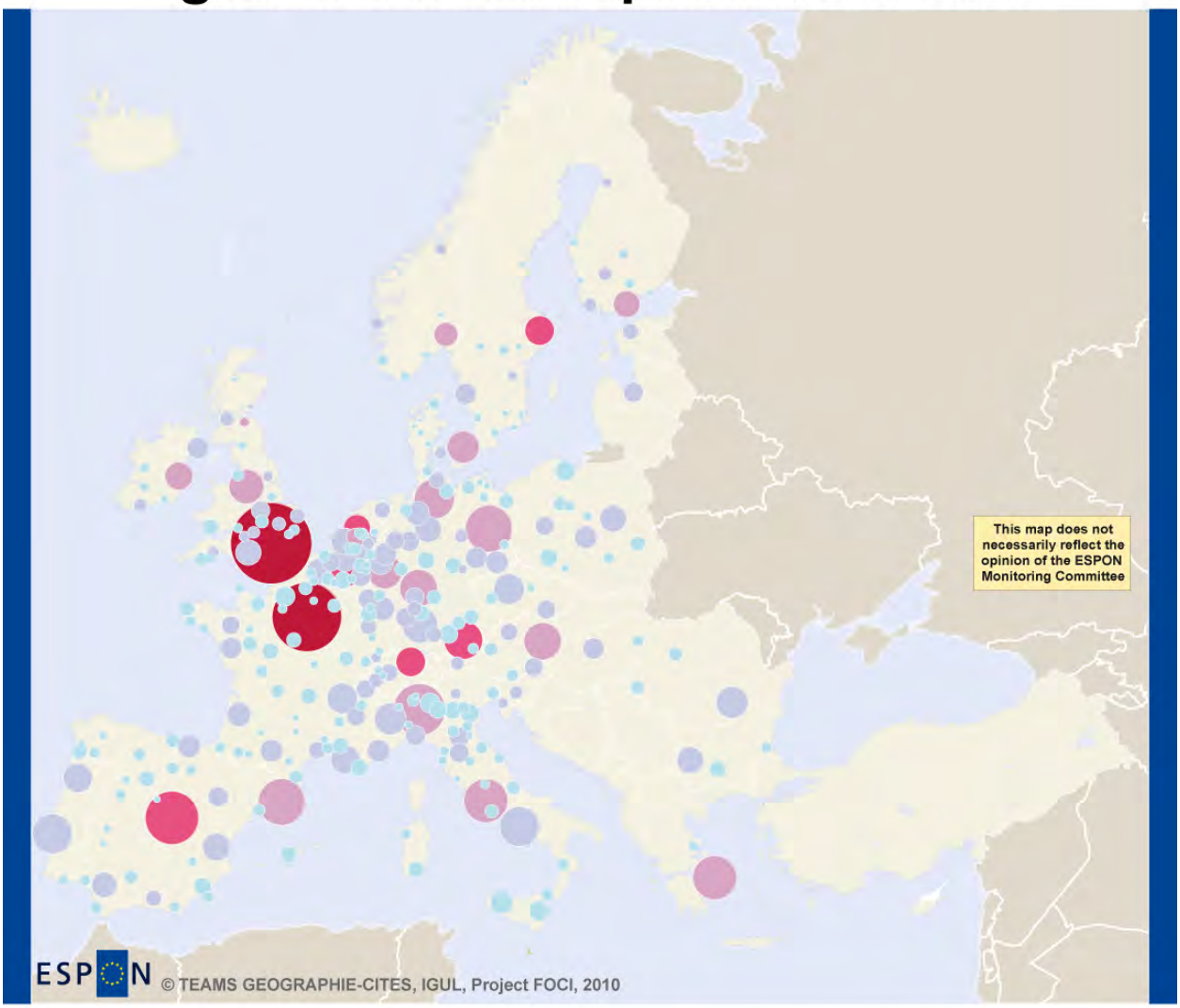


Figure 1. Hierachy of FUAs according to their participation in global and European networks

Rank 1 & 2	PARIS, LONDON
Rank 3 to 8	MADRID, STOCKHOLM, BRUXELLES/BRUSSEL, MUNCHEN, AMSTERDAM, ZURICH
Rank 9 to 24	FRANKFURT AM MAIN, MILANO - BUSTO ARSIZIO – COMO, KOBENHAVN, HELSINKI, DUBLIN, ROMA, WIEN, KOLN, EDINBURGH, OSLO, BARCELONA, UTRECHT, ATHINAI, MANCHESTER METROPOLITAN AREA, HAMBURG, BERLIN

Table 1. Cities with highest participation in networks of leading activities

As already mentioned, the accessibility of cities within the networks of economic activities as well as research networks is on the whole highly correlated with the local accumulation of population, wealth and skill. It is thus not surprising that the observed ranking closely reflects the order expressing the strength of cities on a majority of economic indicators. To illustrate this correlation (that actually is an expression of the path dependence in the dynamics of the system of cities) we have plotted the coordinate of cities on the first factor of the PCA against the population of the FUAs (figure 2). The graph exhibits a clearly positive trend showing the dependence between the total participation of cities to the recent and future cycles of economic development and their total size. But a few cities are clearly above the line, illustrating their higher participation in leading economic sectors. At first Paris and London that are both hierarchically dominant and specialized in leading activities. But also state capitals or major cities as Madrid, Stockholm, Amsterdam, Oslo and Frankfurt are clearly ahead of the other European cities in this diffusion process, as well as technopoles and university cities like Utrecht, Heidelberg or Cambridge. The exocentric position of Edinburgh in this direction although significant, could be explained by an underestimation of the population of its FUA, the reverse being true in the case of Hanover, which under representation in leading activities is probably an artifact due to an overestimation of its population. But below the line the position of capitals of the periphery like Sofia or cities heavily engaged in former cycles of urban development as Marseille, Lille or Genova is not surprising.

Figure 2

FUAs according to their participation in global and European networks and their population

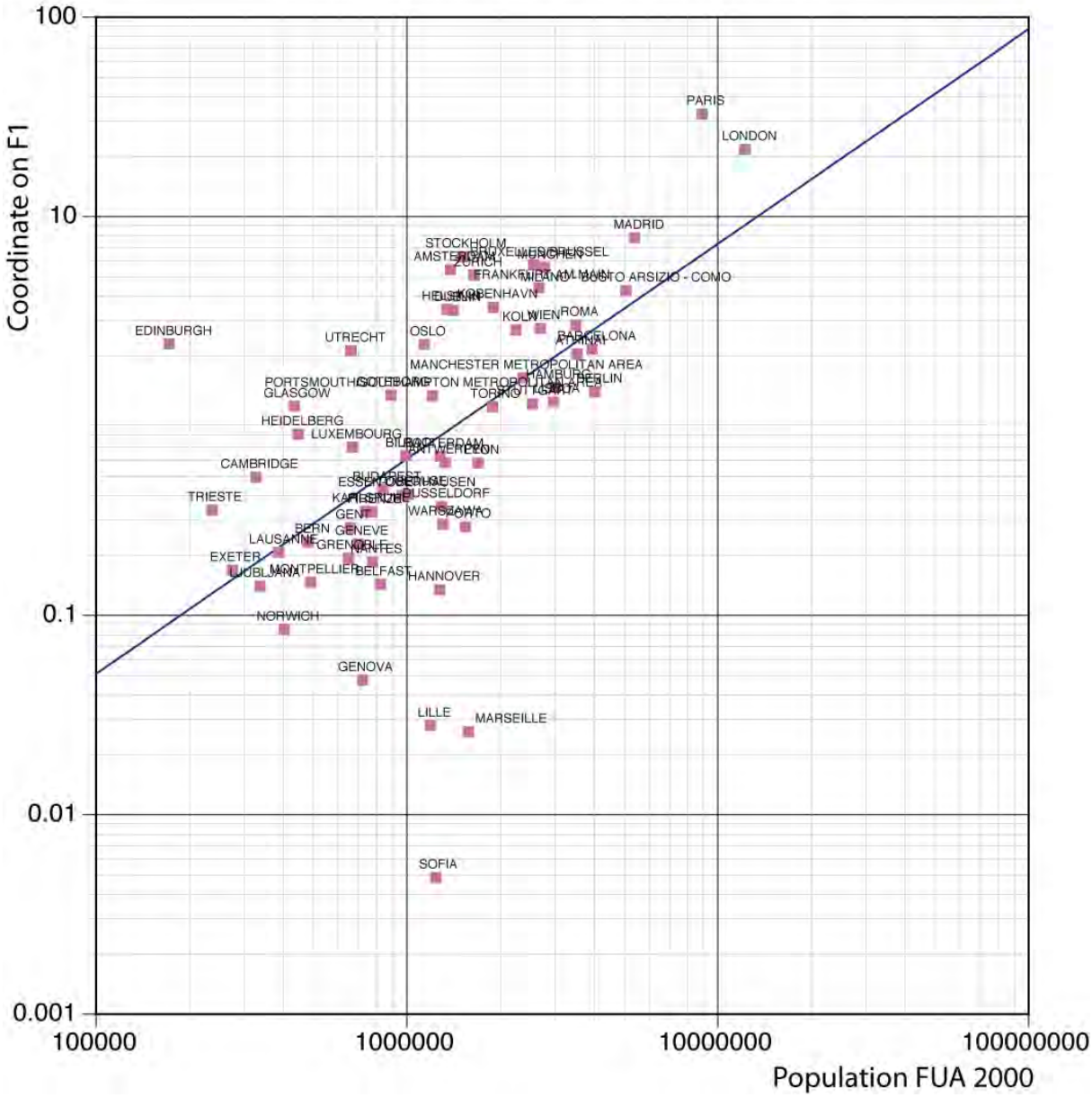


Figure 2. FUAs according to teir participation in global and European networks and their population

2.2 The leading sectors that specialize the participation of cities to European and global networks

It is important to know which sectors of activity are responsible for the external spillovers and network economies that qualitatively differentiate the cities participating to global economic networks and European research networks. A typology of European cities according to the *qualitative profile of their integration* into the five types of networks corresponding to each leading sector of economic activities (FIRE activities (finance, insurance and real estate); High tech including converging technologies; advanced business services; cultural industries; transportation and logistics) is thus providing a useful complementary information to their general ranking listed above.

We have made a cluster analysis on the five indicators extracted from the ORBIS data base (Number of subsidiaries owned in other cities of the world (including Europe) by the number of subsidiaries owned from a city in one of the five leading activity divided by its total number of linkages in all sectors of activity) and on the indicator of specialization in NBIC extracted from the CORDIS data base, that measures the relative weight of these activities compared to the total number of connections in research networks. The results are very clear, separating five classes of cities according to the sector that explains at best their participation in global networks of leading activities (table 2 and figure 3).

Class	Cities
Advanced Business Services	TOURS, TARTU, REGENSBURG, SZCZECIN, OULU, LIMERICK, NANCY, MAGDEBURG, LODZ, ALBACETE, BELFORT, BURGOS, CADIZ, COLCHESTER, EVREUX, FLENSBURG, GJOVIK, GUADALAJARA, HOLSTEBRO, INGOLSTADT, KALMAR, KARLSTAD, LIEGE, LOGRONO, MERIDA, MONTBELIARD, MOSS, NIMES, ROSENHEIM, SEGOVIA, STRALSUND, TARBES, TARRAGONA, VARESE, VENLO, ZAMORA, PALMA DE MALLORCA, SEVILLA, OLDENBURG, PORTSMOUTH/SOUTHAMPTON METROPOLITAN AREA, VIGO, GALWAY, WROCLAW, NAMUR, NICE, BIELEFELD, ZARAGOZA, NANTES, HANNOVER, CORK, LAUSANNE, AUGSBURG, LIMOGES, AGEN, ALESUND, AURILLAC, BAYONNE, BESANCON, ESKILSTUNA, FRIBOURG, HALMSTAD, HASSELT-GENK, HEILBRONN, KASSEL, MAUBEUGE, NEVERS, OXFORD, PERPIGNAN, SKIEN, SKIVE, THIONVILLE, TORBAY, TROMSO, WURZBURG, ESSEN-OBERHAUSEN, PADOVA, VALENCIA, DUSSELDORF, LILLE, KARLSRUHE, KOLN, ROUEN - ELBOEUF, MARSEILLE, BERLIN, BARCELONA, STUTTGART, ODENSE, LISBOA, STAVANGER, BORDEAUX, GLASGOW, CHAMBERY, BERN, GOTEBORG, MADRID, SALZBURG, ROMA, TOULOUSE, KOBENHAVN, DRESDEN, PLYMOUTH, MUNSTER, LINZ, GENEVE, JYVASKYLA, BERGEN, BLACKPOOL, MANCHESTER METROPOLITAN AREA, LYON, GRENOBLE, BREMEN, ORLEANS, SUNDSVALL, TRIER, AALBORG, BIELLA, SAARBRUCKEN, CAMBRIDGE, HERNING
FIRE	KRISTIANSAND, LINCOLN, TRENTO, INNSBRUCK, VALLADOLID, TALLINN, TRONDHEIM, NIJMEGEN, LJUBLJANA, BREDA, METZ, VERONA, AREZZO, AVIGNON, COMPIEGNE, DEVENTER, EPINAL, IPSWICH, KOTKA, MAASTRICHT, RODEZ, SWINDON, VALENCIENNES, WARSZAWA, GENOVA, PRAHA, ANTWERPEN, BERGAMO, DUBLIN, LEIPZIG, HAMBURG, LONDON, MONTPELLIER, TORINO, CAEN, PARIS, PORTO, LUGANO, STOCKHOLM, NAPOLI - CASTELLAMARE DI STABIA - TORRE ANNUNZIATA, WIEN, LEICESTER, GENT, GRAZ, BUDAPEST, OSLO, COSENZA, PALERMO,

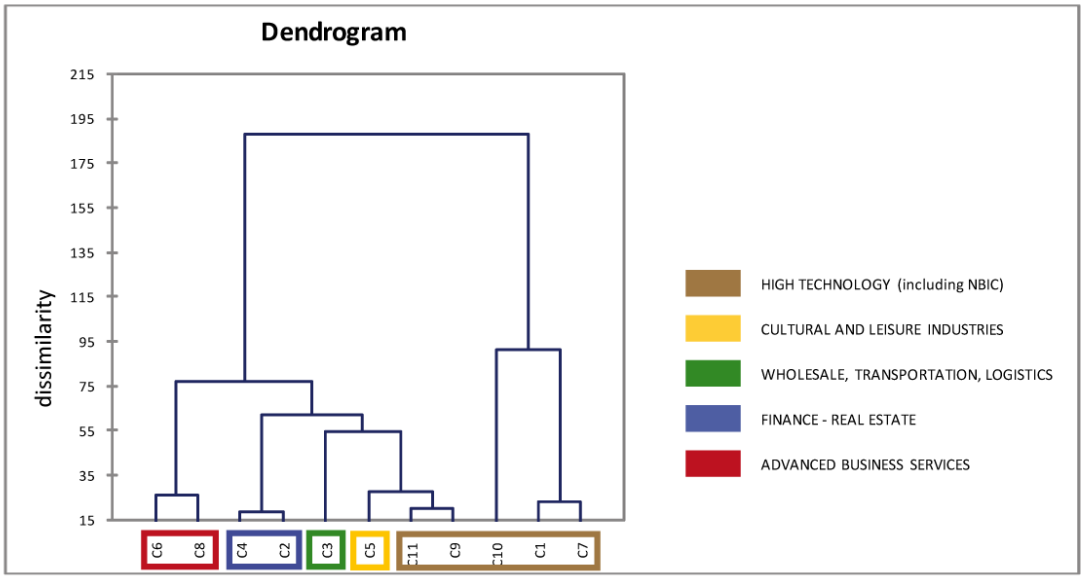
	CATANIA, CAGLIARI, CLUJ-NAPOCA, GDANSK, BRESCIA, ERFURT, TILBURG, ANCONA, TRIESTE, GRONINGEN, RIGA, SOFIA, BYDGOSZCZ, BRUGGE, LUBLIN, PESCARA, AMIENS, CACERES, GELEEN, HUELVA, INVERNESS, JENA, KLAGENFURT, LUCCA, LUGO, NEUCHATEL, NORWICH, TERNI, UDINE, VAASA, FIRENZE, EINDHOVEN, EDINBURGH, FRANKFURT AM MAIN, UTRECHT, BILBAO, AMERSFOORT, MUNCHEN, ZURICH, ROTTERDAM, AMSTERDAM, BRUXELLES/BRUSSEL, LUXEMBOURG, MILANO - BUSTO ARSIZIO - COMO, ATHINAI, BOLOGNA, VILNIUS
Wholesale, Transport & logistics	OPOLE, DIJON, POITIERS, MURCIA, POZNAN, BRNO, TORUN, TIMISOARA, REIMS, ANGERS, BREST, CARCASSONNE, CARLISLE, GREIFSWALD, LAVAL, LEON, MESSINA, NEUBRANDENBURG, ORENSE, PONTEVEDRA, QUIMPER, VALENCE, VEJLE, VICENZA, BUCURESTI, NORTHAMPTON
Culture and leisure industries	EXETER, CLERMONT-FERRAND, MODENA, SANTANDER, ARNHEM, BELFAST, FARO, KIEL, TURKU, TOULON, BETHUNE, CORDOBA, KARLSKRONA, LORIENT, PERTH, ULM, ALES
High tech	BURGAS, KIELCE, CARTAGENA, GROSSETO, LATINA, DEBRECEN, ALESSANDRIA, ALMERIA, ARRAS, CHERBOURG, COTTBUS, FERRARA, ROSTOCK, SASSARI, TAMPERE, BRATISLAVA, PARDUBICE, PLOCK, CHARLEROI, PLZEN, DUNDEE, KRISTIANSTAD, LAHTI, LUGO, PORI, LUBECK, HELSINKI, PLOVDIV, WATERFORD, VOLOS, LIVORNO, RIMINI, SALAMANCA, SWANSEA, YORK, SIEGEN, GLOUCESTER, OREBRO, PAU, DARMSTADT, GRANADA, LINKOPING, RENNES, HILVERSUM, VAXJO, HEIDELBERG

Table 2. Leading sectors specialising the participation of European cities in global networks

A first class of 119 cities (figure 4 a) groups the cities that are preferentially engaged in advanced business services. Many of them are deeply involved in manufacturing activities, as automobile (Würtzburg, Montbéliard, Göteborg, Stuttgart) or aeronautic industries (Toulouse) or even industries belonging to older cycles as textile (Lodz) or steel and metallic industries (Liège, Vigo), among those a significant number of cities already have diversified their economic base. In this group are also cities that developed technopolitan activities, as Oxford, or administrative and political capitals, as Rome or Bern. It is significant that these cities do not have exactly the same pattern of profile according to their connections in networks of leading activities as the other, since the class is relatively isolated in the classification tree (figure 3).

Figure 3

Classification of FUAs according to their type of participation in global and European networks



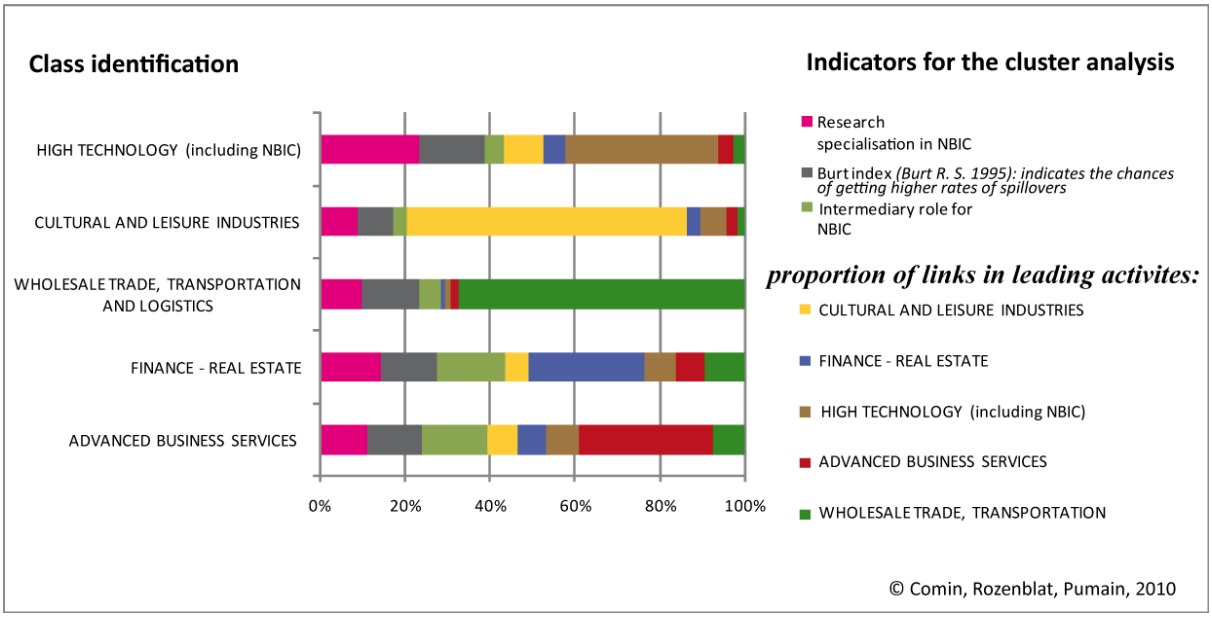


Figure 3. Classification of FUAs according to their type of participation in global and European networks

A second class of 95 cities (figure 4 b) is specialized in the FIRE activities (financial sector). It is highly significant to find in this group not only the major European financial centers (Paris, London, Frankfurt, Zurich, Luxemburg, Brussels, Amsterdam, Wien) and

other western state capitals and major economic poles (Milano, München, Stockholm, Oslo, Dublin, Utrecht, Rotterdam, Athinai, Bologna) but as well almost all the state capitals of former Eastern European countries recently integrated in EU (Budapest, Ljubljana, Praha, Tallin, Sofia, Vilnius, Warszawa). It is likely that in this last case the "specialization" in financial services is only relative and expressing both the progressing integration of these countries in the global networks through this type of activities and their position of followers or even lack of specialization in the other types of leading economic activities. This interpretation may as well explain the appearance in this group of cities of less economic importance that are scattered mostly throughout Western and a few in Eastern Europe.

A third class of cities (figure 4 c) is characterized by their connections to the activities of transportation and logistics. Besides one state capital (Bucuresti) and major urban centers in strategic position like Poznan or Brno or close to specialized agriculture like Murcia or Reims most of them are rather small specialized nodes in this type of networks (Northampton, Pontevedra, Opole, Timisoara).

There are not so many European centers that are specialized in the connections created by the cultural and leisure industries (figure 4 d). Actually the main connections linking cultural activities are concentrated in major centers whose specialization is marked in other sectors like FIRE or advanced business services or even high tech, so that only rather small towns appear with this specialization that may be due to their hosting of one or two companies only.

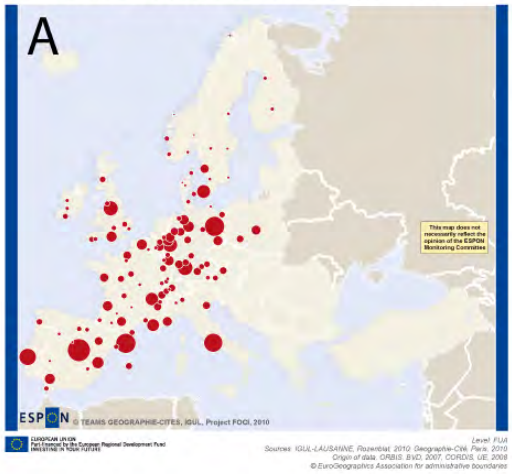
A fifth class of 46 cities (figure 4 e) represents the specialization in activities of high technology, including the so-called "converging technologies" (Nano technologies, biotechnologies, technologies of information and cognition). For the same reason as before, most of these are small centers that have not so many but a few specialized connections in the global economy. But for a few cities also indicating a significant participation in FIRE activities, as Helsinki, Bratislava, Lübeck, Sassari, Tampere, Rostock, this specialization may help in improving their future participation in this expanding sector of activities.

In order to give an overview of the position of the European cities that will more likely take a significant part in the global networks of leading activities during the next decades, we provide in table 3 a representation crossing their hierarchical ranking and their qualitative specialization. This represents a comprehensive approach of their competitiveness for the next decades and the best possible prediction about their future trajectory. Indeed, it is obvious that the uncertainty of the prediction is growing when cities have a lower position in the hierarchy and a narrower specialization.

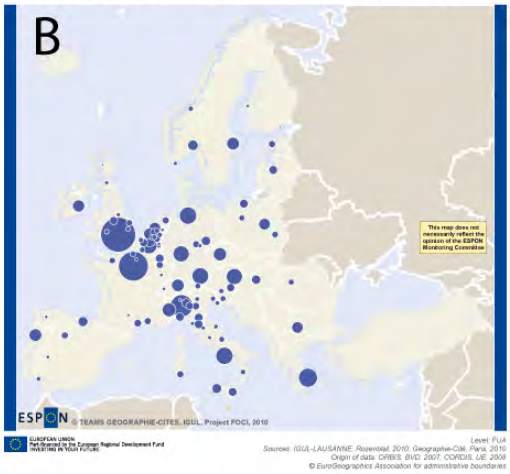
Figure 4

Classification of FUAs according to their type of participation in global and European networks

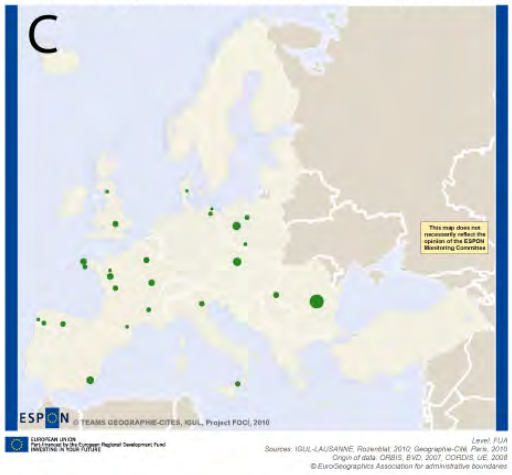
ADVANCED BUSINESS SERVICES



FINANCE - REAL ESTATE (FIRE)



WHOLESALE, TRANSPORTATION, LOGISTICS



CULTURAL AND LEISURE INDUSTRIES

HIGH TECHNOLOGY (INCLUDING NBIC)

Population of FUA:

12 500 000

20 000

© Comin, Rozenblat, Pumain, 2010

Figure 4. Classification of FUAs according to their type of participation in global and European networks

Rank/ type	Advanced Business Services	FIRE	Wholesale, Transport & logistics	Culture and leisure industries	High tech
1-2		LONDON, PARIS			
3-8	MADRID	AMSTERDAM, BRUXELLES/BRUSSEL, MUNCHEN, STOCKHOLM, ZURICH			
9-24	BARCELONA, KOBENHAVN, MANCHESTER METROPOLITAN AREA, KOLN, BERLIN, ROMA	ATHINAI, DUBLIN, OSLO, AMBURG, EDINBURGH, FRANKFURT AM MAIN, WIEN, MILANO - BUSTO ARSIZIO - COMO, UTRECHT			HELSINKI
25-62	LYON, KARLSRUHE, BERN, GOTEBORG, HANNOVER, GRENOBLE, ESSEN-OBERHAUSEN, NANTES, GENEVE, DUSSELDORF, MARSEILLE, PORTSMOUTH/SOUTHAMPTON METROPOLITAN AREA, LAUSANNE, TOULOUSE, CAMBRIDGE, LISBOA, STUTTGART, GLASGOW, LILLE	ANTWERPEN, GENOVA, BILBAO, ROTTERDAM, MONTPELLIER, SOFIA, PORTO, LUXEMBOURG, FIRENZE, NORWICH, TRIESTE, WARSZAWA, TORINO, LJUBLJANA, BUDAPEST, GENT		BELFAST, EXETER	HEIDELBERG

63-303	LODZ, NANCY, COLCHESTER, EVREUX, NEVERS, FRIBOURG, NICE, BAYONNE, NIMES, BELFORT, ODENSE, ALBACETE, OLDENBURG, HALMSTAD, ORLEANS, HASSELT-GENK, OULU, HERNING, OXFORD, INGOLSTADT, PADOVA, KALMAR, PALMA DE MALLORCA, KARLSTAD, PERPIGNAN, BIELEFELD, PLYMOUTH, BLACKPOOL, CORK, BORDEAUX, REGENSBURG, LIMOGES, DRESDEN, BREMEN, ROSENHEIM, LOGRONO, ROUEN - ELBOEUF, CADIZ, SAARBRUCKEN, AUGSBURG, SALZBURG, MAUBEUGE, SEGOVIA, MONTBELIARD, SEVILLA, MUNSTER, SKIEN, AGEN, SKIVE, GALWAY, STAVANGER, BERGEN, STRALSUND, ALESUND, AURILLAC, HOLSTEBRO, SUNDSVALL, BESANCON, SZCZECIN, BIELLA, TARBES, LIMERICK, TARRAGONA, AALBORG, TARTU, MAGDEBURG, THIONVILLE, MERIDA, TORBAY, NAMUR, ESKILSTUNA, GJOVIK, TOURS, HEILBRONN, TRIER, KASSEL, TROMSO, LINZ, VALENCIA, CHAMBERY, VARESE, FLENSBURG, VENLO, JYVASKYLA, VIGO,	LEICESTER, NEUCHATEL, NIJMEGEN, BREDA, CATANIA, GRAZ, CLUJ-NAPOCA, BRUGGE, PALERMO, INNSBRUCK, COMPIEGNE, IPSWICH, PESCARA, KLAGENFURT, COSENZA, KRISTIANSAND, PRAHA, LEIPZIG, RIGA, AREZZO, RODEZ, LUBLIN, DEVENTER, LUGANO, AVIGNON, BYDGOSZCZ, BERGAMO, METZ, SWINDON, CAEN, TALLINN, NAPOLI - CASTELLAMARE DI STABIA - TORRE ANNUNZIATA, TERNI, BRESCIA, TILBURG, HUELVA, EINDHOVEN, JENA, TRENTO, AMERSFOORT, EPINAL, ANCONA, TRONDHEIM, LUGO, UDINE, CACERES, ERFURT, GELEEN, VAASA, INVERNESS, VALENCIENNES, LINCOLN, VALLADOLID, MAASTRICHT, VERONA, GRONINGEN, VILNIUS, LUCCA, AMIENS, KOTKA, BOLOGNA, CAGLIARI,	ANGERS, BREST, BRNO, BUCURESTI, CARCASSONNE, CARLISLE, DIJON, GREIFSWALD, LAVAL, LEON, MESSINA, MURCIA, NEUBRANDENBURG, NORTHAMPTON, OPOLE, ORENSE, POITIERS, PONTEVEDRA, POZNAN, QUIMPER, REIMS, TIMISOARA, TORUN, VALENCE, VEJLE, VICENZA	ALES, ARNHEM, BETHUNE, CLERMONT-FERRAND, CORDOBA, FARO, KARLSKRONA, KIEL, LORIENT, MODENA, PERTH, SANTANDER, TOULON, TURKU, ULM	ALESSANDRIA, ALMERIA, ARRAS, BRATISLAVA, BURGAS, CARTAGENA, CHARLEROI, CHERBOURG, COTTBUS, DARMSTADT, DEBRECEN, DUNDEE, FERRARA, GLOUCESTER, GRANADA, GROSSETO, HILVERSUM, KIELCE, KRISTIANSTAD, LAHTI, LATINA, LINKOPING, LIVORNO, LUBECK, LUGO, OREBRO, PARDUBICE, PAU, PLOCK, PLOVDIV, PLZEN, PORI, RENNES, RIMINI, ROSTOCK, SALAMANCA, SASSARI, SIEGEN, SWANSEA, TAMPERE, VAXJO, VOLOS, WATERFORD, YORK

	BURGOS, WROCLAW, GUADALAJARA, WURZBURG, MOSS, ZAMORA, LIEGE, ZARAGOZA	GDANSK			

Table 3. Level and type of connectiveness of European cities in networks of leading activities

3. Conclusion

Competitiveness is an interesting concept because of its predictive power in terms of the future trajectory of firms or territories. It is however very difficult to assess in comparative terms, either for firms of different economic sectors, or for territories or cities of different size and development level. One possible way is to use the relative position of cities in the global networks that convey the exchanges of information and investment in leading economic activities as revealing their potential for a future development. We have applied this methodology using the empirical information about multinational firms and research networks provided by a European (CORDIS) and global (ORBIS) databases. We provide a ranking of European cities according to the degree of their participation to the networks of leading activities and a typology of their specialization within these global networks. Combining these two types of information could be the best possible prediction about the potential abilities of European cities to capture the best of socio-economic innovation during the next decades.

References

Alderson A.S. Beckfield J. (2004). Power and position in the World City System. *American Journal of sociology*, 109, 4, 811-851

Allen J. (1999). Cities of power and influence : settled formations. In Allen J., Massey D., Pryke M.. *Unsettling cities*, Routledge. Chap.5. 182-227

Allen J. (2008). Powerful City Networks: More than Connections, Less than Domination and Control. GaWC working paper

Bathelt, H. (2007). Buzz-and-pipeline dynamics : towards a knowledge-based multiplier model of clusters. Geograpy compass 1/6. 1282-1298

Bathelt, H., Malmberg, A., Maskell P. (2004). Clusters and knowledge : Local buzz, global pipelines and the process of knowledge creation. In: Progress in Human Geography. Vol. 28, No. 1, pp. 31-56.

Begg I. (1999). Cities and competitiveness, *Urban Studies*, 36, 5-6, 795-809

Belussi, F. and Pilotti, L. (2002): Knowledgecreation, learning and innovation in Italian industrial districts. *Geografiska Annaler* 84B,125–39

Berry B.J.L. (1964). «Cities as systems within systems of cities». in Friedmann J., Alonso W. (éds.), *Regional development and planning*, MIT Press (also in *Paper of Regional Science Association*, 1964, 13).

Besussi E. (2006). Mapping European Research Networks, CASA, working papers series, Paper 103.

Breschi S. Cusmano L. (2003). "Unveiling the texture of a European Research Area: Emergence of oligarchic networks under EU Framework Programmes, CESPRI Working Papers number 130, 35 p

Burt, R. S. (1992), Structural Holes, Cambridge, MA: Harvard University Press.

Burt R. S. Structural Holes : The Social Structure of Competition ; Cambridge, Mass.: Harvard University Press, 1995.

Burt R. S. (2005). *Brokerage and closure. An introduction to social capital*. Oxford Un. Press. 279 p.

Camagni R. (1996). *Economie urbaine*. Paris, Economica

Camagni, R. (1999). « The city as a milieu : applying GREMI's approach to urban evolution ». *Revue d'Économie Régionale et Urbaine (RERU)*, 3, 591-606

Capello R. (2000). The city Network paradigm : Measuring Urban Network Externalities, Urban Studies, Vol.37, n°11, 1925-1945

Capello R. (2009). Indivisibilities, synergy and proximity : the need for an integrated approach to agglomeration economies, Tijdschrift voor Economische en Sociale Geografie – 2009, Vol. 100, No. 2, pp. 145–159.

Castells M. (1996). *The rise of the Network Society*, Oxford. Blackwell.

Cohen R.B. (1981). «The new international division of labor, multinational corporations and urban hierarchy», in

Derudder B. (2006). On conceptual confusion in empirical analyses of a transnational urban network, Urban Studies, 43(11), 2027-2046

Comin M.-N. (2009). *Réseaux de villes et réseaux d'innovation en Europe : structuration du système des villes européennes par les réseaux de recherche sur les technologies convergentes.* Université Paris I, thèse de doctorat.

Doz Y., Santos J., Williamson P. (2001) From global to metanational : how companies win in the knowledge economy, USA, Boston, Harvard Business School Press.

FOCI (2009), Future Orientation of Cities, ESPON, Interim report

http://www.espon.eu/main/Menu_Projects/Menu_AppliedResearch/foci.html

Friedmann J. (1986). «The World City Hypothesis». *Development and change*, vol.17, 1, pp.69-84, re-printed in Knox P., Taylor P.J. (eds.), 1995, *World Cities in a world system*, Cambridge University Press, 317-331.

Gereffi G. (1996). Global Commodity Chains: New Forms of Coordination and Control Among Nations and Firms in International Industries. Competition and Change, Vol. 1, 4, pp. 427-439

Gereffi G. Humphrey J. Sturgeon T. J. (2005). The Governance of Global Value Chains. Review of International Political Economy, Vol. 12, 1, 78-104

Krugman P. (1993). « First nature, second nature and metropolitan location ». *Journal of regional science*, vol.33, 2.

Maskell, P. (2001). Towards a knowledge-based theory of the geographical cluster. *Industrial and Corporate Change* 10, 921–94

Maskell, P. and Malmberg, A. (1999). The competitiveness of firms and regions: 'ubiquitification' and the importance of localized learning. *European Urban and Regional Studies*, 6, 9–25.

Neal Z.P (2008). The duality of world cities and firms: comparing networks, hierarchies, and inequalities in the global economy, *Global Networks* 8, 1 (2008) 94–115.

Paulus F. (2004). *Coévolution dans les systèmes de villes : croissance et spécialisation des aires urbaines françaises de 1950 à 2000*. Université Paris I, thèse de doctorat.

Porter M., (1996). Competitive advantage, agglomeration economies and regional policy, *International Regional Science Review*, 19, 85-90

Porter, M. (1998). Clusters and the new economic of competition, Harvard BusinessReview. (Nov/Dec), pp. 77–90.

Pred A. (1973). « Systems of cities and information flows». *Lund Studies in Geography*, Serie B, 38.

Pred A., (1977*). City-systems in advanced economies*, Hutchinson University Library, London, 256 p.

Pumain D., Paulus F., Vacchiani-Marcuzzo C., (2009), Innovation Cycles and Urban Dynamics, in : D.Lane, D. Pumain, S. Van der Leeuw, G. West (eds.), *Complexity perspectives on innovation and social change*, ISCOM, Springer, Methodos Series, Berlin, 237-260.

Pumain D. Paulus F. Vacchiani C. Lobo J., (2006). An evolutionary theory for interpreting urban scaling laws, *Cybergeo*, 343, 20 p.

Rota F.S. (2008). Cities as nodes of research networks in Europe. In N. Cattan (ed.), Cities and Networks in Europe. A Critical Approach of Polycentrism, John Libbey Eurotext, Montrouge, France, and Esher, United Kingdom, p.125-138.

Rozenblat C. (2010)." Measuring urban centrality in corporate networks from multinational firm linkages within and between cities". *Urban Studies*, November issue.

Rozenblat C., Cicille P. (2003). *Les villes européennes : analyse comparative / Die Städte Europas. Ein vergleichende Analyse.* DATAR – La Documentation française, 94 p 2003/ Bündesamt für Bauwesen und Raumordnung. Forschungen Heft 115. Bonn, 79 p, 2004.

Rozenblat C., Pumain D. (1993). « The location of multinational firms in the European urban system ».*Urban Studies*, 10, 1691-1709

Rozenblat, Pumain. (2007). « Firm linkages, innovation and the evolution of urban systems ». in P.J. Taylor et al (ed.) *Cities in Globalization. Practices, policies and theories*. Routledge. 130-156

Rutherford J. (2005). Network in Cities, Cities in Networks : territory and globalization intertwined in Telecommunications Infrastructure Development in Europe. Urban Studies, Vol.42, 13, 2389-2406

Sassen (1991). *The Global City : New York, London, Tokyo.* Princeton University Press.

Scott A. (ed.) (2001). *Global City Regions, Trends, Theory, policy*, Oxford University Press, 467 p.

Taylor P.J. (2001). « Specification of the World City Network ». *Geographical analysis*, 33 (2), 181-194.

Uzzi Br. (1997). Social Structure and Competition in Interfirm Networks: The Paradox of Embeddedness. *Administrative Science Quarterly* 42:35-67.

Veltz P. (1996). *Mondialisation, villes et territoires : l'économie d'archipel*, Presses Universitaires de France, Coll. Economie en Liberté, 262 p.

Wall R.S., van der Knaap G.A. (2009). Centrality and Structure within Contemporary Worldwide Corporate networks, GAWC, Research bulletin 295, 16 p.

Zajac E.J. Olsen C.P. (1993). From Transaction cost to transaction value analysis : implications for the study of interorganizational strategies, Journal of Management Studies 30 :1, 131-146

Annex 1 Nomenclature of leading activities

CODE	NACE REV2	DEFINITION
HITECH		**HIGH TECHNOLOGY (including NBIC)**
	20	Manufacture of chemicals and chemical products
	21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
	22	Manufacture of rubber and plastic products
	23	Manufacture of other non-metallic mineral products
	26	Manufacture of computer, electronic and optical products
	61	Telecommunications
	72	Scientific research and development
FIRE		**FINANCE - REAL ESTATE**
	K	**FINANCIAL AND INSURANCE ACTIVITIES**
	64	Financial service activities, except insurance and pension funding
	65	Insurance, reinsurance and pension funding, except compulsory social security
	66	Activities auxiliary to financial services and insurance activities
	L	**REAL ESTATE ACTIVITIES**
	68	Real estate activities
SERVE		**ADVANCED BUSINESS SERVICES**
	62	Computer programming, consultancy and related activities
	63	Information service activities
	M	**PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES**
	69	Legal and accounting activities
	70	Activities of head offices; management consultancy activities

71	Architectural and engineering activities; technical testing and analysis
73	Advertising and market research
74	Other professional, scientific and technical activities

CULTI	**CULTURAL AND LEISURE INDUSTRIES**
58	Publishing activities
59	Motion picture, video and television programme production, sound recording activities
60	Programming and broadcasting activities
90	Creative, arts and entertainment activities
91	Libraries, archives, museums and other cultural activities
92	Gambling and betting activities
93	Sports activities and amusement and recreation activities

TRALO	**WHOLESALE TRADE, TRANSPORTATION AND LOGISTIC**
46	Wholesale trade, except of motor vehicles and motorcycles
49	Land transport and transport via pipelines
50	Water transport
51	Air transport
52	Warehousing and support activities for transportation
53	Postal and courier activities

Existing classes Transformed classes Built classes

Chapter 9 – Metropolitan macroregions in Europe: from economic landscapes to metropolitan networks (Cities and their Hinterlands)

EUROREG | CENTRE FOR EUROPEAN REGIONAL AND LOCAL STUDIES UNIVERSITY OF WARSAW

Warsaw, March 2010

Introduction

In contemporary economy, the role of knowledge and information is constantly growing. The competitiveness of enterprises and territorial systems depends on creation of new knowledge, access to information and information processing – in other words – on broadly understood innovation. The question of competitiveness should be viewed in the global context because openness to information and capital flows and internationalisation of labour markets, epitomised by transnational corporations and their operation, is becoming a characteristic feature of contemporary economy (Cf. Gorzelak, Jałowiecki 2000).

The development of global information economy is accompanied by a dynamic growth of huge cities with international functions – the metropolises. Metropolises are becoming the key nodes of global economy, bringing together both management and control functions (Sassen 1991, Lo, Yeing 1998, Castells 1998, Taylor 2007). A multi-nodal, global system of cities is in the making, marked by robust internal ties. It is made of cities which have been able to create a desirable environment for innovation - due to a combination of economic, technological, institutional and social factors – to foster the development of the information sector. It should be noted that the information sector not only comprises higher-order services (Taylor 2007), but also knowledge-intensive industries (Kratke 2007).

The concentration of functions related to the generation and processing of information, handling capital flows and ensuring attractive location criteria for the headquarters of huge transnational corporations in selected metropolitan centres, coupled with the emergence of global and continental systems of cities, can have serious consequences for regional and local systems. Metropolisation processes are leading to changes in the cities' internal structure and to a transformation of the relationships between cities and their surrounding regions. The spreading of metropolises onto regional hinterland areas can lead to the development of a metropolitan area in which the ties with the metropolis are both strong and wide-ranging. At the same time, the economic ties between the city and its metropolitan area and the surrounding region are weakening (as linkages as part of the global or continental city network become stronger). This latter aspect of the metropolisation process is much less researched, unlike the concentration processes of central functions in cities and the consolidation process of the global network of cities, discussed above. Many authors have put forward the hypothesis that the regional hinterland is no longer needed by metropolises as it does not offer the resources that are necessary for metropolitan development (cf. e.g. Castells 1998, Jałowiecki 2000, Kunzmann 2000, Sassen 1991), and is therefore undergoing a relative marginalisation, while the differences in the development level between the metropolis and its regional surroundings are increasing.

In light of the new development paradigm outlined above, and the recent hypotheses published in the world's literature of the subject, an evolutionary model of the metropolises' global and regional relationships could be proposed, which takes into account the type of resources and scale of linkages (Smętkowski 2005). To offer a general picture, the relationships between the city and the surrounding region in the industrial economy were relatively strong, with the region providing simple resources: unskilled labour in the form of daily shuttle migration; food products; raw materials for production and construction enterprises located in the agglomeration. In return, the agglomeration would provide its hinterland with earnings from work, processed products (shopping in the city) and higher-level services. In the industrial civilisation, the relationships between the city and the global economy were as a rule limited to an exchange of industrial goods. In the information economy, the links between the metropolis and the region have become relatively weaker. The role of the hinterland has been limited to the provision of unskilled and skilled workforce in the form of weekly shuttle or permanent migration, as well as environmental resources – potable water, recreational space, building plots, etc. the resources which were earlier supplied to the city from the region now come from different sources (e.g. food) or have lost their significance (e.g. raw materials). In the information economy, for the metropolis, now turned into a node concentrating global information and capital flows (including human capital), the concentration of such flows (frequently of a non-material nature) has become more important than the material exchange of goods or attracting workforce on a large scale (factors which played a key role in the development of the urban-industrial agglomeration).

The above hypothesis on changing relationships between metropolises and regions is well-grounded in the literature of the subject. According to K. Dziewoński (1971), urban agglomerations form a separate subsystem at an advanced development stage of the settlement system, where their inter-linkages are more vigorous than those in the regional subsystem; "huge urban complexes are not central places but represent specialised settlement urban units with individual locations." This issue is also tackled in the works of A. Pred (1973, 1975, 1976), a proponent of the thesis that contacts between large urban agglomerations increase as economic development and urbanisation processes continue. Among more recent works on linkages within the global network of cities the study by A. Esparza, A.J. Krmenec (1994), with Chicago as its case study, is particularly interesting. On its basis, a complex picture showing the ties of a huge city emerges, which could be summarised as follows: flows of services occur in a two-level structure. The first such level is made up of global cities, for which the factor of distance does not play any considerable role, while the second relates to the national system of cities and shows the existence of a hierarchical structure in which distance adversely

affects mutual interactions. On the other hand, the spatial range of demand for services does not perceptibly differ from the supply of services. Most enterprises purchase their services from suppliers operating from the city's metropolitan region. This can be seen as a proof of the significance of central functions, thanks to which the region is largely self-sufficient.

The other studies conducted in a few European cases also reveal a difference between metropolises (cf: Simmie 2001 et al., 2002; 2003) based to some extent on their position in the network of large cities. This is especially important in the case of capital cities that are far more worldwide connected (i.e. London, Paris, Amsterdam) than other regional cities (i.e. Stuttgart, Milan). In general, the higher the position of the city, the smaller significance of ties with regional surroundings for development processes of the metropolis. From a study of the linkages of selected Polish metropolises (Gorzelak, Smętkowski 2008), an overall picture emerges, which we can sum up as follows. The regional surroundings do not play any important part in the metropolitan development processes, and do not constitute any significant supplies or sales markets. Furthermore, the regional surroundings have a greater significance in the provision of simple resources: low-processed goods, low-skilled workforce, services which do not require skilled staff or generally accessible information about information rather than processed resources. The development of the metropolis is largely based on local human resources, which are subject to local deconcentration occurring as part of the suburbanisation process. On the other hand, the non-local inflow results in the draining of human capital, mainly from its the regional surroundings. However, the survey findings also indicate that certain disparities exist in the economic relations connected with the flow of goods, people, capital and information between the researched metropolises and the regions surrounding them, depending on the regional context. Nevertheless, on the one hand, because of the socialist-era heritage and lower innovativeness potential, these processes seems still to be not as advanced in Poland and probably also other post-socialist countries as in many other Western European cities. On the other hand, the intraregional differences in economic potential between core cities and peripheries are much larger in Poland than in higher-developed countries, so the impact of the backwashing of processed resources to main cities is much more severe for regional surroundings.

The other research project (Hall, Pain 2007) was devoted to access interplay between globalization and polycentricity in eight mega-city regions situated in North-Western Europe based on advance producer service evidence. This study (Cf. Hoyler at al. 2008) revealed the concentration of highly advanced functions in prime cities that was supported by dispersion of associated functions in wider mega-city regions (Zürich – Northern Switzerland) similarly to inter-urban linkages in South-East England, but without sectoral specialization that took place for instance in case of Randstad Holland.

However in some other cases (i.e. Dublin, Paris) advance producers services remains highly concentrated and interlocked within metropolitan areas. Also Frankfurt plays a role of primate city mainly in national, European and global scale.

To sum up, some differences between these cases might be observed depending on city size and its function as well as the economic potential of regional hinterland. One should also have in mind that city-region relations are very complex and strongly depend on the regional context. This calls for further comprehensive and dynamic research focused on different types of regions.

Consequently, the research hypothesis that has been the subject of verification in the empirical studies was formulated assuming that the difference in the level of development between the metropolis (the city with its metropolitan area) and its regional hinterland (macroregion) has been increasing as a result of metropolisation processes. Furthermore, the following research questions addressing mechanism of these phenomena have been raised:

- Question 1) What is the impact of linkages between the metropolis and the region on the competitiveness of these territorial systems?
- Question 2) What factors affect the relationships between the metropolis and the region?
- Question 3) What factors determine the diffusion of metropolitan development and what is the spatial range of the backwashing of development resources in metropolitan macroregions?

In its first part, the report provides a review of classical and contemporary urban and regional development theories, placing a special emphasis on the implications for the city-region linkages. As the next step, a typology of such relationships is discussed, including their current situation and recent changes. In the empirical part, the zones of influence of the central/large city were defined, and a simplified delimitation of metropolitan macroregions in Europe was proposed. First, using a selected sample of these macroregions, the degree of intraregional disparities in terms of economic development and convergence processes was analysed. Then, other dimensions of intraregional disparities were identified (demographics, economic structure, labour market) and a typology of macroregions was created; it was used to generalise the conclusions concerning convergence processes for individual groups of regions. The subsequent chapter discusses the reasons for the observable intraregional disparities in the level of development and factors which foster macroregional divergence. Finally, the last chapter, based on purposefully selected case studies (which were intended to portray extreme typological examples) is an attempt to supplement these quantitative analyses

with other aspects, associated e.g. with the quality of human capital, level of innovation as well as mutual relationships between backwashing and spreading processes. These case studies analysis should allow us to answer the question what should be done to strengthen the positive effects of the metropolisation process and weaken its negative aspects for regional hinterland.

1. City-region relationships in light of selected theoretical approaches

In many classical and contemporary theories and concepts dealing with urban and regional development, we will find some aspects explicitly or implicitly discussing the relationships between the city and the surrounding region (Table 1). In the classical references, this issue is frequently limited to analysing mutual ties between cities and rural areas, or those within a hierarchical city system. In reality, processes accompanying the development of information economy can lead to obliterating the dichotomy between urban and rural areas, also because of the now made more facile popularisation of city lifestyles and increasing role of network linkages between cities from different hierarchical levels, which in turn calls for a new look at this phenomenon, particularly in highly developed countries. New concepts which have emerged from the theory of polarised growth and the network theory can be viewed as expressions of such a novel perspective.

Theory / theories	Types of relations between city and region	The role of region in city development	The role of city in regional development
Spatial interaction theories	Complementarity Intervening opportunities Transferability	Provides resources and serves as a market for goods and services	Provides resources and serves as a market for goods and services
Urbanisation theories	Evolution of regional settlement systems as result of agglomeration or deconcentration processes	Area of origin or destination for migrations depending on current tendencies	Area of origin or destination for migrations depending on current tendencies
Economic base theory	Basic and non-basic local activities of city	There is no distinction between regional hinterland and other export markets	Not applicable. Region is one of possible markets for goods and services.
Central place theory	Good and services provided by city for the region	The importance of city depends not only on local, but also regional demand. The city is central place for its hinterland.	Region depends on city.
Growth pole theories	Positive spread effects and negative backwashing effects	Region provides simple resources and labour	Capital investments, diffusion of innovations, but backwashing of human resources
Network theories	Network linkages a-hierarchical and not depending on distance between nodes.	Region does not play important role in city development unless there are nodes of regional network.	City as a centre of nodal region.

Table 1. City-region relations derived from selected theories
Source: Smętkowski (2007).

Among classical models of spatial interactions, we have Ullman's triad (1957) and a group of gravity potential models. The former is used to analyse the following three components: complementarity, intervening opportunity and transferability, all of which determine the ties existing between regions. Complementarity means that individual regions have access to different resources. Their surplus or deficit leads, respectively, to the creation of supply and demand, which in turn triggers exchange of goods between regions. An intervening opportunity means both being able to use supplies from various regions and to sell goods to them. This component is strongly associated with transferability, which refers to the impact of distance on the strength of linkages. On the other hand, gravity potential models mainly focus their analysis on distance and its reductional impact on the intensity of relationships. Interactions between two cities or regions are in direct proportion to their potential and in inverse proportion to the distance between them. The decreasing role of distance as a factor that determines linkages between cities and regions, which can be observed today, leads to a greater role of complementarity and intervening opportunity in the spatial interactions model, while in the gravity potential model the role of distance depends on a given spatial scale. Spatial interaction theories, being general in nature, fail to highlight in detail the linkages between the city and the region. This means that exchange of goods between the metropolis and the region is dependent on the differences in their economic structure, their mutual attractiveness as sales and supply markets, and the role of distance in such an exchange.

In the light of urbanisation theory, individual stages of urbanisation processes and the attendant changes in the distribution of population in cities and their surrounding areas represent important phenomena for the city-region relationships. The starting point here is the definition of urbanisation, which is considered to be a cultural and civilisational process that is epitomised in the development of cities, their increasing number and surface area, growing concentration of population in cities and their direct vicinity, popularisation of sources of sustenance other than agriculture, acceptance for, and absorption of 'city culture': city standards, customs, etc., which leads to an increase in city population (Castells 1982). As part of this theory, the question of distinguishing individual stages of the urbanisation process is frequently tackled. For this, such measures as changes in the population of the city and its adjoining areas (treated collectively as a city region) are most frequently used (Table 2). The main thrust of these theories is that a process of the city's spatial development involves subsequent stages of concentration and deconcentration of the population, which, however, as a rule are taking place on a constantly increasing spatial scale. As a consequence of such cycles, and depending on whether concentration or deconcentration processes prevail, the city and its region either represent, vis-à-vis each other, a source or a target area for the

migration of the population, which in turn affects both the spatial extent of the city and the forms of possible uses of the city space. In this context, Jałowiecki's definition of metropolisation (1999 p. 29) should be evoked: "*metropolisation is the final stage of urbanisation, consisting in the transformation of urban space and change of the relations between the central city and its direct environment, and in a non-discrete way of using urban space. It is manifested by a weakening or severing of the city's economic ties with its regional hinterland and replacing them with contacts with other continental or global metropolises*."

Stage of urbanisation process	**Type of process**	**Population changes**		
		Core	**Periphery**	**City-region**
1. Urbanisation	1.1. Absolute centralisation 1.2. Relative centralisation	+ + + +	- +	+ + + +
2. Suburbanisation	2.1. Relative decentralisation 2.2. Absolute decentralisation	+ -	+ + + +	+ + + +
3. Desurbanisation	3.1. Absolute decentralisation 3.2. Relative decentralisation	- - - -	+ -	- - - -
4. Reurbanisation	4.1. Relative decentralisation 4.2. Absolute centralisation	- +	- - - -	- - - -

++ large increase; + small increase; – small decrease; - - large decrease; the last column is a sum

Table 2. Stages of functional development of an urban region
Source: R. Drewett et al. (1992).

The economic base theory has not evolved into a uniform theoretical system. According to this theory, urban development depends on two factors: basic and non-basic activities. While the former refer to functions provided for the local economy, the latter, also referred to as city-forming functions, are provided for the external world. The latter type of functions can include exchange between the city and the region or its further external environment. In such a perspective, the region surrounding the city is only one of many potential markets for supplies or sales of goods and services.

On the other hand, the central place theory (Christaller 1933), which in some aspects could be regarded as a specific example of the economic base theory (cf. Preston, Mitchell 1990, p. 90) is the first of the theories discussed here which directly deals with the mutual relationships between the city and the region. According to this theory, the city is a centre that offers central goods to its regional hinterland. Such goods can include administrative, cultural, healthcare, trade and financial functions, as well as the labour market, transportation or telecommunication services. It should also be pointed out that the range of individual goods can vary. This concept also implies that the role of the city,

that is its regional nodality, results from the degree of centrality for the regional hinterland. On the other hand, however, the region is not self-sufficient and is dependent on the city as its functional centre. At the same time, in the light of the economic landscape theory which is an elaboration of the central place theory as developed by A. Lösh (1961), we can expect a differentiation in the density of the population distribution and business activity, characterised by an alternate occurrence of sectors with many and few urban centres.

At the same time, when the city is treated as the centre and its hinterland – as the periphery (especially on a macroregional scale), the relationships between them can be highlighted using a group of theories widely referred to as polarised growth theories. The theories of growth poles, initiated by F. Perrox (1950), underline the role of motor units, from which specific centrifugal forces emanate and towards which specific centripetal forces are directed. For instance, A.O. Hirschman (1958) distinguished positive trickling-down effects and negative polarisation effects. Beneficial trickling-down effects result from the complementarity of activities undertaken between two poles (the developed one and the underdeveloped one), from purchases and investments coming in from the developed pole to the underdeveloped one, and from the absorption of hidden unemployment in the underdeveloped pole. Polarisation effects are generated by the existence of a competitive advantage in the developed pole and the draining of qualified personnel from the underdeveloped region. On the other hand, G. Myrdal (1957) distinguishes centrifugal progressive spread effects and centripetal regressive backwash effects. The growth pole theory has found applications in different areas, and distinguishes various types of polarisation: technological, income-related, psychological and geographical.

When we analyse the impact of such effects on the hierarchical settlement system, we can expect that they will result in a transformation of the traditional structure of central place. This process is anticipated to involve such elements as the taking over of functions typical of lower-order centres by the central agglomeration and the formation of the so-called ‘shadow of the metropolis’. At the same time, as S. Sassen (2000) observed, contemporary development trends are leading to the emergence of new forms of centrality, which are expressed in the expansion of the centre beyond the traditional business centre, to include other nodes situated within the metropolitan area of a large city.

To sum up, this concept can be directly transposed to the interdependency between the metropolis (centre, growth pole) and the region (periphery), in which positive centrifugal spread effects following the development of the growth pole can be observed (mainly in the form of capital and innovations) as well as negative centripetal backwash effects

whereby the periphery (region) is stripped of simple resources and labour, particularly highly-skilled personnel.

Similarly to the theory of polarised growth, there is no comprehensive network theory (e.g. Glucker 2007). The main tenet underpinning this group of theoretical approaches to the settlement system is that hierarchical relations between cities as shown in the central place theory give way to a new generation of systems – city networks. Such networks develop when two or more cities that have been independent before but have complementary functions are trying to cooperate, and on the whole manage to merge their economies, a process which is enhanced by fast and reliable transport corridors and telecommunication infrastructure (Batten 1995). American researchers (Fishman 1990) tend to depart from the terminology related to the central city and suburbanisation processes and introduce 'new cities' instead – urban regions which are characterised by the absence of a distinct centre/central node and boundaries, and which are developing along the transport corridors connecting urban centres. As a result of accelerating such linkages, the relationships between cities lose their hierarchical character and become horizontal network ties.

Territorial organisation	**Network organisation**
Centre, periphery	Nodes, tendency to decentralise mutual linkages
Size-dependent	No dependency on size
Boundaries	Connections
Coherence, continuity	Dispersion, separation
One- directional flows	Two-directional flows
Closedness, outward impermeability	Territorial openness
Constancy, inelasticity	Short-lividness, flexibility
Proximity, location ties – transport costs	Insensitivity to distance, omnipresence – costs of information
Territorial hierarchy, vertical links, dominance of size	Horizontal links, cooperation and competition

Table 3. Selected differences between territorial and network organisation of space
Source: based on B. Jałowiecki (1999).

The key differences between territorial and network organisation can be summarised as follows (Camagni 1994, Batten 1995, Minar 1997, Jałowiecki 1999). Firstly, there is an observable departure from the distinct spatial delineation of the centre and the periphery, and the dependence of linkages on the size of the city centre and its economic

significance; instead, we have decentralised linkages concentrated in network nodes, which occur between urban centres of varying sizes. Open, continuous areas which are separated from one another by distinctly marked boundaries, between which one-directional flows used to take place, are losing in significance whereas the significance of horizontal ties between dispersed locations is growing. The constancy and inelasticity of mutual relationships in internally closed regions (which are strongly dependent on distance) is superseded by short-lived, flexible relationships between open systems lying far from one another. In consequence, the hierarchy, vertical linkages and the dominance of size are replaced by the network, horizontal linkages, cooperation and competition.

As P. Korcelli observed (2000), increased significance of non-hierarchical interaction networks within a system of cities leads to the fragmentation of traditional urban systems. As a result, the ties between the city and the region become dependent on the existence of the network's nodes in the proximity of the city. Nevertheless, due to the building of strong ties with other large nodes of the network, the role of the region in urban development is waning. On the other hand, the city is the main node of the network which consolidates the surrounding region. In this particular approach, small and medium-sized cities are of special significance as potential nodes of such a network (cf. ESPON 2006; INTERREG 2005).

Spatially dependent transaction costs Externalities	Uniformly low	Heterogeneous	Uniformly high
Low	1. Spatial entropy	2. Random dispersal combined with emerging Loscherian-Weberian landscapes	3. Loscherian-Weberian landscapes
High	4. Small interconnected clusters	5. Super-clusters	6. Small disconnected clusters

Table 4. Distribution of business activity depending on: a) spatially dependent transactions, cost-related, and b) externalities
Source: Scott (1998 p. 87).

The rise of new theories drawing on the network approach does not mean that they can absolutely explain the spatial relationships in any regional or settlement system. There is little doubt that we can still find many examples of territorially organised settlement systems, as well as systems where territorial and network organisations are intermingled. For example, A. Scott (1998) offered an interesting typology of the spatial location of business activity in contemporary economy based on such dual spatial organisation. This typology takes into account both distance-dependent transaction costs and externalities, which can result from the adopted way of information exchange and information flow, as well as factors of a socio-cultural nature. On this basis, six model situations can be distinguished, including, on the one hand, low and high externalities

and on the other hand - uniformly low, heterogeneous and uniformly high spatially dependent transaction costs (see p. 87). According to Scott, the model of heterogeneous transaction costs and high externalities is currently the most popular one; it involves a differentiation of transaction costs (which, for example, are barely visible in the case of foreign currency exchange, and are relatively high if there is a need for direct, personal contacts) and high external effects related to the post-Fordist system of the organisation of production. With a sufficiently high vertical disintegration of enterprises, clusters will emerge in order to reduce transactions costs. On the other hand, low costs of some transactions enable enterprises to have access to the resources and sale markets on the global scale. In consequence, this may foster a speedy development of the local systems in which those enterprises operate. And that, in turn, leads to the emergence of a large number of such local-global super-clusters, otherwise known as metropolises. These observations are support also by selected empirical studies (i.e. Gordon, McCann 2005).

2. Types of relationships between the city and the region

The basic assumption underlying our line of argumentation is that the relationships between the city and its surroundings are expressed by two categories of flows: periodic–variable flows (e.g. commuting to work), and constant–permanent flows (e.g. internal migrations). Permanent flows are constituents of transformations in a given spatial system, while another constituent of transformations includes internal changes in a given system, such as population increases or changes in the number of enterprises.

It should be emphasised that developing a consistent typology of mutual relationships between the metropolis and its region involves many challenges owing to the multitude of dimensions in which such linkages can be analysed. Among those dimensions, two major ones can be distinguished:

- Sectoral dimension (which inter alia includes the enterprise sector, the household sector and the public sector);
- Material dimension (which includes flows of goods, information, population as well as financial flows).

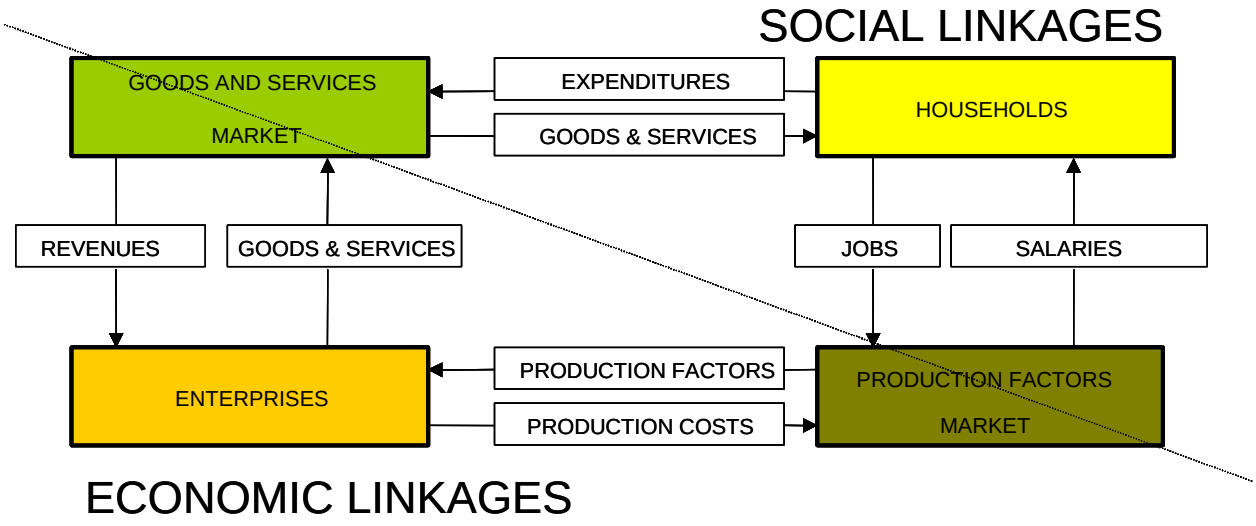
To the above, another two universal dimensions should be added: time one (which takes into account changes of flows in time, as well as their durability) and spatial one (which takes into account different spatial ranges of the linkages, and on the other – linkages between different regions).

Social and economic components which make up the metropolis-region system can be divided into the following: the enterprise sector, the household sector and the public sector, plus capital flows and trade exchange with the external environment. In

traditional input-output analysis, intersectoral flows within one region including **(Hoover 1980, pp. 224-227)**. material flows of goods and services between individual sectors are associated with cash flows going in the opposite direction **(Figure 1)**. The main object of analysis is the enterprise sector where inter-branch exchange is taking place. Sales outside the enterprise sector represent the final demand, which comprises consumer goods purchases made by households, demand in the public sector, investments and sales outside the region, which we have termed exports for the purposes of this paper. On the other hand, purchases outside the enterprise sector represent basic supply which includes workforce, capital resources and purchases outside the region, which we here have called imports.

As regards the placement of individual systemic components vis-à-vis the region-the external environment model, in this approach only the enterprise sector is confined to the region; the public sector and capital flows go beyond the region's boundaries. In addition, this can also apply to the household sector, depending on how the boundaries of a given region are delimited (dotted line in the diagram).

Figure 1. Social and economic linkages between enterprise sector and household sector



Source: prepared by the author.

The above model can be made even more specific for two sectors which are of greatest interest to us, viz. the enterprise sector and the household sector. The linkages that we refer to as economic ones will take place between the enterprise sector and the production factors market (with purchases of production factors corresponding to the production costs of a given enterprise), and between the enterprise sector and the market for goods and services (with sales of goods and services corresponding to the revenues of a given enterprise). On the other hand, the linkages that we refer to as social ones will occur between the household sector and the factors of production market

(remuneration for work), and between the household sector and the market for goods and services (purchases of goods and services). This directly implies that a given phenomenon (such as for example commuting to work) may simultaneously be a manifestation of economic linkages or of social linkages, depending on whether we look at it from the perspective of the enterprise sector, or that of the household sector.

Inclusion of the spatial dimension into the classification described above produces a result shown in **Table 5 and Figure 2.** Individual, hypothetical relationships taking into account various types of flows (in the definition of which classifications of ties between urban and rural areas discussed in **SPESP (2000, pp. 38-41)** and **ESPON 1.1.2. (2004, pp. 86-90)** have been used), have been ascribed to a spatial-sectoral matrix (city, region and enterprises, households, public sector, respectively).

Region City	*Enterprises*	Households	Public sector
Enterprises	Relocation Exchange	***Work*** Consumption	Purchases Services
Households	***Work*** Consumption	Permanent migration Consumption	***Work*** Services
Public sector	Purchases Services	***Work*** Services	Cooperation Competition

Table 5. Types of intersectoral relationships in the city-region system.
Source: prepared by the author.

Enterprise-enterprise relationships

In recent years, there has been an observable tendency for a regional deconcentration of business activity (particularly industry-related). Studies conducted in the United Kingdom by **D. Keeble and P. Tyler (1995)** showed that employment in production enterprises located in rural areas grew faster than in cities. Among the reasons for deconcentration in industry, the authors named such factors as: attractive living and working conditions, new sales markets and lower operating costs in rural areas. In metropolitan areas of large cities (e.g. Copenhagen - **Winther, Hansen 2006**), this is mainly related to soft location criteria associated with quality environment and living conditions, whereas business operations in these areas mainly aim to provide services to the local residents and local enterprises. Shifts between urban and rural areas are taking place mainly due to changes which occur *in situ*, and only to a lesser extent are they connected with relocation of business activity and establishment of new enterprises **(Healey, Ilbery**

1985). It should also be emphasised that relocation connected with the influx of inward capital, given all types of attendant multiplier effects, can have a significant impact on the development of local systems, which in many cases can be greater than stimulation of - frequently limited – local resources **(Smętkowski 2000)**.

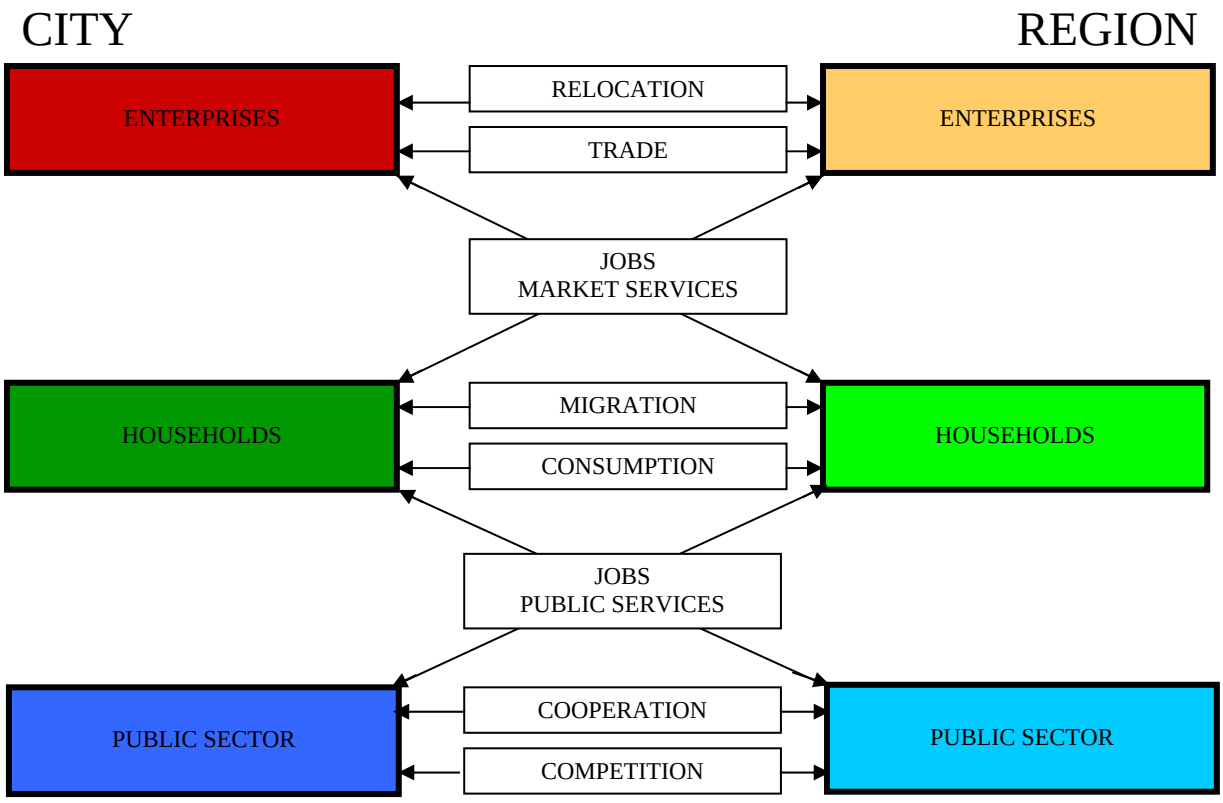


Figure 2. Key types of intersectoral linkages in the city-region system
Source: prepared by the author.

Exchange of goods and services is undoubtedly among the major types of relationships existing between metropolitan and regional enterprises. Owing to differences in the economic structure and in the accessibility of various resources in the city-region system, there can occur mutual complementarities arising from differences in the supply and demand. As a rule, metropolitan enterprises produce goods with a higher added value component, which can then be sold to regional enterprises (e.g. **Gorzelak, Smętkowski 2008**). In many cases, metropolitan enterprises also act as intermediaries in the trade exchange between the metropolitan region and the external environment. In addition to that, certain types of services offered by enterprises operating from a metropolis, such as banking, insurance, consulting, advertising, public relations, etc., can be offered to regional enterprises. On the other hand, as distance from the city centre grows and real property prices fall (reduced land rent), the role of traditional labour-intensive sectors of business activity, which produce goods with lower added value, increases. Here,

agriculture is an interesting example as one of the key activities pursued in rural areas situated in metropolitan regions, especially when we consider the area occupied for farming purposes. Modern, market-oriented farming can have multifaceted links with city centres. Firstly, rural areas can perform a feeding function vis-à-vis the metropolis by providing foodstuffs for its residents. Nonetheless, as huge shopping centres operating as part of global retail networks appeared, the role of local farming was significantly curbed. The traditional model of land use proposed by J. H. Thűnen has been replaced by a more sophisticated model of mutual dependencies. Although rural areas remain food suppliers, the interdependency expressed by the distance between the place of production and the place of sale has been largely constrained. Moreover, areas under intensive agriculture are losing their rural character and turn into zones of quasi-industrial farming production, with all the negative consequences of the process, mainly environmental pollution **(e.g. Tacoli 1998, p. 159)**. Another type of linkages is the supply of minerals (needed in power and construction sectors) to metropolitan enterprises, which may be mined in rural areas, also those situated in a metropolitan region.

Enterprise-household relationships

This type of linkages is considered to be the cardinal component of all relationships between the city and its surroundings, and can be quite varied in character. Firstly, city residents who have moved out of the city to a place within the boundaries of the metropolitan area or even beyond, still work in the city. This largely depends on the spatial and housing policy addressing rural areas around the city. Secondly, residents of the surrounding region account for a considerable part of the city's labour market. As regards movement in the opposite direction, such linkages are few and far between, as a rule being associated with the deconcentration of economic activity (which is usually contained within the boundaries of the metropolitan region) and commuting of highly qualified specialists to regional enterprises. Both the strength and the scale of such linkages depends on the spatial accessibility of areas surrounding the city: the higher the accessibility the stronger and wider the linkages. Such relationships largely determine the boundaries of the functional urban region (metropolitan area), although they can also reach beyond it. At the same time, the metropolitan area acquires an increasingly polycentric character, demonstrated in multi-directional flows between individual centres **(Aguilera 2005; Hall, Pain 2008)**.

Certain types of services undoubtedly have a natural tendency for concentration in places which are referred to as central – as claimed by the central place theory. Cities which supply the surrounding areas with services can be regarded as such central places. Such centrally-provided services can include finances (banks, insurance companies), education

(higher education institutions and – to a lesser extent – secondary schools, training centres), R&D (research institutes, universities, laboratories), healthcare (hospitals, outpatient centres), retail trade (shopping centres) and culture (cinemas, theatres, libraries, culture centres), etc. Owing to a lesser value of the lower threshold (minimum supply), some of these services can be located in smaller city centres (lower-order central places), rural areas or – due to good accessibility of a given location and lower operating costs – outside the metropolitan centre. According to the central place theory, the system of central places tends to increase the level of hierarchisation. Many types of services require a heavy demand and a high turnover. For this reason, when certain areas (rural areas and smaller cities) become depopulated, they become less attractive for the providers of such services.

The development potential of small and medium-sized cities in the vicinity of big metropolises is a serious problem. Naturally, some of them use the proximity of a large city to their advantage, for example due to an inflow of both residents and capital. This is especially the case when such cities can offer easily accessible, cheap land for investments, a situation most frequently encountered in development corridors connecting metropolises. In consequence, some of these cities become incorporated by the polycentric metropolitan area. Conversely, further located small and medium sized cities have a lesser potential for growth. Instead, they can compete by offering better living conditions, and attracting the location of residential estates and certain types of business activity. For instance, surveys of medium-sized cities (with 20,000-100,000 population) lying in the vicinity of large urban centres in Germany **(Adam 2006)** indicated that they tend to preserve their functions and serve as commuting centres, although they depopulate at a faster rate than larger cities.

On the other hand, rural areas surrounding the city play an important role in satisfying those needs of the residents which are connected with recreation and leisure. Some of rural areas situated near big metropolises are being transformed into aggressively developed recreational areas (golf courses, amusement parks, etc.). In areas lying still further away, collective and individual recreation amenities are being developed, such as hotels, pensions and so-called ‘second homes’. This process can lead to the transformation of rural areas into areas of intensive consumption. On the other hand, spatial policies pursued by the authorities often aim to counteract negative aspects of suburbanisation and attempts to preserve open, undeveloped areas. In such territories, there are restrictions concerning permissible development and less intensive recreation and leisure functions are encouraged.

Household-household relationships

Relationships between households in the metropolis and those in the region are mainly associated with permanent migrations. Very frequently, the metropolis is viewed as an attractive place for working and living by the region's inhabitants. This results in an outflow of such people, mainly those who are best educated, to the regional centre **(Gorzelak, Smętkowski 2008)**. On the other hand, examples of some inverse processes could be found, such as an efflux of residents from the metropolitan centre, usually confined within the boundaries of the metropolitan area in the case of working age population, and also beyond it – in the case of post-working age residents who frequently use their 'second homes' for this purpose.

The relationships between the metropolis and its region associated with consumption in the household sector are contemporarily of a minor significance. On the one hand, they can include travels of the region's inhabitants to the metropolis, for example with a view to selling their agricultural produce in marketplaces. On the other hand, this can be connected with agri-tourism stays of metropolitan residents in locations within the metropolitan region.

Public sector – enterprise relationships

When providing services and delivering investment projects, public authorities may opt to use the enterprise sector. Nonetheless, it is difficult to narrow down the extent of the flow of services offered by enterprises to public authorities by metropolitan and regional enterprises. Undoubtedly, in most cases orders in their majority are delivered by local companies which often act as subcontractors of the executed investment projects (cf. e.g. Smętkowski, 2004). For this reason, the attendant public expenditure is not regarded as a significant component of linkages between the metropolis and the region.

Public authorities can also provide various services to enterprises, mainly through an indirect development of business environment institutions. In most cases, such activity is aimed to support local enterprises and does not play any important part in the relationships between the metropolis and the region.

Public sector – households relationships

Relationships associated with commuting to work in the public sector are similar to those which occur in the enterprise sector. However, their role is smaller, also because of the diminishing role of public ownership in the economy.

Furthermore we can mention services for the residents of the metropolis and the region which are provided by the public sector in the same way as they are offered by the enterprise sector. Examples include public higher education, high culture or specialised health care institutions, which are normally located in the metropolis, offering such

services for the inhabitants of the metropolitan region. As regards the opposite direction, we can indicate tourist information centres, museums, etc., which operate in the metropolitan region and service tourist traffic largely composed of metropolitan residents. The typical linkages are similar to those discussed on the occasion of the enterprises-households relationships in the category of consumption.

Public sector – public sector relationships

Both the scope and extent of cooperation between local authorities can vary, starting from the development of transport infrastructure and public communication, through environmental protection to spatial development. Structurally speaking, various facilities belonging to transport, telecommunication and power infrastructure are located in areas surrounding the city, which connect the metropolis via a network with other metropolitan centres. This leads to the development of infrastructure corridors and in turn can trigger fragmentation of rural areas. As people need to commute to work, public authorities must ensure accessibility of public means of transport having a sufficient quality. Thirdly, dumping sites for various types of waste are located in rural areas, ranging from relatively non-noxious municipal waste to highly noxious industrial waste. In addition to that, air and water pollutants can migrate easily, which necessitates cooperation in the sphere of environmental protection between different administrative units. Moreover, aforementioned processes related to changes in the distribution of population and enterprises call for joint spatial policy actions. As the example of such projects as Randstad Holland show us, such actions can be highly effective (Geurs, van Wee 2006). We can also observe processes to consolidate power structures in areas surrounding the city, as a result of which various organisations are set up to manage and administer those areas (regions, metropolitan areas, metropolitan unions); they are able to launch effective activities aimed to embrace the opportunities and counteract threats posed by globalisation (e.g. Scott, Agnew, Soja, Storper 2000, Stephens, Wikstrom 2000).

In addition to collaboration, local systems are engaged in competition in basic two aspects. The first of them refers to competing for investments. Public authorities can use a whole array of direct and indirect instruments in order to persuade potential investors to locate their investment in their area. Secondly, they can compete for inflow of residents. To be effective, they need to ensure attractive living conditions, inter alia by improving the quality of public services on offer. Thanks to incoming investments and new residents, their revenues grow, which as a rule will generate many positive feedbacks.

3. Metropolitan macroregions and their constituent parts

3.1. The regional hinterland – a tentative definition

As a matter of course, a city, especially a large one, cannot be viewed as an isolated point in geographical space. With the help of spatial, morphological or functional analysis, we can distinguish different zones relating to how the city influences its surroundings. It should be emphasised that there exist many, sometimes strikingly dissimilar, concepts for delimiting the city region, which is largely due to different definitions of the concept in hand, and to the existence of different impact zones of the city. As a result, the criterion for assessing the correctness and objectivity of a given method for delineating metropolitan area is largely a consequence of the adopted theoretical approach. There can be little doubt, however, that the range of the city's impact depends on the size and function of the city in question. Depending on the adopted measures, we can come up with a number of city impact zones which will differ in both object and range. On the basis of a review of relevant terminology, we can distinguish two main zones of city impact: zone of direct impacts in which the relationships are both fixed and strong (*Umland* in German) and zone in which the relationships are less vigorous or exceptional (*Hinterland* in German) **(Schöller 1953; Boudeville 1966)**.

The former includes the suburban zone, that is the area adjoining to the central city's build-up areas, which is normally identified using the morphological criterion. In addition to open areas, the zone is made up of villages, towns and hamlets; it is a territory with different types of development, unstable in physiognomic, functional and demographic terms, where both the forms and the substance typical of the city and rural areas tend to intermingle. This is a multifunctional space, with the number and nature of its functions being dependent on the development stage and functional structure of the city. The following can be regarded as suburban zone functions: agricultural, recreational, residential, municipal, communication, industrial, spa and academic. From the perspective of regional and national settlement systems, the suburban zone forms a part of the urban agglomeration, which also comprises the city's central and external districts. This zone is most seriously exposed to urban sprawl, a phenomenon which is commonly observed across the world, Europe not excluded (Schneider, Woodcock, 2008). It can also be noticed in EU's new member states, until recently socialist countries (e.g. Jauhiainen 2006), as well as areas undergoing a demographic downturn (e.g. Couch et al. 2005). The reasons underlying this process are universal, and relate to a greater interest of potential investors in new investment areas, recultivation of brown fields, location of huge shopping malls outside city centres, and housing aspirations of inhabitants who wish to own a house in the suburbs.

It should also be observed that the suburban zone, with its close ties with the city, has a more narrow range than the city's impact zone, the boundaries of which are delimited by the spatial extent of various functions performed by the city. Based on the functional criterion, two zones of city impact can be distinguished: one where the ties are strong and durable, that is the entire metropolitan zone, and one which has much weaker ties with the city while remaining within its impacts - that is the metropolitan region.

A metropolitan area can be defined using the spatial distribution of mutually interdependent production, consumption, exchange-related and administrative activities (Castells 1982). Metropolitan functions are performed by the entire metropolitan region (and not only by its constituent city) and can be located in various places. As a result, the metropolitan area is not entirely homogeneous and consists of a mosaic of spaces, each with a different function, but at the same time is characterised by a robust internal integrity. According to J.B. Parr (2007) four dimensions of such metropolitan area might be distinguished: built city, consumption city, employment city and workforce city constituted by commuting to work. Its terminological equivalent is a functional urban region or functional urban area (ESPON 1.1.1 2004), that is an area having functional ties with the city. In the functional urban region, daily commuting which has replaced regular movements of the population represents the main category of linkages. In addition to that, other linkages associated with the flow of goods, capital and information can be observed in the region, whereas the diffusion model of social, economic and technological phenomena is not hierarchical in nature. The functional urban region defined in this way largely corresponds to the city-region in the economic base theory, the local system in the settlement system theory, and the urban fields in spatial-interaction theories.

On the other hand, the notion of the metropolitan region was introduced by R. McKenzie (1933), who combined the city and its hinterland in a functional whole delimited by the range of the dominant impact of the metropolis. The central city with its institutions and services that extended to the entire region and tied it with other regions, was the centre of functional linkages. Among such services, the major ones were: press, communications, finances, management, as well as specialised trade functions and professional services. Just as in the case of the urban functional region, in certain aspects its terminological counterpart is the functional macroregion, the extent of which can be identified using such tools as for example impact analysis of competitive cities. For instance, studies examining the range of such impacts which were conducted in France also looked at different types of impact (economic, cultural) and, consequently, their different ranges of extent (cf. Maik 1997).

Here, we would like to quote the definition of a polarised region, formulated by J.R. Boudeville (and cited after: Grzeszczak 1999, pp.18-20), whereby such a region is a "hierarchical entity made up of the metropolis, its satellites and rural areas dominated by them. It is a heterogeneous space, the different parts of which are mutually complementary and maintain a more intensive exchange between them, and particularly with the dominant pole, than they do with the poles of the same order from the neighbouring regions. As such, it is a place for exchange of goods, services and information, whose internal intensity at any given point is higher than external intensity. A polarised region is an integrated entity, and its not an autarky – it is a system." The author contrasts polarised regions with urban regions, "which represent a generally uniform space, marked by a high population density, high employment in industry and services, varied forms of non-discrete urbanisation, interspersed with farming enclaves. Hierarchical structures are dystrophic, giving way to strongly integrated structures characterised by functional interdependencies." Although J.R. Boudeville set his definitions in a historical context, they could also well be transposed to a spatial context. As regards the terms mentioned above, the first definition should be ascribed to the metropolitan region (nodal region), while the second – to the metropolitan area (region which is largely homogeneous).

To sum up, in light of the spatial extent of the city discussed above, the notion of the metropolis should be viewed as equivalent to a system composed of a centre and a metropolitan area. Among others, this is associated with the blurring of centrality as part of a metropolitan system. In many metropolises, the economic centre is no longer clear-cut, as a result of the process whereby satellite centres are created, interconnected by a network of strong functional ties with the main metropolitan centre **(e.g. Sassen 2000, Hall, Pain 2007)**. In this way, a polycentric metropolitan area emerges, which comprises the metropolitan centre (central city) and the adjoining, densely populated areas, and has strong ties within the network. On the other hand, a metropolitan macroregion is Boudevillean 'polarised region' – a region influenced by the city, the boundaries of which are limited by the range of impact of other metropolises. In this approach, a metropolitan area constitutes the internal hinterland zone for the city, and the metropolitan macroregion – the external hinterland zone.

3.2. Selection of metropolitan and urban regions for the purpose of city-region analysis

This part of the paper presents a methodology for the selection of metropolitan and urban macroregions for the purpose of city-region analysis. The final outcome, based on NUTS3 regions for the ESPON space, is a "technical typology" of regions enabling a selection of metropolitan areas and their regional hinterlands for further analysis. Using NUTS3 units allows to avoid data availability constraints at city and larger urban zone

levels. Furthermore, this enables us to analyse the situation in regional hinterlands of large cities.

The following types of spatial units have been adapted to city-region relationship analysis:

- metropolitan/urban area, in which ties between the city and its surroundings are strong and permanent, and which has been approximated by a Larger Urban Zone as defined by the Urban Audit,
- metropolitan/urban macroregion that covers territories under the prevailing influence of the city, limited by the impact of other cities at a similar hierarchical level.

Approximations based on NUTS3 units, especially those concerning the delineation of metropolitan macroregions, are obviously a large simplification. Among the weaknesses of this approach, the following might be indicated: significant differences between adjusted metropolitan macroregions depending on statistical divisions in individual countries, neglecting of functional ties between territories, necessity of raw estimations in case of densely populated areas with a polycentric settlement pattern. However, other possible solutions based on smaller units are affected by insufficient availability of socio-economic data. Furthermore, in order to obtain long-term data series, NUTS 3 delimitation from 2003 instead of the new NUTS 2006 has been used.

The following general assumptions, underlying the identification of metropolitan and urban regions, have been applied:

- The importance of the city grows to some extent with the city size in terms of population,
- The influence of the city is decreasing with the distance from the city centre,
- The administrative borders of upper-tier administrative units (NUTS0, NUTS2) to some extent affect delimitation of metropolitan macroregions.

These assumptions are based on gravity potential models that, at least to some extent, relatively well illustrate relationships between the city and its region. However, these assumptions will be under investigation in the second part of this analysis, based on selected case studies. On the other hand, application of upper-tier administrative units as one of the criteria to separate different hinterlands reflects an attempt to adjust this division to socio-economic reality. For instance, among the advantages of NUTS2 units one may indicate that these regions reflect (depending on the country): real ties between territories as a result of an analysis conducted for their delineation; historical provinces that still constitute different types of relationships; geographical barriers (like mountains, rivers, etc.) that affect these relationships. Furthermore, there are self-government authorities responsible for socio-economic development at this level in some countries. Regarding national borders, despite transborder integration processes, one should have

in mind that these are still important elements not only of the legal and administrative context of regional development, but also of socio-economic ties between territories as well. This analysis would not combine city-regions relationships with transborder interactions, because this would require a different methodology.

Other established operational rules and criteria reflect to some extent the principles applied in previous studies, such as the following:

- Identifying European metropolitan and urban regions based on the Urban Audit's Larger Urban Zones (DG Regio, 2008),
- ESPON 1.4.3. Study on Urban Functions (2007),
- ESPON 3.4.3. The Modifiable Areas Unit Problem (2006).

Figure 3. Metropolitan and urban macroregions selected as a sample for city-region analysis
Source: prepared by the author.

Based on these assumptions and remarks, the first step of this research has been to define metropolitan and urban areas (MA) based on the comparison of Urban Audit Larger Urban Zones (LUZ) and EUROSTAT population data for NUTS3 regions. The following basic rules have been applied: minimal size of LUZ (over 250,000 inhabitants), correspondence between LUZ and NUTS3 (threshold of 70% share of population) and combination of neighbouring metropolitan areas into polynuclear metropolitan areas (maximum distance 60 km). In the next stage the regional hinterlands (RH) for such metropolitan and urban areas (MA) have been delineated using surrounding NUTS 3 combination approximations. Another set of rules has been applied here: neighbouring regions (direct neighbours and maximum distance), predominance of larger metropolitan area regions (ratio 3:1) and separate hinterlands. (**Annex 1)**
Using these rules, we distinguished 83 metropolitan/urban macroregions **(Figure 3)**. Owing to the specific characteristics of the respective administrative divisions, both the number and the surface area of these macroregions varied depending on a country.

In effect, it should be noted that the analyses were carried out on a sample of macroregions whose selection was largely dependent on the specific natures of the national settlement systems, delimitation of LUZs in the Urban Audit, and the NUTS3 administrative division. It should be acknowledged, however, that despite leaving out some large urban centres, such a sample should be sufficient to show the diverse relationships between the metropolis and the surrounding region.

All the identified macroregions were accepted for further analyses. However, we should emphasise considerable differences between them, which can have a bearing on the results obtained (**Annex 2**).

	Macro-regions	Metropolitan areas (MA)	%	Regional hinterlands (RH)	%
Area [sq km]	2 105 077	473 612	22.5	1 631 466	77.5
Population 1995	330 127	177 768	53.8	152 359	46.2
Population 2004	338 132	182 744	54.0	155 388	46.0
Population density (inh/sq2)	161	386	-	95	-
Population change 95-05 (1995=100)	102,4	102,8	-	102,0	-
GDP 95 [EUR]	5 531 133	3 330 141	60.2	2 200 992	39.8
GDP 04 (constant prices 1995) [EUR]	6 915 492	4351797	62.9	2 563 695	37.1
GDP change 95-04 (1995=100)	125.0	130.7	-	116.5	-

Table 6. Basic information about macroregions and their constituent parts
Source: prepared by the author.

The analysed macroregions are inhabited by nearly 340 million population and altogether occupy an area in excess of 2 million km^2, of which about 1/5 were metropolitan areas, and the rest formed their regional hinterlands. The demographic situation was different, with over a half of the population living in the core areas, and the dynamics of growth in the researched period (1995-2004) visibly led to a strengthening of this trend. At the same time, metropolitan areas generated over 60% of the macroregional GDP, and its rate of growth was much higher than in the case of the regional hinterland. It should be borne in mind, however, that the GDP in question is expressed in EUR, which means that the overall picture can be affected by the disparities in the development rates between individual countries, as will be discussed in detail below.

Indicator	Area [sq km]	Population density (inh/sq2)	Population 1995 ['000]	Population 2004 ['000]	Population change 95-05 (1995=100)	GDP 95 [mln EUR]	GDP 04 (constant prices 1995) [mln EUR]	GDP change 95-04 (1995=100)
Metropolita/Urban macroregions								
Average	25362	182	3977	4074	101,8	66640	83319	134,8
Max	105954	555	20315	21004	114,7	457761	573105	300,1
Min	3658	16	486	503	93,3	1044	1479	98,7
SD	18850	119	3929	4050	4,4	85290	107980	32,7
CV	74	65	99	99	4,3	128	130	24,2
Metropolitan areas								
Average	5706	443	2142	2202	102,3	40122	52431	143,9
Max	17612	1951	12182	12800	115,0	339308	413934	355,3
Min	797	29	270	274	92,7	580	999	95,2
SD	3941	356	2441	2511	4,7	57823	76005	43,1
CV	69	80	114	114	4,6	144	145	29,9
Regional hinterlands								
Average	19656	121	1836	1872	101,2	26518	30888	119,6
Max	97926	350	8443	8705	119,3	130142	159171	170,0
Min	1079	6	108	107	90,8	464	479	93,4
SD	17005	84	1659	1720	4,8	30642	35788	14,3
CV	87	69	90	92	4,7	116	116	12,0

Table 7. Differences between macroregions and their constituent parts
Source: prepared by the author.

As already indicated above, the analysed units are considerably varied **(Table 7).** An average macroregion occupies an area of 25 000 km^2 and is inhabited by 4 million population, which corresponds to the average population density of 182 inhabitants per km^2. Nevertheless, whilst the number of the population in an average macroregion was stable over a 10-year period, its GDP expressed in EUR increased on average by over 30%. Significant differences could be observed between the analysed macroregions, expressed by the coefficient of variation (CV): the widest in the case of GDP (ranging from 573 billion to 1.5 billion EUR), but also considerable in the case of the population (oscillating from 21 million to 0.5 million inhabitants). The dynamics of economic

development was also strongly diversified, with real GDP changes ranging from a 1.3% decrease (Bergen) and a 201.4% increase (Vilnius). The demographic development was more stable, with a 6.7% fall (Leipzig/Halle) or a 14.7% increase in the population (Valencia) in the extreme cases.

The constituent parts of the macroregions were as strongly diversified, slightly more so in the core areas. An average core area occupied an area of 5 000 km^2 and was inhabited by over 2 million people, with the population density of 440 inhabitants per km^2. In the period in question, the population of such areas increased by 2.3%, and the GDP grew by 43.9% - a considerably better result than in their regional hinterlands, where the number of the population increased on average by 1.2%, and GDP was 19.6% higher (in constant prices). A typical regional hinterland occupied nearly 20 000 km^2 and had a population of 1.8 million, which meant a density of 121 inhabitants per km^2, that is still more than the average population density in EUR27+CH+NO.

3.3. Conclusions

The macroregions' sample selected for analysis was strongly varied in terms of area, population and GDP values. This was true for macroregions as a whole and for their constituent parts, i.e. metropolitan regions and regional hinterlands. It means that the results are strongly dependent on the regional context, which implies the need to carry out the analyses in the form of case studies which would complement the statistical surveys of the macroregions undertaken at the European level.

The demographic situation of the regions in hand was relatively stable when set against marked differences in the pace of economic growth. In effect, this generated wide differences between metropolitan regions and their hinterlands, but accompanied by visible differences between individual cases. Therefore, in the subsequent section of the report we will try to identify those macroregions which are developing most rapidly (including their constituent parts), and offer a typology of the macroregions under analysis in terms of the disparities in the level and pace of economic development.

4. Convergence processes in metropolitan macroregions

In its part of the report, the empirical study of 83 metropolitan/urban macroregions situated in the EU27, Norway and Switzerland was aimed to:

a) Discuss the developmental dynamics of the core areas in these macroregions in the context of the remaining LUZs regions,

b) Compare the degree and dynamics of the internal disparities in the macroregions measured by GDP per capita,

c) Compare the dynamics of economic growth in the macroregions' constituent parts, i.e. metropolitan regions and regional hinterlands.

4.1. Dynamics of macroregions core areas vs. other LUZs regions

The first part of the study focused on the developmental dynamics of all NUTS3 regions corresponding to the LUZs as defined in the Urban Audit[16], taking into account the degree of their correspondence to NUTS3, size of LUZs, and their location vis-à-vis one another. The analyses were conducted for the GDP dynamics in nominal terms, and for the GDP values relativised to the national average.

The development dynamics of NUTS3 regions corresponding to LUZs in 1995-2004 was quite similar (with real GDP growth of ca. 27-28%), regardless of the size and degree of correspondence to the NUTS3 region **(Table 8).** The exceptions were polynuclear metropolitan macroregions (15.6% increase) and regions situated in a close proximity to larger urban centres (20.6% increase). Although statistically significant, those differences largely stemmed from the condition of the economies in the individual countries because the overall picture significantly changed once the data were relativised to the average pace of growth in a given country. Firstly, we could observe a significantly lower pace of growth (in comparison to the regions' national average) of those LUZs which were situated close to larger urban centres (lower by 2.3pp), and those with a population under 250 000 (lower by 0.6pp). On the other hand, the highest values could be observed in monocentric systems regardless of the LUZ - NUTS3 correspondence (increase by 2.5 - 3.0pp above the national average). The pace of development of polynuclear metropolitan macroregions was also higher than the national average (1.2pp).

The poorer results of urban centres situated in the vicinity of large metropolises support the hypothesis on the "shadow of the metropolis", which means the backwashing of functions and developmental resources from smaller urban centres into the core area. Characteristically, only some regions from this group recorded a pace of growth which was distinctly higher than the national average (Cambridge and Portsmounth in the metropolitan region of London, Brescia in the metropolitan region of Milano and Płock in the metropolitan region of Warszawa – higher than the national average; altogether, 22 regions were developing faster, while 31 regions -slower). On the other hand, the poorer results in smaller urban centres corroborate the thesis that small cities have lesser opportunities to participate in metropolisation processes. Given that, we should bear in mind that these results may arise from the weak correspondence of LUZs to the NUTS3

[16] The study also included Marseilles, Nice-Grasse and Lille. Owing to the approximation of LUZ with a NUTS3 region for which GDP data was available, some LUZs were treated jointly, i.e. Białystok-Suwałki, Arnhem- Nijmegen, Rouen-Le Havre and Oviedo-Gijon.

administrative division, due to the inclusion of rural areas into these regions. At the same time, some regions of smaller cities provided more examples of speedy development (10pp higher than the national average), which was usually associated with the development of modern industries or tourism (Cork (IE), Györ (HU), Ancona, Sassari (IT), Coimbra, Funchal, Ponta Delgada, Faro (P), Irakleio, Ioannina (GR), Ajaccio (FR) and Oulu (F).

Name	N	GDP growth 1995-2004 [%]	SD	GDP growth 1995-2004 [each country=100]	SD
Metropolitan areas' regions (strong correspondence between LUZ and NUTS3)	78	127.0	24.3	102.7	8.8
Metropolitan areas' regions (weak correspondence between LUZ and NUTS3)	61	128.4	17.0	103.0	9.2
Polynuclear metropolitan areas	47	115.6	8.4	101.2	6.6
Metropolitan areas subordinated within metropolitan macroregions	50	120.6	15.4	97.7	8.5
Other urban areas regions (LUZ<250 000)	49	128.5	20.2	99.4	12.2
Total	285	124.5	19.1	101.1	9.4

* unavailable data was replaced by the following estimates assuming that regional GDP growth was the same across the country for Bulgaria (1995), Romania (1995-1997), Norway (2004), Switzerland (2004) and Athina (GR) (1995-2000).

Table 8. GDP dynamics in 1995-2004 in different types of LUZs regions*
Source: prepared by the author.

The weaker pace of growth in smaller urban centres is also confirmed in a different research dimension which only included LUZs located outside the zone of impact of larger urban centres **(Table 9)**. When this set is divided into three classes, i.e. LUZs with over 1 million; those between 0.5 and 1 million; and those under 0.5 million population, we will see that while the first two groups were developing at an average rate ca. 3.5pp higher than the national average, the smaller LUZs merely matched the national level (0.6pp *in plus*); however, the statistical significance of this difference was not high (t-test, p=0.15).

The differences can also be explained by the fact that different urban centres perform different functions. For example, this can be seen in capital city regions, which in the period 1995-2004 reached a pace of growth 7pp higher than the national average, while in the remaining cases the LUZs were, on average, developing at a modest rate which was only 1.6pp higher than that in other areas in a given country.

Based on the analyses made, we can propose the following conclusions:

- the national context is of considerable importance in investigating the growth dynamics of LUZs regions,
- the pace of development in the regions of cities located within the macroregion of large metropolis is normally much lower than the average dynamics observable in a given country, although some exceptions to this rule could also be found;
- the regions of smaller urban centres (LUZ under 0.5 million) are as a rule developing more slowly; certain exceptions can occur when such cities perform specific functions (such as: national capital, tourist industry, modern industrial complex).

Groups	**N**	**GDP growth 1995-2004 [each country=100]**	**SD**
Population			
> 1 mn	60	103.7	8.6
0.5 - 1 mn	55	103.4	8.4
< 0.5 mn	70	100.6	8.1
Capital city status			
Capital city-regions**	27	107.0	9.2
Other metropolitan areas regions	159	101.6	8.0

* LUZs with less than 0.25 million population and LUZs situated within the metropolitan macroregions of a larger urban centre were excluded
** capital cities of Cyprus and Malta were excluded

Table 9. GDP change in 1995-2004 [%] in metropolitan areas' regions 1995-2004* Source: prepared by the author.

4.2. Internal differences in metropolitan macroregions

This part of the report discusses the scale and dynamics of the internal disparities within macroregions. Its aim was to conduct a verification of the hypothesis that metropolisation processes tend to increase disparities in the development level between metropolitan areas and their regional hinterlands.

The degree of internal disparities within the macroregions can be measured by comparing the development level of the core areas and their surroundings, expressed in the form of GDP per capita. To this end, the following index was used:

W_{ZR} = (GDP per capita (MA) / GDP per capita (RH)) - 1

where: MA – metropolitan area, RH – regional hinterland.

The indicator in question has positive values when the development level of the metropolitan area is higher than that of the regional surroundings, and negative – in the opposite situation.

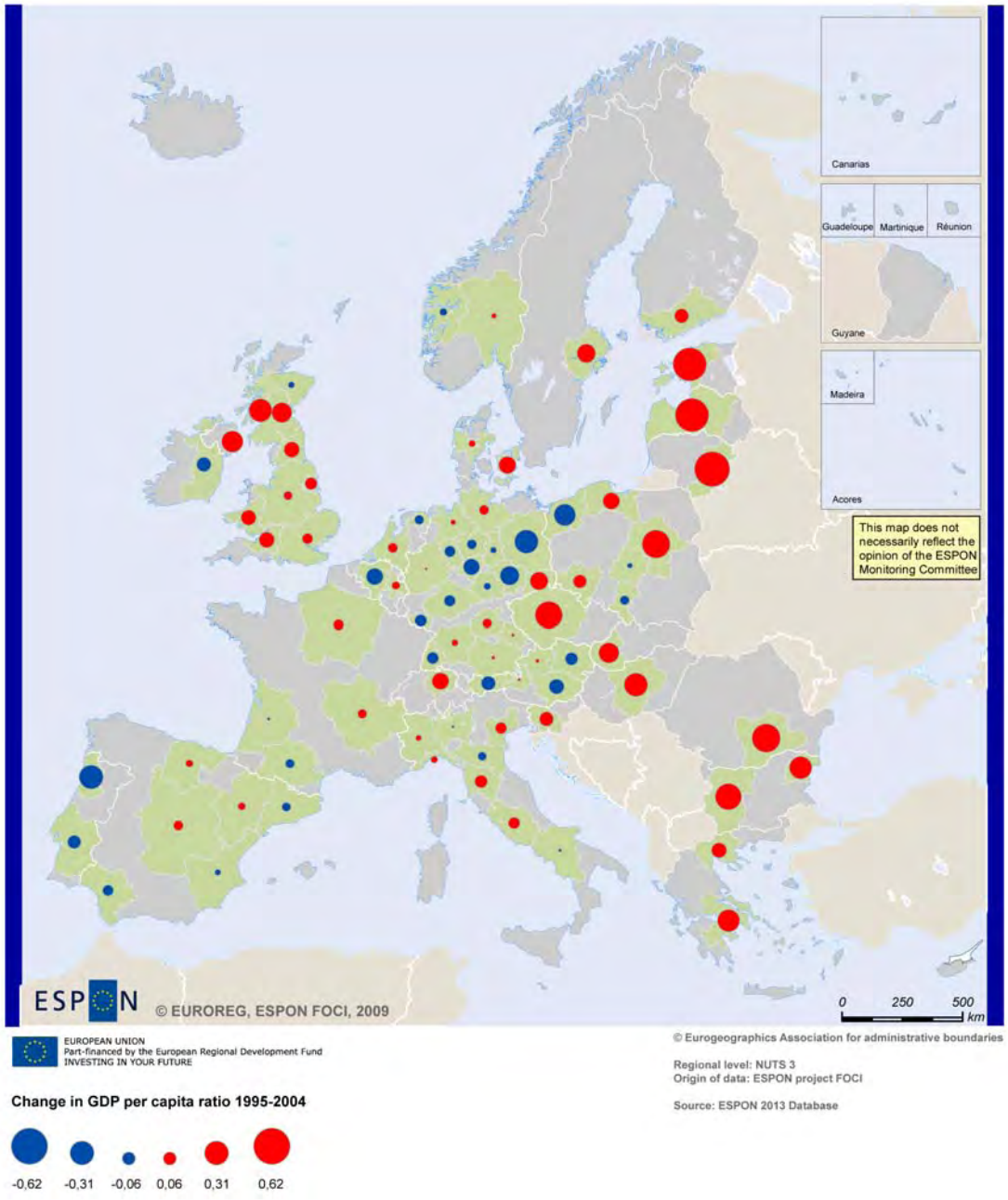


Figure 4. Disparities in the development level between the metropolis and its region in 1995-2004
Source: prepared by the author.

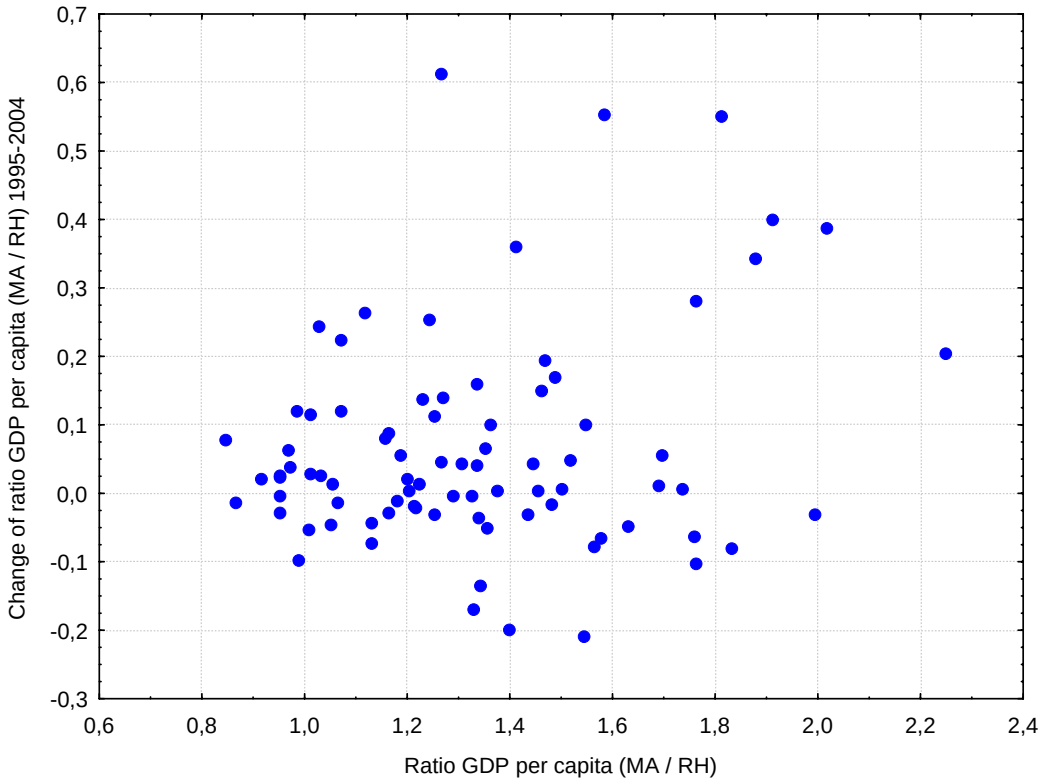
In 1995, its average value was +0.33, and increased in 2004 to +0.40, i.e. by 0.07 units. In 1995, the widest intraregional differences in the development level could be observed in Central and Eastern European countries, particularly in the capital city macroregions, e.g. Bratislava (1.25), Warszawa (1.02), Bucuresti (0.91), Wien (0.76) **(Figure4)**. The differences were considerable also in the Nordic countries (particularly Oslo and Stockholm), so as in the polynuclear region of Central Belgium and in the Groningen region in northern Holland (these cases could to some extent be affected by commuting

to work). On the other hand, minor differences could be observed in Spain (excluding Madrid) and Greece, as well as in Italy (except Roma and Milano) and the United Kingdom (with the exception Glasgow and Edinburgh). In Germany, the widest intraregional disparities could be observed in Frankfurt and Hamburg (in the latter case, the part of the former GDR were comprised to the metropolitan sphere of influence). On the other hand, the differences in the case of smaller urban centres in Germany were insignificant, and in the case of Magdeburg and Gottingen, the regional hinterland manifested a higher level of development than metropolitan area.

In the subsequent years, (1995-2004) this situation quite rapidly changed. In particular, the increasing intraregional differences in Central and Eastern European countries should be emphasised (with the exception of smaller urban centres which were not national capitals, which could be attributed to delayed industrial restructuring processes). Most remarkably, the increased disparities could be seen in the capital city regions of the Baltic states. Another distinct countries where the differences markedly increased were the United Kingdom (with a relatively weaker increase in the London region and the polynuclear Central England region), the Nordic countries (primarily the regions of Stockholm and Kobenhavn) and Greece. The existing disparities decreased in Austria and Germany – especially in the former GDR (except Dresden and the macroregions situated in the southern *Länder*). The intraregional differences also clearly diminished in Portugal (which could be caused by the small size of the Lisboa and Porto respective LUZs, which could lead in interpreting some of their functional urban areas as the regional hinterland). On the other hand, the situation in France and Spain was relatively stable. Altogether, 55 macroregions recorded a growth of the disparities in the development level, as compared to 28 where a decrease could be observed. When we exclude the 19 relatively stable regions (+/- 0.0025) from the picture, 42 recorded an increase (on average by 0.171), and 22 – a decrease (on average by 0.076).

Placing the scale of intraregional disparities in the context of their dynamics made it possible to develop a simplified regional typology, aimed to identify extreme cases in terms of both the conditions and the dynamics of such disparities **(Figure 5)**. Generally speaking, there was no clear correlation between the scale of internal disparities and its dynamics. However, it could be interesting to examine the situation of macroregions in two cross-sections: firstly, geographical along the east-west axis and secondly, related to the threshold of LUZs with 1 million population. As it turned out, the extreme situations in terms of the level and dynamics of the disparities could be observed in the capital city macroregions situated in Central and Eastern European countries regardless of the size of the LUZ. On the other hand, the macroregions of smaller LUZs did not differ considerably when compared to the remaining macroregions of Western Europe. At the same time, the macroregions in the EU15, Norway and Switzerland were more similar both in terms of

internal disparities and the dynamics of change. Interestingly, although the macroregions of smaller cities were more varied in terms of developmental differences, the changes in them were relatively insignificant but more prone to decrease. The situation in the macroregions of metropolitan areas with over 1 million population was different as they more frequently recorded higher disparities in the level of development. Interestingly enough, this increase was as a rule higher in those macroregions which were characterised by a smaller scale of internal disparities.



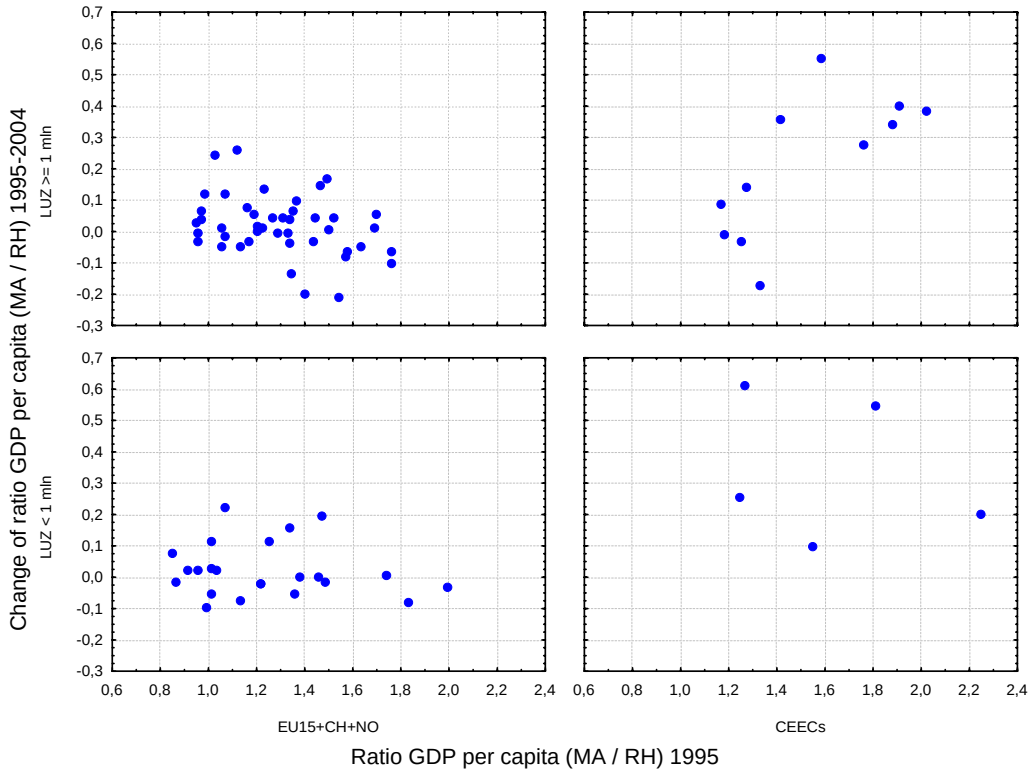


Figure 5. GDP per capita and its change in 1995-2004 (MA/RH ratio)
Source: prepared by the author.

The typologies of macroregions in terms of the level and dynamics of disparities in the GDP level were developed using the average value (1.33) for the level of disparities, after introducing an additional interval at a distance of ¼ of the standard deviation (+/- 0.07). At the same time, an additional, 'stability' interval was introduced for changes in the disparities, in the +/- 0.025 range for 0. The results were rendered on the map **(Figure 6)** in which the regions with a speedy increase in the level of disparities were marked in red; regions with a rapid decrease – in green, and stable macroregions in grey. The intensity of the colour indicates the scale of divergences – the more intensive the saturation the wider the internal differences were in 1995. The macroregions with the highest level and pace of disparities in the development level included regions situated in Central and Eastern Europe, as well as Paris, Madrid, Edinburgh and Hamburg. On the other hand, in the macroregions in Portugal, Austria, Dublin, Toulouse, Frankfurt, Central Belgium and Groningen in the Netherlands, the scale of disparities was decreasing despite their being quite wide. At the other extreme, there were regions with a similar level of development in the core and in the periphery, where the disparities were increasing, e.g. the majority of British and Greek macroregions, as well as Zaragoza and Bilbao-Santander in Spain, Firenze and Padova-Venezia in Italy, Zurich in Switzerland, Liege in Belgium and Wrocław in Poland. On the other hand, particularly in smaller German macroregions such as: Gottingen, Bielefeld, Freiburg, and in Barcelona, Sevilla,

Emilia-Romagna and Innsbruck, although they were insignificant, the disparities in the level of development were falling even further.

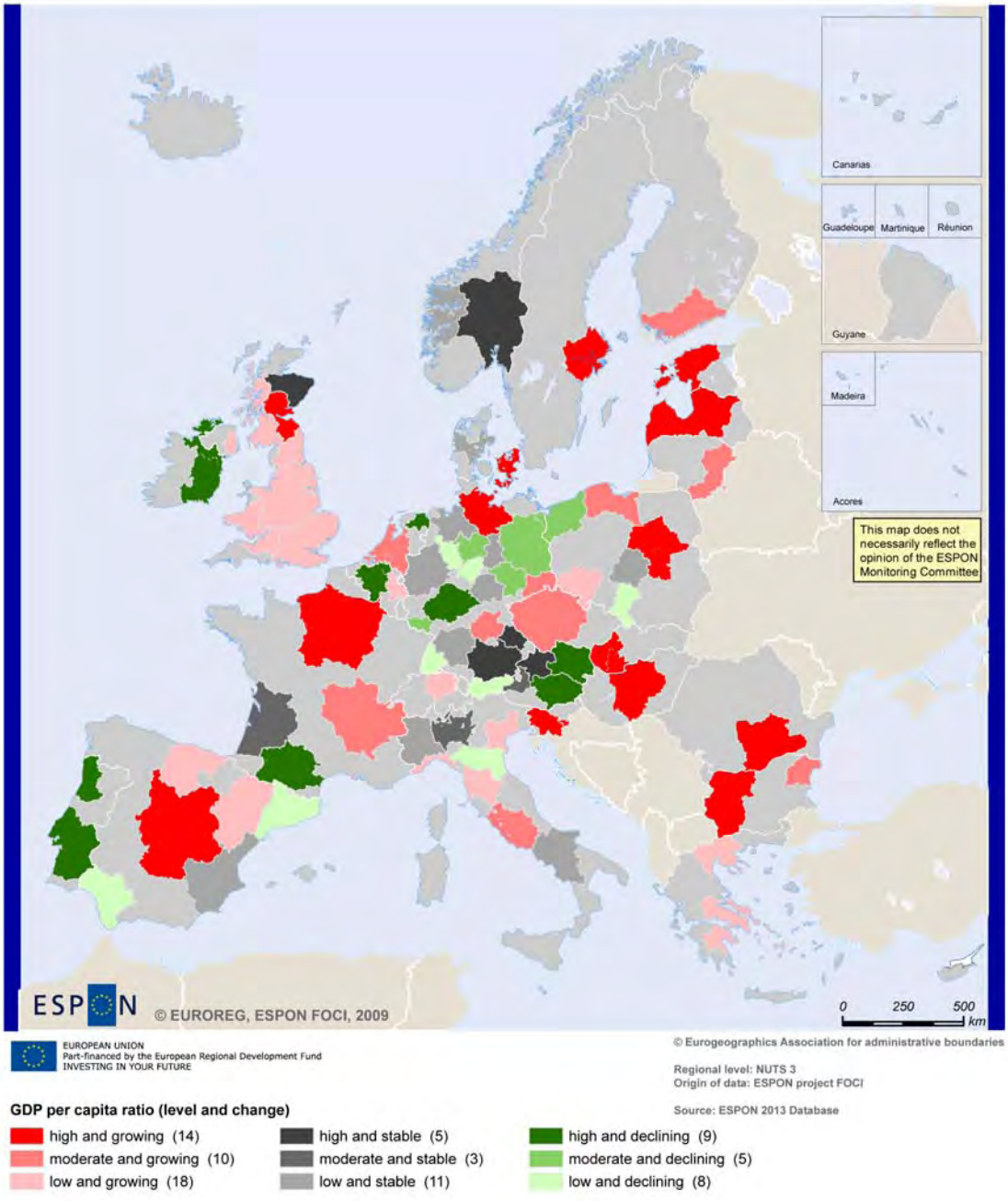
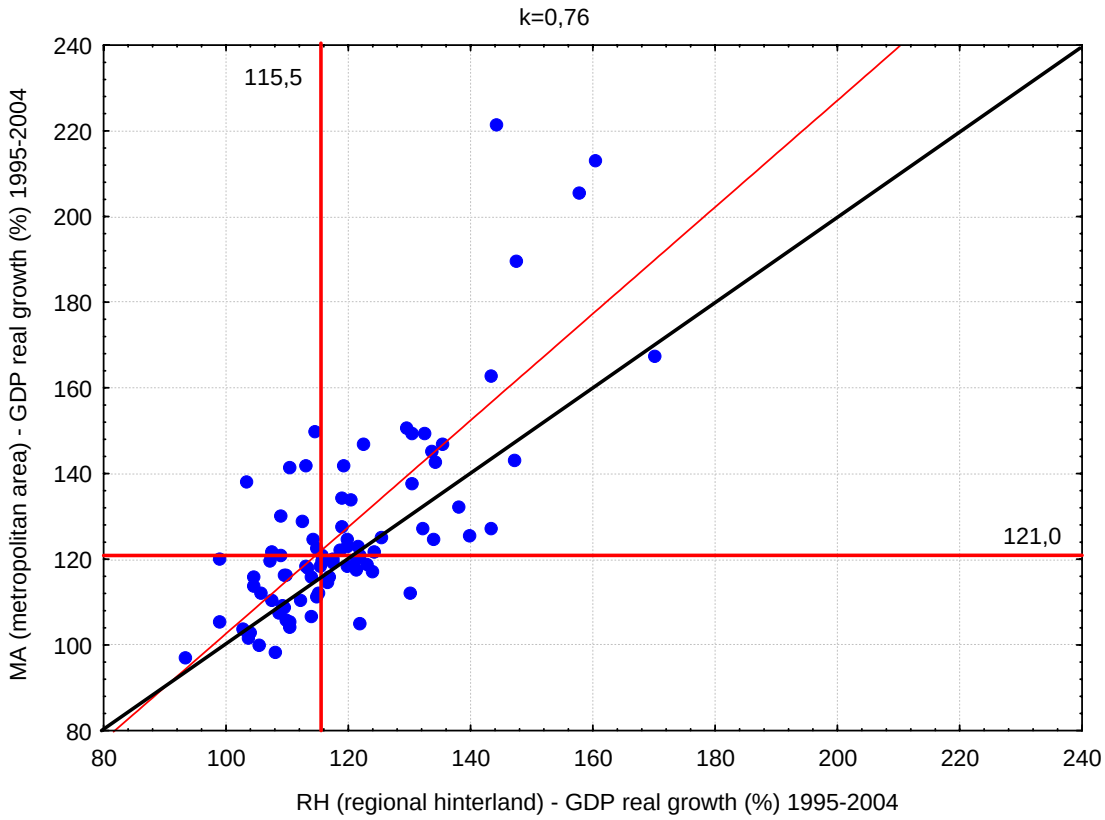


Figure 6. Typology of macroregions based on GDP per capita ratio level and change
Source: prepared by the author.

4.3. Convergence process in metropolitan macroregions

This part of the report strives to answer the question on the consequences of a rapid development of the metropolitan region for its regional hinterland. To this end, the correlations between the GDP for the metropolitan area and its surroundings were examined both for nominal values and when relativised to the national average. In addition to that, a typology was developed for the median values. On this basis, the core areas and the regional hinterlands which were developing faster or slower than the median values were separately defined **(Figure 7)**. As a result, we were able to distinguish four types of macroregions, viz.: a) rapidly developing metropolis and the regional hinterland, b) rapidly developing metropolis and slowly developing regional hinterland, c) slowly developing metropolis and rapidly developing the regional hinterland, and d) slowly developing metropolis and the regional hinterland.

a) real growth %



b) each country's growth = 100

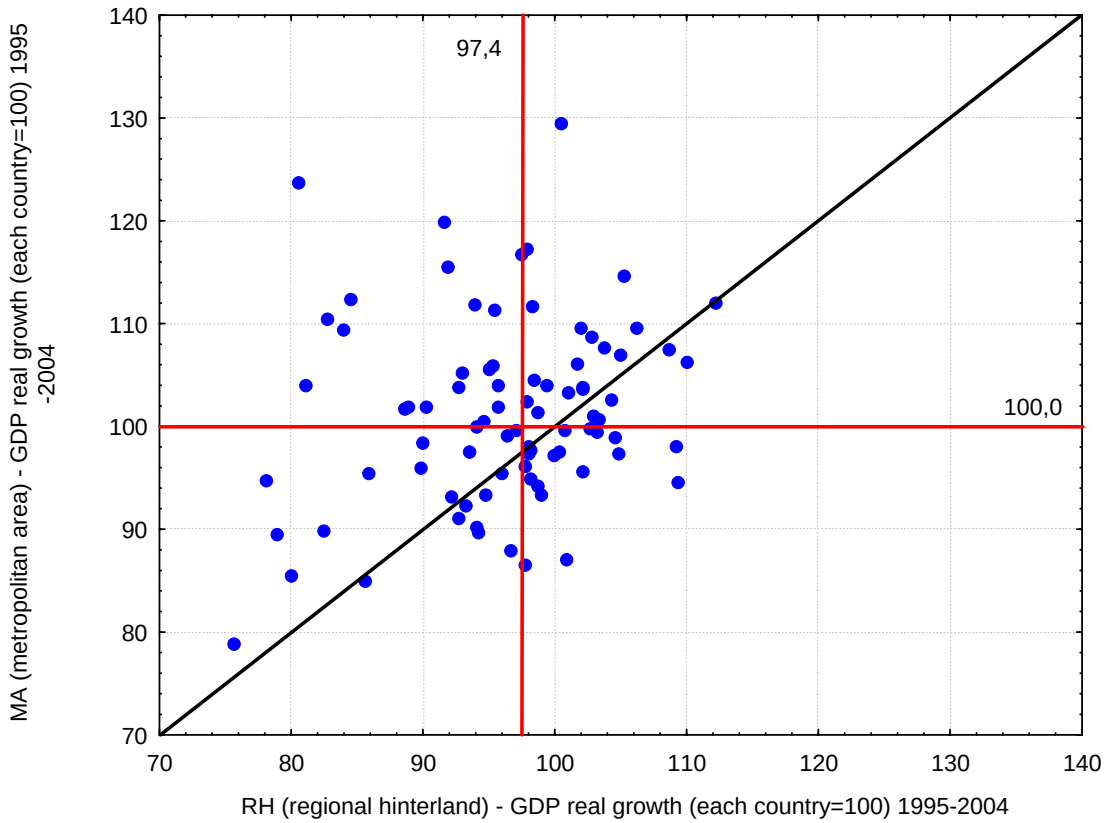


Figure 7. GDP growth in constituent parts of macroregions 1995-2004
Source: prepared by the author.

When we compared the pace of growth in the macroregions' constituent parts, we found out that there was a strong positive correlation between the rate of growth in the central area and its surroundings, of k=0.76 (k=0.60 after excluding outliners) **(Figure 7a)**. Furthermore, the majority of cases showed a faster increase of the central area than that of its surroundings (54:29). An average GDP increase in the core areas was 28.4%, as compared to 19.6% in their hinterland. In general terms, no real GDP decrease could be observed in the researched period (save for one exception - Gottingen in Germany). The distribution of these types (**Figure 9a**) illustrates the European-wide differences between the centrally located countries (Germany, Italy, Austria and Belgium), which recorded a low level of economic development in the period in question, and the external countries which were developing at a faster rate: Central and Eastern Europe, Nordic countries, United Kingdom, Ireland, Spain, Portugal and Greece. The above is also confirmed by the analysis of the real rate of growth of these countries **(Figure 8)**. As regards the central area, the exceptions to the above regularity were the metropolitan regions of München, Regensburg and Dresden (although in the latter case the metropolis' surrounding area was developing more slowly than the average), and in the peripheral areas – the British macroregions: Glasgow, Aberdeen and Kingston upon Hull.

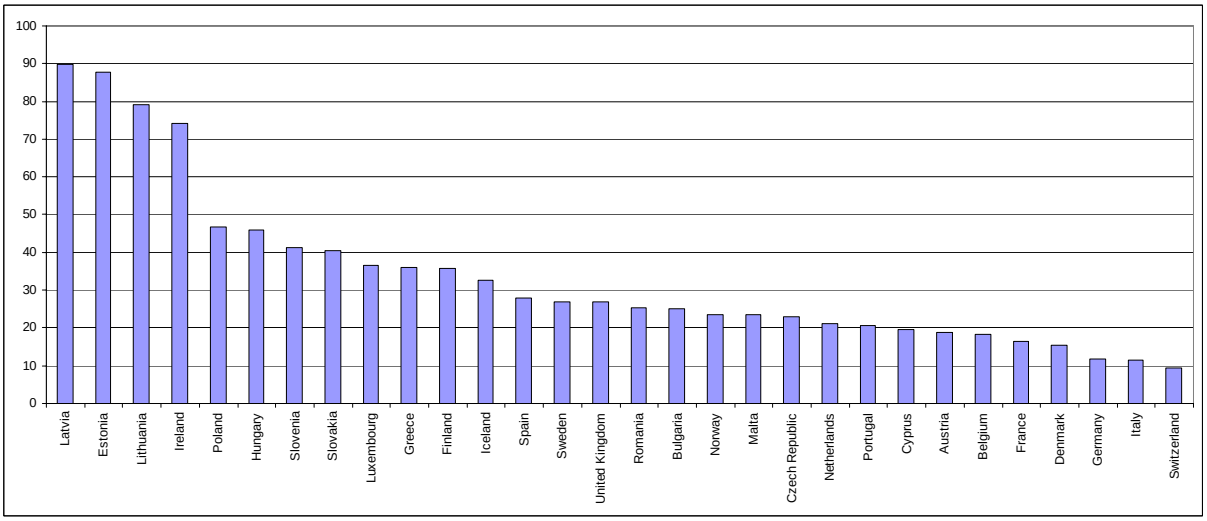
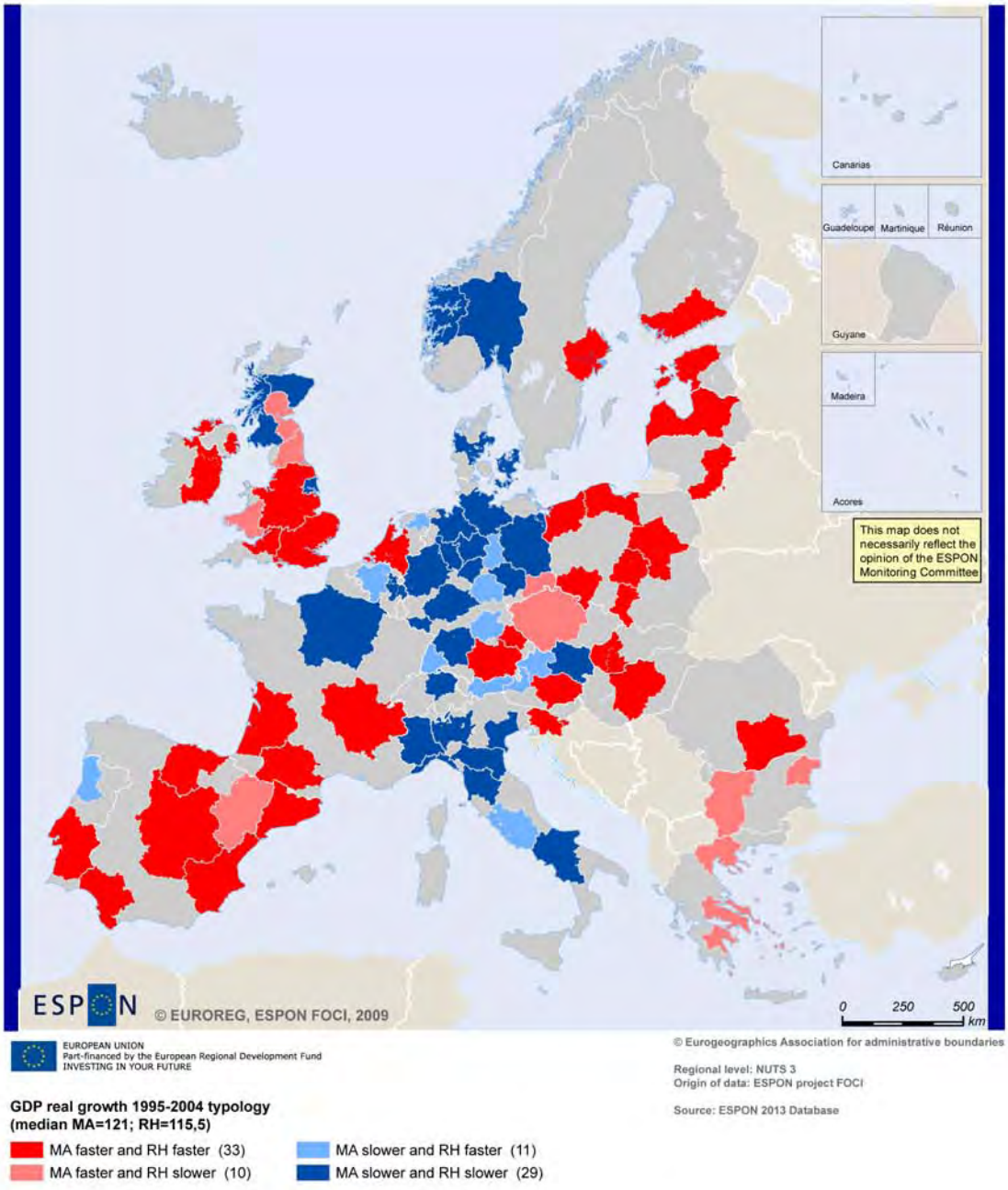


Figure 8. GDP growth (%) in constant prices in ESPON countries 1995-2004
Source: prepared by the author based on UNECE data.

More interesting results can be obtained when the observations are made independently of the rate of economic growth in individual countries **(Figure 7b)**. In this case, no correlation between the growth rate of the metropolis and its regional surroundings could be observed.[17] As before, the number of macroregions whose core areas were developing faster than their hinterland was distinctly higher (51:32). In most cases, the rate of growth of the core areas was 1.6pp higher than the national average, whilst their surrounding area was developing 3.9pp more slowly. As compared to the respective national economies, the metropolitan area of Warszawa was growing the fastest (by 29.5pp), while the Bergen metropolitan area was at the other extreme (- 21.1pp). The growth rate 'leaders' other than the remaining Central and Eastern European metropolises included: Bristol, München, Stockholm, Helsinki and Toulouse. On the other hand, most acute problems were experienced by regions with a considerable share of industry in their economies, e.g.: in Poland (Katowice, Łódź and Szczecin), Portugal (Porto), United Kingdom (Aberdeen), Italy (Torino) and Germany (Saarbrucken). The regional hinterland developing at the fastest rate was that of München, and of the East German cities: Magdeburg and Erfurt, and – probably due to the development of the tourist functions – the hinterlands of Valencia (Spain) and Innsbruck (Austria). A faster development of the macroregions' two constituent parts was easily visible in the southern part of Germany (also in Magdeburg and Erfurt), southern England (London, Bristol), French macroregions (save for the Paris macroregion where the surrounding area was developing more slowly than the median value), certain capital city macroregions in Central and Eastern European countries (Warszawa, Budapest, Bucuresti), as well as in the region of Lisboa, some cities in central and northern Italy (Roma, Milano, Padova-Venezia, Firenze), Graz (Austria) and Aarhus (Denmark).

[17] A very weak correlation (k=0.31) could be observed once the extreme situations were removed.

a) real growth %



b) each country's growth = 100

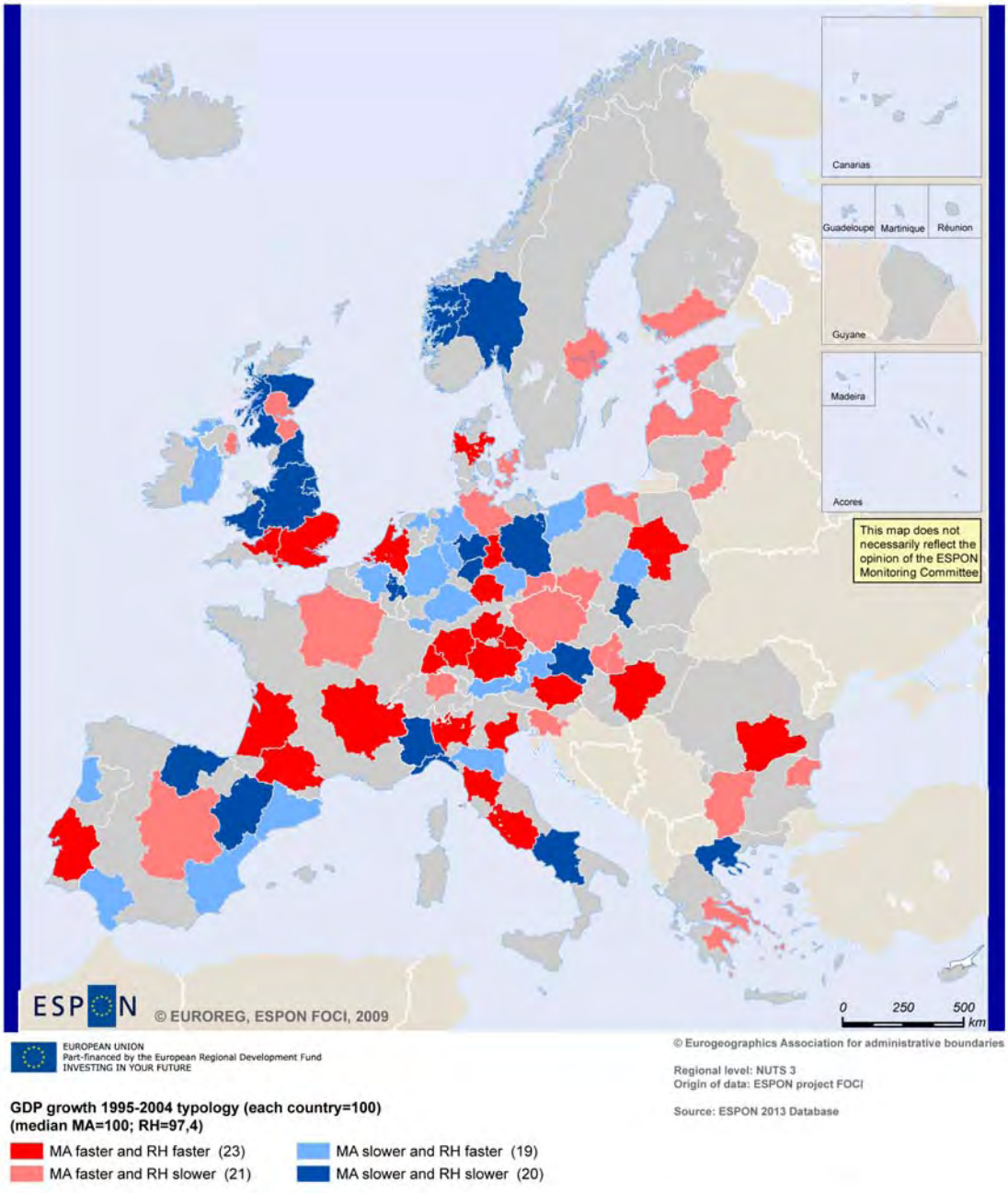


Figure 9. Typology of macroregions based on GDP growth 1995-2004
Source: prepared by the author.

4.4. Conclusions

The macroregions covered by the study were characterised by a prevailing tendency for increasing the disparities in the development level between metropolitan areas and areas surrounding them. This was particularly well visible in the capital city regions (notably

Nordic as well as Central and Eastern European countries), but such processes could also be observed in some of other large cities. The declining scales of internal disparities were less frequent, with their greatest scale encountered in eastern and northern Germany (except Hamburg), Portugal, Austria and Ireland. It should be noted that as a rule this was the case in those regions where the scale of internal disparities had earlier been very high. On the other hand, in the period in question these countries – with the exception of Ireland – were characterised by a relatively low pace of economic development. These observations can mean that metropolisation processes spurred a faster development of large urban centres, which at the same time resulted in an increase in the development disparities in the metropolis-region system. The implications of this process for the regional hinterland in terms of the development dynamics are discussed in the chapter below, which offers a comparison of the development rate in the metropolis and in its hinterland. However, any fuller or more thorough analysis of these processes and corroboration of the interpretation of the results obtained will only be possible after an analysis of development factors at the European level, and on the basis of case studies' analysis.

The development dynamics in the macroregions was rather distinctly correlated with the nationwide rate of growth (in some countries, this was related to a significant share of one macroregion in the national economy). On the other hand, there were relatively few macroregions which deviated from this rule: they were the rapidly developing regions in countries with a lower growth rate, and the slowly developing regions in countries with a high rate of growth. Moreover, a faster or slower nationwide rate of growth as a rule affected both the metropolitan areas and their regional hinterlands. In this case, however, the number of exceptions was higher, which resulted in either a fast increase in the disparities related to developmental level, or in their visible decline. Putting the rate of growth in the context of the national average made it possible to clearly show the differences between the regions within a given country. In effect, we were not able to identify the interrelationships between the development rate of the metropolis and its regional surroundings, while the occurrence of the individual types of macroregions was similar. Consequently, we indicated macroregions where a fast development of the metropolitan area was accompanied by a speedy development of its surroundings. This could be viewed as a proof of the lack of barriers to the diffusion of developmental processes. On the other hand, an inverse situation could point to structural differences or low accessibility which hampered the diffusion processes or, alternately, to the backwashing of developmental resources from the periphery into the regional centre. In a situation of a slower development of the centre, its surroundings as a rule coped slightly better than the mean value. This could either indicate relatively weak intraregional linkages or point to a competent use of endogenous resources by the

regional hinterland (e.g. related to the development of tourism or modern industries). Nevertheless, there also existed macroregions where both the metropolis and the remaining part of the macroregion were developing tangibly more slowly than the national average; this could be seen as a proof either of their strong intraregional ties or of their structural affinities.

5. Internal disparities and typology of metropolitan macroregions

5.1. Internal disparities within metropolitan macroregions

This part of the report provides a comparison of selected European metropolitan macroregions and their component parts (i.e. metropolitan areas and the regional hinterlands) in terms of:

- The demographic situation – which regions and their component parts experience population growth and which become depopulated; what is the role of migration and of natural increase in these processes; does this affect the shape of the settlement system (size of cities in the regional hinterland, degree of polycentrism of the metropolitan area);
- The economic structure – what is the degree of similarity between the metropolis and the surrounding region, particularly with regard to the role of the market services sector, and what are the relationships between the development of "specialised" and "simple" services;
- The labour market situation – what is the situation in the macroregional labour market in terms of the activity rate and unemployment rate; is the dynamics of change similar across the macroregion; are there any marked differences in labour productivity in individual sectors.

Unfortunately, due to the lack of relevant NUTS3 data for most of the Member States, a comparative analysis of metropolitan macroregions did not cover aspects relating to the quality of the human capital, degree of innovativeness and the macroregions' attractiveness for tourism **(Annex 3)**.

The analyses based on the available data were multi-dimensional in character as they took account of both the status and the dynamics of processes occurring in metropolitan macroregions (broken down by metropolitan areas and their regional hinterlands) and the interrelationships between the metropolis and the region (**Table 10**).

Research area	**Metropolitan Area** (MA)		**Regional Hinterland** (RH)		MA / RH **Ratio**	
	State	Dynamics	State	Dynamics	State	Dynamics
Demographic situation incl. settlement system						
Economic structure incl. specialised services						
Labour market incl. labour productivity						

Table 10. Dimensions of the intraregional disparities analyses
Source: prepared by the author.

Demographic situation

In 2000-2005, the majority of macroregions (55) recorded a population increase, with a population decrease noted only in 25 regions[18]. The average increase reached 3.1% (and was the fastest in Valencia macroregion - by 12.8%), whereas the average decrease was -1.7% (with the deepest reduction in the Leipzig and Halle region - by -4.7%). The migration balance played a greater role in the population dynamics, unlike the natural increase. As a rule, the migration balance was positive (with negative balance recorded in 20 macroregions), and amounted to ca. 6.1 ‰ annually. In contrast, the natural increase was usually neutral, reaching ca. -0.2 ‰ annually (there were more deaths than births in 37 macroregions). These processes likely result from a high migration attractiveness of metropolitan areas (their good labour market situation) and population ageing (first and foremost in the regional hinterland of metropolises), coupled with the falling women's fertility rate.

In both component parts of the macroregion, the population dynamics was mostly shaped by migration processes, and to a much lesser degree – by the natural increase *in situ* **(Table 11)**.

Constituent part	Population change in 2000-2005 in %	Average natural increase in ‰	Average migration balance in ‰
Metropolitan area	2.1	0.3	3.6
Regional hinterland	1.2	-0.8	2.6

Table 11. Basic demographic indicators in metropolitan macroregions
Source: prepared by the author.

[18] The demographic situation of metropolitan macroregions is shown using the data compiled for the DEMIFER project for the years 2000-2005. This was done for 80 of 83 macroregions selected for analysis (excluding Norway and Switzerland).

However, while the migration balance was positive both in metropolitan areas and in their regional hinterlands (56 regions), and the scale of migration was rather similar (in 27 cases, the relative immigrants inflow to the metropolitan area was higher than to its regional hinterland, and in 29 a reverse situation could be observed), metropolitan areas as a rule had a positive natural increase (42 cases), whereas regional hinterlands lost population due to an excess of deaths over births (51 cases). **(Table 12)**. The situations when the centre had a positive migration balance and the regional hinterland a negative one – which could point to migration flows from the periphery to the centre of the macroregion – were relatively rare (12 cases, most of them in Central and Eastern Europe); the outflow from metropolises to their regional hinterlands was even smaller, which in turn could be seen as a proof of deurbanisation processes (3 relatively small macroregions: Belfast, Saarbrűcken, Bratislava) **(Figure 10c)**.

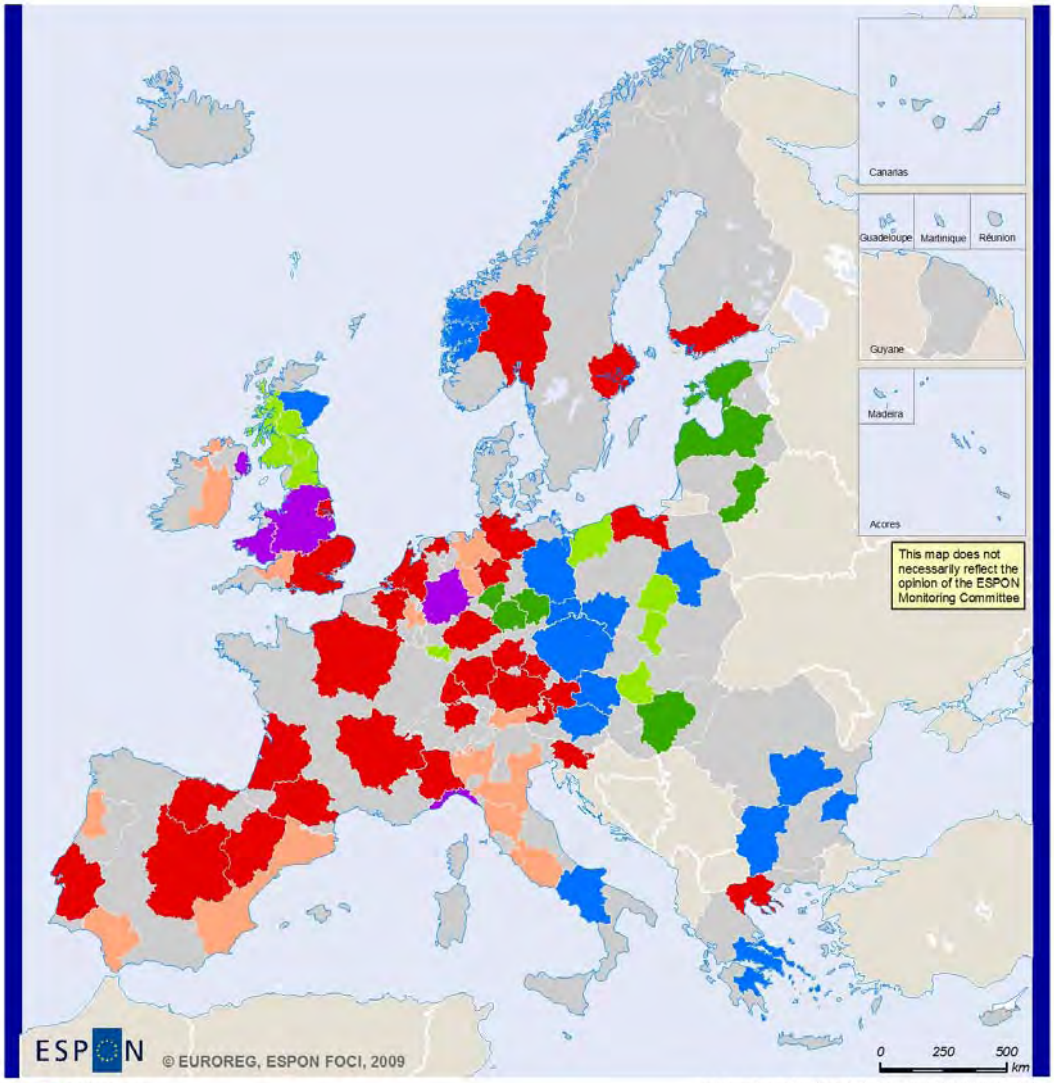
As a rule, demographic processes had a similar direction in both component parts of a given metropolitan macroregion **(Table 12)**. Only in 19 cases opposing processes could be observed: in 14 macroregions the number of the population was increasing in the metropolitan area and decreasing in the regional hinterland, whereas in 5 macroregions we could observe an opposite process. The former situation characterised mostly Central and Eastern European macroregions, ranging from Sofia and Bucharest through Prague and Warsaw to Berlin and Vienna, as well as Athens and Naples (**Figure 10a**). The greatest polarisation between these processes could be observed in the macroregions of smaller cities such as Varna (MA: +4.0%; RH: - 7.8%), Graz (MA: +5.6%, RH: -1.2%) and Bergen (MA: +3.0; RH: -0.6%). On the other hand, the depopulation of metropolitan areas coupled with a simultaneous population increase in their regional hinterlands was a process that could primarily be observed in the UK macroregions of Belfast, Cardiff and the polycentric region of Central England, as well as the German Rhine-Ruhr and Genoa in Italy.

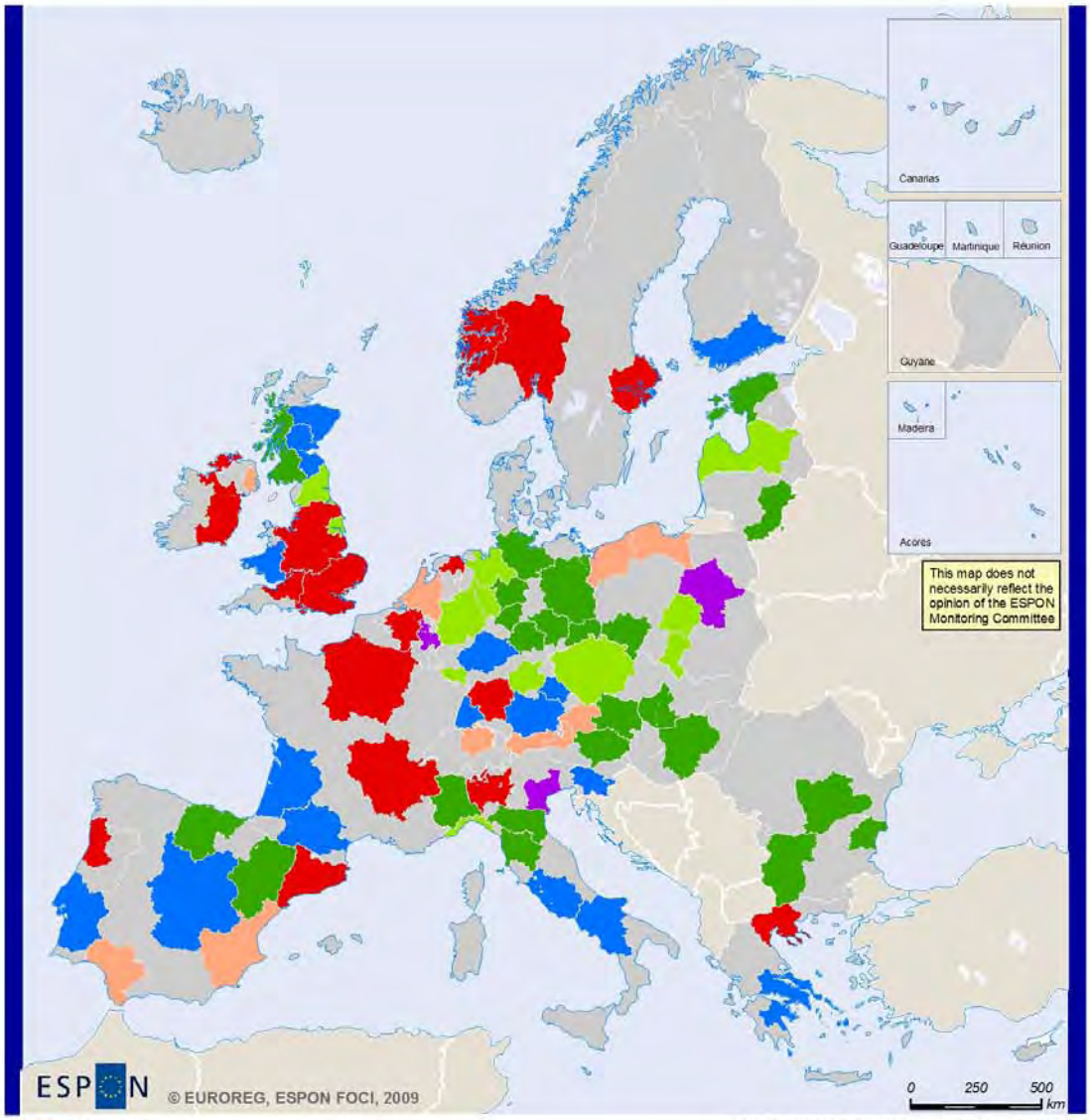
The population increase in the macroregions with a growing population was as a rule higher in metropolises than in their regional hinterlands (31 of 46 macroregions). Nevertheless, this correlation could not be observed in the case of population decrease: in 8 macroregions, it more strongly affected the metropolitan areas, and in 7 cases – the regional hinterlands of metropolises.

Type of macroregion	Population change	Natural increase	Migration balance
Increase MA > Increase RH (11)	31	16	27
Increase MA < Increase RH (12)	15	10	29
Increase MA i Decrease RH (21)	14	16	12
Decrease MA < Decrease RH (32)	7	23	5
Decrease CEC > Decrease RH (31)	8	12	4
Decrease MA i Increase RH (42)	5	3	3

Table 12. Demographic trends in metropolitan areas and their regional hinterlands [2000-2005]
Source: prepared by the author.

A relatively small number of macroregions (London, Paris, Milan, Lyon, Stuttgart) recorded a positive natural increase both in the metropolis and in its hinterland **(Figure 10b)**. In other macroregions, particularly in Western Europe, the positive natural increase model prevailed in metropolitan areas, with a simultaneous population decrease in the regional hinterland. On the other hand – with few exceptions – CEE countries and northern Germany noted more deaths than births in both constituent parts of metropolitan macroregions.


Canarias
Guadeloupe
Martinique
Réunion
Guyane
Madeira
Acores
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
ESPON
© EUROREG, ESPON FOCI, 2009
0 250 500 km
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
©Eurogeographics Association for administrative boundaries
Regional level: NUTS 3
Origin of data: ESPON project FOCI
Source: ESPON 2013 Database
Typology of macroregions - population change [2000-2005]
Increase MA > Increase RH (31)
Increase MA < Increase RH (15)
Increase MA & Decrease RH (14)
Decrease MA < Decrease RH (7)
Decrease MA > Decrease RH (8)
Decrease MA & Increase RH (5)


Canarias
Guadeloupe
Martinique
Réunion
Guyane
Madeira
Acores
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
ESPON
© EUROREG, ESPON FOCI, 2009
0 250 500 km
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
©Eurogeographics Association for administrative boundaries
Regional level: NUTS 3
Origin of data: ESPON project FOCI
Source: ESPON 2013 Database
Typology of macroregions - natural increase [2000-2005]
Increase MA > Increase RH (16)
Increase MA < Increase RH (10)
Increase MA & Decrease RH (16)
Decrease MA < Decrease RH (23)
Decrease MA > Decrease RH (12)
Decrease MA & Increase RH (3)

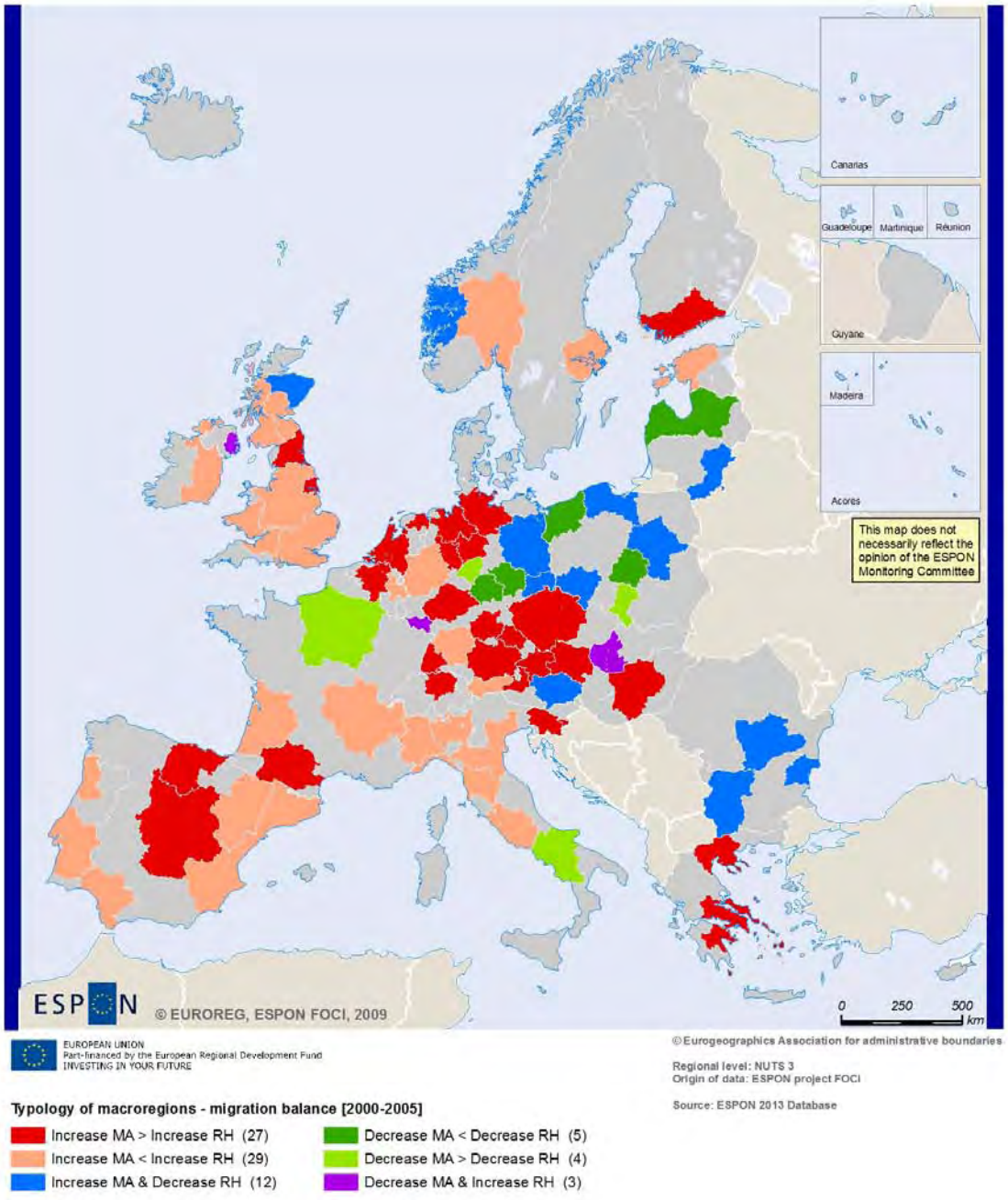


Figure 10. Demographic situation in metropolis-region context [2000-2005]
Source: prepared by the author.

The changes taking part in the component parts of the surveyed macroregions were quite distinctly correlated **(Table 13)**. In particular, this was true for the natural increase

(k=0.76). In contrast, migration processes were not as strongly interlinked (k=0.52), which in some macroregions could point to movements of people between the metropolis and its hinterland, directed to metropolitan areas. At the same time, the relativisation of the population dynamics in metropolitan macroregions vis-à-vis the situation in individual countries revealed a negative correlation: a population increase in the metropolitan area faster than the average national increase denoted a smaller than average increase of the population in the regional hinterland. This was mainly due to the differences in the migration balances. We can conclude therefore that the compatibility of demographic trends observable in macroregions largely resulted from the differences between individual countries, whereas the dominant trend observable in individual countries was the concentration of the population in metropolitan areas.

a) nominal values

Regional hinterland Metropolitan area	Population change	Natural increase	Migration balance
Population change	0.64**	0.38*	0.60**
Natural increase	0.52**	0.76**	0.37*
Migration balance	0.45**	*0.01*	0.52**

b) values relativised using the national average

Regional hinterland Metropolitan area	Population change	Natural increase	Migration balance
Population change	-0.56**	-0.28*	-0.51**
Natural increase	*-0.21*	-0.43**	*-0.05*
Migration balance	-0.60**	*-0.14*	-0.63**

Table 13. Correlation between changes in metropolises and their regional hinterlands [2000-2005]
Source: prepared by the author.

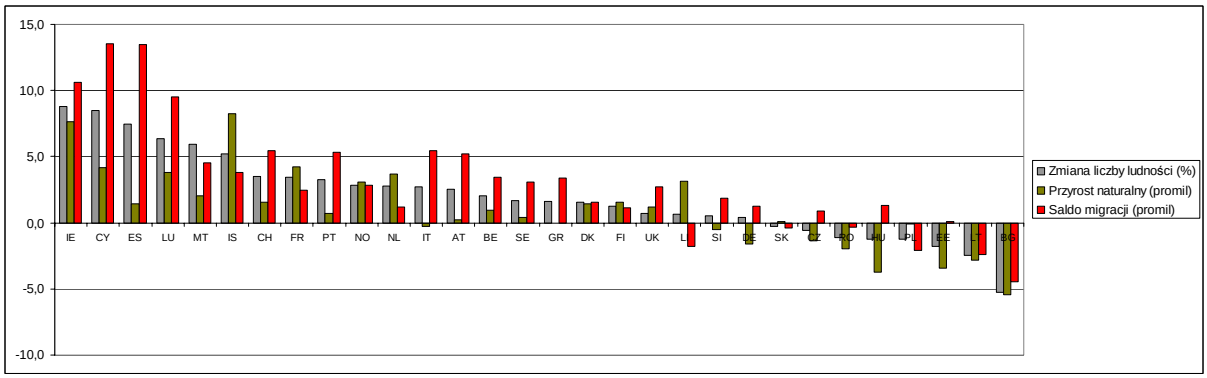


Figure 11. Demographic situation by ESPON country in 2005.
Source: prepared by the author.

The analysis of extreme cases produces interesting information which helps interpret the phenomena described above as it placed them more specifically in their regional context

(Table 14). In the group of five metropolitan areas with the greatest demographic dynamics, there were three Spanish cities: Madrid, Valencia and Barcelona, Toulouse (France) and Dublin (Ireland). Interestingly, in as many as three of these cases (Valencia, Dublin and Barcelona), the rate of the population increase in the regional hinterland was faster than in the metropolitan area, which proved a high migration attractiveness of these macroregions (probably caused by the natural environment assets).

On the other hand, among the five metropolitan areas where the population decrease was the fastest were old industrial districts such as: Łódź (Poland), Leipzig/Halle (Germany), Glasgow (Scotland), as well as two capital city regions of new Member States, i.e. Riga and Bratislava. And, while the regional hinterlands of Glasgow and Bratislava had a positive migration balance – which could point to suburbanisation processes going beyond the metropolitan areas' boundaries - in the remaining cases the reduction of the population clearly affected these two component parts of macroregions.

Metropolitan macroregion	Metropolitan area			Regional hinterland		
	Population change (%)	Natural increase (‰)	Migration balance (‰)	Population change (%)	Natural increase (‰)	Migration balance (‰)
Metropolitan areas with highest population increase						
Madrid	12.2	4.2	18.8	5.5	-0.9	11.7
Toulouse	8.9	5.0	12.1	5.4	-1.3	11.8
Valencia	8.7	1.1	15.7	15.7	3.0	26.1
Dublin	7.7	9.5	5.2	11.4	6.6	14.9
Barcelona	7.5	2.0	12.4	14.4	1.0	26.0
Metropolitan areas with highest population decrease						
Łódź	-2.3	-4.3	-0.2	-1.1	-1.3	-1.1
Riga	-2.3	-4.7	-0.1	-3.2	-4.4	-2.1
Leipzig/Halle	-2.3	-3.1	-0.4	-6.6	-5.5	-7.1
Bratislava	-2.6	-1.2	-4.0	-0.7	-1.8	0.5
Glasgow	-2.7	-0.6	0.2	-1.3	-1.9	1.6

Table 14. Extreme cases in terms of population change in the metropolitan area
Source: prepared by the author.

In the analysis of the impact of the settlement system on demographic processes, we used a few simple indicators[19] such as:

- The number of the population and population density in the metropolitan area and its regional hinterland;
- The share of the largest city (within its administrative boundaries) in the population of the metropolitan area and in the population of the regional hinterland;

[19] Data derived from the most recent Urban Audit (2003-2006).

- The ratio between the population of the largest cities (within their administrative boundaries) of the metropolitan area and the regional hinterland.

It turned out that the structure of the settlement system shown in this manner was not distinctly correlated with demographic processes. The only significant if weak correlations could be observed between the following indicators (in brackets, values of the *k* coefficient with the significance level of 0.05):

- The number of the population of the metropolitan area and the natural increase in the metropolitan area (0.27);
- The share of the city in the population in the metropolitan area and migration inflow into the city (0.26) and the natural increase in the regional hinterland (-0,36);
- The number of the population of the regional hinterland and the natural increase both in the metropolis (0.25) and in the regional hinterland (0.23);
- The migration inflow to the metropolitan area and the population density in the regional hinterland (-0.24);
- The size of the largest city of the regional hinterland and the natural increase in the regional hinterland (0.28);
- The ratio of the population density in the centre and that in the regional hinterland and the population increase in the metropolitan area (0.27).

The majority of these correlations were most likely merely superficial, due to the impact of extreme cases, which can be distinctly seen in the scatter diagrams. In addition to that, in some cases the correlations were indirect, related to other factors such as the differences in the age structure of the population of the macroregions' component parts, as well as the differences in the immigrants' areas of origin.

Summary – demographic situation

Based on our analyses, we can propose the following conclusions relating to the demographic development of metropolitan macroregions in the years 2000-2005:

- The population increase observable in most metropolitan macroregions helped strengthen their role in the analysed countries;
- The population increase in metropolitan macroregions was mainly caused by migration inflows (positive migration balance both in the metropolitan areas and in the regional hinterland of the metropolis), which was probably connected with the segmentation of migration – young people in working age would immigrate to metropolitan areas to seek employment or to study, whereas middle-aged or

retired people would move to areas situated further from the centre, seeking a higher quality of life and better living conditions;

- The natural increase played a smaller role in the population dynamics, and as a rule was positive in metropolitan areas and negative in their regional hinterlands, which in all probability was caused by the differences in the age structure of the population: metropolises were to a larger extent inhabited by people in reproduction age, whereas people in older age groups accounted for a larger share of the population in the regional hinterlands;
- In light of the research, the structure of the settlement system, measured using simple indicators (population density, degree of polycentricity), did not have any substantial bearing on those processes.

The economic structure

There were marked differences between the surveyed macroregions in terms of economic structure[20]. The smallest differences could be observed in the agricultural sector as its share in the gross added value (GVA) in 2005 was on average 2.1%, exceeding 5.0% only in few macroregions. The role of industry was more varied, with differences ranging from 15.4% to 41.5% - and its share in GVA reached on average 28.2%. Similarly, the services sector had a nearly 70% share in GVA, oscillating from 56.2% to 83.5%.

In the years 1998-2005, the share of the agricultural sector in the value of products and services was systematically falling in all macroregions **(Table 15)**. The reduced share of agriculture was more strongly visible in non-metropolitan areas (-1.9pp) as this sector had already played a lesser role in the economies of metropolitan areas (on average, 1.1% of GVA). At the same time, deindustrialisation processes affected metropolitan areas more strongly (-2.5pp), while in their regional hinterlands, industry was still a significant player despite a 1.5pp decrease (32.5%). As a result of these processes the share of the services sector increased as it grew by 3.1pp in metropolises, mostly at the expense of industry, and by 3.2pp in the regional hinterland – which is a reflection of the waning of the traditional agriculture- and industry-based economy.

[20] The economic structure of metropolitan macroregions (N=79) was analysed on the basis of 2003 EUROSTAT data on gross value added (GVA) for three main sectors: agriculture, industry and construction, and services for NUTS3 entities. In addition, for some macroregions (N=77), the internal structure was analysed taking into account three aspects: "simple" services (sections: G: trade and repairs, H: hotels and restaurants, I: transport, storage and communication), "advanced" services (J: financial intermediation; K: real estate, renting and business activities), and "public" services (L: public administration, M: education, N: health and social work, O: community services). These data were derived from the IGEAT database created for the needs of the project based on the NUTS3 system for 2006.

Component part	Agriculture		Industry and construction		Services	
	% GVA in 2005	Change in pp in 1998-2005	% GVA in 2005	Change in pp in 1998-2005	% GVA in 2005	Change in pp in 1998-2005
Metropolitan area	1.1	-0.7	25.5	-2.5	73.4	3.1
Regional hinterland	4.2	-1.9	32.5	-1.5	62.4	3.2

Table 15. Basic economic structure indicators in metropolitan macroregions
Source: prepared by the author.

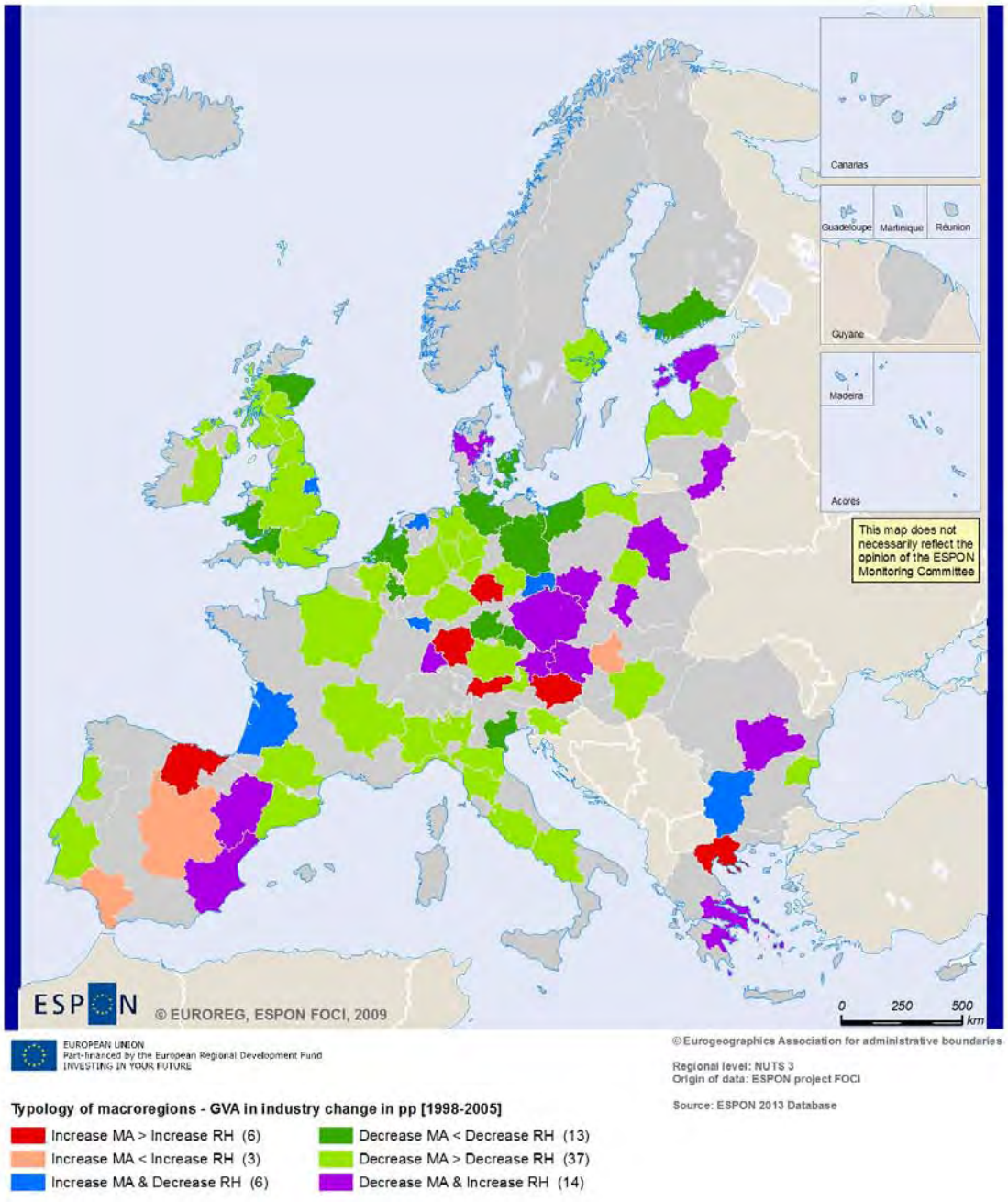
While in the case of agriculture, the directions of changes in both component parts of the majority of macroregions were convergent, the situation in industry and services was much more complex **(Table 16).** In about 20 macroregions, opposing tendencies relating to the role of these sectors in the metropolis and in the region could be observed.

Type of macroregion	Share of agriculture	Share of industry	Share of services
Increase MA > Increase RH	0	6	24
Increase MA < Increase RH	0	3	35
Increase MA i Decrease RH	1	6	7
Decrease MA < Decrease RH	27	13	1
Decrease MA > Decrease RH	51	37	0
Decrease MA i Increase RH	0	14	12

Table 16. Structural trends in the metropolitan areas and their regional hinterlands [1998-2005]Source: prepared by the author.

In the vast majority of macroregions, deindustrialisation was the dominant process; it was progressing at a particularly fast rate in the regional surroundings of large cities in the United Kingdom, Italy, France, Benelux countries and Germany (with the exception of Stuttgart and Erfurt) **(Figure 12a)**. In some macroregions, these processes of relative deindustrialisation of metropolitan areas were accompanied by an increased role of industry in the regional hinterland. Here, examples include the capital city macroregions of CEE countries (including Austria) as well as some regions of Spain (Valencia, Saragossa). In contrast, the role of industry grew only in a very small number of macroregions, both due to its faster development in metropolitan areas, e.g.: Bilbao, Stuttgart, Thessaloniki, Graz, Innsbruck or Erfurt, and in their regional hinterlands, e.g. Madrid, Seville or Bratislava. As a matter of course, increasing industrialisation was followed by a relative diminishing of the significance of the service sector in the economy.

The role of the services sector grew relatively faster in non-metropolitan locations. Nevertheless, in some places of Europe (northern England and Scotland, northern Italy, the regions of some cities in Central and Eastern Europe and in northern Germany), this sector was developing relatively faster in metropolises than in their hinterlands **(Figure 12b)**. Moreover, opposing tendencies concerning the development of this sector could be frequently observed in the metropolis-the region context. As a rule, this led to a relative increase of the concentration of the services sector, particularly in the capital city regions of CEE countries. On the other hand, a relative deconcentration of services could be seen particularly distinctly in Spanish macroregions (Madrid, Bilbao), some regions of Germany (Stuttgart, Erfurt) and Austria (Innsbruck, Graz) and, to a lesser extent, in some of CEE countries (Budapest, Sofia, Bucharest).


Canarias
Guadeloupe
Martinique
Réunion
Guyane
Madeira
Acores
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
ESPON
© EUROREG, ESPON FOCI, 2009
0 250 500 km
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
©Eurogeographics Association for administrative boundaries
Regional level: NUTS 3
Origin of data: ESPON project FOCI
Source: ESPON 2013 Database
Typology of macroregions - GVA in industry change in pp [1998-2005]
Increase MA > Increase RH (6)
Increase MA < Increase RH (3)
Increase MA & Decrease RH (6)
Decrease MA < Decrease RH (13)
Decrease MA > Decrease RH (37)
Decrease MA & Increase RH (14)

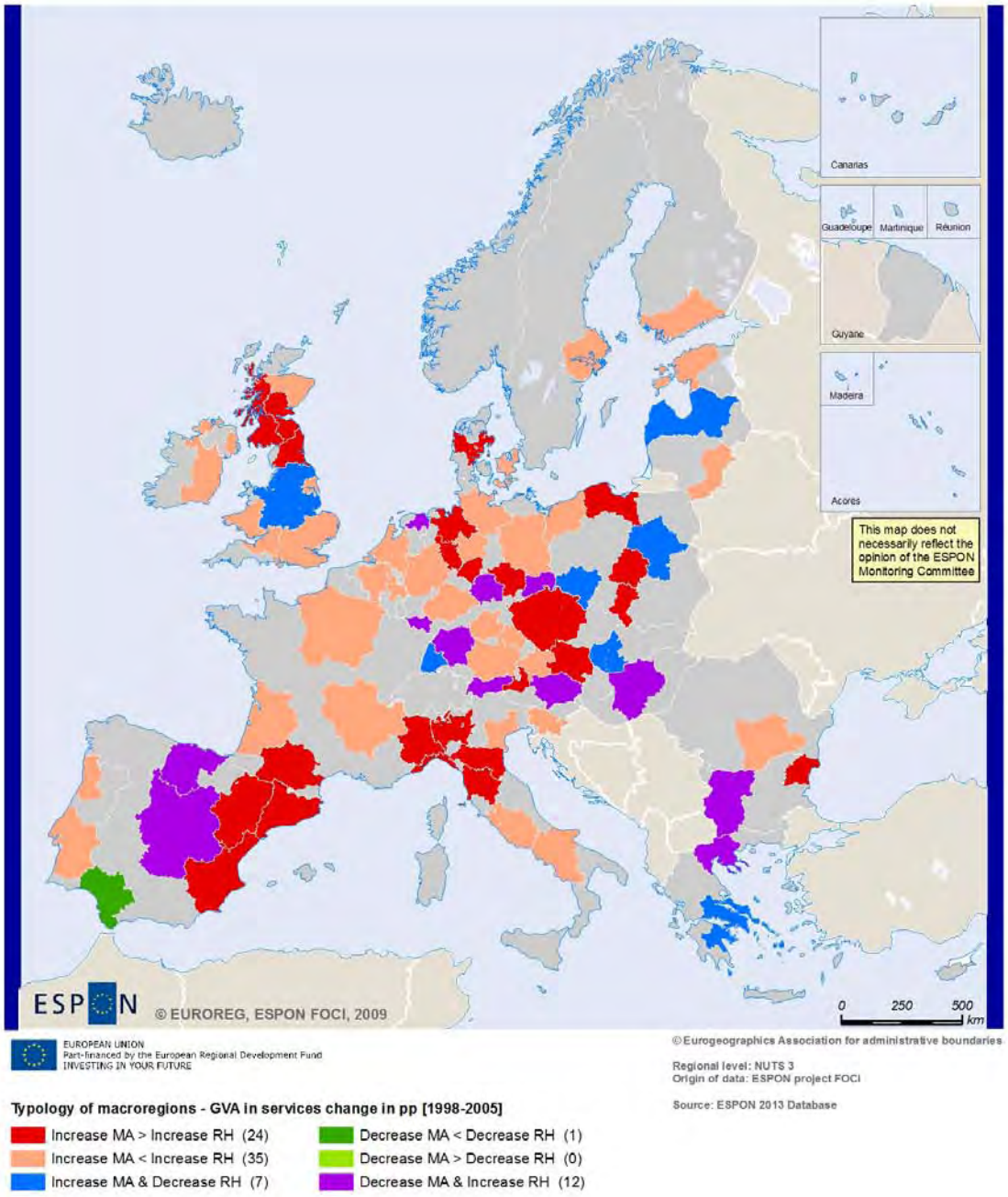


Figure 12. Change in the economic structure in metropolis-region context [1998-2005]
Source: prepared by the author.

A synthetic view of the structural differences between the metropolis and the region for the three principal sectors can be shown using the dissimilarity index, expressed by the following formula:

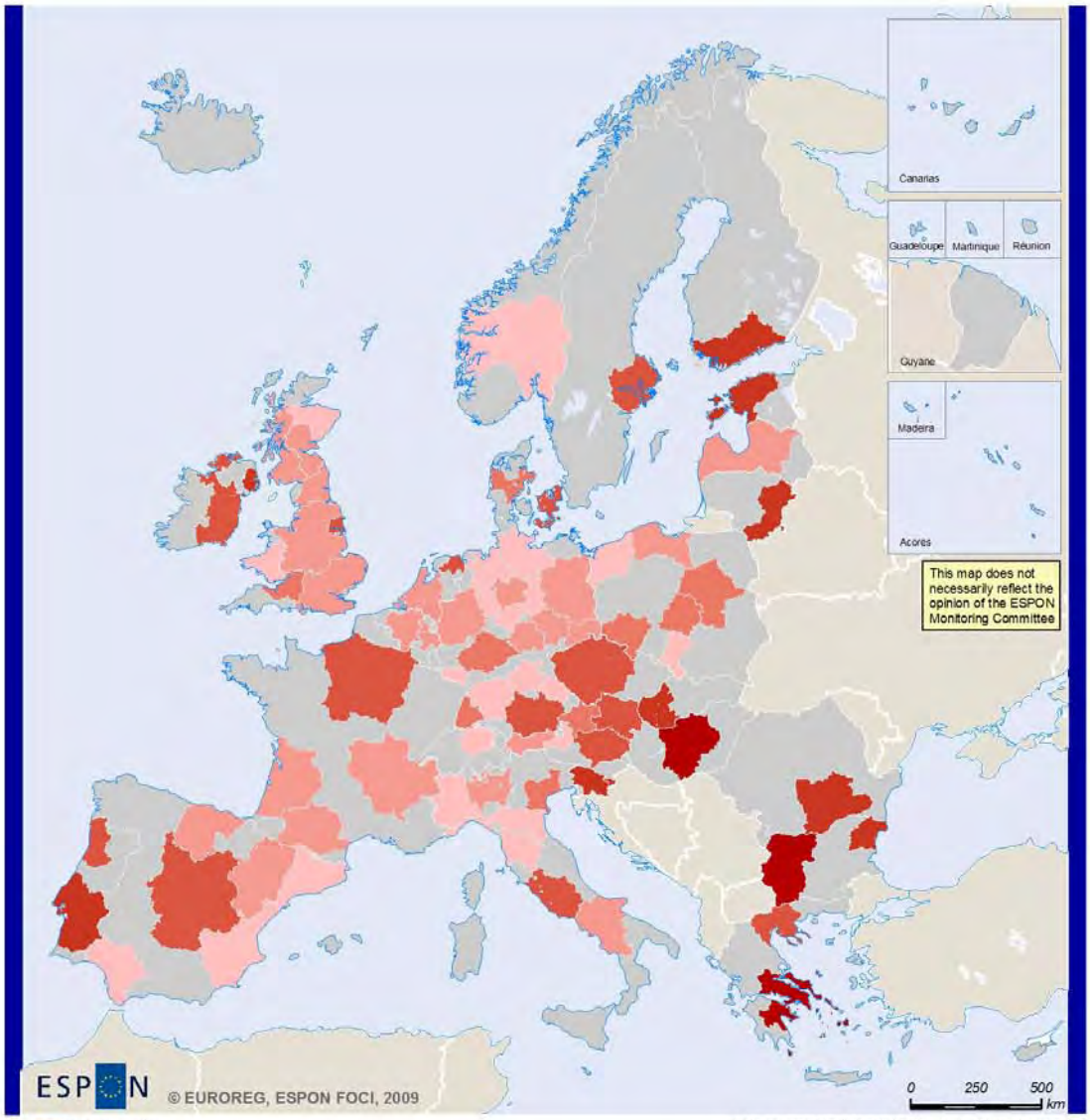
$\Sigma_{i \to N} | a_i/A - b_i/B | / 2$

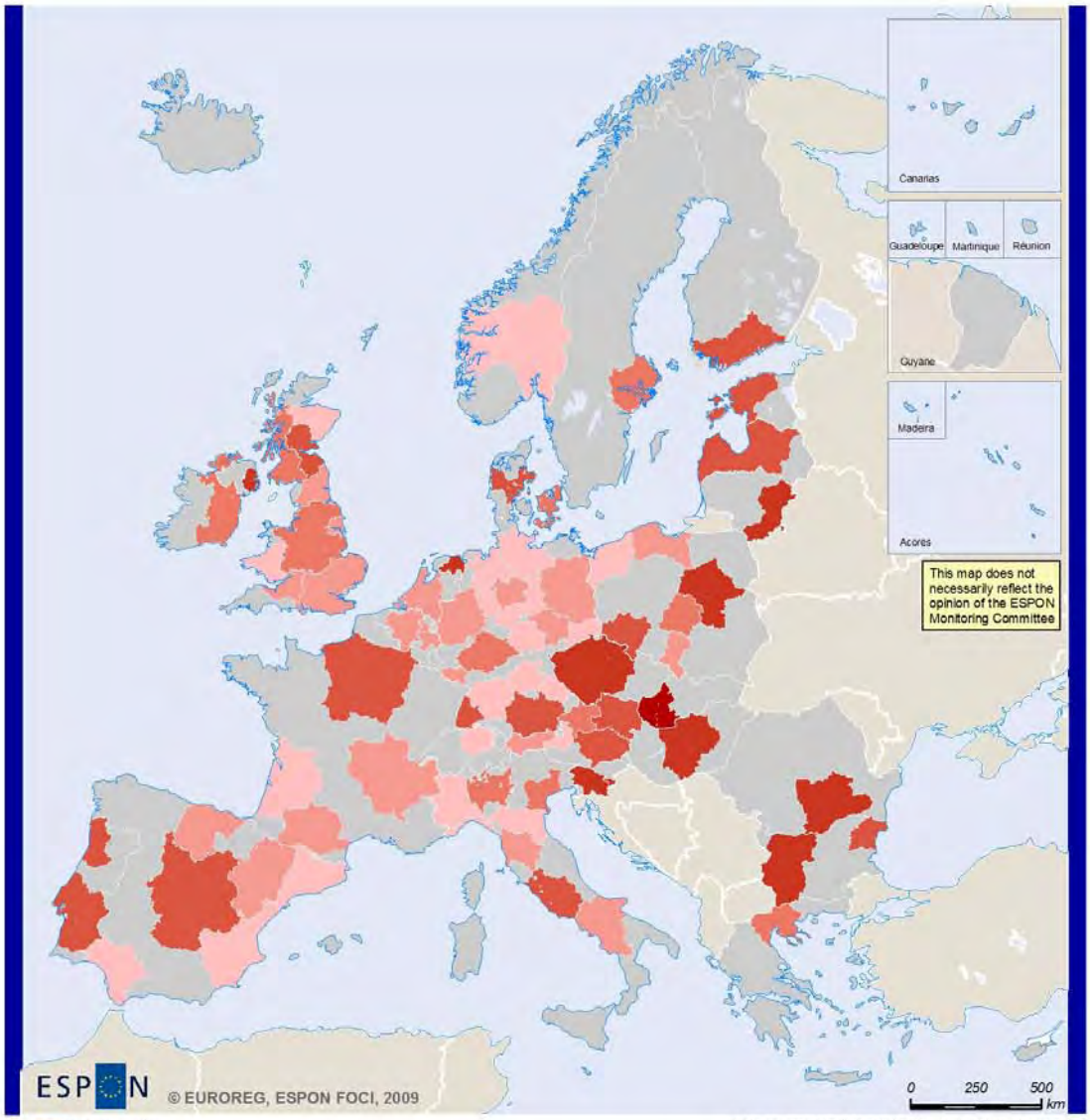
where: i – sector of the economy, a/A – GVA of the metropolitan area, b/B – GVA of the regional hinterland.

This index can be expressed in the percentage form and can assume values from 0 – total similarity, to 100 – denoting the total dissimilarity of the economic structure.

In 1998-2005, the average structural similarity rate within metropolitan macroregions was very high (ca. 11%) as well as stable (change only by 0.2%). Nevertheless, significant differences were observable between macroregions, with the figures ranging from 0% to 40%. At the same time, the pace of changes in the economic structure was similar in the metropolis-the region context, and reached 3.7pp in metropolitan areas and 4.1pp in their regional hinterlands.

Structural disparities were particularly high in the capital city macroregions of CEE countries (Warsaw, Budapest, Sofia, Bucharest, Vilnius, Ljubljana, Bratislava, Prague), including Greece (Athens) **(Figure 13)**. At the same time, some macroregions were internally homogenous in terms of economic structure, e.g. the Spanish regions of Barcelona, Valencia, Seville, Emilia-Romagna in Italy or selected regions of northern (e.g. Hamburg and Bremen), as well as southern Germany (e.g. Stuttgart, Nuremberg). On the other hand, changes in the dissimilarity index values were rather “patched” spatially. The differences in this respect as a rule increased in CEE countries, northern England and Scotland, and in selected regions of Germany (Hamburg, Munich, Rhine-Ruhr), Italy (Turin, Milan, Florence), Spain (Valencia, Seville) and Greece (Athens). In contrast, in some of the major Western European macroregions (including London and Paris), the economic structures of the metropolis and the regional hinterland were becoming increasingly similar.


Canarias
Guadeloupe
Martinique
Réunion
Guyane
Madeira
Acores
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
ESPON
© EUROREG, ESPON FOCI, 2009
0 250 500 km
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
©Eurogeographics Association for administrative boundaries
Regional level: NUTS 3
Origin of data: ESPON project FOCI
Source: ESPON 2013 Database
Dissimilarity index 1998 [%]
0,8 up to 5 (3)
5 up to 10 (9)
10 up to 15 (14)
15 up to 20 (10)
20 up to 25 (23)
25 up to 31,4 (20)


Canarias
Guadeloupe
Martinique
Réunion
Guyane
Madeira
Acores
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
ESPON
© EUROREG, ESPON FOCI, 2009
0 250 500 km
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
©Eurogeographics Association for administrative boundaries
Regional level: NUTS 3
Origin of data: ESPON project FOCI
Source: ESPON 2013 Database
Dissimilarity index 2005 [%]
0,8 up to 5 (2)
5 up to 10 (9)
10 up to 15 (16)
15 up to 20 (11)
20 up to 25 (21)
25 up to 39,8 (20)

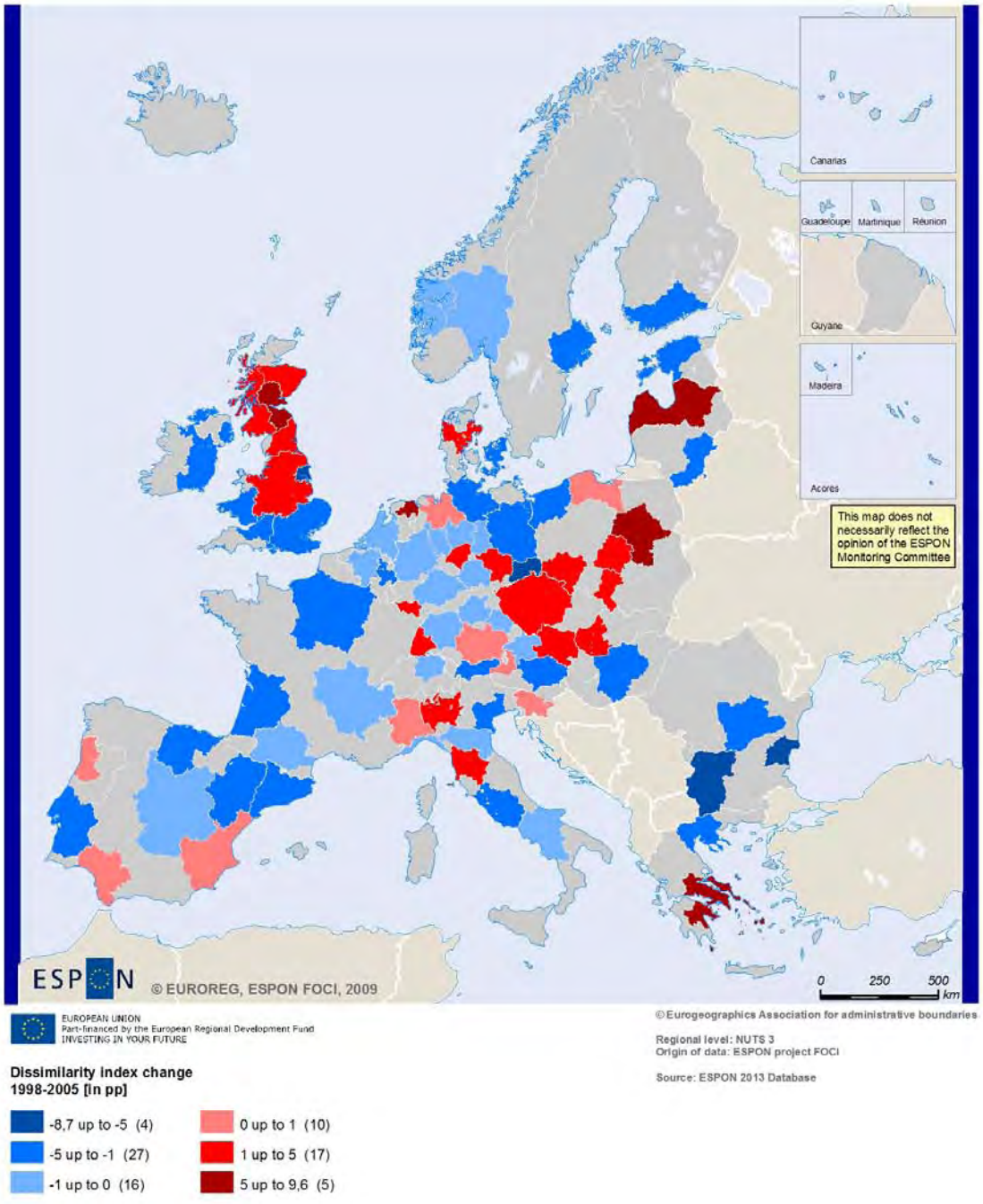


Figure 13. Structural similarity and its changes in metropolis-region context
Source: prepared by the author.

The structural changes in the metropolis and in the region did not show any significant correlation. This means that, for instance, the increased significance of the services sector in the metropolis did not imply specific structural changes in the regional hinterland. In effect, there existed wide disparities in this regard between macroregions, which could be seen as a proof of the *differentia specifica* of the each metropolis-region system.

This is also corroborated by the analysis of five extreme cases in terms of decreased similarity of the economic structure. In some of them (e.g. Warsaw and Athens), the deindustrialisation process progressed rapidly in metropolises, which was accompanied by a simultaneous development of the production sector in their regional hinterlands **(Table 17)**. However, in other macroregions (e.g. Edinburgh) the speedy development of the metropolitan service sector was accompanied by a deindustrialisation process in the regional surroundings. On the other hand, the unique character of the region of Groningen, a city in northern Holland, was expressed by the fact that the significance of industry in the economy increased – quite a typical situation in smaller urban centres which did not perform significant service functions vis-à-vis external part of the regional hinterland.

Macroregion	GVA in agriculture		GVA in industry and construction		GVA in services	
	% in 2005	Change in pp in 1998-2005	% w 2005	Change in pp in 1998-2005	% in 2005	Change in pp in 1998-2005
Metropolitan area						
Warsaw	1.1	-0.5	18.5	-8.2	80.4	8.7
Athens	0.4	-0.2	15.0	-3.8	84.6	4.0
Riga	1.3	0.0	19.6	-8.5	79.0	8.6
Groningen	1.3	-0.7	51.2	2.5	47.5	-4.8
Edinburgh	0.4	-0.2	16.8	-9.5	82.8	9.7
Regional hinterland						
Warsaw	13.2	-2.6	30.9	3.5	55.9	-0.9
Athens	7.3	-4.2	47.8	9.5	44.9	-5.3
Riga	10.4	1.1	27.1	-0.9	62.4	-0.2
Groningen	3.9	-2.0	28.4	-3.2	67.8	2.2
Edinburgh	2.1	-1.0	30.2	-3.5	67.7	4.4

Table 17. Extreme cases in terms of the dissimilarity of economic structures
Source: prepared by the author based on EUROSTAT data.

In contemporary information economy, the increasing role of specialised B2B services is extremely important as compared to other types of services. The analysis investigating the share of specialised services in two NACE sections (J – financial intermediation and K – real estate, renting and business activities to simple services such as: trade and repair,

(G), transporting, storage and communication (H) as well as hotels and restaurants - I) shows that the higher was the share of services in the economy of a given macroregion the higher the share of specialised services **(Table 18).**

	Metropolitan area (MA) - share of services in GVA	Regional hinterland (RH) - share of services in GVA	Ratio of services' share in GVA [MA/RH]
Share of specialised services in GVA			
- metropolitan area	0.61**	0.42**	*0.01*
- regional hinterland	*0.19*	0.59**	-0.44**
Share of simple services GVA			
- metropolitan area	*0.06*	-0.41**	0.46**
- regional hinterland	*0.00*	0.24*	-0.25*

** at the significance level of 0.01
* at the significance level of 0.05

Table 18. Correlation between the share of specialised services in GVA and the role of the service sector [2002]
Source: prepared by the author.

This correlation was equally visible in the metropolises and in their regional hinterlands. Furthermore, the metropolis' "advancement" in services, understood as a high share of specialised services in Gross Value Added had a positive though smaller impact on the services sector in the regional hinterland. In contrast, the role of simple services was different: their high share in the metropolitan economy would as a rule imply a small share of services in the regional hinterland's GVA, and thereby broader differences in the role of services between the metropolis and the region.

This correlation can hypothetically indicate situations when the provision of simple services to the regional hinterland by the metropolitan centre obstructs the development of such services in the regional hinterland and leads to the so-called "shadow effect" of the metropolis. However, the comparative analysis of the service sector structure shows that there exists a positive correlation between the role of the simple services sector in the metropolis and in the regional hinterland **(Table 19)**. Moreover – and very interestingly – a higher share of simple services in the metropolitan economy implies a smaller role of the specialised services sector and (albeit to a lesser extent) public services in the regional hinterland's economy. This interrelationship is difficult to explain, and it should be borne in mind that it could be coincidental, caused by an interplay of other factors not included in this part of the study.

Regional hinterland Metropolitan area	Share of simple services	Share of specialised services	Share of public services
share of simple services	0.46**	-0.57**	-0.44**
share of specialised services	-0.28*	0.59**	0.26*
share of public services	*-0.17*	*0.13*	0.67**

** at the significance level of 0.01
* at the significance level of 0.05

Table 19. Correlation between the shares of different types of services in GVA in the metropolis and in the region [2002]
Source: prepared by the author.

Summary

Based on our analyses, we can draw the following conclusions concerning the changes in the economic structure which took place in metropolitan macroregions in the years 1998-2005:

- The structural differences between the metropolis and the region are primarily due to the different roles of industry in the economy, whereas the differentiating significance of the agricultural sector, expressed as its share in gross added value, is only marginal.
- It is difficult to identify linkages between structural changes occurring in metropolises and in their regional hinterlands. In some regions, similar processes take place (e.g. an increasing role of services), whereas opposing trends can be observed in other macroregions (e.g. increasing share of services in the metropolitan area's economy, accompanied by a simultaneous industrialisation of the metropolitan regional hinterland).
- The role of services in metropolitan services results from a growing role of specialised services, whereas the service "advancement" of the metropolis is usually accompanied by an increased role of services in the regional hinterland.
- A greater role of simple services in the metropolis is correlated with a smaller role of specialised and public services. However, suggesting the direct reason for this is difficult.

Labour market situation

On the basis of analyses depicting the labour market situation[21], we can say that there were few disparities in this regard between the metropolis and the region as compared to the demographic and structural aspects. In 2005, per 1000 inhabitants of the metropolitan region, on average ca. 448 were employees. In effect, the activity rate was 47.7% with the rate of unemployment reaching 9.5%. In addition, despite favourable economic performance, there was no marked improvement of the situation in macroregional labour markets in the years 2002-2005. As an example, the average unemployment rate remained at a similar level even though the activity level improved, albeit slightly.

The surveyed component parts of macroregions, i.e. metropolitan regions and their regional hinterlands, differed mostly in terms of the number of employees per 1000 population **(Table 20)**, which was visibly higher in metropolises. This can be due to a higher percentage of the non-working age population and to commuting to work from locations beyond the boundaries of metropolitan areas. At the same time, the situation in macroregional labour markets in terms of activity rate and unemployment rate was quite similar, with a slight prevalence (by about 2pp) of metropolitan areas over their regional hinterlands.

	Employees per 100 population		Activity rate		Unemployment rate	
	% in 2005	Change in pp in 2000-2005	% in 2005	Change in pp in 2002-2005	% in 2005	Change in pp in 2002-2005
Metropolitan area	48.8	0.9	48.9	1.3	8.4	-0.1
Regional hinterland	41.0	0.2	46.6	0.9	10.5	0.1

Table 20. Basic labour market indicators in metropolitan macroregions [2005]
Source: prepared by the author.

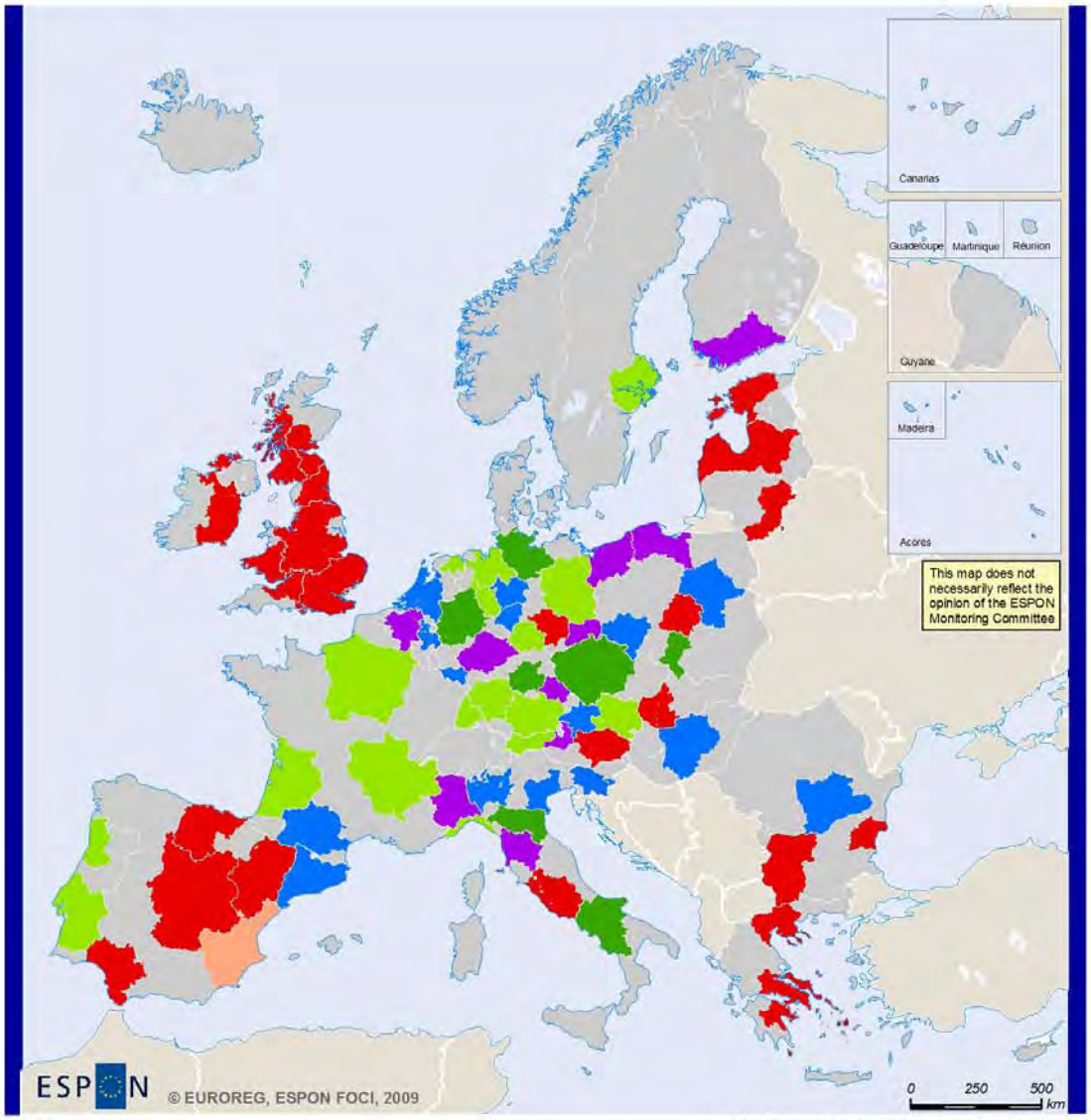
In addition to that, the labour market dynamics was rather similar in the surveyed metropolises vs. the regions **(Table 21)**. Generally, the labour market situation was improving, as a rule to a greater extent in metropolitan areas, which could be observed particularly well in British, Spanish and CEE macroregions. In contrast, in many of German, French, Italian and Austrian macroregions the labour market situation was

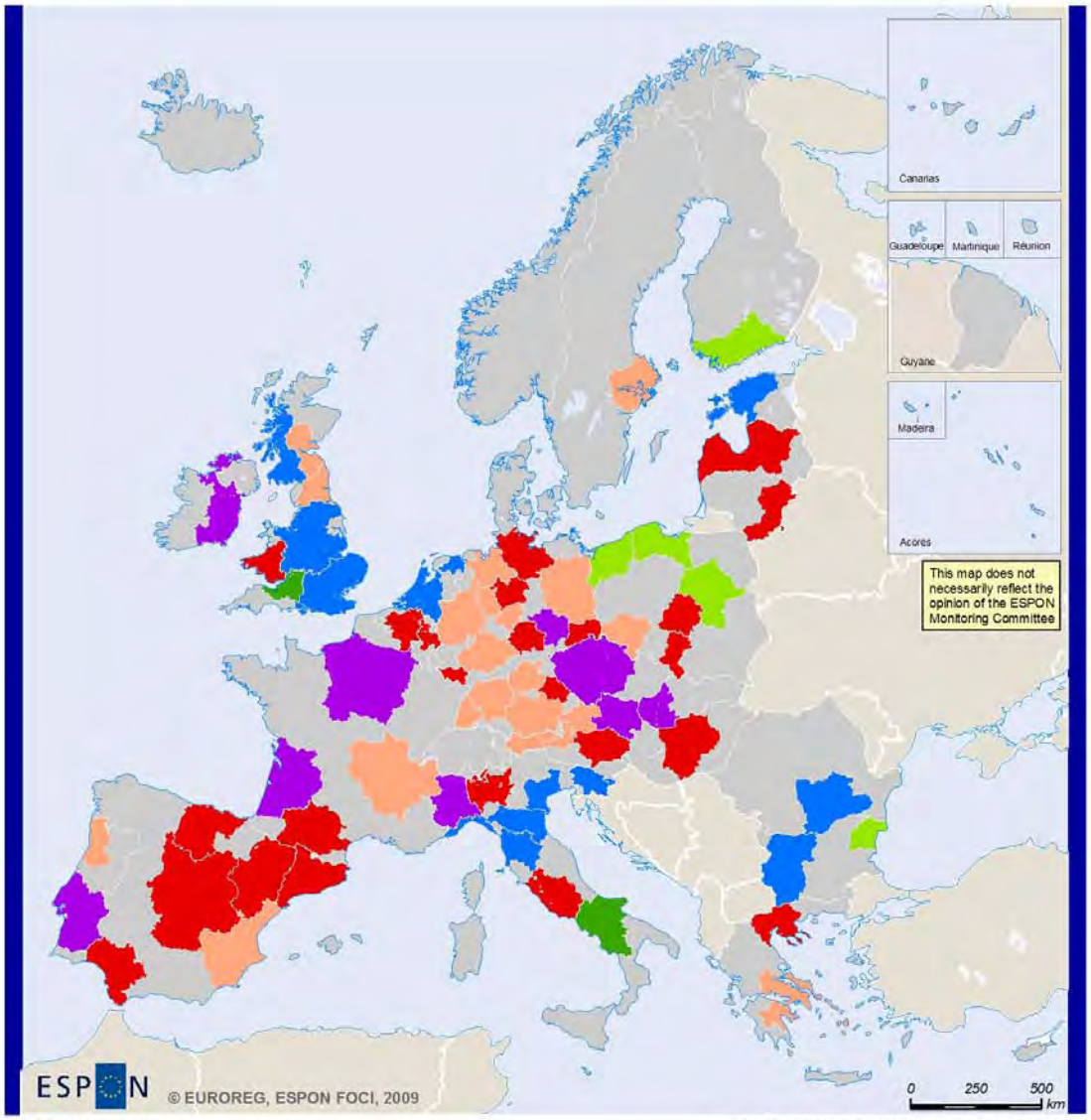
[21] Data on the situation in macroregional labour markets used in the present study were derived from two EUROSTAT sources: ESA95 (European System of Accounts) – showing data on the number of employees by place of work, and LFS (Labour Force Survey) – providing data on the number of economically active population and unemployment rate by place of residence. The data from the former source referred to the NUTS3 level in 2003, and from the latter – to the NUTS3 system in 2006.

deteriorating in both component parts of metropolitan macroregions. In the remaining countries, the situation varied from country to country, whereas the distribution of individual types of macroregions was rather patchy, which was particularly well visible in Italy and Poland **(Figure 14)**.

Types of macroregions	Employees per 100 population	Activity rate [%]	Unemployment rate [%] (reversed scale)
Increase MA > Increase RH	24	24	11
Increase MA < Increase RH	15	13	7
Increase MA i Decrease RH	7	2	16
Decrease MA < Decrease RH	1	21	15
Decrease MA > Decrease RH	17	5	20
Decrease MA and Increase RH	10	9	5

Table 21. Labour market trends in metropolises and its regional hinterlands
Source: prepared by the author.


Canarias
Guadeloupe
Martinique
Réunion
Guyane
Madeira
Acores
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
ESPON © EUROREG, ESPON FOCI, 2009
0 250 500 km
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
©Eurogeographics Association for administrative boundaries
Regional level: NUTS 3
Origin of data: ESPON project FOCI
Source: ESPON 2013 Database
Change in employees per 100 population in percentage points [2002-2005]
Increase MA > Increase RH (24)
Increase MA < Increase RH (1)
Increase MA & Decrease RH (15)
Decrease MA < Decrease RH (7)
Decrease MA > Decrease RH (17)
Decrease MA & Increase RH (10)


Canarias
Guadeloupe
Martinique
Réunion
Guyane
Madeira
Acores
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
ESPON © EUROREG, ESPON FOCI, 2009
0 250 500 km
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
©Eurogeographics Association for administrative boundaries
Regional level: NUTS 3
Origin of data: ESPON project FOCI
Source: ESPON 2013 Database
Change of activity rate in percentage points [2002-2005]
Increase MA > Increase RH (24)
Increase MA < Increase RH (21)
Increase MA & Decrease RH (13)
Decrease MA < Decrease RH (2)
Decrease MA > Decrease RH (5)
Decrease MA & Increase RH (9)

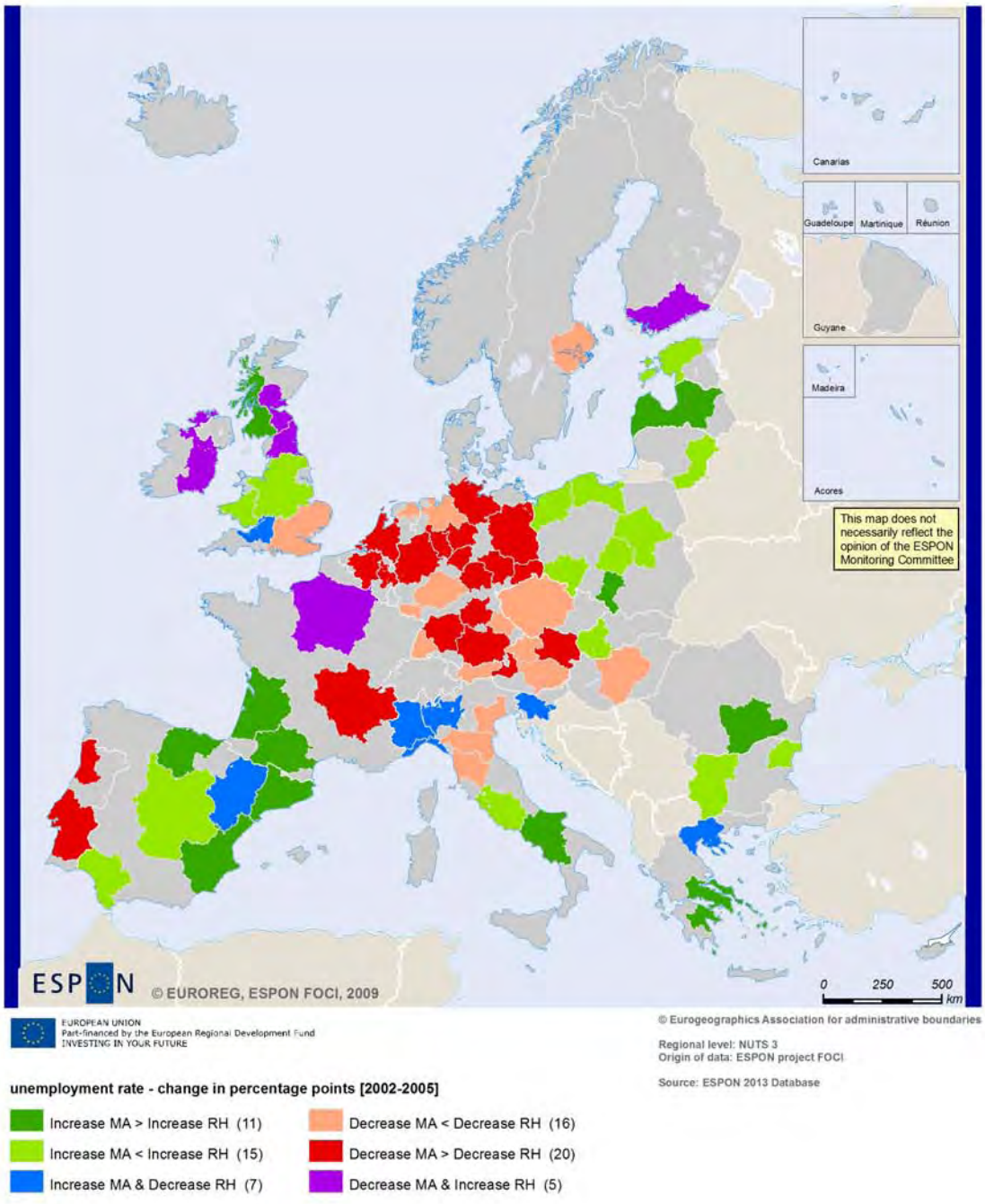


Figure 14. Changes in labour market situation in metropolis-region context in 2002-2005
Source: prepared by the author.

The situation and changes in the labour market situation were quite similar in the analysed metropolises and regions. In particular, an improved situation in the metropolitan labour market would as a rule imply an improvement in the regional hinterland's labour market, mostly with regard to the unemployment rate (k=0.68) and the number of employees per 100 population (*k*=0.72). In contrast, the intraregional correlation in terms of activity rate changes was weaker (k=0.54). Also, in 2005 the correlation between the values of three analysed indicators (i.e. employees, activity rate and unemployment rate) in the metropolis and in the region remained at a similar level. Furthermore, in 2005 a high unemployment in metropolises was strongly correlated statistically with a small percentage of employees per 100 population in the regional hinterland, which is difficult to interpret. It could well be that this was caused by a negative impact of the metropolis' problems on cooperation linkages between the metropolis and the region.

a) status [2005]

Region Metropolis	Employees per 100 population	Activity rate	Unemployment rate
Employees per 100 population	0.58**	0.30*	-0.33*
Activity rate	*0.15*	0.52**	*-0.07*
Unemployment rate	-0.77**	-0.24*	0.58**

b) change [2002-2005]

Region Metropolis	Employees per 100 population	Activity rate	Unemployment rate
Employees per 100 population	0.72**	*-0.02*	-0.59**
Activity rate	*0.06*	0.54**	0.22*
Unemployment rate	-0.53**	0.33*	0.68**

** at the significance level of 0.01
* at the significance level of 0.05

Table 22. Correlation between labour market situation and change in the metropolis and its regional hinterland]
Source: prepared by the author.

It should be pointed out that the labour market dynamics in the surveyed metropolises and regions was significantly shaped by the economic performance in the country at large. In the years 2002-2005, the situation in this respect varied from country to country. The highest fall in the unemployment rate was recorded in CEE countries (except Bulgaria), mostly the Baltic countries (Lithuania, Latvia, Estonia), as well as Poland, Slovakia and Romania. On the other hand, among the EU-15, the situation got

better in Spain and Italy, and deteriorated – though not as strongly - in Germany, Portugal, Sweden and the Netherlands **(Figure 15)** .

To some extent, the tendencies described above are reflected in an analysis of extreme cases **(Table 23)**. For instance, the most significant unemployment rate decreases, measured in percentage points, could be observed in the metropolises of Southern Europe: in Naples (Italy) and Seville (Spain) as well as in Central and Eastern Europe: Vilnius (Lithuania), Varna and Sofia (Bulgaria). As unemployment fell, the number of employees per 100 population was increasing rapidly, which was particularly well visible in Bulgaria. In addition to that, the unemployment rate fell comparably also in the regional hinterlands of these metropolises (except Naples). As a result, the situation in regional labour markets became more uniform - except Seville and Varna, where unemployment was still felt more acutely in the metropolis' regional hinterland.

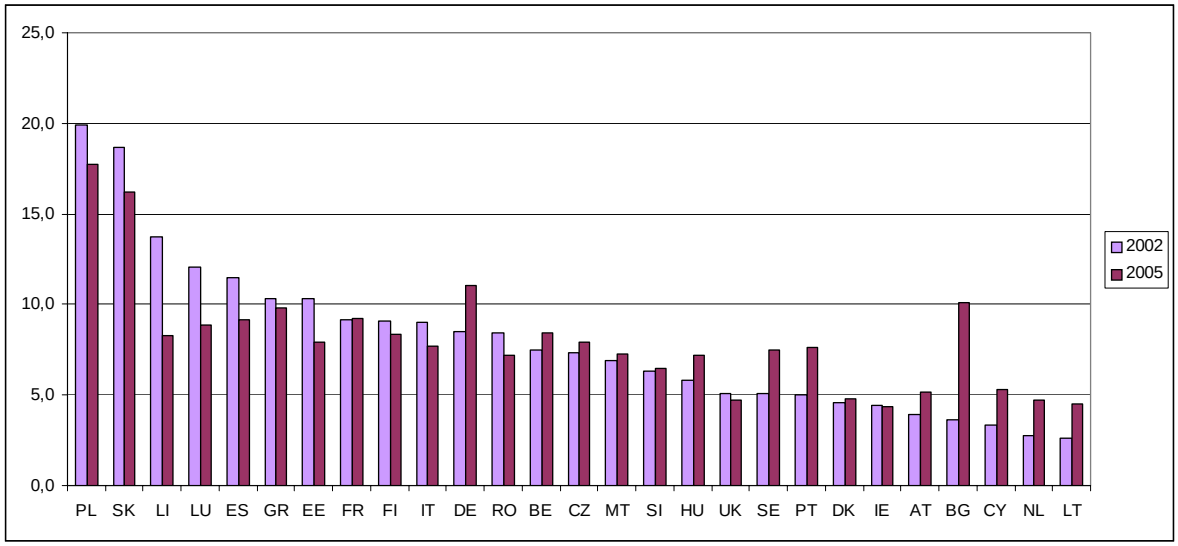


Figure 15. Changes in unemployment rate by ESPON country in 2002-2005.
Source: prepared by the author.

At the same time, the labour market situation deteriorated most alarmingly (with an increase in the unemployment rate by 3-5pp) in four German metropolises, and in Porto (Portugal). These processes affected the metropolises and their regional hinterlands equally strongly, as a result of which the unemployment rate was similar across the entire macroregion. Here, the differentiating factor (between the metropolis and the region) was the number of employees per 100 population, which oscillated between 45-52 in the metropolitan area and between 39-48 in the regional hinterland of the metropolis.

Macroregion	Metropolitan area				Regional hinterland			
	Unemployment rate		Employed per 100 population		Unemployment rate		Employed per 100 population	
	% in 2005	Change in pp in 2002-2005	% in 2005	Change in pp in 2002-2005	% in 2005	Change in pp in 2002-2005	% in 2005	Change in pp in 2002-2005
Metropolitan areas with highest unemployment rate decrease								
Naples	15.2	-7.2	31.5	-0.2	14.1	-0.3	31.5	-1.3
Seville	13.9	-6.3	37.9	3.0	17.1	-8.6	34.9	2.6
Vilnius	8.6	-5.9	46.6	4.6	7.1	-8.1	40.5	3.6
Varna	9.5	-5.8	46.2	12.0	16.7	-10.8	41.0	6.5
Sofia	8.0	-4.7	53.5	9.7	10.3	-7.1	39.7	3.6
Metropolitan areas with highest unemployment rate increase								
Saarbrücken	11.4	3.3	50.8	0.8	10.2	3.5	39.3	-0.2
Hanover	11.0	3.3	51.1	0.0	10.8	2.8	41.4	-0.2
Ruhr-Rhine	11.3	3.6	47.2	-0.1	8.8	2.8	44.8	-0.3
Bremen	11.6	4.5	48.0	-1.0	11.7	4.6	43.5	-0.4
Porto	10.8	4.8	46.1	-2.3	7.4	3.5	48.5	-1.5

Table 23. Extreme cases in terms of unemployment rate changes in the metropolitan area
Source: prepared by the author.

The economic growth without fostering a distinct improvement in the labour market situation was possible mainly due to an increase in labour productivity. Productivity in the surveyed metropolitan macroregions differed from region to region. **(Table 24)**. A comparison of productivity in industry and in services (without taking internal differences between them into account) points to a higher productivity in the former sector (by 13% higher in the metropolis and 11% in the regional hinterland), characterised by an increasing tendency concerning these disparities (ca. 5-6pp in 2002-2005). On the other hand, productivity in industry was even 2.5 to 3 times higher than in agriculture both in the metropolis and in the regional hinterland, and this ratio increased tangibly during the three years.

Ratio	Metropolitan area		Regional hinterland	
	2002	2005	2002	2005
Industry / Services	1.07	1.13	1.07	1.11
Industry / Agriculture	2.66	3.14	2.44	2.70

Table 24. Differences in labour productivity between sectors and their changes
Source: prepared by the author.

A comparison of metropolitan areas and regional hinterlands in terms of labour productivity revealed that while productivity in agriculture was on the whole similar and becoming uniform even further in the period in question (1998-2005), the disparities in the two remaining sectors were significant and growing wider **(Table 25)**. Labour productivity in the industrial sector in metropolises was by some 17% higher than in their

regional hinterlands. The scale of disparities in labour productivity was similar in the service sector (14%). Nevertheless, owing to substantial internal differences in the sector, it can be expected that it was much higher in the case of specialised services, and lesser in the sector of simple and public services.

	Agriculture		Industry		Services	
	2005 ratio	Change in pp in 1998-2005	2005 ratio	Change in pp in 1998-2005	2005 ratio	Change in pp in 1998-2005
Labour productivity ratio MA/RH	1.03	-0.03	1.17	0.02	1.14	0.01

Table 25. Ratio of labour productivity between the metropolis and the region in metropolitan macroregions
Source: prepared by the author.

Summary

Based on our analyses, we can propose the following conclusions concerning the situation in the macroregional labour markets in 1998-2005:

- The pool of labour in metropolitan areas was higher and better utilised than in regional hinterlands;
- There were marked linkages between the labour market situation in metropolises and in their regional hinterlands, but this applied to the dynamics rather than the situation on the macroregional labour market – and was largely a consequence of changes in the nation-wide labour market;
- The situation in macroregional labour markets was rather stable despite a period of good economic performance, and economic growth was mostly produced by an increase in productivity;
- The disparities in productivity between the metropolis and the region were relatively wide, both in case of the industrial and services sectors.

Multidimensional coherence of metropolitan macroregions

Intraregional cohesion should be evaluated not only in terms of equalising the development level disparities between the metropolitan area and its further regional hinterland, but – more importantly – in terms of the correspondence between the directions of changes in both these territorial systems. In addition to the strictly economic dimension (GDP per capita), these transformations may relate to other aspects, e.g. demographic and structural aspects as well as the labour market situation. To evaluate the similarity of intraregional changes in metropolitan macroregions, nine of the following variables were selected:

- Demographics: population change, natural increase, migration balance;
- Economic structure: changes in the share of agriculture, industry and services;
- Labour market: changes in the number of employees per 100 population, changes in the economic activity and unemployment rates.

As the next step, these variables were assessed, and the following were regarded as positive: population increase, positive natural increase and migration balance; increased role of services in the economy and reduced role of agriculture; as well as an increase in the number of employees and the activity rate, as well as reduction of the unemployment rate. In the case of industry, owing to the significance of the sector's internal structure, we decided to forgo assessment at this level of aggregation.

In some of the surveyed metropolitan macroregions, we could see some discrepancy in the directions of change **(Table 26).** As a rule, this divergence could only be observed for one of the three examined aspects (2-3 analysed indicators in case of 35 macroregions). Slightly more frequently, this was related to a greater number of positive trends in the metropolitan area (20 cases) than in the regional hinterland (15 cases). At the same time, with a wider divergence concerning the directions of change (comprising 4 or more indicators) – which was observed in as few as 8 macroregions – the predominance of positive trends in the metropolitan region was clearly visible, which could be a consequence of the backwashing of development resources from the regional hinterland to the metropolis.

On the other hand, the directions of intraregional changes were similar in 31 metropolitan macroregions (ca. 40%). Moreover, as a rule this resulted in the relative strengthening of the role played by the regional hinterland (19 cases), which could point either to its endogenous growth potential or to the positive effects of the diffusion of development processes generated by the metropolitan centre.

<table>
<tr><td colspan="2">Similarity of directions of change (0 or 1 indicator)</td><td colspan="4">Dissimilarity of directions of change (2 or more indicators)</td></tr>
<tr><td colspan="2">N=31</td><td colspan="4">N=43</td></tr>
<tr><td>MA favourable*</td><td>RH favourable *</td><td colspan="2">High (4 or more indicators)</td><td colspan="2">Low (2 or 3 indicators)</td></tr>
<tr><td rowspan="3">N=12</td><td rowspan="3">N=19</td><td colspan="2">N=8</td><td colspan="2">N=35</td></tr>
<tr><td>MA favourable *</td><td>RH favourable *</td><td>MA favourable *</td><td>RH favourable *</td></tr>
<tr><td>N=8</td><td>N=0</td><td>N=20</td><td>N=15</td></tr>
</table>

- at least 5 indicators

Table 26. Compatibility in the directions of change in metropolitan macroregions
Source: prepared by the author.

The distribution of the individual types of metropolitan macroregions in the European space was quite patchy and did not easily yield to generalisation. The widest intraregional dissimilarity in the directions of change could be observed in macroregions situated in Central and Eastern Europe (6 of 8 cases). These were mostly the capital city macroregions of: Warsaw, Bucharest, Sofia, Ljubljana, in addition to Wrocław and Dresden. This group also included Athens and Saarbrűcken. Lesser dissimilarities (also with an excess of more favourable trends for the metropolitan area than for the regional hinterland), were also quite common in CEE countries, e.g. Austria, Czech Republic, Hungary and Lithuania, and in some Italian and Spanish macroregions. In addition, this group included e.g. polycentric metropolitan macroregions of central England and the Netherlands. A certain discrepancy concerning development trends in a more favourable situation in the regional hinterland was visible in the remaining capital city macroregions: Paris, Lisbon, Dublin, Berlin, Tallinn, Helsinki and Bratislava. This group also included some macroregions in the United Kingdom, France and Italy. On the other hand, German macroregions as well as some British and Spanish macroregions (with London and Barcelona) as well as certain macroregions in Sweden and Latvia were characterised by a full compatibility in the directions of changes.

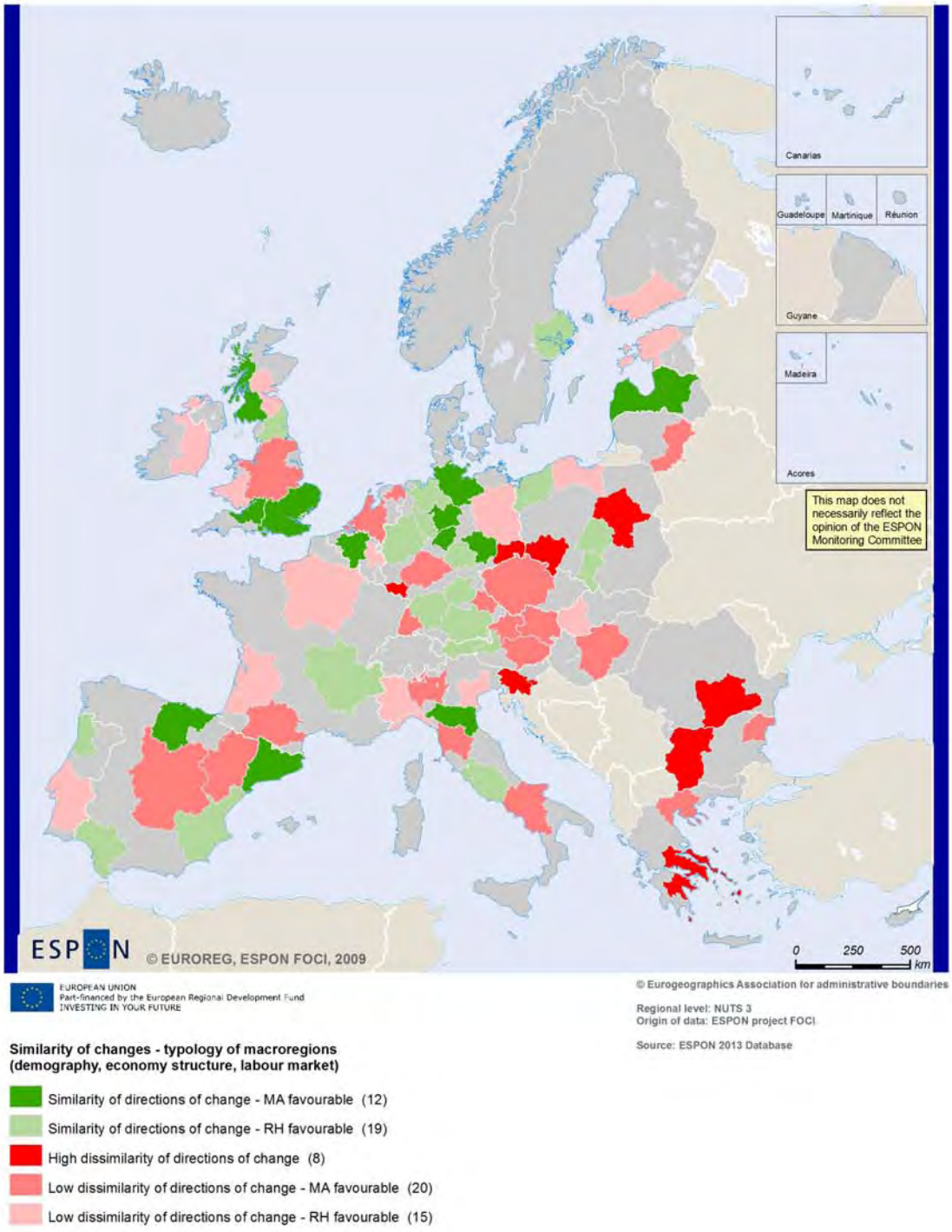


Figure 16. Types of macroregions based on trends compatibility
Source: prepared by the author.

5.2. Types of metropolitan macroregions

As shown in the above analyses, despite some common characteristics, metropolitan macroregions of Europe represent a rather motley set in such aspects as the dynamics of economic growth, demographic processes, structural changes and labour market situation. This is largely an effect of development which was underpinned by the dissimilar evolution of these territorial units in *longue durée* processes. For these reasons, the Report first identified the key dimensions of the disparities among metropolitan areas and separately among their regional hinterlands. These dimensions were then used to create separate classifications of metropolises and their regions, and ultimately a typology of metropolitan macroregions. This typology served to analyse the dynamics of interregional disparities in development level, which led to the formulation of certain generalisations concerning the development paths of individual types of macroregions.

Research methodology

In our analysis, we adopted a rather formalised procedure for identifying the key dimensions of disparities and typological classes of macroregions. To this end, multivariate analyses (principal component analysis and cluster analysis) were used, which to some extent allowed for an objectivisation of the results obtained. Below, the variables used in the study are summarised, along with short descriptions of the methods applied.

Regional socio-economic disparities may be analysed both on the basis of a purposeful selection of variables, or in an exploratory manner, using the broadest possible spectrum of indicators. In the present study, the latter method was applied. We should also bear in mind that the selection of features was largely dependent on the availability of comparable data on NUTS3 subregions in the analysed countries. Ultimately, the data used for analyses were the following:

- Level of economic growth: GDP per capita (EUR and the national average =100);
- Demographic potential and characteristics of the settlement system: number of the population, population density (pax/km^2), population of the metropolitan centre (actual number and % of the population of the metropolitan region);
- Economic structure: gross value added by basic sectors: agriculture, industry and services (%),gross value added by groups of services: simple, specialised and public (% of the total and % of the service sector);
- Labour productivity: productivity (EUR), productivity in basic economic sectors and groups of services (EUR and % of total productivity);

- Labour market: people in work (per 100 population), economic activity (%), unemployment rate (%).

Altogether, 25 variables were used in the analyses, some of which were complementary variables. Expanding this mix by indicators illustrating: human capital, level of innovation, social capital or the institutional environment would certainly serve to offer a fuller picture of the major dimensions of disparities. Unfortunately, such data could not be taken into account due to the lack of relevant statistics for NUTS3 subregions in many of the analysed countries. Nonetheless, analyses carried out in Central and Eastern European regions **(Smętkowski, Wójcik 2009)** indicate that such indicators are correlated with the variables used in the study, and we can therefore assume that the dimensions of disparities associated with them could at least partly be identified owing to the application of multivariate methods of data analysis.

Factor analysis using the principal component method was applied to identify the major dimensions of disparities between the constituents of metropolitan macroregions. This method, exploratory in character, involves the reduction of variables which are replaced by weakly correlated principal components, which in fact represent the meta-dimensions of disparities. As a result, it is possible to reduce the number of variables without losing key information. The significance of the selected principal components results from their share in total variance; in further analysis, those components were used which better explain the disparities than a single component – in this case, the screen test was used **(Catell 1966)**. As a next step, the number of variables was reduced using the correlation and factor method proposed by **G. Gorzelak (1979)**. This method involves elimination of insignificant variables characterised by: a low value of the variation coefficient (adopted value: 0.1), a high degree of correlation (adopted value: 0.8), also poorly correlated with the adopted principal components before rotation (adopted value: 0.4). Then, to facilitate interpretation of the disparities' dimensions, the principal components were transformed orthogonally using the Varimax method. In choosing the names of the components, we used the spatial distribution of the values of individual components and other background information.

At the next stage, all the above components of socio-economic disparities were used to offer a classification of the constituents of metropolitan macroregions. This classification was made using hierarchical cluster analysis and the Ward optimisation method. The advantage of this method lies in a considerable homogeneity of the typological classes, coupled with a tendency to identify many small clusters. On this basis, the classification tree was produced, which allowed for the identification of similar units. The similarity threshold was arbitrarily determined within the range of 20-30% of the maximum distance between the elements, and its actual height was dependent on the shape of the

classification tree. Typological classes were identified on the basis of: the average values of the analysed meta-traits; an analysis of their distribution as well as of other background information, and were given summary names.

Classification of metropolitan areas

Based on the principal components analysis, we can distinguish four major dimensions to differentiate metropolitan areas in demographic and economic terms **(Annex 4)**:

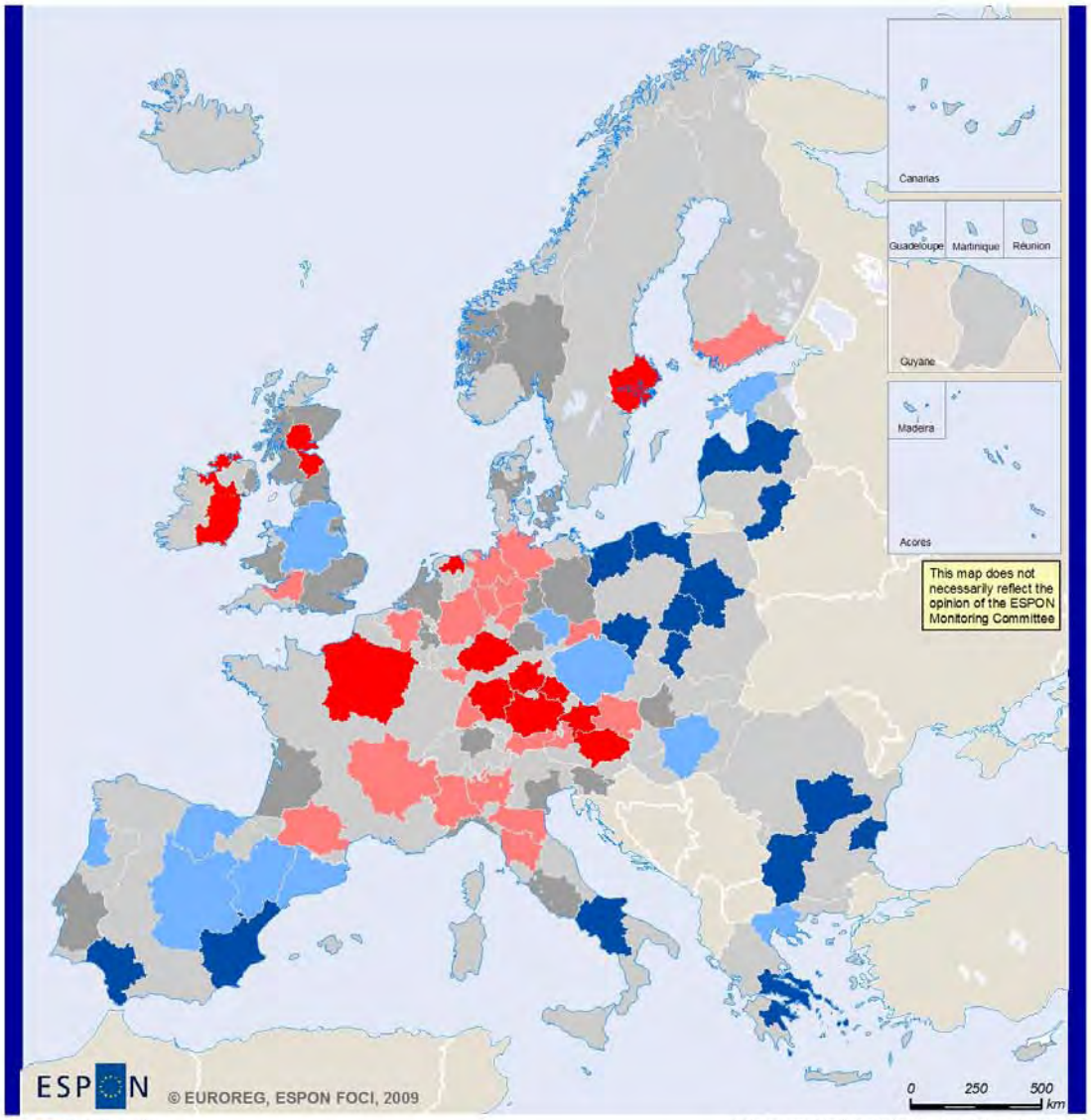
- Component 1 "modern economy" (25% of the total variance), which referred to highly-developed service centres characterised by high labour productivity in industry and a good labour market situation;
- Component 2 "population potential" (16% of the total variance), which referred to populous, densely populated and usually deindustrialised metropolitan areas with a significant role of the service sector (with specialised services in particular) in the economy;
- Component 3 "national growth poles" (12% of the total variance), which referred to highly-developed metropolitan areas in countries with a relatively large share of simple services in the economy and a small role of public services;
- Component 4 "weak suburban zone" (12% of the total variance), which referred to monocentric metropolitan areas with a low population density and low labour productivity in agriculture.

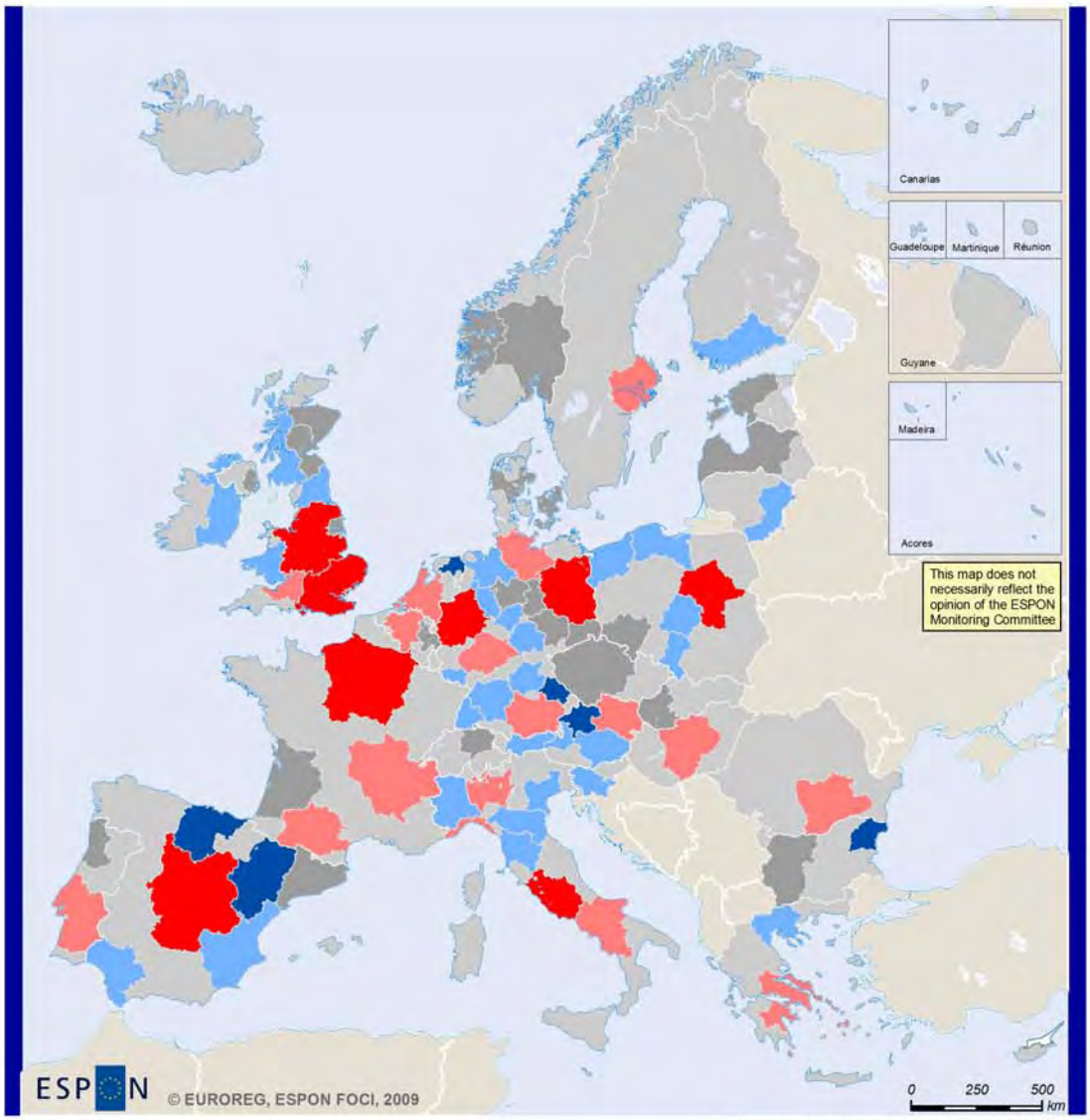
A better evaluation of the diagnostic value of the adopted components will be possible with an analysis of the spatial distribution of their actual values **(Figure 17).**

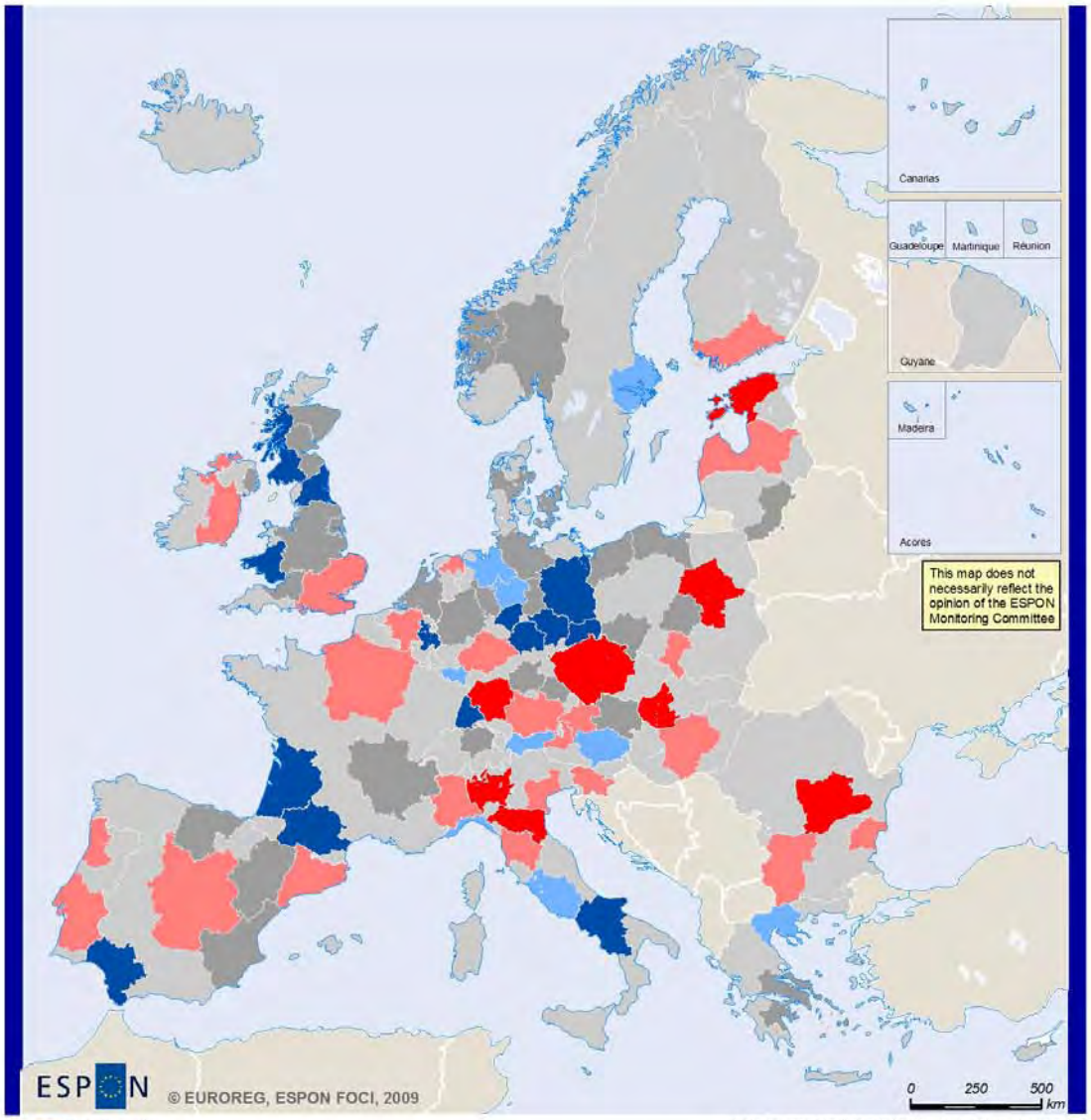
The high values of the first component were characteristic primarily for metropolitan areas situated in highly-developed countries such as Germany (Frankfurt am Main and the south Lander), Austria, France (especially Paris) and Italy (northern part), the Nordic countries and Ireland. At the other extreme, there were metropolises in CEE countries, Greece and the Iberian Peninsula. In effect – and to some extent (with the exception of the UK and the Netherlands) - this component indicated the classical economic dimension of European disparities, related to the modern character of the economy between the centre and the periphery.

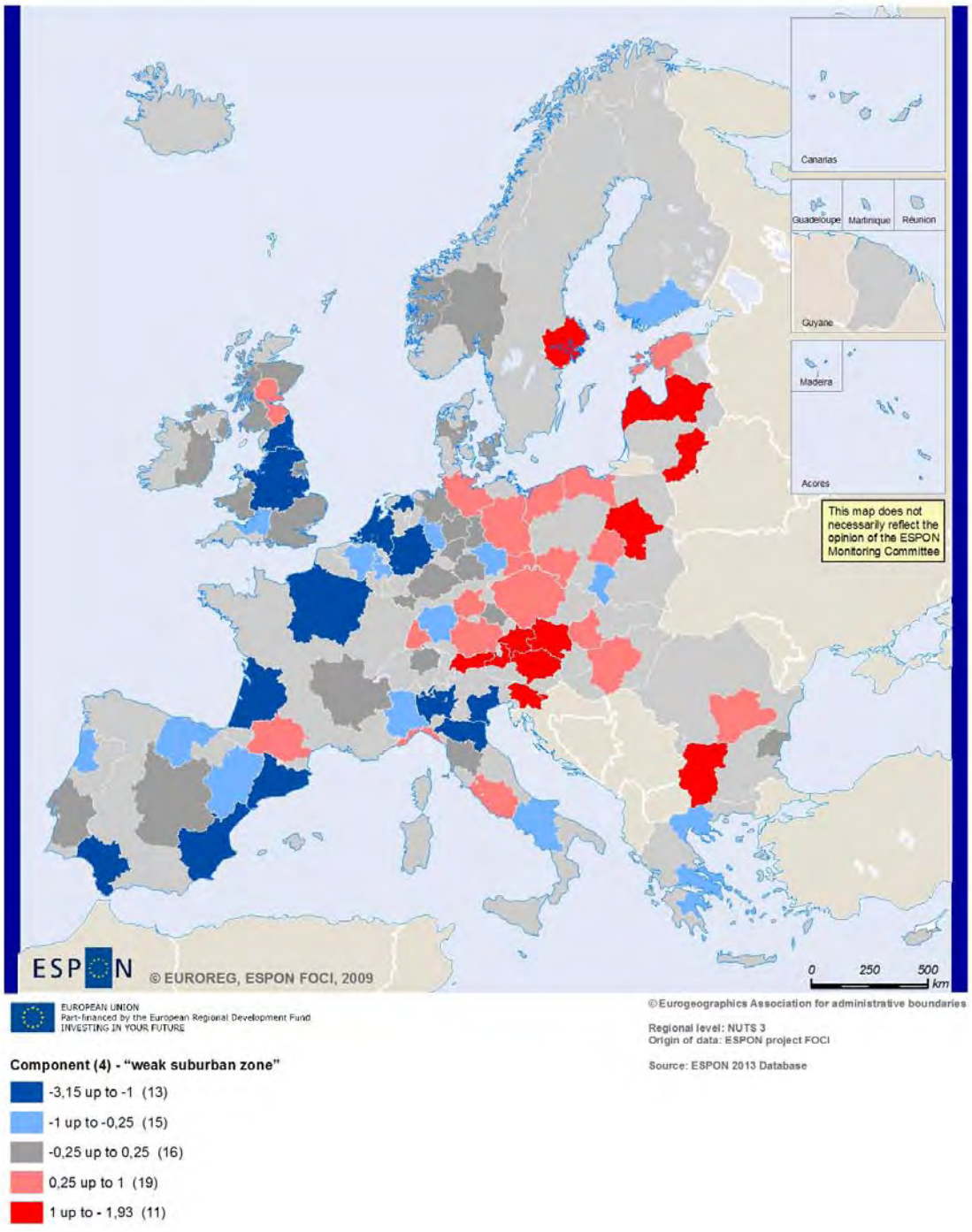
The high values of the second component were mostly characteristic for largest metropolitan areas, as a rule including the capital city: London, Paris, and also: Rome, Madrid, Berlin and Warsaw, in addition to former polycentric industrial conurbations: Rhine-Ruhr and Central England. The remaining capital cities (save for the smallest states) also had relatively high values of this component. In addition, other large urban centres such as: Frankfurt am Main, Milan, Lyon, Toulouse and Naples were included in

this group. On the other hand, the smallest values typified the industrialised metropolitan areas of smaller cities such as: Bilbao, Saragossa, Varna, Regensburg or Groningen. As a result, this component indicated the demographic dimension of the disparities, showing the major areas with a concentration of the population and well-developed service functions catering to the national and supra-national economic areas.


Canarias
Guadeloupe
Martinique
Réunion
Guyane
Madeira
Acores
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
ESPON
© EUROREG, ESPON FOCI, 2009
0 250 500 km
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
©Eurogeographics Association for administrative boundaries
Regional level: NUTS 3
Origin of data: ESPON project FOCI
Source: ESPON 2013 Database
Component (1) - "modern economy"
-2,55 up to -1 (15)
-1 up to -0,25 (11)
-0,25 up to 0,25 (15)
0,25 up to 1 (21)
1 up to 1,77 (12)


Canarias
Guadeloupe
Martinique
Réunion
Guyane
Madeira
Acores
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
ESPON
© EUROREG, ESPON FOCI, 2009
0 250 500 km
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
© Eurogeographics Association for administrative boundaries
Regional level: NUTS 3
Origin of data: ESPON project FOCI
Source: ESPON 2013 Database
Component (2) - "population potential"
-2,7 up to -1 (6)
-1 up to -0,25 (29)
-0,25 up to 0,25 (14)
0,25 up to 1 (17)
1 up to 4,37 (8)


Canarias
Guadeloupe
Martinique
Réunion
Guyane
Madeira
Acores
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
ESPON
© EUROREG, ESPON FOCI, 2009
0 250 500 km
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
©Eurogeographics Association for administrative boundaries
Regional level: NUTS 3
Origin of data: ESPON project FOCI
Source: ESPON 2013 Database
Component (3) - "national growth poles"
-2,26 up to -1 (14)
-1 up to -0,25 (9)
-0,25 up to 0,25 (20)
0,25 up to 1 (23)
1 up to 2,48 (8)



Note: the values for metropolitan areas were presented in graphic layer for metropolitan macroregions.

Figure 17. Spatial distribution of principal component values in metropolitan areas
Source: prepared by the author

The high values of the third component mostly indicated those metropolises which had a high development level as compared to their national economies; they were mainly capital cities, especially those situated in Central and Eastern Europe. Those metropolises were relatively frequently characterised by a considerable share of simple services in the form of well-developed trade, transport and tourist traffic functions. At the other end, there were cities with a relatively low level of wealth as compared to the average national level, located in France, the UK, eastern Germany (not excluding Berlin), as well as central (not excluding Rome) and southern Italy. It can be said therefore that this component shows the national dimension of disparities associated inter alia with services rendered by the major growth poles to their national economies.

The last principal component identifies metropolitan areas with a high degree of monocentrism, e.g. the demographic domination of the key urban centre, with a relatively high percentage of people employed in agriculture in the suburban zone (and the resultant low productivity of labour in this sector). This group mainly included CEE metropolises (with Austria), as well as some of the metropolitan areas situated in Western Europe, e.g.: Toulouse, Edinburgh, Rome as well as Munich, Nuremberg and Stockholm. The remaining metropolises of the former EU-15 had average or low values of this component. We can say therefore that this component best illustrates the agricultural dimension of disparities in the suburban zone of the metropolis along the European east-west axis.

It should be emphasised that the above principal components explained only some of the disparities between the analysed metropolitan areas (65.6% of the variance). This could suggest that there exist other dimensions of disparities, not incorporated into our analysis, and associated for example with human or social capital or institutional environment.

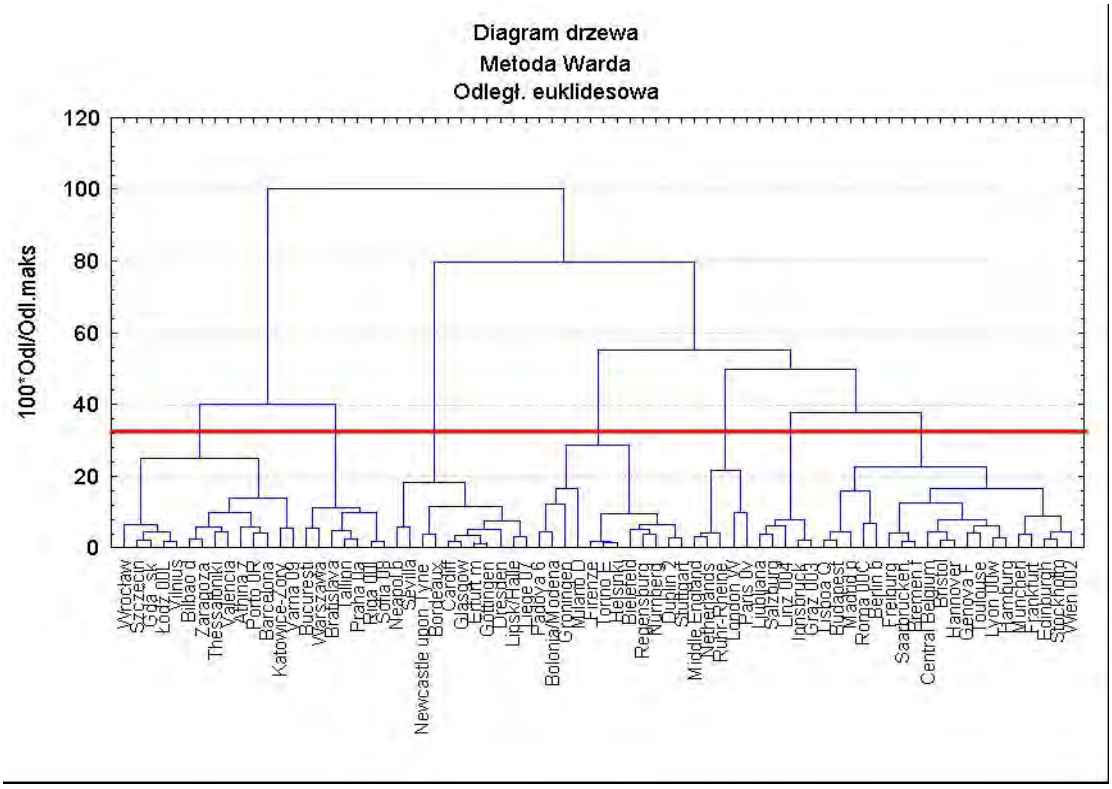


Figure 18. Classification of metropolitan areas - graph
Source: prepared by the author.

The values of these four principal components of the disparities were used in the classification of macroregions, the results of which are shown in the **Figure 18**.

In this case, identification of classes was not formalised; it was mostly based on the analysis of the dendrite structure together with the spatial distribution of the identified types. On the basis of their distribution, analysis of their average values and other background information, individual typological classes were given summary names reflecting their specific character.

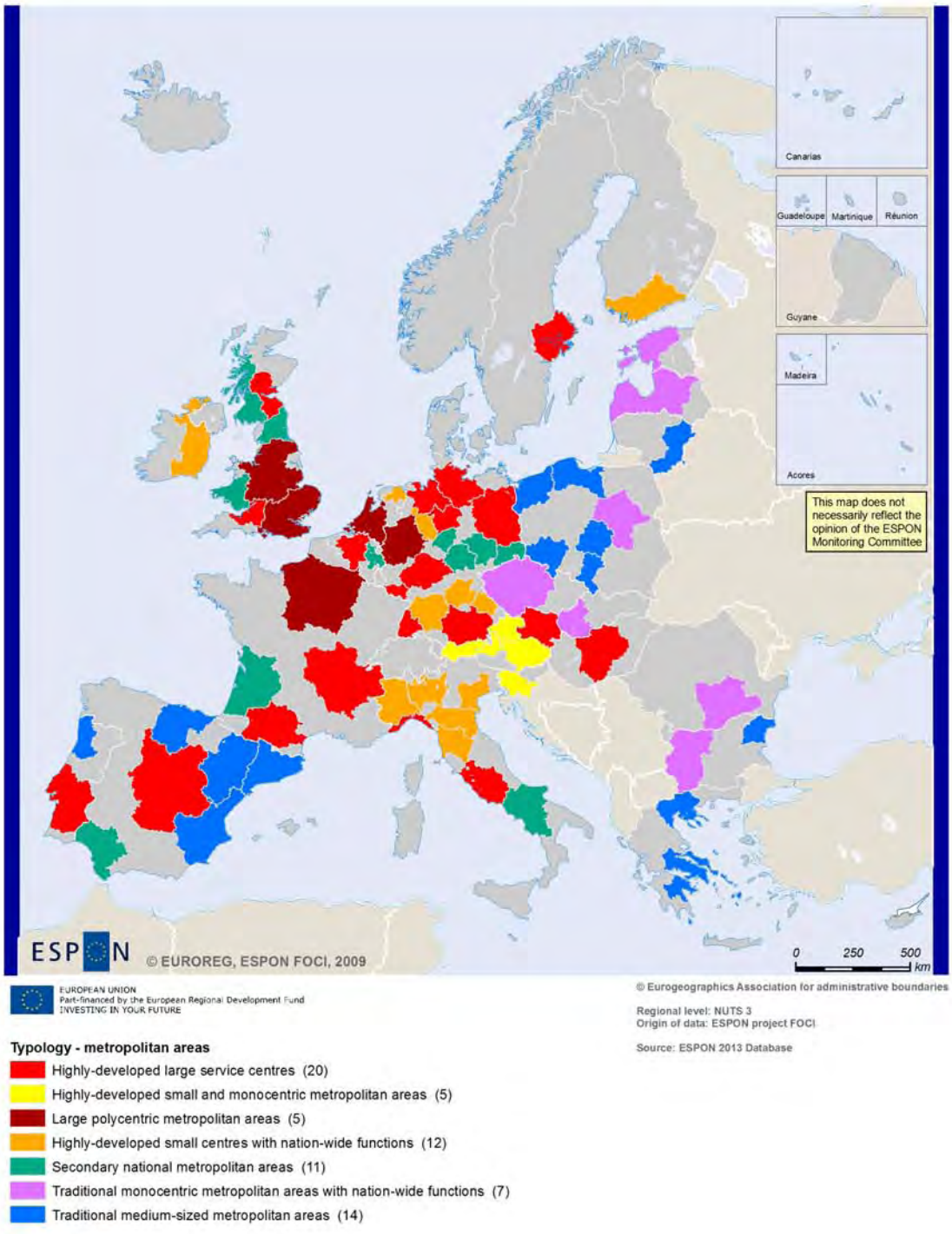
On this basis (**Table 27; Figure 19**), we can identify seven typological categories of metropolitan areas, which, with some degree of simplification, could be defined as follows:

- (1) Highly-developed large service centres. The French city of Lyon can be regarded as a typical example of this category, and similar metropolises could be found in many other countries, from Sweden to Portugal. This group of metropolitan areas also included a subgroup of capital city metropolises. Most of these areas were characterised by a relatively high level of population monocentrism.

- (2) Highly-developed small and monocentric metropolitan areas. The Austrian city of Salzburg was a typical example of this category, which could be found only in Austria and Slovenia. Their characteristic features also included low labour productivity in the agriculture of the suburban zone, which was probably associated with their location in mountain areas.
- (3) Large polycentric metropolitan areas. Two subtypes could be distinguished within this category, characterised by somewhat dissimilar economic structures: the service subtype: London, Paris and Randstadt Holland, and the industrial subtype: Rhine-Ruhr and Central England.
- (4) Highly-developed small metropolitan areas with nation-wide functions. The Italian Turin was a typical example of this category, characteristically encountered in northern Italy and southern Germany.
- (5) Secondary nation-wide metropolitan areas. The Belgian Liège was a typical example of this type, and its basic characteristic feature was its occurrence in countries with a complex settlement structure. It included e.g. metropolitan areas situated in eastern Germany, southern parts of Italy and Spain, as well as Scotland and northern England.
- (6) Traditional monocentric metropolitan areas with nation-wide functions. Tallinn (Estonia) was a typical example of this type, which included nearly all capital cities of CEE countries (except Budapest).
- (7) Traditional medium-sized metropolitan areas. Gdańsk (Poland) was a typical example of this category, which included primarily metropolitan areas situated in CEE countries, Greece and on the Iberian Peninsula. Most conspicuous members of this type in terms of size (measured by the population and functions performed) were the metropolitan areas of Athens and Barcelona.

Types of metropolitan areas	Modern economy	Demographic potential	National growth pole	Weak suburban zone
(1) Highly-developed large service centres	0.62	0.53	-0.20	0.38
(2) Highly-developed small and monocentric metropolitan areas	0.87	-0.87	0.19	1.61
(3) Large polycentric metropolitan areas	0.32	2.04	0.06	-1.16
(4) Highly-developed small centres with nation-wide functions	0.79	-0.70	0.77	-0.82
(5) Secondary national metropolitan areas	-0.28	-0.23	-1.66	-0.47
(6) Traditional monocentric metropolitan areas with nation-wide functions	-0.99	0.23	1.40	0.99
(7) Traditional medium-sized metropolitan areas	-1.27	-0.50	0.14	-0.13

Table 27. Average principal component values in identified types of regions
Source: prepared by the author.



* Note: the values for regional hinterlands were presented in graphic layer for metropolitan macroregions.

Figure 19. Classification of metropolitan areas - map
Source: prepared by the author.

Classification of the regional hinterland of metropolises

On the basis of factor analysis, we can distinguish four major dimensions of disparities between the regional hinterlands of metropolises in terms of the demographic and economic potential **(Annex 5)**:

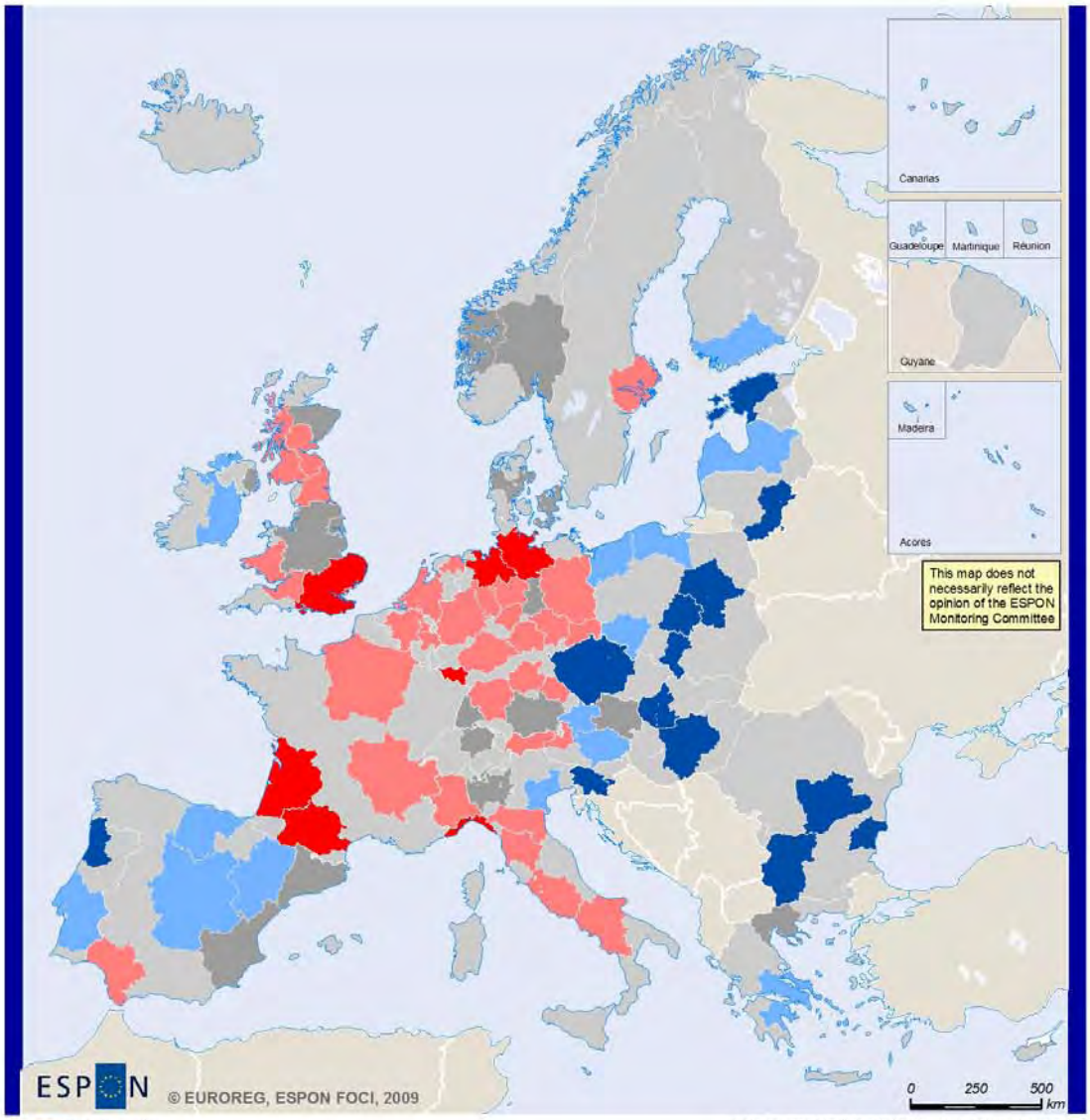
- Component 1 "modern economy" (20% of the total variance), which indicated regions with highly-developed economy, a large share of services, high labour productivity (also in agriculture), and a good labour market situation;
- Component 2 "well-developed labour market" (16% of the total variance), which indicated regions with a good labour market situation, a significant role of industry in the economy and a high level of development by comparison with the rest of the country;
- Component 3 "demographic potential" (14% of the total variance), which indicated densely-populated regions with large cities and highly productive agriculture;
- Component 4 "duality of the economy" (10% of the total variance), which indicated regions with low labour productivity in agriculture and high productivity of labour outside agriculture, characterised by a considerable share of simple services in the economic structure.

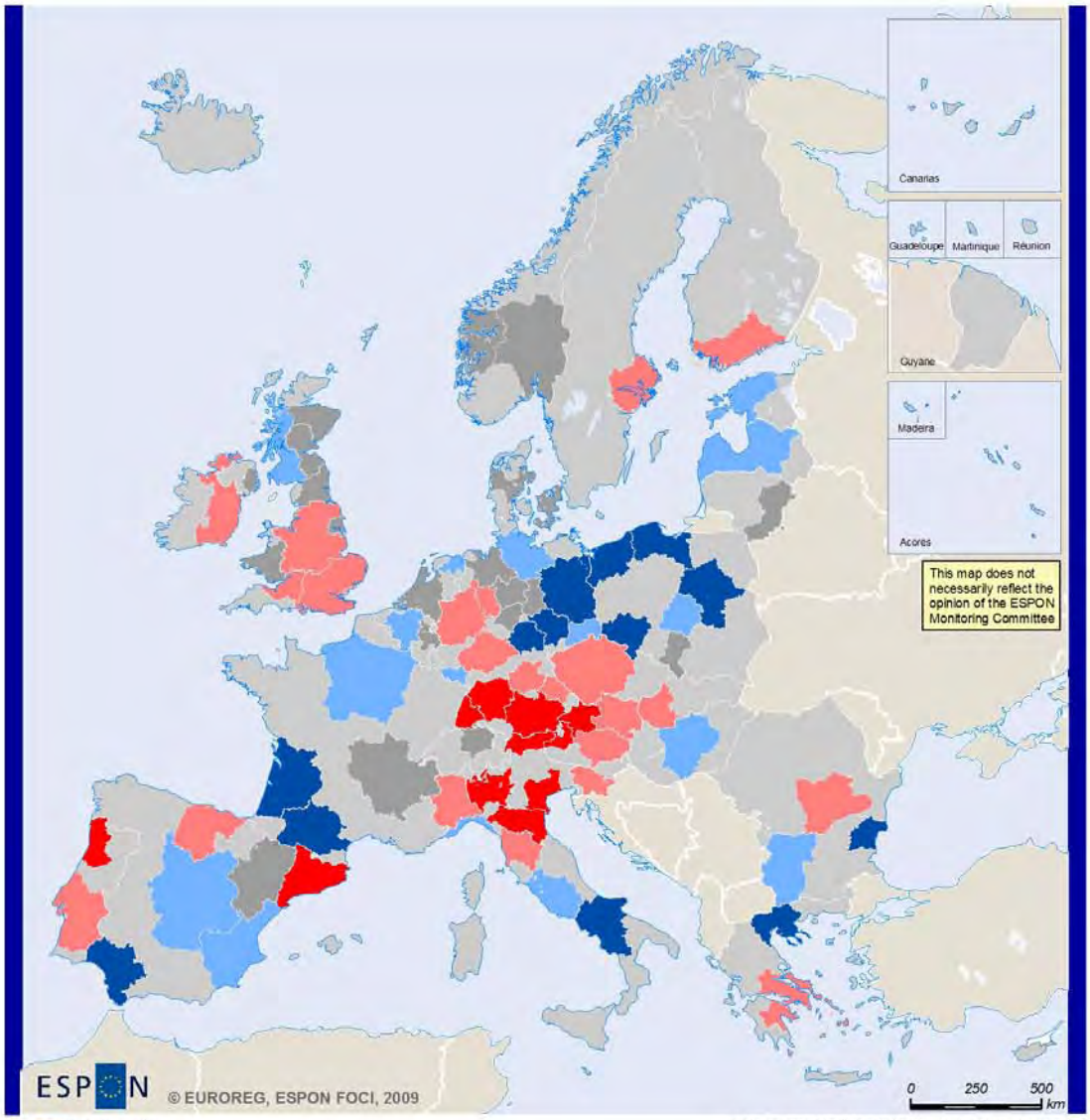
A better evaluation of the diagnostic value of the adopted components will be possible with an analysis of the spatial distribution of their actual values **(Figure 20).**

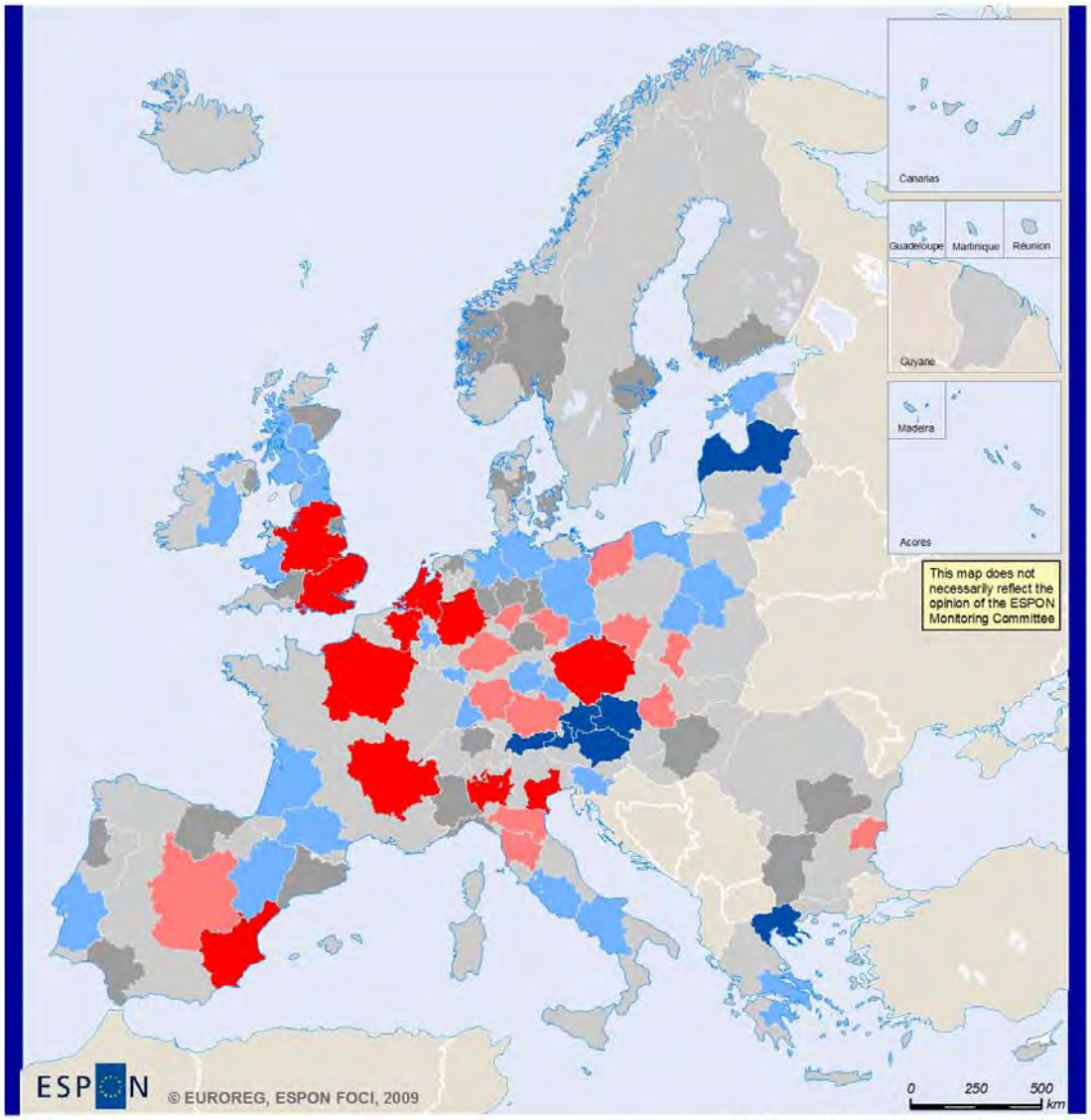
The first component showed the disparities between macroregions regarding the level of economic development – which was higher in the EU core countries and lower in the former EU-15 cohesion countries and the new Member States. A high level of development was strongly correlated with a high share of the service sector in gross value added and a low share of industry in the economy, as well as high labour productivity in agriculture owing to a small number of employees in this sector. As a result, this component illustrated the classical dimension of disparities, to modern economy in the European the centre–the periphery system.

The second component showed a good situation in the regional labour market with a relatively high role of industry in the economy. As a rule, such regions occupied a prominent place in the national economic space. Regions with high values of this component made up a distinct cluster with its core in southern Germany, northern Italy and western Austria, and with a wide external zone comprising: central Germany, Czech Republic, eastern Austria and Slovenia. In addition, the high values of this component were characteristic for the regions of Barcelona and Porto, and for the regions of southern and central England. By contrast, the regional hinterlands of metropolises in

CEE countries (including the former GDR), in France, Spain and southern Italy were characterised by low values of this component. In general terms, we can say therefore that this component illustrated well-developed labour markets in industrial regions.


Canarias
Guadeloupe
Martinique
Réunion
Guyane
Madeira
Acores
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
ESPON
© EUROREG, ESPON FOCI, 2009
0 250 500 km
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
©Eurogeographics Association for administrative boundaries
Regional level: NUTS 3
Origin of data: ESPON project FOCI
Source: ESPON 2013 Database
Component 1 "modern economy"
-2,67 up to -1 (13)
-1 up to -0,25 (14)
-0,25 up to 0,25 (8)
0,25 up to 1 (32)
1 up to 1,82 (7)


Canarias
Guadeloupe
Martinique
Réunion
Guyane
Madeira
Acores
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
ESPON
© EUROREG, ESPON FOCI, 2009
0 250 500 km
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
©Eurogeographics Association for administrative boundaries
Regional level: NUTS 3
Origin of data: ESPON project FOCI
Source: ESPON 2013 Database
Component 2 "well-developed labour market"
-3,13 up to -1 (13)
-1 up to -0,25 (16)
-0,25 up to 0,25 (12)
0,25 up to 1 (22)
1 up to 1,65 (11)


Canarias
Guadeloupe
Martinique
Réunion
Guyane
Madeira
Acores
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
ESPON
© EUROREG, ESPON FOCI, 2009
0 250 500 km
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
©Eurogeographics Association for administrative boundaries
Regional level: NUTS 3
Origin of data: ESPON project FOCI
Source: ESPON 2013 Database
Component 3 "demographic potential"
-2,19 up to -1 (7)
-1 up to -0,25 (27)
-0,25 up to 0,25 (16)
0,25 up to 1 (13)
1 up to 3,05 (11)

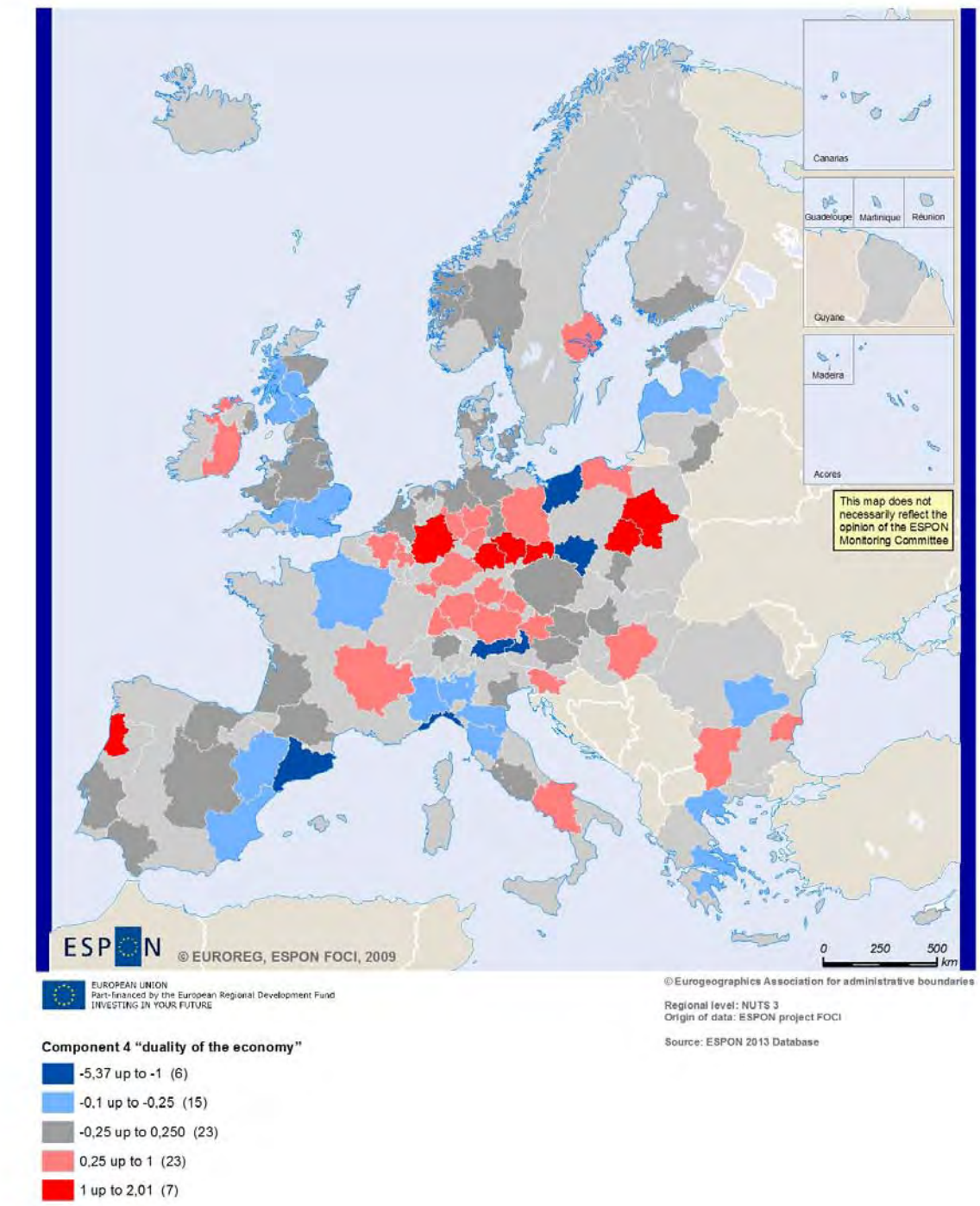


Figure 20. Spatial distribution of principal component values in regional hinterlands
Source: prepared by the author.

The third component was associated with the existence of other large cities in the regional hinterland of the metropolis, coupled with a high population density and a relatively high labour productivity in agriculture. High values of this meta-dimension of

the disparities were characteristics for the regional hinterlands of Paris, London, metropolises in the Benelux countries, western and southern Germany, northern Italy and the Czech Republic. As a rule, more peripheral regions (excluding the regional hinterlands of Varna and Valencia) had lower values of this component. We can say therefore that this component illustrated the demographic dimension of the disparities, while simultaneously showing some degree of polycentrism in the regional hinterlands of metropolises.

The high values of the last component of the disparities identified regions with a high labour productivity in services and industry, associated with low productivity in agriculture. Furthermore, simple services played a considerable role in the economic structure of these regions. This type of regional hinterlands was characteristic for Germany save for its northern part, and for some regions of Central and Eastern Europe. It was also occasionally encountered in other European countries (Sweden, Italy, Ireland, Portugal). This component suggests the dual character of the economy, associated with wide disparities in labour productivity existing between agriculture and non-agriculture sectors, and with functions provided by the metropolitan centres to their regional hinterlands.

It should be emphasised that the selected principal components explained only some of the disparities in the regional hinterlands of the analysed metropolises (59.6% of total variance, that is less than in the case of metropolitan areas).

The values of these four principal components of the disparities were used to make a classification of regional hinterlands of metropolises, which is shown in the dendrogram below (**Figure 21**).

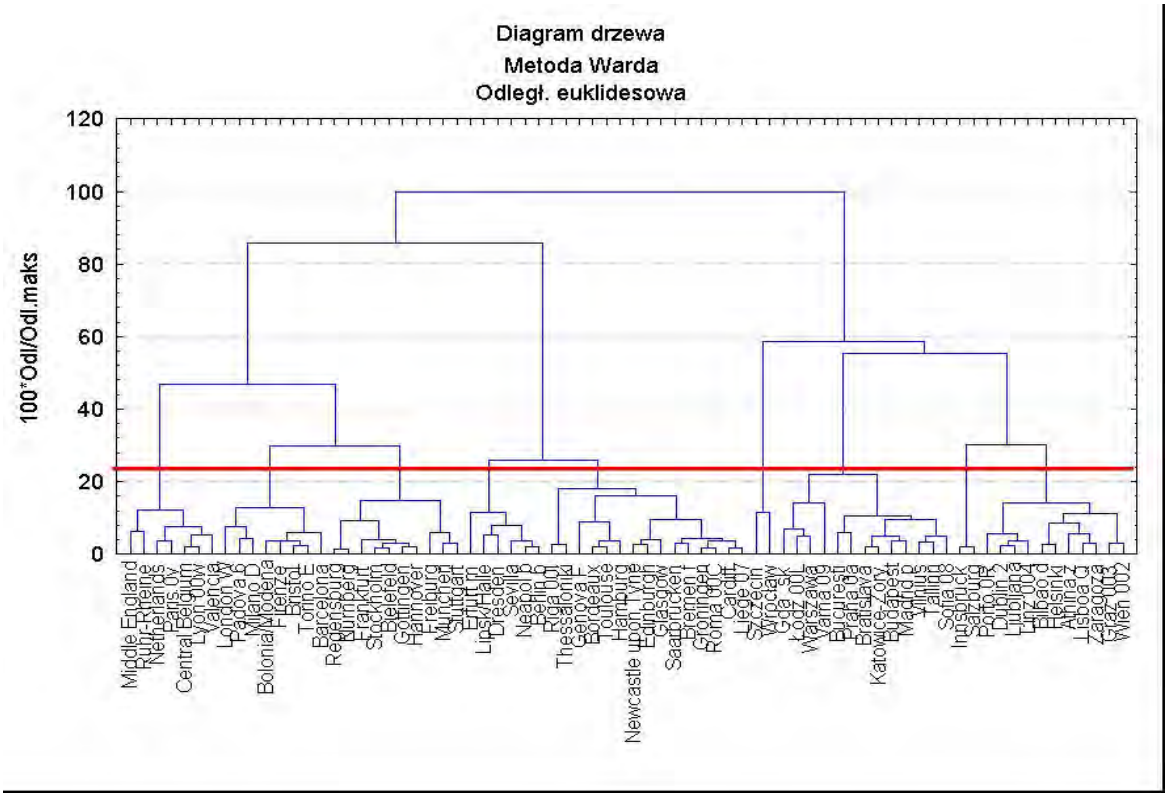


Figure 21. Classification of regional hinterlands of metropolises
Source: prepared by the author.

Type of regional hinterland	Modern economy	Well-developed labour market	Demographic potential	Duality of economy
(1a) Well-developed labour market and considerable industrialisation in regions with small population density	-0.66	0.77	-0.74	-0.10
(1b) Variation of type 1 with considerable duality of economy	0.66	1.42	-2.17	1.55
(2a) Traditional economy with underdeveloped service sector	-1.55	-0.43	0.12	-0.39
(2b) Variation of type 2 with considerable duality of economy and labour market problems	-0.85	-1.71	0.65	4.28
(3) Labour market problems with considerable duality of economy	0.63	-0.67	-0.44	0.65
(4) Serious labour market problems	0.51	-1.56	-0.22	-0.77
(5) Well-developed labour market and considerable industrialisation	0.54	0.75	0.01	-0.47

(6) Well-developed labour market, considerable industrialisation and demographic potential	0.49	1.05	0.78	0.47
(7) Large demographic potential in polycentric regions	0.41	-0.09	2.02	-0.20

Table 28. Average principal component values by types of regional hinterlands
Source: prepared by the author.

On this basis **(Table 28; Figure 22)**, we can distinguish seven main typological classes of regional hinterlands, which can be broadly described as follows:

- (1) Well-developed labour market and considerable industrialisation in regions with small population density. Subtype (a) – the regional hinterland of Helsinki can serve as a typical example of this class, which is primarily characteristic for the former EU-15 cohesion countries, i.e. Spain and Portugal, Greece and Ireland, even though regions belonging to this class were also found in Austria and Slovenia. Subtype (b) – the above features coupled with a high degree of duality in the economy. The latter subtype included two regions only: Salzburg and Innsbruck, both situated in mountain areas.
- (2) Traditional economy with underdeveloped sector of services (mostly specialised). Subtype (a) – the regional hinterland of Budapest could serve as a typical example, and this category was primarily characteristic of CEE countries and the hinterland of Madrid. Subtype (b) the above features plus a high degree of duality in the economy. It included only two regions: Wrocław and Szczecin, situated in the west of Poland.

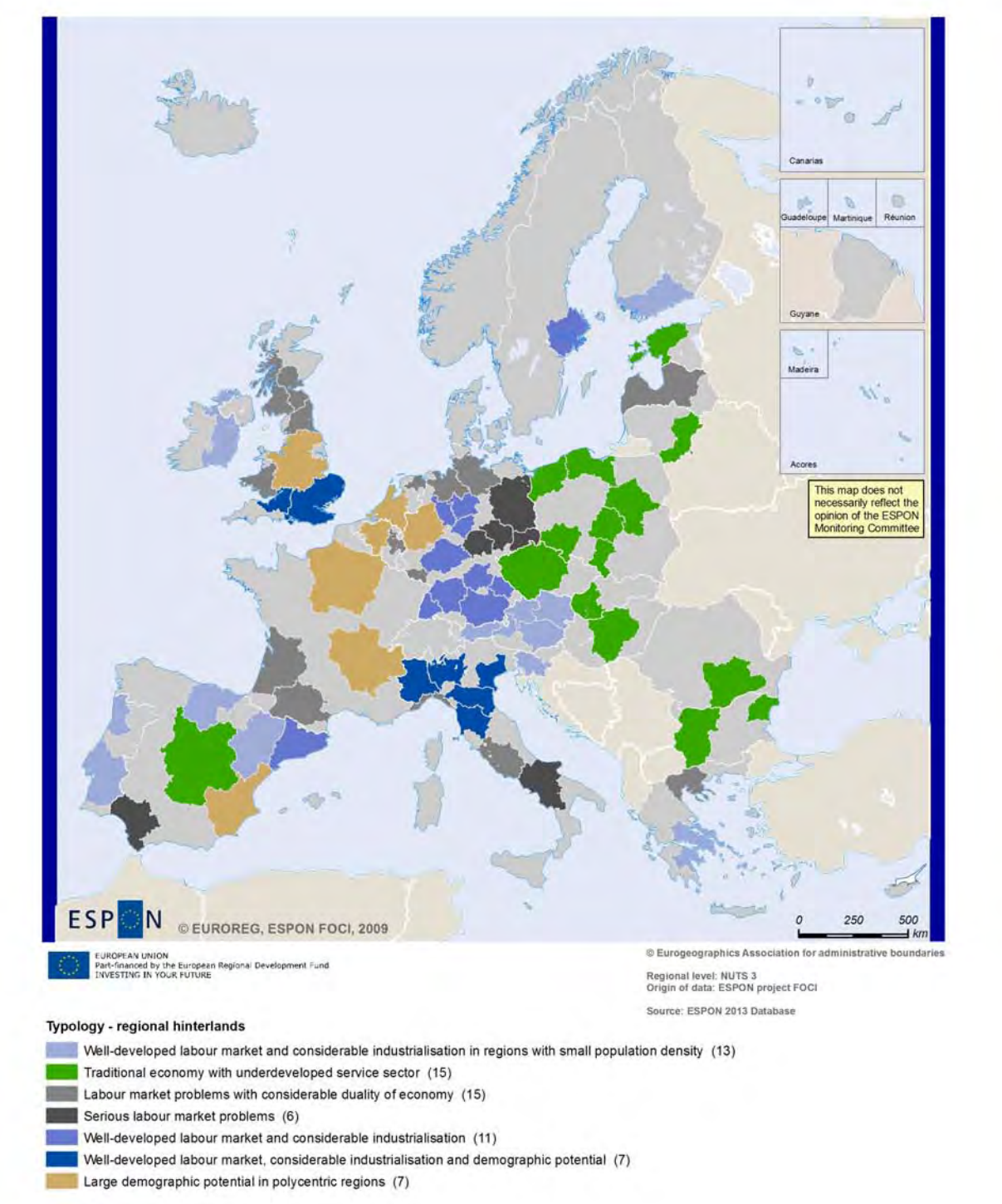


Figure 22. Classification of regional hinterlands - map
Source: prepared by the author.

- (3) Labour market problems and a high degree of duality in the economy. The regional hinterland of Thessaloniki was a typical example of this category, which included inter alia former traditional industrial regions: Saarbrűcken, northern England, Scotland and Wales, as well as the regional hinterlands of metropolises which underwent rapid economic restructuring: Riga, Rome, Toulouse and Bordeaux, as well as metropolises of northern Germany.
- (4) Serious labour market problems. The regional hinterland of Erfurt in Germany was a typical example here. This category was typical for regions of the former GDR and southern Italy (Naples) and Spain (Seville).
- (5) Well-developed labour market with considerable industrialisation. The regional hinterland of Nuremberg was a typical example of this class, which was generally characteristic for southern and central Germany and for the regional hinterlands of Barcelona and Stockholm.
- (6) Well-developed labour market with considerable industrialisation and high demographic potential. Tuscany was a typical example of this category, which also included other regions of northern Italy, as well as southern England.
- (7) High demographic potential in polycentric regions. The Rhine-Ruhr was a typical region in this category, which also included the regional hinterlands of metropolises in the Benelux countries, as well as Lyon in France and Valencia in Spain.

Typology of metropolitan macroregions

Based on the identification of the above categories, a typological matrix was produced with the dimensions of 7x7[22]. Of 49 cells in the matrix showing the types of the metropolis – the region systems, 23 fields were occupied (47%), which means that similar conditions determining the relationships between the metropolis and its regional hinterland could be observed in many macroregions. Below, we provide short characteristics of those types which occurred most frequently, while leaving out the most unique types. In their identification, correspondence analysis was additionally used (**Annex 5**) to indicate the major types of metropolitan macroregions.

[22] For simplification, types 1a and 1b and types 2a and 2b were combined.

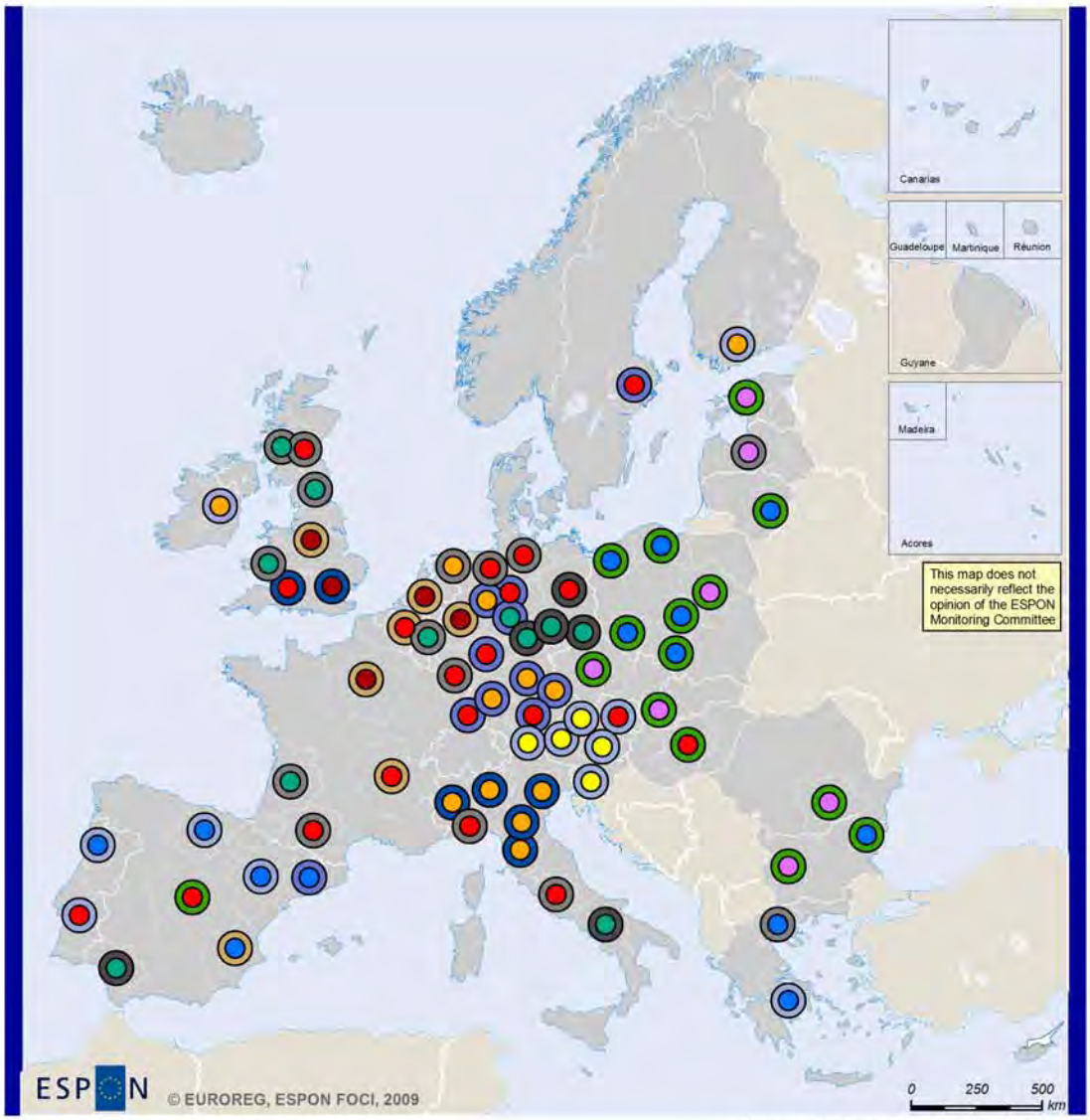


Figure 23a. Typology of metropolitan macroregions
Source: prepared by the author.

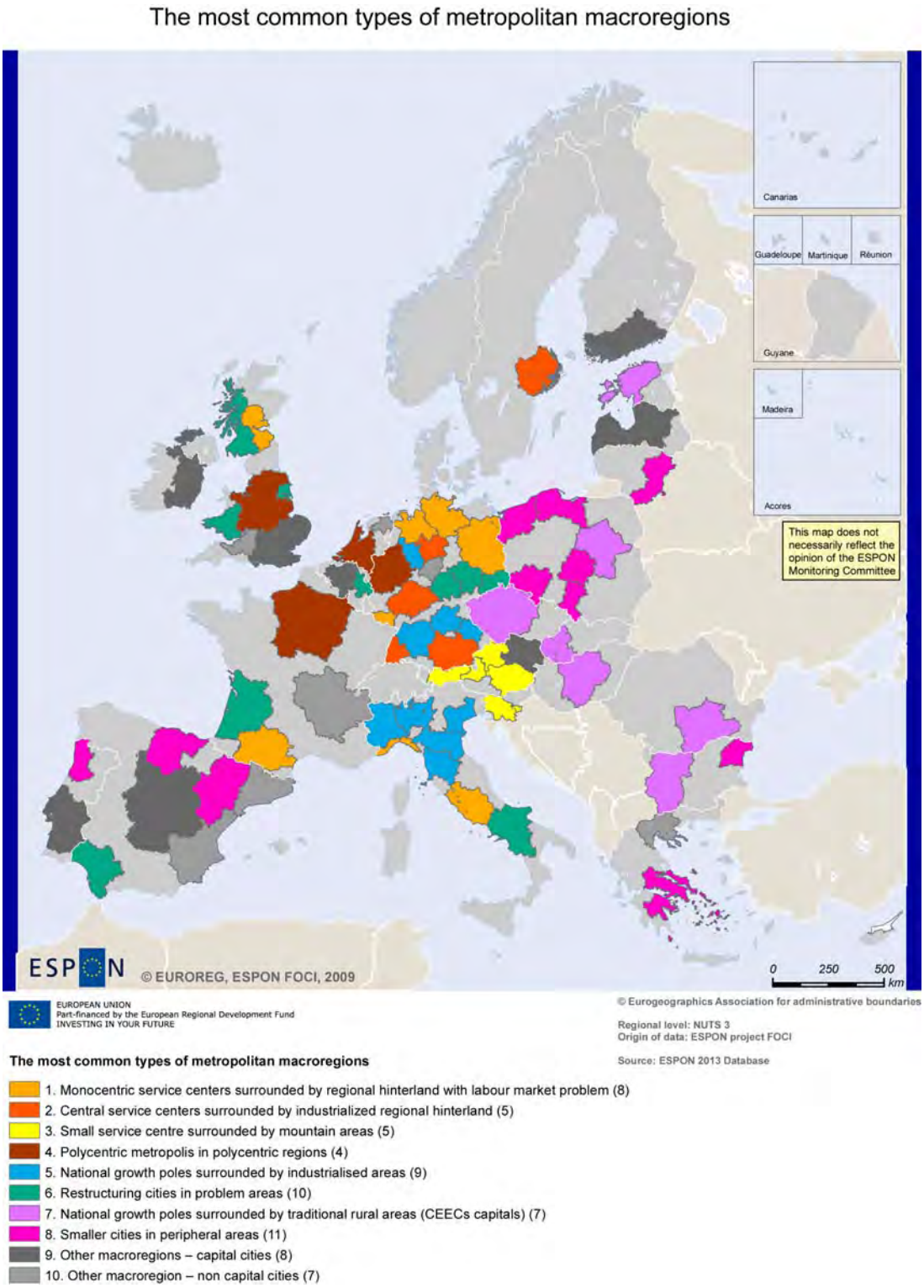


Figure 23b. Typology of metropolitan macroregions (selected types)
Source: prepared by the author.

RH MA	1	2	3	4	5	6	7	Total
1	2	2	7		5	1	2	19
2	5							5
3						1	4	5
4	2		1		4	5		12
5			5	5	1			11
6		6	1					7
7	4	7	1		1		1	14
Total	13	15	15	5	11	7	7	73

Bold borders denote similar typological classes of the metropolis and the regional hinterland.

Table 29. Typological matrix of metropolitan macroregions*
Source: prepared by the author.

Among the identified types (X/Y_1Y_2 – where x – category of metropolitan region, y_1 – category of regional hinterland, and, potentially, y_2 – similar category of regional hinterland), the following proved to be the most important ones **(Table 29; Figure 23)**:

- Type 1/3 (N=7) – highly-developed monocentric, large service centres surrounded by regions with labour market problems. This type was found in three countries, and – more importantly – was usually characteristic for coastal macroregions – northern Germany (Bremen and Hamburg), Scotland (Edinburgh) and Italy (Rome and Genoa).
- Type 1/5 (N=5) – highly-developed large service centres surrounded by regions with well-developed labour markets, considerably industrialised. This type was characteristic for Germany (Frankfurt am Main, Munich, Hanover and Freiburg), and therefore it can be summarily referred to as “central”, and outside Germany it also included the metropolitan macroregion of Stockholm.
- Type 2/1 (N=5) – highly-developed small and monocentric metropolitan areas surrounded by well-developed industrialised regions in areas with low population density, frequently in mountain areas. This type was characteristic for Austria (except Vienna) and the neighbouring Slovenia.
- Type 3/7 (N=4) – huge polycentric metropolitan areas surrounded by highly-developed polycentric regional hinterlands. This type was characteristic for

densely populated areas of the European core, enclosed within the quadrangle: Central England, Paris, Rhine-Ruhr and the Netherlands.

- Type 4/56 (N=9) – modern national growth poles surrounded by well-developed industrial areas. This type comprised two subtypes, represented by German macroregions (southern Germany and Bielefeld), as well as macroregions of northern Italy.
- Type 5/34 (N=10) - national metropolitan areas surrounded by areas undergoing economic restructuring – composed of two subtypes with a similar number of regions, differing by the scale of labour market problems. This type includes the EU-15 convergence regions – macroregions in the former GDR, southern Italy and Spain, as well as British macroregions (Glasgow, Newcastle, Cardiff), Bordeaux in France and Liège in Belgium.
- Type 6/2 (N=6) - traditional national growth poles surrounded by traditional farming areas. This type only covered capital city macroregions in Central and Eastern European countries (with the exception of Budapest, Vilnius and Riga).
- Type 7/12 (N=11) - traditional metropolitan areas surrounded by industrial (7) and farming (4) regions. This type comprised peripheral regions of smaller cities in Central and Eastern Europe, in northern Spain (Bilbao and Saragossa) and Portugal (Porto), and also the metropolitan macroregion of Athens, different from other regions in this category.

The remaining metropolitan macroregions (16) were so unique that they made up individual types. As a rule, this was associated with their capital city functions – 10 cases, i.e. the majority of the analysed capital city macroregions of the EU-15.

Type	Degree of distribution		Degree of concentration	
	European	National	Dispersed	Concentrated
Type 1/3 “Monocentric”	x		x	
Type 1/5 “Central”		x	x	
Type 2/1 “Mountain”		x		x
Type 3/7 “Polycentric”	x			x
Type 4/56 “Industrial”		x		x
Type 5/34 “Problem”	x		x	
Type 6/2 “CEE capitals”	x		x	
Type 7/12 “Peripheral”	x		x	

Table 30. Characteristics of the distribution of identified types of macroregions
Source: prepared by the author.

Most of the major types that we identified (5) were European in character, i.e. they could be found in at least three countries **(Table 30)**. What is more, as a rule these were not neighbouring countries, which justified referring to this type as “spatially dispersed”. On the other hand, three other types were national in character (could be found in not more than two countries), which as a rule was associated with a relatively high degree of their spatial concentration, frequently manifested by their direct vicinity.

As the next step, the identified types were characterised using the earlier adopted indicators to show the degree of their internal cohesion regarding the level of economic development, economic structure, demographic processes and the labour market situation. The differences were then subject to the t-test. Based on the results of these tests capital city macroregions in CEE countries, proved to be the only group which turned out to be statistically distinguishable when compared to the remaining types of macroregions. This type was characterised by wide disparities in the development level between the metropolis and the region, and also by a rapidly increasing rate of these disparities. The similarity of the economic structure of the metropolitan area and the remaining part of the macroregion was relatively small, with considerable differences in terms of the labour market situation and attractiveness of migration. Very probably, this led to intensive backwashing processes from the regional hinterland to the centre, involving primarily the best educated and the most enterprising individuals, which was bound to negatively affect the endogenous potential for growth in the regional hinterland of the metropolis. On the other hand, resources offered by the regional hinterland were not attractive for companies based in the capital city, whose cooperation links would as a rule bypass the direct regional vicinity of the metropolis.

Type (N) "summary names"	Development level disparities [GDP per capita ratio]	Dynamics of development level disparities [Change of GDP per capita ratio]	Similarity of demographic processes [difference in migration balance]	Structural dissimilarity [composite index]	Labour market dissimilarity [difference in unemployment rate]
Type 1/3 "Monocentric"	1.37	0.04	1.9	7.5	2.2
Type 1/5 "Central"	1.40	0.01	2.0	13.5	0.5
Type 2/1 "Mountain"	1.52	-0.01	5.4	12.6	0.5
Type 3/7 "Polycentric"	1.32	0.04	1.7	11.1	1.2
Type 4/56 "Industrial"	1.21	0.02	1.8	5.1	1.0
Type 5/34 "Problem"	1.18	0.05	3.1	5.9	2.8
Type 6/2 "CEE capitals"	2.25	0.37	5.5	22.6	5.5
Type 7/12 "Peripheral"	1.29	0.09	4.0	14.0	5.8

Table 31. Characteristics of selected types of metropolitan macroregions
Source: prepared by the author.

Wide disparities in the development level were also characteristic for "mountain" macroregions, where the outflow of the population from peripheral areas could also be observed. On the other hand, the level of structural similarity was much higher, and the labour market situation comparable, which resulted in the stabilisation of disparities in the level of economic development.

By comparison, "industrial" and "problem" macroregions regarding the development level and the economic structure were characterised by considerable internal cohesion, which might be a proof of well-developed linkages within these macroregions. Nevertheless, development level disparities in the "problem" macroregions were increasing quite rapidly, and the scale of differences in the migration balance between the metropolis and the region was high, similarly to the disparities in the unemployment rate. In contrast, the situation concerning these aspects in the "industrial" regions was relatively stable.

The scale of increase in the development level disparities was high in the "peripheral" macroregions, characterised by a low structural similarity between the metropolis and its region. This was expressed as wide disparities regarding the unemployment rate, which was much higher in the peripheral areas, while backwashing processes were similar to those discussed in the example of the "CEE capital city macroregions". At the same time,

despite a speedy increase, the scale of development level disparities between the metropolis and the region remained relatively low.

Demographic processes relating to migration were similar in highly-developed "polycentric" and "monocentric" macroregions. This was coupled with a simultaneous increase of disparities in the development level, with considerable differences in the economic structures but a rather similar situation in the labour markets of both the metropolis and the region.

The labour market situation manifested many similarities in the "central" macroregions, and the dynamics of disparities in the level of economic development remained stable, despite a relatively small level of structural similarity and a large scale of these disparities, which could mean that metropolitan centres were central places for their regional hinterlands.

5.3. Conclusions

To sum up, we should emphasise considerable dissimilarities related to the correspondence between the directions of change in the component parts of metropolitan macroregions. This, however, makes generalisation difficult and points to a significant role of the national and regional contexts, which prove a clear *differentia specifica* of each of the surveyed macroregions.

One of the major factors differentiating both metropolises and their regional hinterlands was the modern character of the economic structure, expressed by a large share of services, including specialised services, which was associated with a high level of economic development. In addition, the disparities in the demographic potential of the macroregions played an important role as they signalled the size of the local labour pool and sales markets, which in turn would usually foster the development of the service sector. In case of metropolitan areas, their place in the respective national settlement structures was important, with an additional differentiating factor being the degree of integration of the suburban zone with the metropolitan centre, expressed by the disparities in the economic structure and labour productivity. On the other hand, for regional hinterlands of metropolises, the labour market situation was more important; in many cases it was linked to the level of industrialisation of the regional economy. Furthermore, the level of the duality of the economy, expressed by the disparities in the labour productivity between agriculture and non-agricultural activity, was another significant factor.

Taking into account the above dimensions of disparities, we identified several main types of conditions determining the economic relationships between the metropolis and the region observable in Europe. Most of the types of such conditions could be encountered

across Europe and were spatially dispersed. Nonetheless, there were also groups of macroregions with similar conditions which could be found in one or several neighbouring countries, e.g. southern Germany and northern Italy, Austria and Slovenia, as well as the remaining macroregions of large German cities. On the other hand, the capital city macroregions of Central and Eastern European countries were the most conspicuous of metropolitan macroregions. In this group, it could be clearly observed how metropolises break ties with their regional hinterlands. This was probably caused by the rapid pace at which the capital city metropolises joined the mainstream of an open networked economy, with a dominance of traditional functions such as low-productivity agriculture and declining traditional industries in the economies of their regional hinterlands. To some extent, this type was imitated by other, usually smaller cities with peripheral locations, where similar processes took place but with a lower degree of macroregional divergence. At the same time, highly industrialised regions (here referred to as "industrial" or "problem" regions) were relatively the most internally coherent. However, during the process of adapting their economic structures to the conditions of global information economy, their intraregional convergence would as a rule decrease. The remaining types of regions were quite varied despite a similar scale of intraregional disparities in the economic development level. Divergence could be observed both in highly-developed monocentric and in polycentric regions. Nevertheless, in the former type of regions, this process took place in the conditions of an extensive and complex network of flows both regarding migration and local labour market linkages, whereas in monocentric regions the degree of complexity of these relationships was much smaller. In contrast, metropolitan regions situated in Germany, Austria and Slovenia manifested the greatest stability in terms of development disparities between the metropolis and the region, which was largely a result of a similar situation in the macroregional labour markets and could be seen as a proof of considerable integration of regional production systems. However, capital city macroregions yielded the least to such attempts at generalisation – particularly those in smaller countries, where the relationships between the metropolis and the region were uniquely distinctive.

6. Determinants of macroregional convergence

As shown above, the analysed metropolitan macroregions showed considerable differences regarding the scale and dynamics of intraregional disparities between the metropolis and the region. Therefore, this part of the Report sets out to identify factors which were first and foremost responsible for these disparities. The analysis comprised the indicators discussed in the previous chapter, and highlighted the following issues: demographic situation and the settlement system, labour market situation, economic

structure and labour productivity. The presented data illustrated the situation in 2004/2005 as well as the changes that took place in the period 1998-2004/5.

Undoubtedly, there are many causes underlying both the internal disparities in metropolitan macroregions in terms of the level of economic development measured by GDP per capita as well as their dynamics. The factors responsible for this divergence have been defined in an exploratory manner. As the first step, we constructed the correlation matrix for the quotients of per capita GDP in the metropolitan areas and their regional hinterlands (in the case of dynamics, the differences in the quotients were analysed for the years 1998-2005) and for the above groups of indicators. This enabled us to make a preliminary identification of variables which could affect the level of macroregional convergence. Then, we set out to indicate the key factors with the use of the general regression model (the least squares method) – and a supplementary use of forward stepwise regression. Originally, this was intended to help build a model incorporating variables which are strongly correlated with the dependent variable and, at the same time, as weakly as possible intercorrelated with one another.

6.1. Disparities in the development level between the metropolis and the region

The scale of disparities in the level of economic development between the metropolitan area and the surrounding region (*degree of macroregional convergence*), which was the dependent variable, was defined as:

W_{MC} = GDP per capita $_{MA\ 2004}$ / GDP per capita $_{RH\ 2004}$.

In consequence, the more the value of the WMC coefficient diverged from 1, the larger the scale of disparities in metropolitan macroregios. A coefficient value of less than 1 indicates a higher level of development of the regional surrounding than in the metropolitan area and the values over 1 the opposite situation. However, the first situation (RH higher than MA) was only observed in 5 macroregions and in those cases the index was very close to 1, so in the following analyses we will consider that a high WMC coefficient means divergence, and a low coefficient (i.e. close to one) means convergence.

Demographics

Among indicators from the “demographics” category, the share of the largest city (within its administrative boundaries) in the population of the entire metropolitan region had the biggest impact on the level of macroregional convergence **(Table 32)**. However, it should be borne in mind that, to some extent, this correlation could result from the differences in the adjustment of the boundaries of individual metropolitan areas to the extent of the metropolitan labour market. Leaving this objection aside, this correlation (upon its testing) meant that the surroundings of polycentric metropolitan areas was

relatively better developed economically than the surroundings of monocentric metropolises with a clear domination of the centre. What is more, the degree of monocentrism of the metropolitan area was the more significant the greater the polycentrism of the regional hinterland, expressed by the share of the largest urban centre in the number of the population living in the remaining part of the macroregion. As a result, the lack of big urban centres in the regional hinterland when the metropolitan centre had a large number of the population as a rule signified wider disparities in the level of economic development.

Index	Metropolitan region	Regional hinterland	MA/RH ratio
Similarity of demographic processes**	*0.16*		
Population	*-0.08*	0.00	*-0.12*
Population density [pax/km2]	*-0.02*	**-0.28***	*0.14*
Natural increase in ‰ [average 2000-2005]	*-0.09*	*-0.18*	*0.11*
Migration balance in ‰ [average 2000-2005]	*-0.03*	**-0.33***	*-0.09*
Population of largest city	*0.12*	*-0.09*	*0.15*
Share of largest city in population [%]	**0.47***	*-0.10*	**0.34***

* significance at the level of 0.05
**sum of absolute differences in natural increase and migration balance in the metropolis and regional hinterland

Table 32. Correlation coefficients between the level of macroregional convergence and demographic factors
Source: prepared by the author.

The characteristics of the regional hinterland affected the level of macroregional convergence to a lesser extent (bordering on statistical significance). In particular, this was true for the population density, which was higher in regions with lesser disparities in the economic development level. In addition to that, the migratory balance of the regional hinterland was negatively correlated with the degree of macroregional convergence of the level of economic development. This could mean that in the conditions of more tangible disparities in per capita GDP, an outflow of the population from the regional hinterland to the metropolis can be observed (e.g. to seek employment). In contrast, when the disparities are low, the regional hinterland could be attractive for some metropolitan dwellers (e.g. old age pensioners looking for cheaper real property and better living conditions). However, it should be emphasised that

although statistically significant, these two correlations were very weak and could be produced by other analysed factors.

Economic structure

The similarities between the economic structure of the metropolitan area and its hinterland had a substantial bearing on the degree of macroregional convergence **(Table 33)**. This can be clearly seen in the case of the composite dissimilarity index, which was strongly correlated with the macroregional convergence index. It means that wider disparities in the level of economic development were accompanied by wider disparities in the economic structure. An analysis of partial dissimilarity indices will show whether this could be explained by the disparities in the roles of the agriculture and services sectors between the metropolis and the region. In particular, the more agricultural the nature of the metropolis' regional hinterland, the greater the degree of macroregional divergence in the development level.

Indicator	Metropolitan area	Regional hinterland	MA/RH ratio
Dissimilarity index	**0.64***		
GVA in agriculture [%]	*-0.15*	**0.48***	**-0.50***
GVA in industry [%]	*-0.10*	*0.21*	*-0.23*
GVA in services [%]	*0.12*	**-0.42***	**0.50***
GVA simple services (sections G-I) [%]	**0.38***	*-0.14*	**0.51***
GVA - specialised services (sections J-K) [%]	*0.06*	**-0.37***	**0.51***
GVA – public services (sections L-O) [%]	**-0.41***	*-0.18*	*-0.22*
GVA - specialised services (sections J-K) [% GVA of the service sector]	*0.01*	*-0.23*	**0.30***

* significance at the level of 0.05

Table 33. Correlation coefficients between macroregional convergence level and dissimilarity index

Source: prepared by the author.

In contrast, a well-developed service sector in the regional hinterland was more likely to foster structural similarity, which in turn was manifested by small disparities in the economic development level between the metropolis and the region. At the same time, disparities in the industrialisation level did not affect the level of macroregional convergence, which was probably due to the differences in the stages of restructuring processes in this sector in individual metropolitan macroregions.

The role of the service sector for macroregional convergence could also be clearly seen in the analysis of the internal disparities in the sector, broken down into "simple" services

which included: trade, hotels and restaurants, as well as transport, storage and communication; "specialised" services such as: financial intermediation and real estate and business activities, as well as "public" services such as: public administration, education, health care and social assistance. Interestingly, a higher share of simple services in the metropolitan area economy, just as a smaller share of specialised services in the economy of the regional hinterland, signalled a higher level of macroregional economic divergence. This could indicate barriers to the development of simple services in the peripheral areas of regions with strongly developed central features in the metropolis. This, however, did not apply to public services as in their case a higher share in the economic structure of the metropolitan area would normally foster a greater macroregional convergence. On the other hand, disparities in the role of specialised services vis-à-vis other types of services only marginally affected the scale of intraregional disparities in the level of economic development.

Labour market

Similarities in the labour market situation were distinctly related to the scale of disparities in the level of economic development between the metropolis and the region **(Table 34)**. This was primarily indicated by the composite indicator - a sum of absolute differences in the number of employees per 100 population and the unemployment rate between the metropolis and the region. As the partial indices revealed, this was mostly due to a higher degree of economic activity and a higher number of jobs per 100 inhabitants of the metropolitan area. On the other hand, the smaller the differences in the unemployment rate within the metropolitan macroregion, the greater the degree of macroregional convergence. Nevertheless, it should be pointed out that the above correlations (other than the composite indicator), were very weak.

Indicator	Metropolitan area	Regional hinterland	MA/RH ratio
Dissimilarity of labour market situation**	**0.48***		
Employees per 100 population	**0.35***	*-0.09*	*0.23*
Activity rate [%]	**0.27***	*-0.02*	*0.10*
Unemployment rate [%]	*-0.20*	*0.02*	**-0.30***

* significance at the level of 0.05
**sum of absolute differences in the number of employees per 100 population and the unemployment rate

Table 34. Correlation coefficients between macroregional convergence level and labour market indicators
Source: prepared by the author.

Labour productivity

Another factor directly related to the degree of macroregional convergence was labour productivity, defined as gross value added per one employee **(Table 35)**. Quite naturally, the greater were the disparities in labour productivity between the metropolitan area and the remaining part of the metropolitan macroregion, the was greater the degree of macroregional divergence. This was mostly due to a lower labour productivity in the regional hinterland both in services and in industry. At the same time, the relativisation of labour productivity in individual sectors vis-à-vis the average for a given macroregion in many cases made the correlation with development disparities very weak or statistically insignificant.

Indicator	Metropolitan area	Regional hinterland	MA/RH ratio
Total productivity [EUR]	*-0.22*	**-0.52***	**0.86***
Productivity in agriculture [EUR]	**-0.33***	**-0.32***	*0.21*
Productivity in industry [EUR]	*-0.04*	**-0.43***	**0.51***
Productivity in services [EUR]	**-0.29***	**-0.51***	**0.76***
Productivity in agriculture [total =100]	*-0.20*	*0.14*	**-0.24***
Productivity in industry [total=100]	*0.05*	*0.12*	*-0.04*
Productivity in services [total=100]	*0.04*	**0.29***	**-0.25***

* significance at the level of 0.05

Table 35. Correlation coefficients between macroregional convergence level and productivity indicators

Source: prepared by the author.

General regression model - disparities in the development level

At the next stage of investigating the determinants of macroregional convergence, we discarded the variables which were very strongly correlated (k>0.8) (e.g. labour productivity, very strongly linked to per capita GDP), and those with an insignificant correlation (p>0.05). From the correlation matrix produced in this way, we removed interdependent variables at the correlation level (k>0.6). In effect, we obtained a set of variables which were then used in the multiple regression analysis. In the process, we additionally used the forward stepwise regression method, whereby we successively added the most strongly correlated variables, having set the minimum increase threshold of the adjusted determination coefficient (r^2) for the model at a level of 0.05. As a result, the following regression equation was produced:

W_{MC} = 0.486 * DI + 0.340 * LMI + 0.308 * LP

where:

W_{MC} – intraregional economic development disparities;

DI – dissimilarity index (the higher the index value the smaller the similarity of the economic structure);

LMI – dissimilarity index for labour market situation (the higher the index value the smaller the similarity of the labour market situation);

LP – intraregional disparities concerning labour productivity in (the higher the index value the higher the labour productivity quotient between the metropolis and the region).

On this basis, we can conclude that the level of intraregional disparities was the most dependent on the structural similarity of the metropolis and its regional hinterland, as well as on the comparability of their labour market situations. In addition to that, disparities in the labour productivity in the industrial sector played an important part for the macroregional convergence in the level of economic development.

It should be observed that a similar economic structure largely determined the average labour productivity in the three major sectors. The reason for this were substantial disparities in labour productivity between the agricultural sector on the one hand and the industrial and service sectors on the other. The structural similarity could also produce similar responses of the component parts of metropolitan macroregions to trade cycles and development megatrends. In addition, a similar structure most likely fostered the development of linkages between businesses situated in different parts of metropolitan macroregions. On the other hand, the well-developed service sector in the regional hinterland could signify a greater self-sufficiency of the region in this regard, which in effect reduced the role of services provided to its regional hinterland by the metropolitan area.

In contrast, a similar situation on the labour market could explain lesser disparities in the development level between the metropolis and the region on the one hand, and on the other – it could be caused by such disparities. In particular, this applied to the similarities between the metropolis and the region in terms of the number of jobs per 100 population, which could restrict the flows from the metropolis to the region and vice versa, particularly in case of commuting to work. Secondly, a similar unemployment rate could suggest a similar response of the macroregion's component parts to economic performance or be seen as a proof of well-developed cooperation linkages regionally.

The disparities in labour productivity in industry were interesting determinants of the level of macroregional convergence. A similar labour productivity in this sector could

signify a similar capital intensity of the sector or a similar level of technological advancement. This could naturally generate similar responses in the two macroregional components to economic performance in the industrial sector, although this was probably influenced by the dissimilarities in the sectoral structure. The similarity of both parts of the macroregion in terms of the value of this indicator could also point to a similar stage of restructuring processes in traditional branches of industry.

To sum up, it should be noted that the above determinants were not the sole factors affecting the degree of macroregional convergence of the economic development level as the adjusted determination coefficient of the regression model was only 0.61. This can undoubtedly be attributed to a strong internal differentiation of the metropolitan regions under analysis, relating to a number of aspects ranging from demographic through economic to social ones. In addition, incorporating additional variables into the model, mostly those illustrating the differences between the metropolis and the region in terms of the quality of human capital and degree of innovation, would in all likelihood significantly increase the value of that coefficient.

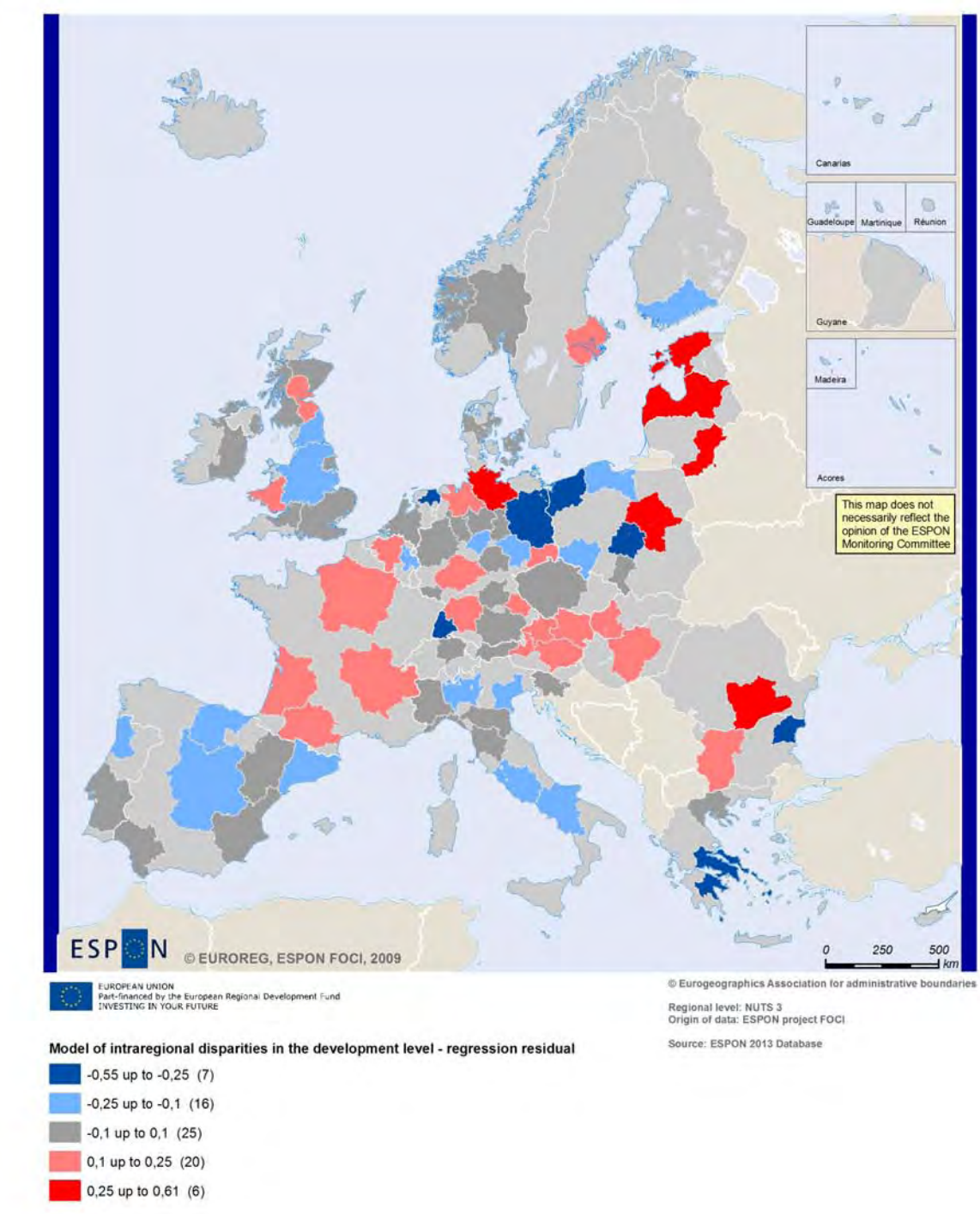


Figure 24. Regression residual – intraregional development disparities
Source: prepared by the author.

To better verify the model summarised above, we made a residual regression analysis and examined the resultant spatial distribution. It should be emphasised that the analysis of regression residuals did not reveal any significant deviations from the normal distribution. The spatial distribution of residuals also corroborates the correctness of our model, and does not show any disruptions related to the spatial concentration of regression residuals in one or several neighbouring countries. However, based on the analysis of residual distribution, we can indicate those metropolitan macroregions which most strongly diverged from the correlation revealed in the model. Those macroregions primarily included Central and Eastern European capital city regions of the Baltic countries, Poland and Romania. This group also included the macroregion of Hamburg, which encapsulated a part of the former GDR in the vicinity of Schwerin. At the other extreme of regions departing from the model, we have Berlin and Athens, as well as smaller industrial regions in CEE countries, i.e. Szczecin, Łódź and Varna, as well as Groningen and Freiburg. On the other hand, German, Italian, British, Dutch, Iberian and Irish regions made the best fit with the presented regression model.

6.2. Change in the development disparities between the metropolis and the region

The change in the scale of disparities in the economic development level between the metropolis and the region (*macroregional convergence process*), adopted as the dependent variable, was defined as:

ΔW_{MC} = (GDP per capita $_{MA\ 2004}$ / GDP per capita $_{RH\ 2004}$) - (GDP per capita $_{MA\ 1998}$ / GDP per capita $_{RH\ 1998}$)

Positive values of this indicator denoted an increase in the macroregional divergence of the development level, and negative ones – its decrease.

Just as before, the independent variables belonged to four groups and illustrated the situation in 1998 and its dynamics in the years 1998-2005[23] both in the metropolitan area and in the regional hinterland. Moreover, the quotients of these indicators and the differences in these quotients between 1998 and 2005 were used in the analysis 2005.

Demographics

The juxtaposition of macroregional convergence processes with demographic indicators shows the following, weak or very weak, correlations **(Table 36)**. Firstly, the lesser population density in the regional hinterland coincided with a greater increase in the disparities in the level of economic development. Secondly, the monocentrism of the

[23] In case of changes in the labour market structure for calculating labour productivity in metropolitan macroregions of: Greece, the Netherlands, Poland and Romania, the data for the years 2002-2005 were used; while the data concerning changes in the internal structure of the service in Bulgaria, France, Poland and Italy come from the years 2002-2005.

metropolitan area, expressed by a significant share of the largest city in the population of the metropolis would increase the macroregional divergence. Thirdly, the demographic collapse in the metropolis and the region, manifested by a fall in the number of the population and a negative natural increase, also coincided with an increase in intraregional divergence. In addition to that, the migratory outflow from the regional hinterland would as a rule take place in the conditions of a divergence of the development level.

Indicator	Value in 1998			Change in 1998-2005		
	Metropolitan area	Regional hinterland	MA/RH ratio	Metropolitan area	Regional hinterland	Difference - MA/RH quotients
Population	*-0.07*	*-0.06*	*0.07*	**-0.37***	**-0.51***	**0.30**
Population density [pax/km2]	*-0.14*	**-0.28***	*0.12*	-	-	-
Natural increase in ‰ [average 2000-2005]	-	-	-	**-0.41***	**-0.47***	*0.01*
Migration balance in ‰ [average 2000-2005]	-	-	-	*-0.16*	**-0.41***	**0.35**
Population of largest city	*0.01*	*-0.11*	*0.06*	-	-	-
Share of largest city in the population [%]	**0.37***	*0.13*	*0.13*	-	-	-

significance at the level of 0.05

Table 36. Correlation coefficients between macroregional convergence level and demographic indicators
Source: prepared by the author.

Economic structure

The similarity in the economic structure within one metropolitan region determined not only the degree of convergence of the level of economic development but also its change **(Table 37)**. In particular, the greater was the share of agriculture and the smaller the share of services in the regional hinterland's economy, the greater was the increase of macroregional divergence. On the other hand, the analysis of economic structure dynamics points to some role of industry in equalising the development levels between the metropolitan area and its hinterland. As a rule, an increased role of industry, especially when it was accompanied by a simultaneous decrease in the role of agriculture in the regional hinterland, usually led to a decrease in intraregional disparities. This could suggest positive consequences of the industrialisation of agricultural areas (which probably mostly applied to areas situated in the transport corridors) for macroregional convergence processes. What is more difficult to explain, however, is the positive

correlation between an increase of the macroregional divergence in the level of economic development and the share of the quotient of the agriculture's share in gross value added in the years 1998-2005. Most probably, this is a superficial correlation arising from other factors such as for example an extremely low share of agriculture in the economies of metropolitan regions, which could cause some accidental disruptions (high coefficient of variation values for this indicator).

Another determinant of the macroregional divergence process was a high share of simple services in the metropolitan area's economy. This could mean that a high penetration rate of such services in metropolises can restrict the development of such services in the regional hinterland. To a large extent, this is compatible with the central places theory, according to which the metropolitan centre "services" the regional hinterland. To some extent, this hypothesis has been corroborated by the fact that an average share of simple services in gross added value reached 24.4% in metropolises and only 20.7% in their regional hinterlands. Nevertheless, it should be pointed out that in the years 1998-2005 no correlation between macroregional convergence processes and the dynamics of the role of simple services in the metropolis and in the region could be observed.

To add further to this picture, a higher share of other types of services, not only those which usually represented the public domain, but also specialised financial and other B2B services indicated an increased macroregional convergence. It should be noted, however, that specialised services could at least to some extent perform the role of a growth engine for the regional hinterland. This is manifested by the positive correlation between the increase of macroregional convergence and the development of such services in the metropolises' regional hinterlands, particularly in the situation of a relative stagnation with respect to the increasing role of such services in the economy of the metropolitan region.

Indicator	Value in 1998			Change in 1998-2005		
	Metropoli-tan area	Regional hinterland	MA/RH ratio	Metropoli-tan area	Regional hinterland	Difference - MA/RH quotients
Dissimilarity index	**0.52***			-0.01		
GVA in agriculture [%]	*0.20*	**0.55***	*-0.22*	**-0.28***	**-0.46***	**0.45**
GVA in industry [%]	*-0.01*	*0.09*	*-0.01*	*-0.06*	**0.26***	**-0.30**
GVA in services [%]	*-0.03*	**-0.50***	**0.52***	*0.11*	*0.05*	*0.07*
GVA simple services (sections G-I) [%]	**0.49***	*-0.09*	**0.61***	*0.22*	*0.10*	*0.12*
GVA specialised services (sections J-K) [%]	**-0.30***	**-0.29***	*0.10*	*0.10*	**-0.26***	**0.31**
GVA public services (sections L-O) [%]	**-0.29***	**-0.33***	*0.12*	*-0.19*	*0.03*	*-0.23*
GVA specialised services (sections J-K) [% GVA of the service sector]	**-0.37***	*-0.10*	*-0.10*	*0.12*	**-0.26***	**0.37**

- significance at the level of 0.05

Table 37. Correlation coefficients between macroregional convergence level and economic structure indicators
Source: prepared by the author.

Labour market

The linkages between labour market indicators and macroregional convergence processes were to a greater extent associated with the labour market dynamics in the years 1998-2005 than with the initial situation of 1998 **(Table 38)**. One exception were disparities in the unemployment rate in 1998. The smaller these differences, the greater the increase of the macroregional convergence in the level of economic development in 1998-2005 and, conversely, a divergence increase could be observed in the conditions of a manifest segmentation of the labour market. The differentiation of the labour market situation was mainly connected with its deterioration in the regional hinterland, which frequently accompanied the macroregional divergence process. On the other hand, increased labour market similarities, particularly in terms of the number of jobs per 100 employees and an increased activity rate in the regional hinterland of the metropolis, fostered the equalising of development disparities between the metropolis and the region.

Indicator	Value in 1998			Change in 1998-2005		
	Metropoli-tan area	Regional hinterland	MA/RH ratio	Metropoli-tan area	Regional hinterland	Difference - MA/RH quotients
Dissimilarity of labour market situation	*0.01*			**0.32***		
Employees per 1000 population	*-0.15*	*-0.09*	*-0.13*	**0.64***	**0.44***	**0.58**
Activity rate [%]	*0.06*	*-0.07*	*0.05*	*0.03*	**-0.38***	**0.27**
Unemployment rate [%]	*0.02*	*0.22*	**-0.35***	*-0.16*	**-0.27***	*0.19*

- significance at the level of 0.05

Table 38. Correlation coefficients between macroregional convergence process and labour market situation
Source: prepared by the author.

Labour productivity

Indicator	Value in 1998			Change in 1998-2005		
	Metropolitan area	Regional hinterland	MA/RH ratio	Metropolitan area	Regional hinterland	Difference - MA/RH quotients
Productivity - total [EUR]	**-0.60***	**-0.60***	**0.46***	**0.63***	**0.50***	**0.60**
Productivity in agriculture [EUR]	**-0.43***	**-0.39***	*0.14*	**0.54***	**0.51***	*0.10*
Productivity in industry [EUR]	**-0.49***	**-0.55***	*0.14*	**0.71***	**0.53***	**0.44**
Productivity in services [EUR]	**-0.61***	**-0.62***	**0.44***	**0.58***	**0.41***	**0.59**
Productivity in agriculture [Total=100]	*0.01*	*0.13*	*-0.12*	*0.06*	*0.20*	*-0.10*
Productivity in industry [Total=100]	*-0.19*	*0.07*	*-0.21*	*0.01*	*0.11*	*-0.08*
Productivity in services [Total=100]	**0.28***	*0.24*	*-0.06*	*-0.02*	**-0.26***	*0.23*

* significance at the level of 0.05

Table 39. Correlation coefficients between macroregional convergence level and labour market indicators
Source: prepared by the author.

Quite naturally, both labour productivity measured in EUR and its change in the analysed period were rather strongly correlated with macroregional convergence processes. As a rule, a wider disparity in labour productivity between the metropolis and the region in the base year led to an increase in the macroregional divergence of the economic development level, which, first and foremost, was due to the disparities related to labour productivity in the service sector. In addition to that, an increase of intraregional disparities in labour productivity in industry and services widened the macroregional divergence. This process was mainly fostered by a faster increase in labour productivity in metropolitan areas in the industry sector, although such an increase, albeit on a smaller scale, could also be observed in the service sector. On the other hand, the relativisation of labour productivity in individual sectors to the average as a rule made these correlations statistically insignificant.

General regression model - change in the development disparities

At the next stage of constructing a regression model, we discarded all variables which were not significantly ($p<0.05$) correlated with macroregional divergence processes concerning the level of economic development. Then, we removed those variables which were strongly intercorrelated ($k>0.6$) from the correlation matrix. In effect, we obtained a set of variables to use in the multiple regression analysis. In the process, we used forward stepwise regression whereby we successively added the most strongly correlated

variables, with the adopted minimum increase of the adjusted determination coefficient (r^2) of 0.05%. This ultimately produced the following regression equation (r^2 = 0.57).

On this basis, it can be observed that the macroregional convergence process was largely dependent on the similarity of the metropolises' economic structure and their regional hinterlands in the base year. In 1998-2004, the divergence of the development level could be observed mostly in the circumstances of wide disparities in the economic level between the metropolis and the region. On the other hand, similarities between the metropolis and the region in terms of the share of individual sectors in gross added value fostered convergence, and in any case led to a slower increase of intraregional disparities.

$$\Delta W_{MC\ (1998\text{-}2004)} = 0{,}253 * DI_{\ (1998)} + 0{,}478 * \Delta LI_{\ MA\ (1998\text{-}2005)} - 0{,}240 * \Delta AR_{\ RH\ (1998\text{-}2005)} - 0{,}169 * MB_{\ RH\ (2000\text{-}2005)}$$

where:

ΔW_{MC} – change of intraregional disparities in the level of economic development

DI – dissimilarity index

LI – employees per 100 population

AR – activity rate in %

MB – migratory balance in ‰

and:

MA – metropolitan area

RH – regional hinterland

Other factors associated with macroregional convergence processes included the number of employees in the metropolitan area, with a simultaneous fall in the number of people economically active in the regional hinterland and the migratory outflow from the regional hinterland. Most likely, this was a proof of the backwashing of development resources from the regional hinterland to the metropolis.

It can be concluded that while structural disparities point to one of the key reasons for the increase of disparities in the development level between the regional hinterland and the metropolis, the labour market situation and migration flows are consequences of an increase in macroregional divergence. In a nutshell, metropolitan areas with their quickly increasing share of services (particularly those situated in regions which were still agricultural in character or were dominated by traditional industries) represented the poles of growth "draining" the human capital from their hinterland, which in effect led to a negative feedback related to the shrinking of resources needed for an endogenous development of these areas.

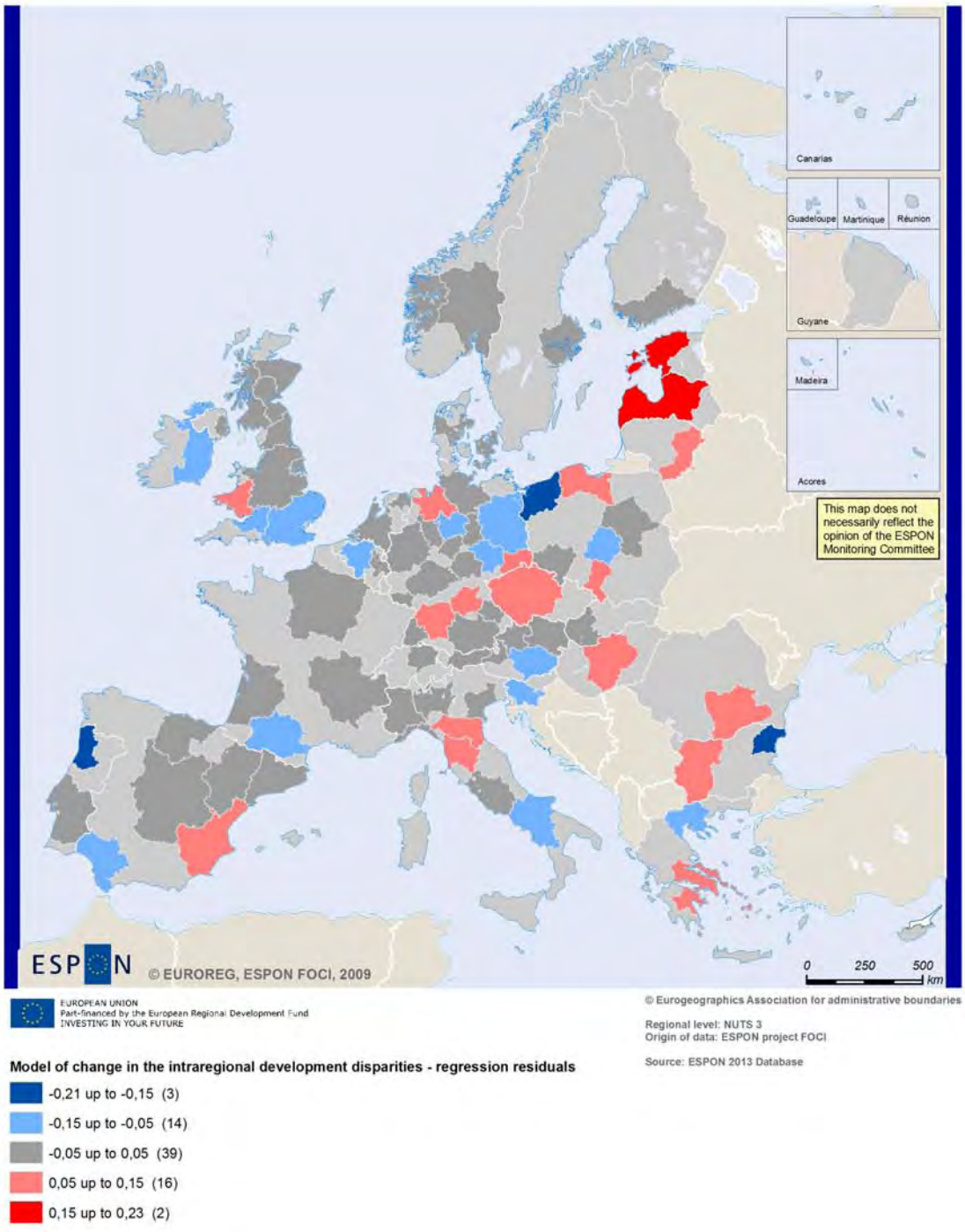


Figure 25. Regression residuals – intraregional development disparities
Source: prepared by the author.

Just as in the case of the degree of macroregional convergence, in order to gain a better understanding of the nature of the model presented above, we examined the regression residuals and their spatial distribution. The residual analysis did not reveal any significant

deviations from the standard distribution; likewise, the spatial distribution of residuals was also very even. Among metropolitan macroregions which diverged the most from the correlation shown in the regression model in question, there were: coastal macroregions situated in new Member States (e.g. Tallinn and Riga) Szczecin and Varna. Nevertheless, their distribution was so patchy that its precluded any generalisations concerning their spatial structure.

6.3. Conclusions

On the basis of the foregoing analysis, the following conclusions can be drawn:

- Both the scale of intraregional disparities and their changes were quite strongly dependent on the national and regional contexts, while the indicators and the regression models used showed only some of the factors that determined them. The incorporation of indicators related to the quality of the human capital and innovation of the enterprise sector would probably help better understand the intraregional disparities that can be observed.
- The key factor affecting the disparities in the economic development level and their change was the similarity of the economic structures of the component parts of the metropolitan macroregion. A similar economic structure could point to the existence of direct or indirect linkages between metropolitan areas and their regional hinterlands which lessened the disparities in the development level. Wider structural differences were manifested in dissimilar development paths for the metropolises and their regions and led to macroregional divergence. Nonetheless, the increasing level of similarity between the economic structures of the metropolis and the region was not the key factor underlying macroregional convergence.
- Similarity of the labour market situation was a manifestation of minor intraregional disparities in the level of economic development, which could be seen as a proof of linkages within the macroregional labour market. Furthermore, an improved situation in the metropolitan labour market with its simultaneous deterioration in the regional hinterland was the main reason (or consequence) for the macroregional divergence in the development level. Seen together with the migratory outflow from the regional hinterland to the metropolis, this could testify to the backwashing of development resources (mostly human capital), from the periphery to the core.
- Labour productivity was very strongly correlated with the development level (to some extent, this was due to the structural disparities), which was manifested inter alia by the fact that the differences in labour productivity in industry (testifying to a varying degree of capital intensity of the sector, and thereby

probably to the level of its technological advancement) were an important factor differentiating the development level macroregionally. Nevertheless, the growing similarity of labour productivity figures was not included among the factors that we employed in the model explaining convergence processed in the analysed macroregions.

Among other observable correlations which were not incorporated in our regression models, the following should be mentioned in particular:

- Regarding the disparities in the economic development level:
    - The level of monocentrism of the metropolitan area. This correlation meant that the hinterlands of polycentric metropolitan areas were in relative terms better developed economically than the metropolises with a clear domination of the centre; this could be viewed as a proof of stronger intraregional linkages generated by urban centres making up conurbations.
    - The share of simple services in the economy of the metropolitan area. A higher share of simple services in the metropolitan economy generated wider disparities in the development level, just as a smaller share of specialised services in the economy of the regional hinterland. This could point to barriers to the development of services in regions with strongly developed central functions in the metropolitan centre.
- Regarding the changes in the disparities in the economic development level:
    - Labour productivity was quite closely connected with macroregional convergence processes. As a rule, the higher the labour productivity the smaller the increase in development disparities, which was basically due to the disparities in labour productivity in the services sector. On the other hand, an increase in macroregional disparities in labour productivity led to macroregional divergence, which was mainly due to a faster increase in labour productivity in metropolitan area in service and industry sectors.
    - Specialised services performed, to some extent, the role of the growth engine for the regional hinterland, which was primarily due to the fact that a high share of such services in the regional hinterland usually coincided with macroregional convergence processes. Secondly, a decrease in the disparities concerning the role of specialised services in the metropolis and in the region (both with regard to the economy at large and their share in this type of services) signified a smaller increase of macroregional divergence in the development level.

Metropolitan macroregions in Europe – Case studies

Metropolitan macroregions selected for detailed analysis were intended to represent a diverse set in order to show both the variety of intraregional linkages and factors which determined them, and their significance for the development of the metropolis and its regional hinterland. In this case, the aim of the study was to show the mechanisms underlying the linkages between the metropolis and the region.

The selection of the case studies was purposeful and was done on the basis of the typologies discussed in Chapter 4, using data on intraregional development disparities based on per capita GDP. The selected macroregions were intended to represent extreme cases in terms of the scale of disparities in the level of development between the metropolis and the region, and show changes in these disparities also with regard to the national GDP dynamics **(Annex 7)**. In effect, the following were selected for further research:

a) macroregions with a wide and rapidly growing scale of intraregional disparities: the macroregion of Warsaw (fast development both of the metropolis and of the regional hinterland in comparison with the national average) and the region of Stockholm (weaker development of the regional hinterland as compared to the national average); which allowed for the drawing of comparisons between an “old” EU Member State and a “new” one;

b) the macroregion of Toulouse with a considerable scale of intraregional disparities, however with a tendency for their reduction in the circumstances of a rapid pace of growth of the entire macroregion as compared to the national average;

c) the macroregion of Glasgow with a small scale of intraregional disparities, but with their fast increase and a low rate of macroregional growth as compared to the rest of the country;

d) the macroregion of Barcelona with a very small and stable scale of intraregional disparities (a comparable development level of the metropolis and the regional hinterland) with a relatively low rate of economic growth as compared to the rest of the country.

Quite naturally, the above selection cannot be considered as a representative sample, and the conclusions drawn on this basis can hardly be expected to encompass all the situations taking place in the extremely diverse research area covered by the ESPON programme. Nevertheless, it can be expected that the analyses of these cases will improve our understanding of the relationships between the metropolis and the region in

rather extreme situations, which should in turn make it easier to put forward relevant recommendations regarding activities aimed to strengthen the positive aspects of metropolisation processes and reduce its negative aspects.

In the case studies, the following spatial ranges were applied (Table 40):

- The city in its administrative boundaries;
- The metropolitan region, as a rule corresponding to the NUTS3 subregion;
- The metropolitan macroregion, corresponding in three cases to the NUTS2 region, and in two other cases being a combination of NUTS3 subregions.

Spatial ranges	Spain	United Kingdom	Sweden	France	Poland
City in its administrative boundaries	Barcelona (1.7 mil.)	Glasgow (600 000)	Stockholm (830 000)	Toulouse (440 000)	Warsaw (1.7 mil.)
Metropolitan area	Barcelona metropolitan area - NUTS3 in approximation (3.2 – 4.9 mil.)[24]	Glasgow metropolitan area 9 local council areas (1.75 mil.)	Stockholm Lan (NUTS2/NUTS3) (2.0 mil.)	Aire Urbaine de Toulouse (1.1 mil.)	Warsaw metropolitan area - NUTS3 in approximation (2.6 mil.)
Macroregion	Catalonia (NUTS2) 7.4 mil.	Western Scotland (8 NUTS3) 2.5 mil.	Mälar (5 NUTS3) 3.1 mil.	Midi-Pyrénées (NUTS2 and 1 NUTS3) 3.25 mil.	Mazowsze (NUTS2) (5.2 mil.)

Table 40. Component parts of the analysed metropolitan macroregions
Source: prepared by the author.

The case studies mostly used the results of qualitative analyses, supplemented by the quantitative results of questionnaires circulated among local governments and enterprises.

Qualitative analyses included study visits of experts, in the course of which a number of in-depth interviews were made with representatives of institutions in charge of the development of a given city and region (moreover, in the case of Glasgow, Stockholm and Toulouse, we used analyses prepared by the local experts[25]). In each of the

[24] For more information see the case study of Barcelona.
[25] The expert's studies were prepared by: Prof. Iain Docherty and Malcolm Leitch (for Glasgow); Tuija Meisaari-Polsa (for Stockholm); Prof. François Taulelle (for Toulouse).

macroregions, about 10 interviews were conducted (Annex 7), which focused on the following aspects:

- The spatial range of the city's influence;
- The key strengths and weaknesses of the metropolis and of the region and major differences between these territorial systems;
- The crucial socio-economic relationships between the metropolis and the region and factors which determined them, as well as their role for the development of these territorial systems;
- The directions and extent of public intervention concerning the linkages between the metropolis and the region;
- The development prospects for the metropolitan macroregion.

As part of quantitative analyses, questionnaires[26] were distributed among local governments located in the analysed metropolitan macroregions (Annex 9), and among enterprises situated in the city's metropolitan area (Annex 10). Altogether, 1500 questionnaires were sent out to local governments, and dealt with such issues as: transport accessibility; the impact of the central city on the development of local systems, and cooperation with other local government levels. The rate of return varied from region to region, and ranged from over 30% in the metropolitan macroregion of Stockholm to 3% in the metropolitan macroregion of Glasgow[27] (Table 41). Quantitative analyses were carried out using two approaches: for the municipalities situated at a distance of not more than 50 km from the city centre (in broad terms, the local governments making up the metropolitan region), and for areas located further away, which constituted the external zone of the city's influence. Due to the low rate of return and a small size of the sample (in some cases), the results obtained should be treated with caution, only as a supplementary source of information to the qualitative analyses made on the basis of the interviews.

[26] In the emails sent out in October and November 2009 (stage I) and faxes (stage II), we provided links to the electronic versions of the questionnaires uploaded to a designated server.
[27] Due to the low rate of return and the small size of the sample, the Glasgow macroregion was not included in the quantitative analyses.

	Barcelona	Glasgow	Stockholm	Toulouse	Warsaw
Total municipalities	**454**	**239**	**52**	**570**	**356**
MA questionnaires*	**14**	**4**	**9**	**17**	**25**
RH questionnaires *	**20**	**3**	**9**	**11**	**59**
Rate of return	**7.5%**	**2.9%**	**34.6%**	**4.9%**	**23.6%**

* The general rule was that municipalities situated within 50 km from the city centre were regarded as ones situated within the metropolitan area, and the areas situated further away were treated as the external zone of the city's influence.

Table 41. Surveyed sample of local governments in metropolitan macroregions
Source: prepared by the author.

As regards enterprises operating in the metropolitan areas, the number of circulated questionnaires was about 20 000 altogether (based on the KOMPASS database); they tackled such issues as: spatial linkages; evaluation of the local environment and potential for innovation. The companies selected for the survey represented two sectors of activity, i.e. manufacturing (Section D) and services for enterprises (Section K).

	Barcelona	Glasgow	Stockholm	Toulouse	Warsaw
Total sample size	**2 500**	**1 583**	**2 500**	**2 500**	**10 000**
Number of questionnaires	**35**	**10**	**73**	**26**	**118**
Industry	**25**	**3**	**23**	**6**	**19**
Services	**10**	**7**	**50**	**21**	**109**
Rate of return	**1.4%**	**0.6%**	**2.9%**	**1.0%**	**1.2%**

Table 42. Surveyed sample of enterprises in metropolitan macroregions
Source: prepared by the author.

As a result the qualitative analyses for respective case studies were presented below followed by synthesis supported by selective use of quantitative analysis.

7. City-region relationships: Barcelona – Catalonia case study

The introduction offers a general presentation of Catalonia and its main component parts: the Barcelona metropolis and the metropolitan region, that is the Catalonian territory comprising the rest of Catalonia. In the description of this region, the issue of the dissimilarity of its territorial divisions, the so-called old and new ones, or the Spanish and the Catalonian, is extremely important. This will be discussed further in the study. Unfortunately, since statistical data are provided for differently understood statistical units, conservatism in their application is recommended. For reasons explained below, unless it is specified otherwise, the provided data concerning the metropolis, alternately referred to as the metropolitan area (and marked as a STAT source), as a rule refer to the province of Barcelona (a NUTS3 subregion; cf. Maps 1 and 5). Regardless of its weaknesses (the boundaries do not overlap with the functional metropolitan area and they include large rural areas), a NUTS3 unit gives access to comparable statistical data, and – unlike the proposals for the delimitation of the Barcelona metropolitan area discussed below, the province has fixed borders, competences and financial resources. Most of Catalonia's inhabitants live here (Kaczmarek, Mikuła 2007: 103). At the same time, numerous analytical works focus on other planning units. In this context, in-depth interviews with representatives of research centres, consulting companies and public

administration (interviews in the body of the text) provided an invaluable source of information)[28]

Catalonia lies in south-eastern Spain on the Mediterranean Sea. In the east, the natural boundary of the Pyrénées divides it from France and Andorra (where Catalonian is the official language). It mostly comprises mountain and upland areas with few lowland valleys along the largest rivers (the Ebro) and some areas on the sea coast. Catalonia occupies an area of 31 700 km2, and has 7.4 million inhabitants (2006). Catalonia's capital, Barcelona, has a population of 1.7 million and occupies an area of only 101 km2[29]. (Papers 50: 54) (see below).

Beside Barcelona, Catalonia's major cities include Hospitalet de Llobregat (250 000 inhabitants, in practice territorially integrated with Barcelona), Terrasa (202 000 inhabitants), Sebadell (202 000), Tarragona (140 000), Lleida (136 000). Both Catalonia and the city of Barcelona as well as the metropolitan area (regardless of how it is defined) have a high population density (**Annex 11**) (cf. Matheu 2003: 43), which for the region is 218 inhabitants/km2; for the metropolitan region - 674 inhabitants/km2, and for the city of Barcelona - 17 171 inhabitants per km2 (STAT). The characteristic feature of the metropolis is that there are no large rivers: those which flow through Barcelona (the Besos and the Llobregat) are – especially in dry season – streams rather than rivers and do not satisfy the residents' demand for water.

The very high population density of Barcelona, coupled with exorbitant costs of living and other inconveniences of living in the centre of the vast metropolis leads to continuing suburbanisation, facilitated by the relatively well developed centric transport network connecting it with the surrounding areas and the metropolitan region. In 2005, the metropolitan area had 4.7 million inhabitants, i.e. over than 2/3 of Catalonia's population.

Over the last decade, each of these cities – excluding Barcelona – absorbed several thousand immigrants. The region is characterised by a high concentration of the population in the Barcelona metropolitan area: only ca. 1/4 of Catalonia's population inhabit the surrounding metropolitan region.

Catalonia, which accounts for 16% of the population of Spain, generates nearly 1/5 of the country's GDP. In 1995-2004, it recorded 128% of GDP growth (up to a level of EUR 19 700 per capita in 2004). The EU enlargement in 2004 provided an additional growth

[28] I would like to extend special thanks to all those who shared their knowledge and materials with me during my stay in Barcelona in October 2009, in particular to: Mr Camarasa J.A., Mr Canals M.J.M., Mr Domenech R. B., Ms Herrero M., Lopez J., , Mr Munoz-Torrent X., Mr Redondo J.L., Mr Thomas J. T., Mr Ulied A. I would also to thank their associates. Special thanks are also due to Mr Jaume Fons-Esteve.

[29] In 1979, it had over 1.9 million inhabitants.

stimulus which was only halted by the financial crisis of 2008. What distinguishes Catalonia from the remaining metropolises under analysis is the higher level of per capita income in the metropolitan region than in the metropolitan area. Moreover, this disparity is growing in favour of the metropolitan region: whilst in 1995 the ratio of the area's GDP to the region's GDP was 0.95, in 2004 it was only 0.92 (STAT). In 2004, Catalonia's GDP was EUR 23 741, which accounted for 120.5% of the Spanish average. In 1995-2004, the GDP dynamics reached 108.8%, which was only minimally higher (by 0.4%) than the country's average. Starting from 2004, another round of accelerated development took place.

The share of the metropolis in the generation of GDP was prevalent, but – as mentioned below – lower per capita than in other parts of Catalonia, and in 2004 it was EUR 23 276.4 (as compared to EUR 13 967.2 in 1995), i.e. a 24.6% increase. By comparison, however, it meant a relative deterioration of its position vis-à-vis the national average, from 120.5% to 118.2% in 2004.

In 1998, the structure of the metropolitan economy 1998 was dominated by services (with 62.7% share in GVA generation), with a considerable role of industry (36.5% GVA) and an insignificant share of agriculture (0.7% GVA). For obvious reasons, the role of agriculture in other parts of Catalonia was greater (5.7% GVA), but there both services and industry played nearly the same role as in the metropolitan area (60.9% and 33.4%, respectively). The years 1998-2005 were characterised by an increased significance of services both in the metropolitan area (by 3.3pp), and in the metropolitan region (by 2.1pp), mostly achieved at the expense of industry. For many years now, industry has been relocated to the external ring of the metropolis (Figure 26).

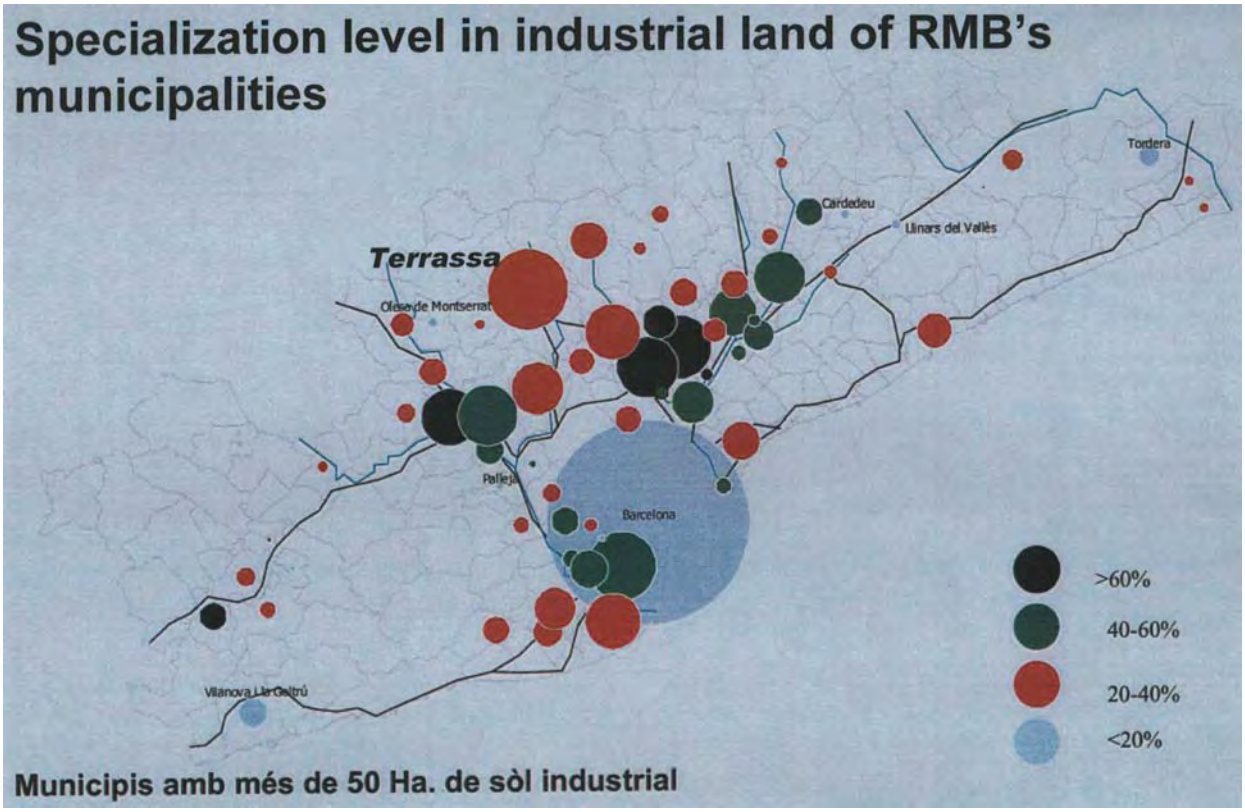


Figure 26. Specialisation levels in the industrial land of the Region Metropolitan of Barcelona municipalities
Source: Xavier Munoz and Torrent, 2009.

The problem of the positioning of the Barcelona metropolis (and thereby of Catalonia) in Europe and globally (for various reasons, Spain is rarely adopted as a frame of reference for Catalonians) is seen in a new light when we analyse the structure of the service sector. It is commonly acknowledged that Barcelona (the metropolitan area) has made an attempt to become a centre of fashion and related new technologies and services. Coupled with the well-developed sector of culture and tourism, this would make it possible to promote a new image of the city and improve its position in competitiveness rankings, and in this way replace the collapsing industry with new sources of work and income. So far, none of these aspirations has been put to life. The data for the metropolitan area (for 2002) prove that while the share of simple services in GVA generation was 26.2% and was higher than specialised services (22.0%), the latter indicator had worse values than in all the remaining case studies (including Warsaw, where specialised services had a 25.1% share). The year 2002 can probably be regarded as a starting point for the implementation of a new development policy for the metropolis (let us recall that in 2003 the Metropolitan Plan was adopted). In 2002-2005, a considerable increase in the share of advanced services in the service sector GVA could be observed in the metropolitan area (by 1.3pp – it is worth noting that this was a much worse result than in the case of the Glasgow and Warsaw metropolises). In 2002, the Catalonian metropolitan region had a higher share of simple services (28.8%), and a

slightly lower share of specialised services (18.0%) than the metropolitan area. The only considerable difference has been a small increase in the share of specialised services in the service sector GVA in the years 2002-2005 (by 1.6pp). The share of public services has changed only minutely (by 0.5pp).

In 2001, 38.3% of all people in work in Catalonia were employed in industry and construction, 58.9% – in services, and 2.5% - in agriculture (AMB 2003: 167). Catalonia's exports accounted for 28% of all Spanish exports and generated 29% of Catalonia's GDP. The share of the MRB in Catalonia's industrial output reached over 70% in medium-tech and over 80% in hi-tech exports, and 69.2% in income (GDP) (ibidem: 167). Agriculture is developing in river valleys, and the best developed area with a modern agricultural and food production complex is situated in the west of the region, in the environs of Lleida. As we can see, non-metropolitan areas do not play a considerable role in employment and economic activity. This rather uncommon situation is the consequence of many years of development processes. For over 150 years, these processes were underpinned by the industrialisation of Catalonia, which produced a concentration of activity around the capital. The region's relief (mountains) played a part in the physical fragmentation of the area which was bound together by several centripetal transport routes. The success of industrialisation not only resulted in the concentration of the population in the Barcelona metropolitan area, but also led to a considerable depopulation of the region's remaining areas, whose inhabitants migrated to Barcelona and its environs in search of work. The modernisation of agriculture and a dynamic development of tourism in weakly-populated areas (or, more broadly – increased functional ties with Barcelona) fostered a rapid increase of incomes in areas which were earlier regarded as peripheral. Today the quality of life and per capita income are higher outside the metropolitan area than in it.

The metropolitan region and its component parts

The region of Catalonia is one of 17 NUTS2 regions in Spain. Similarly to Basque Country, it enjoys a greater deal of autonomy than most Spanish regions. In the traditional division, Catalonia has 4 provinces [provincias] (NUTS 3) and 946 municipalities [municipios]. (cf. Maps 1a and 1b) These structures were determined nationally as early as the 19th century, during the early stages of Catalonia's industrialisation. For instance, the capital province (Barcelona) occupies 7 718 km2, and has 311 municipalities (Figure 27). 95% of the province's population live in cities with over 5 000 inhabitants, and 80% - in cities with over 20 000 inhabitants. The provinces inter alia distribute funds for investment projects in Catalonia (mainly for municipalities). They are administrative in character and are objects of an ongoing controversy (which is justified as the division into provinces has for a long time been divorced from the Catalonian reality, which

evolved during the massive industrialisation in the last two centuries). To some extent, it is also due to separatist ambitions shared by many Catalonians, and the gradual taking over of the duties of state administration by the Catalonian authorities (e.g. tax collection, police). Catalonia's territorial system will be discussed in more detail in the following chapter. The existing and planned territorial divisions are utterly incompatible. Paul Strijp (2008) referred to the status quo as "administrative crowdedness". In some areas of Catalonia, 7 tiers of territorial units can be found.

Figure 27. Catalonia, groups of *comarcas* (Regional Spatial Planning Areas). Metropolitan Region de Barcelona marked as "Ambit Metropolita"
Source: AMB.

Under to the statutes accorded to autonomous regions, they had the right to make internal divisions into counties or districts (*comarcas*), but most of them did not exercise this right. Today, Catalonia consists of 41 *comarcas*. On their basis, attempts are being made to form groups of *comarcas* for planning purposes. There are 7 such groups, known

as the Regional Spatial Planning Areas (RSPA) (see Map 3). Apparently, these groups are to provide an alternative to *provincias*. They are better attuned to the actual settlement reality which was evolved inter alia following the development of Barcelona's satellite cities and the dynamic urban sprawl than the 19th century provinces. However, neither *comarcas* nor their associations, nor forms of cooperation listed below, are furnished with sufficient powers or funds to replace the now compulsory nation-wide division into regions, provinces and municipalities. Though various institutional forums and communities (academic, territorial associations), Catalonia propagates its own proposed divisions, which are however merely planning in character, and only exceptionally stipulate some real forms of cooperation such as inter-municipal associations in Poland. We can say therefore that Catalonia has its own concept of separate territorial structures of its own design, but their actual role in steering development is limited mainly to analytical and planning functions. Just as every territorial system drawn on the map, this one does not fully correspond to the description of the metropolis. For example, on Figure 28, the area of the metropolis should in fact be also delineated in the area of *Comarques Central*, especially along the main transport routes. It goes without saying, naturally, that planners have every right to mark the boundaries using their own criteria.

Figure 28. Barcelona metropolitan area covered by the operation of three municipal associations
Source: Redondo 2009.

In addition, the Barcelona metropolitan area is demarcated for planning purposes (*Metropolita de Barcelona*; or MRB, i.e. the Metropolitan Region of Barcelona) which is purely planning in character (one of *comarcas* groups with 163 municipalities and 4.9 million inhabitants, spanning an area of 3 200 km2). Moreover, the literature of the

subject distinguishes the Metropolitan Agglomeration of Barcelona (MAB; 93 municipalities over an area of 1 578 km2, with a total population of 4.1 million). The criteria for the identification of the MAB and the underlying definition were the following: " a grouping of contiguous Urban municipalities situated around a central city (with over 100,000 inhabitants and a density greater than 1 500 inhab./km2) and which make up an urban unit with a population greater than 250 000 inhabitants and with average density of over 1,500 inhab./km2." (AMB, 2003: 151). To sum up, we can say that there is no single uniform definition of the Barcelona metropolitan area (Kaczmarek, Mikuła 2007: 103)

Other than the division into provinces, groups (associations) of municipalities or organisations in the Barcelona metropolitan area (more precisely: in a part of this area) operate on the ground, in a much smaller area, viz.:

- (a) 33 municipalities with competences in environmental protection (*Entitat Metropolitana del Medi Ambient*);
- (b) 18 municipalities (including Barcelona) which co-manage the transport in the metropolis (*Entitat Metropolitana del Transport*);
- (c) The area of *Mancomunitat de Municipis de l'Area Metropolitana de Barcelona*, which connects the city of Barcelona plus 30 neighbouring municipalities, intended to carry put other tasks than transport and environment (**Figure 28**).

Groups (a) and (b) were established by the Parliament of Catalonia following the liquidation of the Metropolitan Corporation of Barcelona, and deal with specific tasks (environmental protection, transport) in the metropolitan area, and it is commonly believed that they perform their tasks satisfactorily. Group (c) is a voluntary association of municipalities with practically no influence on real activities. The city of Barcelona plays a key role in the work (and financing) of this group (Kaczmarek, Mikuła 2007). It is also widely believed in Catalonia that the existing municipal associations prove that there exists a need to establish anew a territorial unit that would cover the entire metropolitan area and would administer its development.[30]

These main groups of municipalities and the Strategic Plan association are regarded as exponents of the opinions and interests of metropolitan municipalities. Additionally, an initiative involving cooperation networks (the Arc[31]) between the mainly industrial satellite cities surrounding Barcelona arch-wise, currently undergoing deindustrialisation and difficult transformation processes (from Villanova in the south-west through Terrassa

[30] In addition, there is an association with the aim of developing the Strategicznego Plan for the Barcelona Metropolitan area comprising solely the area of **31+5** metropolitan municipalities. Such a plan was devised in 1999 and 2003 (AMB 2003).

[31] Some publications refer to its as the "ring", which is less accurate because the Arc cities do not surround Barcelona from all directions.

in the north to Mataro in the east) has lately become more active. The network of cities (Arc) lies beyond the zone of influence of the three earlier groups of municipalities, and slightly remains in opposition to the city of Barcelona, with a strong sense of the unique nature of many of its problems and an awareness that this uniqueness forces them to cooperate regardless of Barcelona. Terrasa and Sebadell were among the key textile industry centres in Europe, whereas the remaining Arc cities also evolved on the basis of traditional industries. Most of these cities have strong ties with Barcelona (which is within a distance of not more than 1 hour's journey), but also, in their majority, they represent labour markets independent of Barcelona.

Why is there no metropolitan structure with some tangible powers (e.g. within the boundaries of the group of *comarcas* of *Metropolita de Barcelona*, the MRB)? The answer is: because of Catalonia's structure and conflicts of interests. The Barcelona metropolitan area with its specific institution (Metropolitan Corporation de Barcelona[32]) was established in 1974, but was disbanded by a decision of the regional Parliament in 1987. The reasons for this should be sought in politics: its existence was not favourable neither for the city of Barcelona, nor for the Catalonian authorities, because the metropolitan authorities were the strongest player in Catalonia, threatening the status of the authorities of Barcelona and of the region. At that time, a similar situation took place in several other areas of Spain (Valencia, Bilbao) (Kaczmarek, Mikuła 2007). Political conflicts have divided (and still do) individual areas making up the metropolitan area. This was compounded by the local traditions and identities of historic cities which, as a result of urban sprawl processes, were surrounded by the metropolis (Garcia 2003).

Owing to the role that it plays in the regional economy, its metropolitan functions, strong European linkages and a well-developed culture and tourism sector, Barcelona in fact extends its influence not only over the metropolitan area but also – as many researchers point out – over the whole of Catalonia. Regardless of the importance that Catalonia (the metropolitan area) still enjoys in the Spanish economy and culture, there can be little doubt that in the recent years Barcelona lost in the competition for the dominant position with Madrid (Strijp 2008; interviews 2009). This is manifested by the outflow of great transnational corporations which more frequently opt for Madrid as their seat, and by visible difficulties in completing the economic restructuring process whereby traditional industries are to be replaced by hi-tech sectors. The collapsing industry and increasing unemployment are particularly acutely felt in the cities of the Arc surrounding Barcelona from the north-west, where many groups of recent migrants, with low vocational qualifications and poor cultural roots (unassimilated) still remain unemployed. The case of the old industrial district of Barcelona – Poblenou – is very symptomatic; there,

[32] Its initial name was: *Entitat Municipal Metropolitana de Barcelona*.

extensive investments were made with a view to creating 120 000 to 130 000 new jobs in the IT and media sectors (the so-called 22@ project, covering an area east of *Placa de les Glories* and in the vicinity of the new high-speed railway station).[33] So far, the results of the exercise have been partially satisfactory. Even though Barcelona's industry plays a limited role, but it still remains an important sector in the metropolitan area (particularly textiles, car manufacturing, chemical, pharmaceutical, electronic, printing and other industries). Attempts are also made to introduce new sectors in the metropolitan area (e.g. Terrassa: The Audio-Visual Park of Catalonia; in the former hospital) (Munoz and Torrent 2008).

The characteristic feature of Barcelona is the long tradition of arts, crafts and trade. Together with strongly-developed tourism which draws on its unique cultural assets, this makes Barcelona one of the major tourism and conference centres, one of a few cities which can organise the largest conference or congress events in the world.

It is virtually impossible to evaluate the role of Barcelona as a separate city because it is wholly functionally integrated with the surrounding municipalities, and neither its functioning as a self-standing entity nor its planning or development management would be possible. This is true not only for transport or water management and environmental protection. We should remember that Barcelona occupies an area of a mere 101 km2 and has a population of some 1.67 million. Many important institutions were located outside the city (which not in all cases was fortunate, for example the *Universidad Autonoma de Barcelona*, which had to start its own bus service for students and staff).

The metropolitan area comprising Barcelona exerts an influence reaching far beyond Catalonia. This role is primarily a result of its metropolitan functions. In the social and political aspect, the still stimulating idea of the national identity of Catalonians (though according to some only ethnic) remains a characteristic feature of such influence. Economically, this area is the principal centre of services, relatively modern industry and tourism as well as culture industries; it also shows a great deal of changeability: while traditional industries in Barcelona have basically disappeared, in the city's external areas (the Arc cities and the second line of satellite cities), the traditional industry is undergoing a painful restructuring stage.

Barcelona's labour market is among the most versatile, open and attractive in Spain. Especially during the last decade, it has drawn thousands of immigrants who – depending on their education – sought better life opportunities in Barcelona, in the industrial centres of the metropolis or in peripheral metropolitan areas. However, experts emphasise that due to the slower than expected development of hi-tech sectors, many of the best

[33] For the presentation of the project, see: The 22@ Barcelona Project, http://www.insyncbv.nl/pdf/22aBarcelona.pdf; October 2009.

qualified graduates and employees move to Madrid, which is being transformed into a dynamic and modern metropolis, dominating in Spain (even though the Barcelona metropolis is larger).

Due to the high living costs in Barcelona, and problems related to living in the central zone having quite good transport links with the surrounding areas, many people working in Barcelona live in the outer cities (municipalities) making up the metropolitan area, or even beyond. And, while the residents of the metropolitan area usually commute to work on a daily basis, those living at a further distance opt for travels to work at weekly intervals.

Catalonia is a region with a strong sense of togetherness which goes beyond today's borders and draws on the land of the former Kingdom of Aragon. An interesting feature of the Catalonian society is its openness to migrants, based on the repudiation of the bonds of blood in ethnic identification. Everybody who considers himself a Catalonian and accepts the social values is one. The metropolitan area has strong functional linkages with the metropolitan region, which is similar to the former in terms of the generated income (which is even fractionally higher in the region than in Barcelona). Some researchers even claim that Catalonia's metropolitan regions should be treated as an integral part of the metropolitan area (Kaczmarek, Mikuła 2007; interviews 2009).

In the opinion of many Catalonians, including development specialists, the boundaries of today's Catalonia do not correspond to the historical range of the Catalonian population (who inhabited the area from Perpignan in France to Valencia in the west and Saragossa in the north). The present boundaries of the Spanish regions (NUTS2) and provinces (NUTS3) were delineated in the 1830s. The real impact of the Barcelona metropolitan area – although dwindling according to some – still reaches beyond the region's borders (for instance, extremely strong cooperation ties link Barcelona with the nearby Valencia). The functional metropolitan area (not in the meaning of the administrative boundaries of the province of Barcelona) comprises areas lying at a distance of even more than 100 km from Barcelona (in the areas situated along the five main transport routes).

The strengths of the Barcelona metropolitan region include mainly the highly-developed tourism and culture sectors as well supra-regional services. Despite the still existing enclaves of traditional industry, the metropolitan area is characterised by a high percentage of people with higher education. It is an important supraregional transport hub, a major sea harbour and a trade centre in the western part of the Mediterranean. Barcelona has a well-developed transport network connecting it with the rest of the region and with the Spanish capital.

The weaknesses of Barcelona include its competitiveness, which in the last decade or so has deteriorated as compared with Madrid and other growth centres in Western Europe.

Likewise, Catalonia's income is on the decrease. The attempt to replace jobs lost in the collapsing industry (the deindustrialisation process has not as yet been completed in the satellite cities of the metropolis) by new jobs in hi-tech sectors or in financial services has not been successful. In effect, well-educated professionals more and more frequently move to Madrid in search of work, whereas lowest-qualified employees, who are frequently foreigners poorly assimilated with Catalonia, start to live on the unemployment benefit. Development is also hampered by the prevalent, centric linkages within the metropolitan area, with Barcelona as the hub of the system. Another obstacle is posed by the exorbitant costs of housing in the centre of the metropolitan areas (Barcelona), which leads to a steady decrease in the number of Barcelona's population and the growing urban sprawl. The long-standing problem of the metropolis is a clear deficit of water, which is provisionally solved by the water desalination station in Prat de Llobregat and water supply systems supplying water from far-off rivers (such as the Ebro). There are no new quality investors; also the old investors are leaving the metropolis, which can be viewed as a proof of the deteriorating competitive advantage of Barcelona and its environs. In the conflict around water, the neighbouring regions of Spain suffering from water shortages are also involved. However, the main dimension of the conflict pertains to intra-regional relations: non-metropolitan agriculture which employs less than 10% of the region's human resources and generates ca. 2% of Catalonia's GDP uses nearly 80% of the water resources (Stasiński 2008).

The regional hinterland of the metropolis has well-developed functional linkages with Barcelona. Most of the region is well accessible owing to a number of major transport routes. High productivity in agriculture and well-developed food processing and the tourist sector in the mountains and historic cities (Tarragona, Girona and others), coupled with low population density, have contributed to the fact that the level of income is slightly higher in the regional hinterland than in the Barcelona area.

Other weaknesses of the region include the prevalence of centric transport links connecting it with Barcelona. Transport routes bypassing Barcelona are poorly developed, which is regarded as an impediment to the stimulation of the peripheral centres. In addition, difficulties in the development of other than tourist functions in cities situated outside the Barcelona metropolitan centre can be viewed as a weakness. One example here is a not very successful attempt at making Tarragona a congress centre: the city's central area is poorly developed and cannot win in the competition against Barcelona. The endogenous resources of the regional centres prove too weak (excluding certain forms of tourism) to move out of the shadow cast by Barcelona.

A review of statistical data (see: Introduction) and the strengths and weaknesses of Catalonia reveals an unquestionable domination of the Barcelona metropolitan area over

the region. This refers not only to the demographic domination but also to the human capital and attractiveness for investors and tourists. On the other hand, owing to their relatively well-developed industries (food and tourism), the weakly-populated areas of Catalonia reach per capita incomes several percentage points higher than is the case in the metropolitan region. They also often offer a better quality of life and – at least along the main transport routes – an easy access to the country's capital. Catalonia as a region may serve as an example of well-developed, functional linkages which foster development. Nevertheless, it is now experiencing development problems, objectively expressed in the relative GDP decrease.

7.2. Relationships between the metropolis and the region

Commuting to work

Commuting to work is concentrated in time and in space. On weekdays, we can observe three rush hour periods: in the morning and in the afternoon (mostly related to travelling to and from work), and in the evening, which is unrelated to work. The characteristic feature of Catalonia and its metropolitan area is that most commuting is enclosed within this area, particularly the *Comarcas Central* group. As many as 91.6% of commuting done by the residents of the *Comarcas Central* begins and ends in the region (Cebollada, Riera 2008: 180). A very small group of work-related journeys goes beyond this area, which is to a large extent explained by the concentration of the population in the metropolis. In the metropolitan area, commuting is mostly done using means of public transport, whereas most of journeys from outside the metropolitan area are made by car (ibidem). Journeys to and from the non-metropolitan area primarily originate in the largest urban centres lying at a distance from Barcelona: Girona, Tarragona and Leida.

Migrations

Migrations flows are frequently connected with commuting to work. Also, migrations in the Catalonian region are bi-segmental in character. The first segment refers to the outflow of residents from the central city, which has been in progress for some time now, underpinned by a considerable increase in the costs of living and greater inconvenience associated with living in the centre of the metropolis – the extremely densely populated Barcelona. Those who leave Barcelona for other places to live include people who work in the city but cannot afford to live there, and wealthy people who wish to live in the suburbs. In effect, Barcelona is constantly losing population while the nearby municipalities making up the metropolis absorb it. The extended transport system which allows for commuting to work even from distant locations makes it much easier. It could be said that the majority of traffic takes place in a very large metropolitan area where the definite majority of Catalonia's inhabitants live. We could see that the growth of the population observable during the last decade was mainly limited to the Barcelona

metropolitan area and was produced by immigrants. Owing to the high costs of living in Barcelona, migrants would mainly settle at the outskirts of the metropolis. Also coastal cities recorded a significant population increase. In general terms, only a large influx of foreign migrants (mostly from South America) more than made up for the decrease of the metropolitan area's population, lasting for over a decade (Redondo 2009).

Trade exchange between enterprises

For over 1 700 industrial estates identified in Catalonia, nearly 1/3 are located in Barcelona. They cover areas located along the main exit routes (Miralles-Guasch, Donat, 2007). Most of the trade exchange is done within the boundaries of the metropolitan region or with the European or global environments. This is driven by supra-regional trade and a well-developed tourism and culture sector. Trade with the metropolitan region is insignificant in volume, save for two exceptions: the agriculture and food sector (the environs of Leida in particular) and tourist sector (excluding the coastal belt, mountain resorts and cities which abound in historic and culture monuments).

Higher-order services for individuals

Barcelona with its direct surroundings is an important centre of higher-order services. Taking account of the very high degree of population density in the metropolis in any of its delimited borders, Barcelona is definitely its dominant centre. This applies both to higher education and other services (administration, business, financial, tourism, information, media, technology). The very high place occupied by Barcelona (and Spain) on the map of European and global tourist attractions promotes the internalisation of the metropolis. A modern sea harbour and the recently enlarged international airport facilitate this process. Studying in Barcelona is attractive not only to students from Catalonia, but also – through exchange programmes – from other regions of Europe. However, there is also an observable tendency for the outflow of the most ambitious youth to study in Madrid, which in the future can offer better employment prospects in attractive occupations. Internationalisation of Barcelona only marginally affects economic development not connected with tourism: the long-lasting processes of relocating industrial activity to the outskirts of the metropolis and off-shoring lasting for about a decade have dented Barcelona's competitive advantage. Interestingly, the neighbouring regions of Valencia and Aragon (interviews 2009) are regarded as Catalonia's main competitors in attracting investors (interviews 2009). The advantage of the offer of the metropolis over the remaining centres is so great, that their offer may only be supplementary.

None of Catalonian cities and only few in Europe can match the quality of cultural services offered by Barcelona.

Barcelona is the seat of the Union for the Mediterranean.

Entertainment and leisure

In terms of tourism and recreation, Catalonia is one of the most attractive regions of Europe, with an offer that combines cultural and natural assets (the sea and the mountains). Recreational, tourist, weekend and holiday journeys play an important role in the mobility of Catalonians. In this context, two issues command special attention. Firstly, the residents of Catalonia – similarly to many Mediterranean regions (in France, Italy, Greece, etc.) leave for holidays outside their region relatively seldom, and even more seldom go abroad. For obvious reasons (concentration of the population at the seaside), most journeys, especially short-term ones, are limited to the coastal area, the major part of which is located in the metropolitan area. The accessibility of leisure destinations, and well-developed tourist infrastructure does not exert such a pressure on having holiday homes as is the case e.g. in northern European countries. Cultural factors also seem play a certain role in this regard: the Catalonian society is much less atomised.

Relationships with public authorities

As mentioned earlier, public authorities at different levels have strongly divergent views on many matters, from the territorial division of Catalonia, to institutional arrangements to the division of competences. Here, both the attitude to the degree of autonomy (independence?) of Catalonia, and division of influences in the region come into play. The establishment and subsequent liquidation of a joint metropolitan institution is a proof of the intensity of internal conflicts. Various coalitions are created, which are frequently limited to specific spheres, e.g. water management, transport, etc. However, due to voluntary participation, even the very core of the metropolitan area resembles a patchwork rather than an area managed in a uniform way.

From developmental perspective, there exist two interesting divisions. The first is metropolitan in character: the external areas where the industry has been relocated from Barcelona, feeling the lack of any support, initiated cooperation bypassing Barcelona in the construction of the transport infrastructure connecting the cities involved (the so-called Arc) and overcoming the centric layout of the current connections with the centre of the metropolis. What also commands attention is the growing conflict for the use of the deficit water resources in the region, which still awaits a permanent solution. The metropolis lies on two small rivers which cannot satisfy its needs, and its population faces severe restrictions in this regards. Given this situation, most of Catalonia's water is used up by agriculture.

The division of public funds among territorial units is an obvious object of controversy; the usual practice being to concentrate the funds in the hands of the regional and

provincial administration (NUTS2 and NUTS3). The planning units, consistently developed using the support from many Catalonian institutions, have very limited means and powers accorded to them.

7.3. Factors affecting the relationships between metropolis and its region

The functional ties between the metropolis and the region are definitely a key factor in the description of Catalonia. The metropolis is a modern city which however is undergoing a difficult stage associated with a gradual loss of the competitive advantages it had during the industrial era. Similarly to many metropolises built around industry, the process of transition to a knowledge based economy proved more difficult than expected. The strongly-developed sector of culture and tourism represents a significant resource, yet one which is insufficient to build a new image and a competitive advantage for the city. The metropolitan region is too weak (from human resources to the economy) to make any pertinent contribution to new solutions. Its potential is far too low. At the same time, the metropolitan region makes a very efficient use of the metropolis' potential to promote its own development.

Political differences manifested in a variety of aspects represent an important factor defining the relationships between the region and the metropolis. Whilst the conflict for the control and use of water resources clearly has a territorial dimension, other bones of contention do not. The issue of the autonomy, underpinning Catalonia's political life, is an important factor differentiating the regional community.

The ties linking the metropolis with the region evolved many decades ago and today are mature and based on functional adaptations (interviews 2009). The economic activity of the metropolis, where for some time relocation from the central districts to the outskirts of the metropolitan region could be observed, is absolutely dominant. The metropolitan region is not involved in these processes in any serious way: the industry there has always been overshadowed by the metropolis and was mostly local in significance. Adaptation processes ultimately led to the development of centres of agriculture and food industry and tourism.

In consequence, the region has a relatively small share in economic development and in migrations: the greatest influx of migrants was recorded in the external areas of the metropolis, where both the economic structure and costs of living met the demands and expectations of migrants. The proximity of Barcelona is and has been the main factor of attraction. For this reason, the diffusion of development processes of the metropolis has been possible on a relatively limited scale and is restricted to the relocation of economic activity towards the edges of the metropolis, but not to the region as such. Due to its scale, commuting to work, mostly enclosed within the metropolitan region, has little influence on financial transfers from the metropolis to the region and vice versa. The

process of urbanisation of the coastal belt is under way; among its many attractions, it also has good transport connections with Barcelona.

Contemporarily, there is no room for backwashing in Catalonia as it ended with the last stage of industrialisation. The depopulated areas outside the Barcelona metropolis show a very small influx of the population, usually in waves and mostly from outside Catalonia. Thanks to improved transport connections, the number of people who spend weekends in the region is growing. As a rule, however, journeys in the metropolitan area start and end there. The metropolis seems to be nearly self-sufficient, which does not mean that it is not subject to internal territorial transformations. The depopulation process in Barcelona (which is the core of the agglomeration) is a specific type of backwashing. This process, affecting over 100 000 people over the last three decades, involved moves of the population within the metropolitan boundaries.

7.4. Interrelationships between the metropolis and the region

After nearly two hundred years of industrial development, we can say that the metropolis and the metropolitan region still maintain strong functional ties, rarely encountered in European regions. In view of the fact that 2/3 to 3/4 of Catalonia's population is concentrated in of the metropolis (the actual number depends on the definition of the metropolitan boundaries used), the process of the region's depopulation is no longer an option. Much more likely is the continuation of a relatively moderate suburbanisation process in the immediate surroundings of the metropolis. The further improvements of transport links, not only the centre-oriented ones but also those directly connecting more peripheral centres with themselves, with Barcelona and with the largest centres of the neighbouring regions (Valencia, Saragossa) should stabilise the population of the region as the supplier of relatively simple services, foodstuffs and medium-tech industry. The provision of tourist services which were complementary rather than competitive vis-à-vis metropolitan tourism to the metropolis' inhabitants also played an important role.

7.5. Activities of public authorities in metropolis-region context

In the recent years, we have seen a considerable increase of activity related to development studies and development planning where attention is mostly focused on the development strategy with the metropolis as the dominant growth centre in Catalonia. Many units of regional and local authorities, self-governing associations and research institutes take part in the organisation and financing of these efforts. Despite the plethora of works diagnosing the situation of the metropolis in the context of the region, it can hardly escape attention that one of the limitations concerning the usefulness of these efforts is that they are carried out in isolation from the formally binding territorial division of Spain into autonomous regions and provinces. The administrative and

planning units do not overlap territorially and, without making some changes, both the effectiveness and efficiency of the research and planning efforts will be limited.

Financial instruments

Owing to the high development level of the metropolis and the region, the EU funds do not play such a significant role as they do in Objective 1 regions (Convergence). Efforts were made to ensure the co-financing of the development of new, innovative economic sectors in the metropolis, mostly in connection with the 22@ project, and of transport projects. Generally speaking, development activities in the metropolitan area are financed from the own funds of the constituent municipalities. The city of Barcelona plays a special role in this regards owing to its dominant share in the financing of joint projects. The current financial crisis negatively affected the region's income, and, on the other hand, due to the growing unemployment, it exerted pressure on an increase of public expenditure, including social. This problem mainly affects the more peripheral areas of the metropolis.

Budgetary subsidies to development projects, transferred from the state budget via provincial administration (NUTS 3), represent an important source of public funding supporting development. In the metropolitan area understood as a *provincia*, this function is discharged by the Barcelona-based *Diputacio de Barcelona* (DIBA). The mission of DIBA is to: "to ensure adequate provision of the services that form part of municipal responsibilities and powers, guaranteeing a high level of quality and equality of access for all our citizens" (DIBA 2009). The needs observatory (a list of projects submitted by the local authorities) provides the basis for intervention, in addition to contracts for specific projects approved by DIBA. The scale of intervention is shown in Figure 29.

The Map clearly shows that municipalities lying at a distance from the core and rural in character receive preferential treatment in the selection of projects for financing.

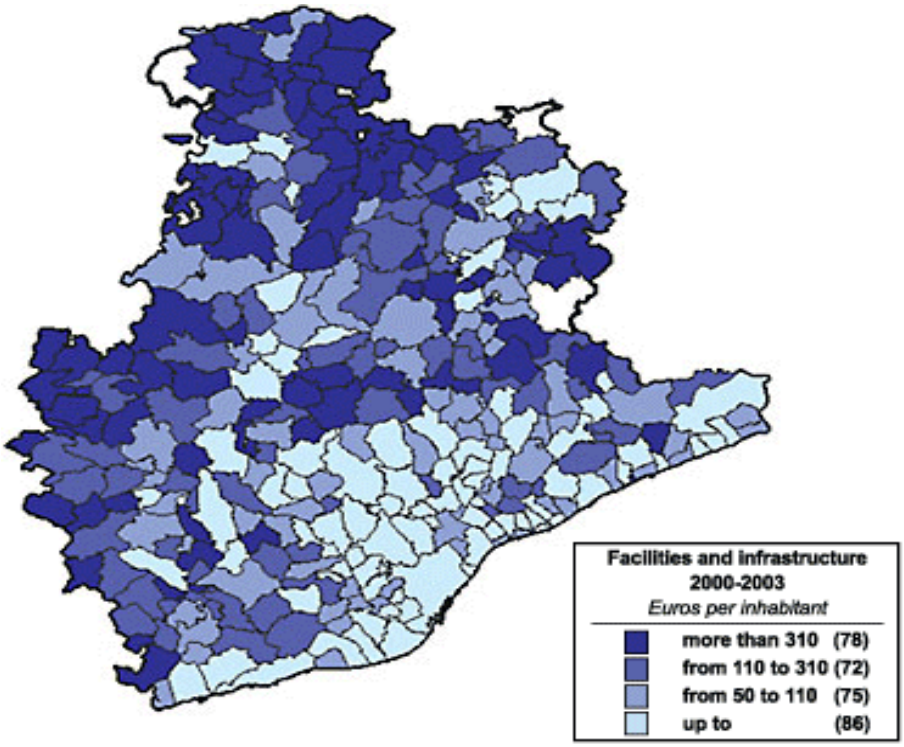


Figure 29. Co-financing facilities and infrastructure within DIBA activities in *provincia de Barcelona* (NUTS3), by municipalities, in EUR per capita, 2000-2003
Source: DIBA 2009.

Infrastructural investments

The development of transport infrastructure is largely dispersed territorially. The local and regional authorities pursue independent development policies, in addition to central investments related to motorways and high-speed railways. Despite these circumstances, the road and railways transport network is well-developed; what is regarded as a problem is the shortage of connections which bypass Barcelona, the core of the metropolis. The great number of carriers running services mainly in the metropolitan area may seem an inconvenience for customers, but this is a typical situation in the majority of metropolises.

Major efforts to adapt infrastructural investments to the needs of revitalisation and development of post-industrial areas include investments made in preparation to the Olympic Games and the 22@ project. However, we should wait to see their synergy effects.[34]

[34] In the case of the 1992 Olympic Games, it is commonly acknowledged that despite promises and circulated opinions, the Games led to a temporary collapse of tourism in Barcelona, which was to

Education

Similarly to other EU countries and regions, European funds are used to provide supports to the development of human resources in addition to local funds. Due to the high level of regional development (which in Spain is only surpassed by Madrid), these funds are decreasing, but are now more focused on projects related to the fostering of competitiveness and knowledge-based economy. However, to achieve the desirable results, it is necessary not only to educate top-quality specialists but also to create relevant jobs for them in Catalonia. The fact that many graduates and specialists leave for the Spanish capital proves that there is no synergy in this regard.

Summary

The results of the activities discussed above are not spectacular, and the degree of their coordination may only be evaluated as moderate. In consequence, they have not significantly fostered the development of linkages between the metropolitan centre and the remaining part of the metropolitan region. It should be remembered however than many plans and projects have not as yet been implemented or finalised. We should also take account of the fact that the incoherence of the administrative and planning divisions if not the institutional territorial chaos is certainly an obstacle. It so happens that funds for investments and other developmental activities are controlled by traditional division units (regional government, provinces and municipalities), whereas planning activity is apparently being developed at the level of units furnished with small competences and means (*comarcas*, groups of *comarcas*).

7.6. The metropolitan area governance

The debate on the establishment of metropolitan areas has been going on in Spain for a long time, and the changing fortunes of the Barcelona metropolis have spurred an extraordinary mobilisation of efforts on the definition and delimitation of the metropolitan area in Catalonia. The results achieved so far are less than satisfactory, but they produced many studies and analyses which significantly expanded knowledge about this part of Catalonia. To date, no agreement has been reached regarding either the definition (and thereby the delimitation of the boundaries), or a uniform mechanism for managing metropolitan development. The situation concerning political conflicts around the implementation of any new territorial division (whether only in Catalonia, or in Spain as such), as well as inter-municipal, inter-institutional or party conflicts within of the metropolis effectively blocked making any changes in the status quo. There is a widespread opinion that the national authorities will hamper the process of replacing the traditional division into regions, provinces and municipalities by other territorial divisions

the advantage of the tourist resorts on the Mediterranean Sea competing with the city (Kozak 2009).

(although the creation of *comarcas* was allowed, they have not been furnished with significant funds). In effect, in the near future the new divisions will not have any other advantages save for the planning aspects. The real funds and competences will still be connected with the traditional, official, nation-wide division. It is difficult to predict what conditions must be fulfilled to make the change happen. There is little doubt that the adaptation of the administrative and competence-related divisions to the actual development of Catalonia in territorial terms would be a move that could be politically difficult but certainly rational. However, difficulties encountered in the setting up of voluntary associations of municipalities show that these problems have a strong inter-Catalonian and even intra-metropolitan dimension. This is not merely a question of relations with the national authorities.

As stressed above, despite some features denoting elements of chaos, Catalonia is trying to delineate the boundaries of the metropolis on the basis of studies and analyses, using the combined efforts of many institutions and decision-making bodies. They would provide the basis for the building of institutions which would manage development and successfully implement strategies.

Conflicts of interests have so far proved less acute at the stage of research, but where the recommendations refer to real issues “on the ground”, particularly distribution of funds and competences, these differences of opinion gain in significance. Controversies regarding the scope of Catalonia’s autonomy provide a background that is certainly not conducive to working out shared opinions or solutions. But can things be different if nearly every single proposal is examined insofar as it may affect the political standing of Catalonia in Spain? For this reason (and due to common conflicts of interest in the region, and in the metropolis), there has been little progress in the development of a mechanism for managing metropolitan development. The plethora of ideas concerning the delimitation of the metropolitan area can serve as a perfect proof of Catalonian impossibility. On the other hand, positive examples include in particular cooperation in public transport in the metropolitan area (or rather part of it), but this does not satisfy all needs related to metropolitan management, especially in view of the fact that the metropolis faces many long-term development problems (water provision being one of them).

7.7. Development prospects

Catalonia is not a typical region, not as much because of its ambitions for autonomy as because of the very strong position of the metropolis in the region and strong ties with the surrounding metropolitan region. The role played by the metropolis is crucial to understanding the situation of the whole Catalonia. And Catalonia is visibly at the crossroads. The general improvement in the economic climate post 2002 led to a

considerably influx of the population, which offset the fall in the Catalonian population leaving the region in search of a better life. The main reason for the propensity for migration is the collapse of traditional industry, relocation and off-shoring, which phenomena – despite the efforts undertaken by the authorities – were not compensated by new jobs created in new, modern economy sectors. The prospect of curtailing jobs to the medium-tech sector e.g. in the car industry and tourism turned out to be a stimulus propelling increased migration. The competitive advantage of the metropolis diminished perceptibly, and the efforts made to re-work the image and create thousands of new jobs in new sectors (such as the 22@ project) did not produce the anticipated results. In the time of the crisis, the factor which initially helped improve the situation, that is the influx of employees from outside the region and mostly from outside Spain, became a source of problems, particularly in more peripheral parts of the metropolis, burdened with traditional industries (the so-called Arc). Immigrants, who frequently had low qualifications, a poor command of the language and poor knowledge of the local culture, suddenly began to exert pressure on the local budgets.

In the present situation, two broad scenarios are feasible.

The first envisages a further deterioration of the competitive advantage of the metropolis, and thereby of the entire Catalonia. Migrations of top specialists out of the region (to Madrid and other European countries), which could be observed for many years now; the outflow of investors, a lack of political stability in internal relations and at the national level – all these factors are conducive neither to endogenous development nor to attracting inward investment. The leading industries of culture and tourism industry will sustain the prosperity of the metropolis, but will it be all of the metropolis? This is not so certain. The attempts made so far to revert this trend (1992 Olympic Games, global fashion events[35], the 22@ project) can be regarded as spectacular if not quite successful strategically.

The intensive analyses and planning efforts made in the recent years could underpin the development of a new strategy and restructuring of the Catalonian economy in tune with the new development paradigm of knowledge-based economy. However, the political context of these works, lack of coherence between the territorial units, uncertainty concerning the powers and competences, local and regional ambitions pose serious threats to the results of these. Nevertheless, it can be hoped that further aggravation of the situation will force a consensus, consistent reforms and re-entry of the development path by Catalonia. Still, global trends must be taken into account, and these are not favourable for Europe. Will they prove favourable for Catalonia? From today's

[35] The prestigious Bread&Butter fashion event (which happens to be a German brand), after being held for several years in Barcelona, in 2009 was moved to Berlin, to the former Tempelhof airport location.

perspective, this does not seem very likely. Building the region's future around a strong sense of community and Catalonian identity may not be enough to ensure success in the international competition. Investors rarely base their decisions on such criteria.

8. City-region relationships: Glasgow – West Scotland case study

Glasgow is located in the southern part of Scotland, in the so-called Central Belt area which stretches from Glasgow in the west to Edinburgh and Dundee in the east. This area has the largest number of the population in Scotland and the highest urbanisation rate (all Scotland's major cities except Aberdeen are located in this area), and is characterised by the greatest economic potential.

Initially, the power of Glasgow was built around trade and later, in the time of the Industrial Revolution, around the shipbuilding, textile and machine-building industries. The processes taking place at the time in the city had a strong bearing on its hinterland: Glasgow provided employment not only to citizens of Scotland but also to Irish workers. Towards the end of the 19th century, the city's population exceeded one million, which made Glasgow the third largest agglomeration after London and Paris. Such a situation continued for over half a century. However, the problem of overcrowding caused by the city's increasing population was not solved through the construction of new housing estates with multi-family residential buildings. The 1960s saw the introduction of a policy of residents' relocation to new cities (the so-called "overspill" plan). Coupled with significant changes in the administrative boundaries of Glasgow, this led to a substantial decrease of the population living within the city's boundaries (Rae G., Brown C., 1966). Today, Glasgow, being the largest urban centre of Scotland, has only 584 240 inhabitants (i.e. 11% of Scotland's overall population).

In addition to Glasgow, there are only 3 cities in Scotland with a population over 100 000 inhabitants. These are: Edinburgh (471 650), Aberdeen (210 400) and Dundee (142 470). The cities with the greatest significance within the area of Glasgow's dominant influence include: Paisley (74 000), East Kilbride (73 000), Hamilton (49 000), Cumbernauld (49 000), Ayr (46 000), Greenock (44 000), Kilmarnock (44 000), Irvine (39 000), Motherwell (30 000), Clydebank (29 000), Bearsden (28 000), and Dumbarton (20 000)[36].

Following the 1997 reform, the administrative structures in Scotland were changed yet again: 9 higher-order administrative units (regional councils) were abolished, and their tasks were taken over by 32 council areas, governed by elected councils. At that time, the area corresponding to the functional extent of Glasgow's influence (Strathclyde Region Council) was abolished, to be replaced by 12 councils: Argyll and Bute,

[36] http://www.gro-scotland.gov.uk.

Renfrewshire, East Ayrshire, East Dunbartonshire, East Renfrewshire, Glasgow City, Inverclyde, North Ayrshire, North Lanarkshire, South Ayrshire, South Lanarkshire, and West Dunbartonshire.

8.1. The metropolitan region and its component parts

The administrative areas of Glasgow City do not encompass all processes and functional ties which connect entities located in Glasgow with entities of its broadly understood hinterland. The spatial extent of the influence of the Glasgow metropolitan centre on its hinterland does not yield easily to clear-cut definitions. and varies depending on a given aspect of such impact. The studies which were carried out to delimit the zones of influence of the largest Scottish cities (Glasgow, Edinburgh, Dundee, Aberdeen) confirm a broad spatial extent of Glasgow's influence (The City Region…, 2002). An analysis of the housing market, commuting to work, strategic transport linkages and the retail market suggest that the impact of Glasgow reaches much further than the council areas making up the metropolitan area. The influence of Glasgow in different spheres of life, particularly regarding commuting to work and education, reaches as far as: North, South, East Ayrshire, Argyll and Bute, and Stirling (Metropolitan Glasgow…, 2008). Also, the Glasgow metropolis performs a very important role for the Highlands and Islands region, notably with regard to the educational base and health care services.

The relationships of the Glasgow city with its internal hinterland are marked by the proximity of another large urban centre – Edinburgh. Glasgow exerts influence not only on Edinburgh but also on the council areas located outside Edinburgh (albeit to a lesser degree), e.g. the Lothians, Fife, or Scottish Borders (Glasgow and the Clyde…, 2006). Due to the small distance between Glasgow a Edinburgh, their zones of influence penetrate each other. Nevertheless, the mutual impact of these cities is much smaller than could be expected on the basis of the small distance between them, and good transport connections. The reasons for this are historical, and are associated with a divergent sense of regional identity of the residents of these two cities. Making use of the proximity of Glasgow and Edinburgh is currently perceived as a development challenge and opportunity for Scotland, and cooperation between these cities is believed to be indispensable for the development of Scotland at large (National Planning…, 2009). However, strengthening the linkages between the two cities, and generating synergy effects calls for additional cooperation and coordination of activities on the part of their authorities.

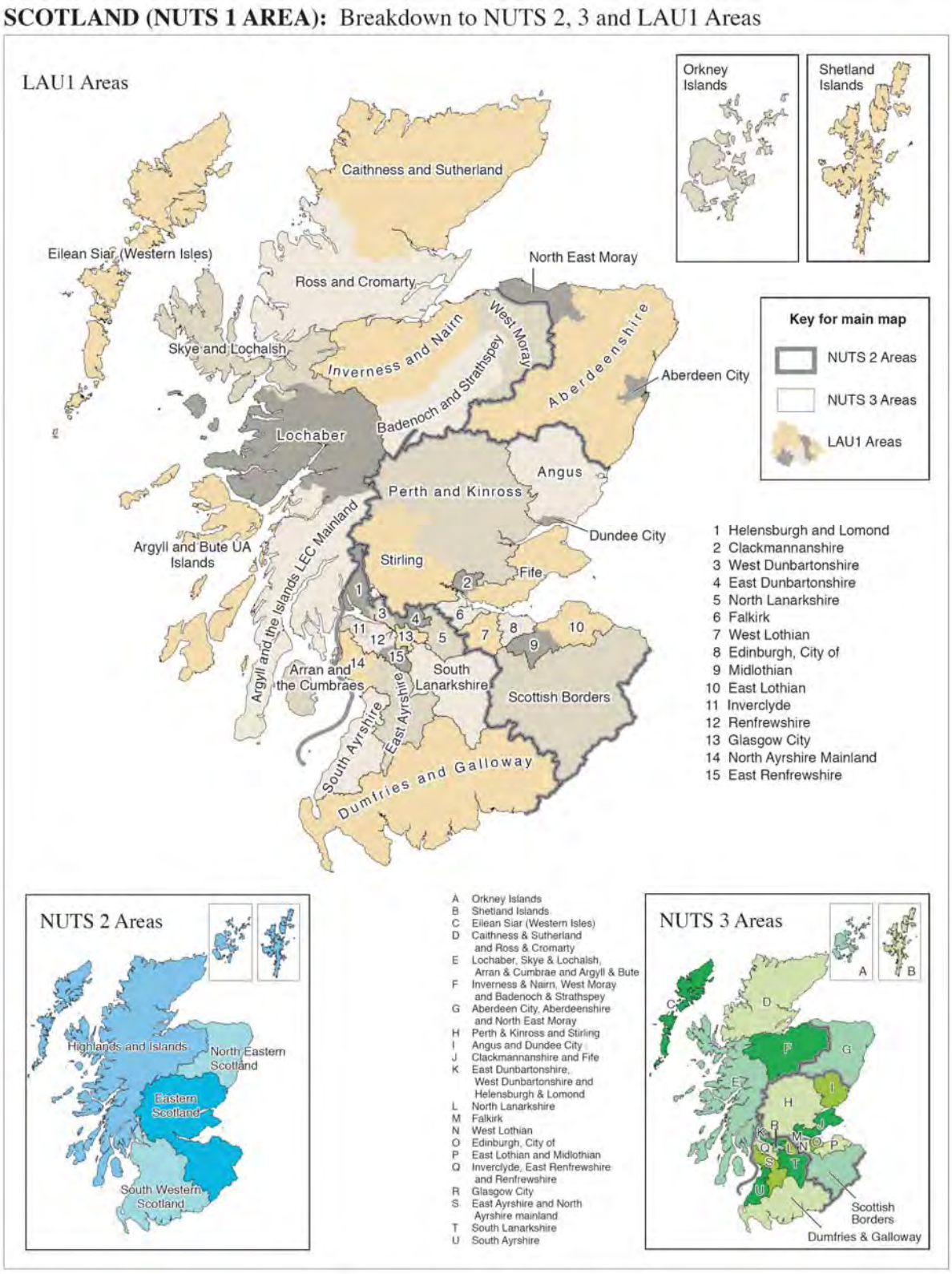


Figure 30. Scotland NUTS regions and LAU1 areas
Source: maps received form Malcolm Leitch, Glasgow City Council.

It should be emphasised that at present neither the metropolitan area nor the metropolitan region of Glasgow are reflected in Scotland's current administrative

structure. In 1975, a two-tier system of local government was introduced in Scotland, with 9 regional councils. The largest of them, the Strathclyde Regional Council, indicated the zones of Glasgow's functional ties and corresponded in size to the Glasgow metropolitan area. In addition to Glasgow, it covered 11 other units of the lowest administrative level (see Introduction). The regional authorities were in charge of providing a framework for the area's operation in the sphere of strategic planning and of service provision for the population in the sphere of education, social assistance, police and fire services, sewerage, roads, passenger transport.

In 1996, this system was replaced by a network of 32 "unitary" authorities. The reasons for abolishing the regional management level include inter alia the blurred powers of the individual authorities caused by the system's operation, its low degree of acceptance and mismatches between the spatial extent of the services provided. However, regional experts emphasise that political interests played an important role in this process, and the 1996 reform was not an optimum solution for Western Scotland (P. Carmichael, A. Midwinter, 2000). Currently, many local administration tasks are coordinated as joint undertakings, e.g. Police and Fire services are still organised at the level of the now nonexistent Strathclyde region, whilst the responsibility for Water and Sewerage services was delegated to 3 regional water authorities, which merged in 2002 to form the Scottish Water.

The currently used notion of the Glasgow metropolitan area, comprising: Glasgow City, Renfrewshire, East Renfrewshire, South Lanarkshire, North Lanarkshire, East Dunbartonshire and West Dunbartonshire councils, and Inverclyde) was first used in 2003, when the political leaders of the 8 local authorities mentioned above and comprised by the Glasgow and Clyde Valley Structure Plan established the Glasgow and the Clyde Valley Structure Plan Joint Committee (GCVSPJC) in response to a Scottish Government initiative named the Cities Growth Fund[37]. In February 2009, under the new regulations of the Scottish Government (Town and Country…, 2008), the tasks of the GCVSPJC associated with the preparation of development plans for the metropolitan area were formally taken over by the Glasgow and the Clyde Valley Strategic Development Planning Authority (GCVSDPA).

The criteria for the delimitation of this area are basically historical as they refer to the Strathclyde region; at the same time, they reflect the strong linkages existing between the city and the surrounding area in terms of family ties, education, transport, recreation and culture. The metropolitan area Glasgow delimited in this way has 1.75 million inhabitants, which represents 34% of the entire population of Scotland.

[37] http://www.gcvcore.gov.uk

The current NTS2 area (South Western Scotland) where the Glasgow metropolitan area is located has only a minor significance from the point of view of public administration because it is not furnished with any powers or competences. Likewise, it cannot be regarded as an area which closely corresponds to the area of the metropolitan influence because, on the one hand, South West Scotland comprises vast farming areas of Dumfries and Galloway which have very few economic, social or political ties with the Glasgow metropolis. On the other hand, South Western Scotland does not comprise areas with stronger or weaker ties with the Glasgow metropolis, i.e. Lomond, Argyll and Western Highlands areas, which have always traditionally leaned towards Glasgow (and not Inverness), particularly with regard to the provision of higher-order services. Moreover, as part of the NTS, there is South and East Ayrshire, which emphasise their autonomy despite their linkages with the Glasgow metropolis through the use of its service functions.

There are distinct differences between the so-called Central Belt of Scotland in which the Glasgow metropolis is located and the rest of the area regarding the number of the population, population density, sources of income and lifestyles. Therefore, we can say that the metropolis and the surrounding region are characterised by different sets of strengths and weaknesses. The metropolis is primarily an urban area with a considerable population density, which distinguishes it significantly from the rarely populated areas of the regional hinterland. The perception of the Glasgow metropolis was determined by the gradual reworking of the city's image associated with the overcoming of the negative consequences of the decline of traditional branches of industry. At present, efforts are aimed to foster development in 8 strategic sectors (life sciences, energy, financial services - back office and contact functions, tourism, creative industries, food and drink and electronic markets), which is expected to foster transformation towards a knowledge-based metropolis. As compared with the metropolis, the regional hinterland of Glasgow has only few strengths, and is building its potential on limited endogenous resources. These are mostly natural environment assets, which underpin the development of tourism, agriculture and renewable energy generation based e.g. on biomass. To some extent, the development of the metropolitan hinterland is also based on the stimuli generated by the metropolis regarding employment opportunities or tourism and recreation of the metropolitan inhabitants (Turok T. at all, 2003; Metropolitan Glasgow.., 2008; Lowlands & Uplands…, 2008; Highlands & Islands; 2008.). The differences in the demographic and economic structure also have a bearing on the social dimensions of the disparities. The metropolis faces different types of challenges than the region; they are mostly connected with the industrial past and the negative consequences of the restructuring processes. The most pertinent ones include both the adverse social consequences of structural and long-term unemployment, i.e. poverty,

weak family structures, low incomes, health problems, and such consequences of industrial past for the natural environment as contaminated soils or derelict and undeveloped land. The metropolis is also a region with a higher level of deprivation and crime. All these factors still define the negative external image of the city, which undoubtedly is one of the reasons for a small presence of international corporations in its space. On the other hand, the metropolitan hinterland is struggling with completely different problems, such as insufficient accessibility, depopulation processes, and outflow of educated youth to Glasgow or other areas of Scotland (Turok T. at all, 2003; Metropolitan Glasgow.., 2008; Lowlands & Uplands…, 2008; Highlands & Islands; 2008.). One example of the interdependence between the strengths and weaknesses of the metropolitan area and the metropolitan region is the sector of tourism, in which the attractiveness of the Glasgow metropolis as a cultural and conference centre adds to the tourist offer of Scotland's rural areas, in this way creating an all-rounded offer. On the other hand, the shortages of the educational offer in the West Highlands and Islands are compensated by the educational potential of the Glasgow metropolis.

8.2. Relationships between the metropolis and the region

The Glasgow metropolitan area is largely self-sufficient as the economic interactions take place mostly between the metropolitan city and its immediate hinterland. Interactions with more distant hinterland are much less important. The major types of flows include: commuting to work, higher-order services (education, health care), flows related to consumption, while the trade linkages of enterprises, relocation of business activity and migrations of the population play a lesser role.

Commuting to work

Commuting to work is the basic type of economic relations which take place between the metropolis and the and region. The city of Glasgow is the main magnet attracting employees as the majority of new jobs are created there owing to an expansion of the financial services sector. According to the Census 2001 data, of 331 000 employees working in the metropolitan city, 52% live in the city, 40% in the metropolitan area, whereas the remaining 8% outside it, and a half of them live in the former Strathclyde area[38]. The spatial range of commuting to work reaches 50-70km, and covers Ayrshire, South Lanarkshire and even Dumfries and Galloway in the south, and Stirling, Falkirk and the Lothians in the north and east. The radial-shape road and railway infrastructure investments undertaken over the past 20 years are an important factor facilitating daily commuting to work in the metropolitan region.

38. http://www.gro-scotland.gov.uk/census/censushm/index.html

City council area	Residents working/studying outside place of residence	Employees/students living outside place of residence
Argyll & Bute	16%	14%
East Ayrshire	36%	22%
East Dunbartonshire	64%	36%
East Renfrewshire	70%	36%
Glasgow	19%	48%
Inverclyde	27%	23%
North Ayrshire	34%	20%
North Lanarkshire	40%	28%
Renfrewshire	40%	38%
South Ayrshire	26%	27%
South Lanarkshire	40%	28%
West Dunbartonshire	48%	32%
West Region (Strathclyde)	4%	3%

Table 43. Commuting to work/studies in selected areas of the metropolitan area [2001]
Source: *West Region Economic Review*, Scottish Enterprise, p. 36, based on: *Census 2001*, General Register Office for Scotland.

Daily commuting related to higher education is as important, and it is done on the most intensive scale also within the metropolitan area. The directions and intensity of flows associated with studying outside the place of residence are similar to those related to commuting to work and result from the expansion of the higher education sector.

Interestingly, the area of the former Strathclyde region enjoys a high degree of self-sufficiency with regard to the labour market and education: only 4% of the region's residents work or live outside the place of residence, and 3% of the workforce/students come from outside this area. At the same time, significant processes involving individuals take place within Western Scotland; they are the strongest in the metropolitan region, and somewhat weaker in the regions of Ayrshire, Argyll and Bute (cf. Tab 1.). The values of the indicators for Highlands and Dumfries and Galloway are much lower (below 10%)[39]. The highest percentage of employees commute to work to Glasgow (48% of employees from outside the city); shuttle commuting to work is observable on the largest scale in the East Renfrewshire and East Dunbartonshire regions (respectively, 70% and 64% of the residents of these council areas outside the region).

Glasgow is also the key retail trade centre in Western Scotland. Owing to a substantial concentration of shopping centres, the city is called the second destination for shoppers in Britain (after West End in London).

39. Calculated by the author based on the above sources.

Other types of services which are important for the external hinterland of the metropolis are related to health care. Even though local health care and social assistance centres are found across the entire Western Scotland, the advantage of the metropolis, and the city of Glasgow in particular, is that it has specialised hospitals. In this regard, Glasgow has no real competitors and its specialised health care services attract patients from distant areas, which is particularly well visible in the case of residents of regions located north of the Central Belt.

As regards recreation and leisure, we can say that mutual interrelationships exist between the metropolis and the surrounding region. Although valuable areas for recreation can be found within the boundaries of the metropolitan area, external locations also enjoy a great deal of popularity, e.g. the Loch Lomond National Park, Ayrshire golf courses, the coastal cities or the highlands. The hinterland offers a tourist base for the residents of the metropolis, which leads to increased incomes in some of the local communities. On the other hand, the metropolis, especially the city of Glasgow, is a magnet attracting tourists from the region for its cultural facilities and artistic events.

It is difficult to evaluate trade linkages between enterprises located in the metropolitan area and in the broader region owing to insufficient sources of data and the complexity of this type of interactions. We can observe, however, that such interactions evade any administrative boundaries and enterprises, in their activity, follow the principle of effectiveness. In addition, every sector has a different type of needs concerning such ties, and a different distribution pattern of both suppliers and recipients. The majority of flows in this regard occur within the metropolitan region, and relationships with the broader environment matter less; 41% of all corporate transactions from the Glasgow area are made with companies situated in the Glasgow metropolitan region (Turok T. at all, 2003).

The relationships between the metropolitan area and the hinterland as regards relocation of enterprises or opening corporate branches (industry, trade, higher-order services) are associated with changes in the profile of the Glasgow metropolis which took place over the recent decades. As the Glasgow region lost in significance as an industrial centre, efforts were made to attract new types of activity. By the 1970s, new investments in the electronics industry were located in areas with available “greenfield” industrial sites, particularly in the so-called New Towns. Three of them: East Kilbride, Cumbernauld and Irvine, were located within the metropolis or in the metropolitan area. However, starting from the 1980s, efforts have been made to develop “brownfield” areas, mostly located in Glasgow, for housing and industrial purposes. The region’s weakness in this regard is the relative shortage of the headquarters of major British or foreign corporations, which restricts the possibilities of expansion into the metropolitan region.

Currently, migration plays a relatively small role as compared to other types of interactions between the metropolis and the region. The Census 2001 data indicate that the largest number of people in the metropolitan region who changed their place of residence in Scotland in the years 2000-2001 came from the city of Glasgow (63 000 people). The main waves of migration took place within the conurbation as most people settled in the counties bordering with the city, including South Lanarkshire (ca. 2 500) (C. Jones C., Leihsman C.,2006). The scale of migration from the remaining regions was not as significant owing to the smaller numbers of people involved. Still, it can be noticed that the prevalent direction of migration for people from all the non-metropolitan councils was the city of Glasgow (Dumfries and Galloway, Highlands, Argyll and Bute). The only exception was Ayrshire, whose population preferred to change the place of residence within this particular part of Scotland to migrate to Glasgow, which was definitely done on a smaller scale (A. D. Fleming, 2005). This confirms the relative autonomy of this area, discussed above. In the recent years, many activities were undertaken to revert the outflow of the population from Glasgow to the surrounding councils areas, e.g. construction of new residential estates or the initiatives launched by the Scottish Enterprise and encouraging people to settle down in Scotland. In 2002-2007, the influx of the population (mostly from CEE countries) was higher than the outflow of the Scottish population; as a result, the city recorded a small population increase (0.3% of average annual income) for the first time in 50 years.

Relationships with the local authorities

The Glasgow metropolitan area has a long history of regional planning and partner cooperation. We can find many examples of formal cooperation between the local authorities and/or other public administration bodies in the region. It should be borne in mind that public management in the region is extremely complex, and individual strands of public policy are characterised by dissimilar spatial ranges and legal status. The primary areas of cooperation are the following:

- The Glasgow and Clyde Valley Strategic Planning Authority prepares plans for the Glasgow metropolitan area understood as 8 local authorities / council areas;
- The Strathclyde Partnership for Transport (SPT) is a body responsible for strategic planning in transport in 12 local authorities / council areas;
- The Greater Glasgow and Clyde Health Board (NHSGGC) provides medical services in the Glasgow conurbation and is the largest such entity in Scotland – its activities cover 6 local councils and two cities of one of the councils;
- The Strathclyde Police and Strathclyde Fire and Rescue is the most formal of the agreements signed in the Glasgow metropolitan area, and covers the former area

of Strathclyde (12 councils).

The recent and very interesting Glasgow Edinburgh Collaboration Initiative strives to strengthen cooperation between the two cities in the hope of producing synergy in business and infrastructure development; it is also hoped to consolidate Scotland's cultural offer.

Despite the existence of partner agreements, each council area within the metropolitan region is autonomous, and therefore the council areas also compete in such spheres as e.g. jobs and residents. A particularly strong rivalry within the Glasgow metropolis can be observed between Glasgow city and the two Lanarkshire authorities regarding new jobs and residential housing. Likewise, there is a competition for attracting various business locations concerning domestic and foreign investments.

8.3. Factors shaping the relationships between metropolis and its region

The Glasgow metropolitan area is extremely varied in terms of the structure of sources and level of income, accessibility, level of educational services and health care. As a result, the complementarity of the economic structures within the Glasgow metropolitan area is manifested only to a limited extent, and the division between rural and urban areas is noticeable. For instance, Glasgow mostly hosts the sector of financial and business services and the public sector, while plants and enterprises connected with transport and logistics are located in other urbanised parts of the region (West Region…, 2009). However, it should be pointed out that due to the restructuring of the Glasgow metropolis towards a service economy, the ties arising from complementarity are becoming weaker, and are certainly not as strong today as they were in the times of industry-based development. At the same time, the endogenous resources of the rural areas of Western Scotland can supplement the metropolis' offer regarding tourism, food provision, and labour.

In this context, the mutually reinforcing relationships (although still relatively weak due to historical considerations and dissimilar identities) between Glasgow and Edinburgh are particularly interesting. Among other aspects, the complementarity of both cities in the sphere of the financial sector is pointed out: while the back office and contact functions prevail in Glasgow, high quality functions dominate in Edinburgh (Turok T. at all, 2003). Cultural services are another example of cooperation as both cities have initiated cooperation to gain benefits from an agreed agenda of major cultural events. In addition to that, the number of people commuting to work from Glasgow to Edinburgh and in the opposite direction is growing slowly but steadily. It can be clearly seen that business and economic linkages are gaining in significance, which has a bearing on the migration between these two cities. Although commuting to work affects only 5% of the labour force flows, 15% companies from Edinburgh and 11% companies from Glasgow have

revealed that their major business partners are, respectively, enterprises from Glasgow and Edinburgh (I.Turok, N.Bailey, 2004).

To sum up, there still exist strong stimuli coming from the regional hinterland towards Glasgow, whereas stimuli generated by the metropolis are directed to the supra-regional and international environments.

The Glasgow metropolis unquestionably serves as the growth engine for Western Scotland. We can distinguish several aspects showing how the metropolis positively affects the surrounding region. First and foremost, the metropolis provides jobs, also to the residents of the broader region. This is possible owing to a well-developed network of road and railway connections in the region, and the prospects for its further extension and modernisation. Although new residential estates are built in the metropolis, they will not be sufficient to satisfy the housing needs of all those who commute daily to work in the metropolis. Furthermore, the metropolis offers high-quality higher-order services (in health care and higher education) for the metropolitan hinterland, as well as caters to cultural and consumer needs of its residents.

Another element/aspect is associated with the sector of tourism, in which positive stimuli are diffused from the metropolis to the wider hinterland in the form of incomes expended by the metropolitan residents in attractive tourist destinations. At the same time, owing to its well thought-out strategy, the city of Glasgow is a magnet attracting many tourists to Scotland, mainly in the so-called business tourism (business visitors account for 28% of all visitors to the city). This offers an excellent opportunity to visit well-accessible and not so distant regions attractive for tourism and situated in the metropolitan area. Glasgow's tourism products are based on the organisation of major events (such as the Glasgow Garden Festival in 1988, the designation as European Capital of Culture in 1990 and the UK City of Architecture and Design 1999), organisation of business conferences and weekend urban tourism.

To some extent, the negative impact of the metropolis on the regional hinterland is the opposite of the positive impact. The transformation that was carried out in Glasgow required substantial investment outlays in the long term. As compared with other councils, the city absorbed a lot of financing from Scottish, national and European funds. Some of the resources allocated to the city's development may have been used for the development of other locations in the wider hinterland of the metropolis and thus have brought benefits for the local communities. Therefore, the jobs provided by the metropolis produce positive effects on the one hand, but on the other sometimes a different perspective is used to look at them – as alternative costs to other locations. The retail trade sector can serve as an example: it has been substantially enhanced in the Glasgow and Clyde Valley area. This led to the degradation of the centres of smaller

cities, as a result of which their residents must look for alternative sources of income. In addition to that, a new restructuring strategy for the city centres is needed to furnish them with a new function (Metropolitan Glasgow…, 2008).

The negative impact of Glasgow on the wider hinterland is also associated with its being perceived as a city associated with economic collapse, declining industries, widespread poverty, high level of crime and a low standard of the housing stock. Such a reputation may affect not only the tourism sector but also potential investors. It should be emphasised that the regional authorities are aware of such a threat, and initiate many activities aimed to change the image of the city, and thereby of the region.

8.4. The interdependency between the metropolis and the region

Due to the difference in the potentials between the metropolis and the region discussed above, the region needs the metropolis much more than the other way round, even though these two component parts need each other. The larger part of Western Scotland has a peripheral location and is relatively poor, and therefore needs higher-order services provided by the metropolis, the spreading of the effects generated by it, and the incomes of its residents (e.g. in the form of tourism and recreation). Glasgow is a driver of the region's growth and will determine the shape that this growth will take.

On the other hand, we can identify several areas in which it is the metropolis that needs the region. These include: supplementing the labour market offer and providing a place for residence for those who work in Glasgow (due to insufficient housing facilities), access to tourist areas for the metropolitan residents (e.g. the Green Network), food provision and valuable additions to Glasgow's tourism offer (e.g. Loch Lomond National Park, Ayrshire's golf courses).

8.5. Activities of public authorities in metropolis-region context

In Scotland, the local level is the key competence level in public administration[40]. The individual areas of the Glasgow macroregion are looking for ways to unlock their endogenous potential. Most frequently, such activities are associated with investments in the tourism facilities and renewable energy projects. Some other initiatives are more specific; for instance, the predominantly farming area of Dumfries and Galloway south of Glasgow undertakes activities jointly with the Scottish Border region located in the influence zone of Edinburgh relating to possible applications of modern design in the textile industry, which has had a traditionally strong presence in the region.

40. It is pointed out that following the 1997 reforms and the establishment of the Scottish Parliament with its seat in Edinburgh, the local authorities w Scotland have become more independent of the central government, although not to such a degree as it was expected (A. McConnell, 2006).

However, as mentioned in the earlier chapters of the study, many activities of the public administration are coordinated at the level of the metropolitan region. We cannot speak of a coherent strategy whereby the metropolis affects the surrounding region, although we can list examples of initiatives which potentially can strengthen the diffusion of positive stimuli from the metropolis to the regional hinterland. For example, this includes transport system projects, such as the development of regional airports (Prestwick Airport), or the construction of new road connections within the metropolis. Other projects are aimed to create new jobs, for example through the development of business or technological parks across the metropolis; still others target education, for instance a project intended to raise skills in the building industry (Construction Skills Action Plan). Efforts were also made to create jobs outside the metropolitan area; for instance, sites have been prepared for potential investments around the cities: Ayr, Irvine, Kilmarnock; transport connections between Prestwick Airport and harbours: Ayr, Troon, Hunterston, with the cities of the Glasgow metropolis in order to secure solid foundations for the development of clusters of export-oriented industries or services. Many projects are intended to strengthen the region's potential four tourism, e.g. initiatives for the regeneration of downtown Glasgow and centres of the regional cities, or activities related to the development of Loch Lomond for tourism purposes.

Measures to weaken the negative influence of the metropolis are undertaken via projects aimed to enhance the external image of the metropolis, inter alia the Clyde Waterfront project, which involves the regeneration of the former shipbuilding-dependable communities along the River Clyde, the redevelopment of the former Ravenscraig steelwork (North Lanarkshire) or the restructuring of Motherwell and Wishaw. Other activities included the construction of new residential estates in the metropolis, regeneration of the centres of regional cities, development programmes for derelict and vacant areas (Derelict and Vacant Land Programme), as well as the development of a network or recreation and leisure sites in the metropolitan area (the Green Network).

It is difficult to prove the thesis on the coordination of public activities in the macroregion which aim to strengthen the influence of the metropolis on the hinterland. Many activities which are important for Western Scotland are coordinated at the level of the Scottish Government, e.g. those intended to: enhance transport accessibility (including the construction of a high-speed railway between the Central Belt and London), improve railway connections in Renfrewshire, Inverclyde and Ayrshire, develop recreation and leisure areas (as part of the Green Network) or develop infrastructure associated with the 2014 Commonwealth Games. An example of a nation-wide instrument has been the Government Relocation Programme, intended to relocate some of the public services from London and the South-East. As part of this programme, the NHS Central Register has been relocated to Dumfries.

8.6. The metropolitan area governance

The recent years saw a substantial policy change concerning urban development in Scotland. Cities were to be no longer perceived as sources of problems; from now on, they were to be looked at as drivers of growth, places where important development resources – economic, social and cultural - are generated. This is visible in strategic actions which provide supports to the resources of the city-regions. These activities should be anchored in the idea that strong metropolitan regions will produce welfare and prosperity for the whole of Scotland (Turok I., 2007).

The most important body which coordinates the functioning of Glasgow metropolitan area is the Clyde Valley Strategic Planning Authority (GCVSPA), established in 2008 to replace the Glasgow is the Clyde Valley Structure Plan Joint Committee (GCVSPJC), in existence since 1998[41]. This change was formal in character, and followed the changes made in the strategic planning legislation in Scotland. In February 2009, the *Town and Country Planning Regulations (Scotland) 2008* came into force. This instrument introduced mandatory Strategic Development Plans and Local Development Plans for 4 city-regions of Scotland (including Glasgow), and Local Development Plans for the areas of outwith city-regions. The GCVSPA continues the tasks performed by its predecessor regarding a similar area. The main task is preparing the publication of, and submitting to the Scottish authorities, strategic development plans for the Glasgow metropolitan area understood as 8 local authorities. The GCVSPJC and its successor have a fine reputation for preparing high-quality strategic plans for the Glasgow metropolitan region. The works of the organisation is based on consensus, i.e. each of 9 local councils has the same number of votes in making strategic decisions, despite their dissimilar “weight” with regard to the surface area, population and the economic potential. This, in addition to the shortage of funds needed for implementation and insufficient impact on the key institutions, is identified as the main factor playing down the role of this institution (Turok T. at all, 2003).

Despite an unquestionable need to coordinate public activities at the level of the Glasgow metropolitan area, today there is a lack of political and social willingness to return to the earlier organisation of the regional government, i.e. restoring the second tier of public administration in the Glasgow region. It could be said however that less radical changes in metropolitan region management would be more preferable with a view to decreasing fragmentation and reducing efforts needed to ensure communication and political cooperation between different organisations. Such changes could involve for example harmonisation of the territorial scopes of local cooperation agreements and special-purpose organisations. According to regional experts, the reform could for example

41. http://www.gcvcore.gov.uk.

define the areas for their joint activities in e.g. health care, police and fire services, spatial planning and transport. A different alternative for the formalised form of organisation within the metropolis could be a system whereby management of specific functions within the metropolitan area would be entrusted to one local authority belonging to the metropolitan area[42].

8.7. Developmental perspectives

There is not enough evidence to prove the thesis that the metropolis and the surrounding region are becoming unified in terms of the economic and/or social structure. The region of Western Scotland is extremely varied, and disparities both in the level of, and access to education are difficult to reduce. The strategic decisions on investing mainly in Glasgow and several selected locations have resulted in creating a considerable competitive advantage of the metropolis. By contrast, building the potential in peripheral locations has been less successful, and the stimuli generated by the metropolis have been insufficient. If the current development trends relating to knowledge-based economy continue in the future, it can be expected that the disparities between the city and the surrounding region will increase, perhaps even quite significantly. The authorities of the metropolitan area are aware of these processes, and therefore development strategies for this area look for development opportunities in strengthening the cooperation with the Edinburgh metropolis or linkages with British cities rather than with the regional hinterland. It can be expected that more proposals will be submitted for tightening the coordination of activities in the Central Belt, where economic relations are important, and are gaining in significance also in the east-west context (I. Turok, N. Bailey, 2001).

It should be added that the prospects for the future concerning the disparities between the metropolis and the region naturally depend on many factors, but they first and foremost rely on the question what sectors will gain advantage in the future, and this – as recent history shows beyond doubt – can change very rapidly. As few as 10 years ago, the role of Glasgow decreased and that of the region increased owing to the development of the electronic industry and establishment of new (greenfield) enterprises outside the city. At present, the situation has changed radically in view of a robust development of the financial business services sector. Other factors which can have a potentially strong bearing on the future development of Western Scotland include: development trends in public transport, policies implemented by the Scottish Government, and dissemination of technological changes (e.g. teleworking).

42. Such solutions are already being introduced, e.g. Renfrewshire's administrative support of the metropolitan-wide strategic planning function, and the second Metropolitan Glasgow economic strategy (2008).

9. City-region relationships: Stockholm – Mälar Region case study

The Stockholm Mälar region is located in eastern Sweden, stretches across 27,2 thousand km^2 and is populated by 2,7 million inhabitants. The region is of monocentric character with Stockholm, the capital city of Sweden, being the core of the metropolitan area. The city is populated by 830 thousand people and the metropolis has around 2 million inhabitants. The metropolitan area is clearly separated from the rest of the region by the difference in the population density. Stockholm doesn't have any significant counterpart, however few other cities and towns play the role of regional centres: Uppsala (140 thousand people), Västerås (132 thousand people), Örebro (125 thousand people), Norrköping (83 thousand people) and Eskilstuna (60 thousand people).

Stockholm region is one of the most competitive regions in the world and ranks very high in terms of innovation, knowledge-based economy, quality of life and sustainable development solutions. After the transition in Central-Eastern Europe it managed to position itself in the new geopolitical context and adjust its economy to new growth paradigm even before the globalization and internationalization of the world economy became broadly acknowledged. Therefore, having significant competitive advantages the region experienced two decades of constant growth characterized by the importance of research and development activities, concentration of advanced business, rapid growth of high-tech sectors such as biotechnology and ICT and creative economy – music industry, fashion and design. The dynamics of these processes varied for the core metropolitan area and the surrounding hinterland, which within time led to significant development gap (OECD, 2006).

9.1. The metropolitan region and its component parts

Stockholm is one of the most important cities in Scandinavia and besides being the capital city of Sweden its influences range further across the Baltic Sea macroregion. The main role of Stockholm city can be derived from its metropolitan functions. The city hosts headquarters and offices of many multinational companies, especially those of Swedish origin. Furthermore, it's the biggest financial market in Scandinavia, concentrating more than 50% employees working in the sector in the country. Stockholm is also a very important transport hub in both national and Scandinavian context with the strategic location in the centre of road, train and sea transport networks. The city is also an important research and development centre with a lot of prestigious academic institutions, research institutes and technology parks. It is therefore one of the most attractive labour markets in the region offering diversified range of jobs in high, middle and lower segments. In this sense the city is attractive to foreign immigrants, who during

the last two decades were the group that most significantly contributed to the city's population growth.

The range of the metropolitan region (macroregion) is mainly defined by the labour market area and consequently by the range and capacity of the commuting transport system. This is the most popular definition of the region used for the purpose of spatial planning and business activities. Taking this into consideration the metropolitan region includes the Stockholm County, Uppsala County, and eastern parts Södermanlands and Västmanlands Counties. The working definition of the metropolitan region is the 1 hour long travel distance from the Stockholm City. Within this definition metropolitan region ranges along the main transport routes and includes secondary poles such as: Norrtälje, Uppsala, Bålsta, Enköping, Västerås, Strägnås, Eskilstuna, Gnesta, Flen, Oxelösund and Nyköping (with Skavsta airport) (Regionplaneämneden, 2010).

A more formal definition of the metropolitan region can be found in RUFS 2010 - Regional Development Plan for the Östra Mellansverige with a time range 2050. The spatial definition is broader and includes Stockholms, Uppsala, Sörmlands, Västmanlands, Örebro, Gävleborgs and Östergötlands Counties (Regionplaneämneden, 2010).

The definition of the functional metropolitan region mentioned in RUFS 2010 includes the whole Stockholm County, Uppsala County together with Gnesta, Strängnäs and Trosa municipalities in Sörmlands County (Regionplaneämneden, 2010).

Another definition of the Stockholm Mälar region is reflecting the political will to make the region one of the most competitive regions in Europe. The concept, or rather an initiative, is based on the bottom-up cooperation between various municipalities and county-level administration from five counties (Stockholm, Uppsala, Södermanland, Örebro and Västmanland). Despite not being yet functionally integrated, the definition of the "aspirational" Stockholm Mälar region can be justified by the current trends in commuting flows and labour market expansion (OECD, 2006).

Other factors such as access to public services, business links between enterprises, migration or regional identity play secondary role in determining the range of the metropolitan region or are simply related to the influence of the labour market and commuting factors. Since there is a free choice of public services accompanied by high quality of these services in most of the municipalities in the area, this factor cannot be pointed as crucial in terms of spatial range of the metropolitan region and basing on this definition it would make it difficult to generalize about the spatial range (SLL, 2009).

Business activities, especially biotech, financial, automobile, ICT and R&D clusters are still concentrated in the Stockholm City, however their functional links are constantly

expanding to other parts of the Stockholm Mälar region, which can be interpreted as a result of cooperation between companies and research institutions (OECD, 2006).

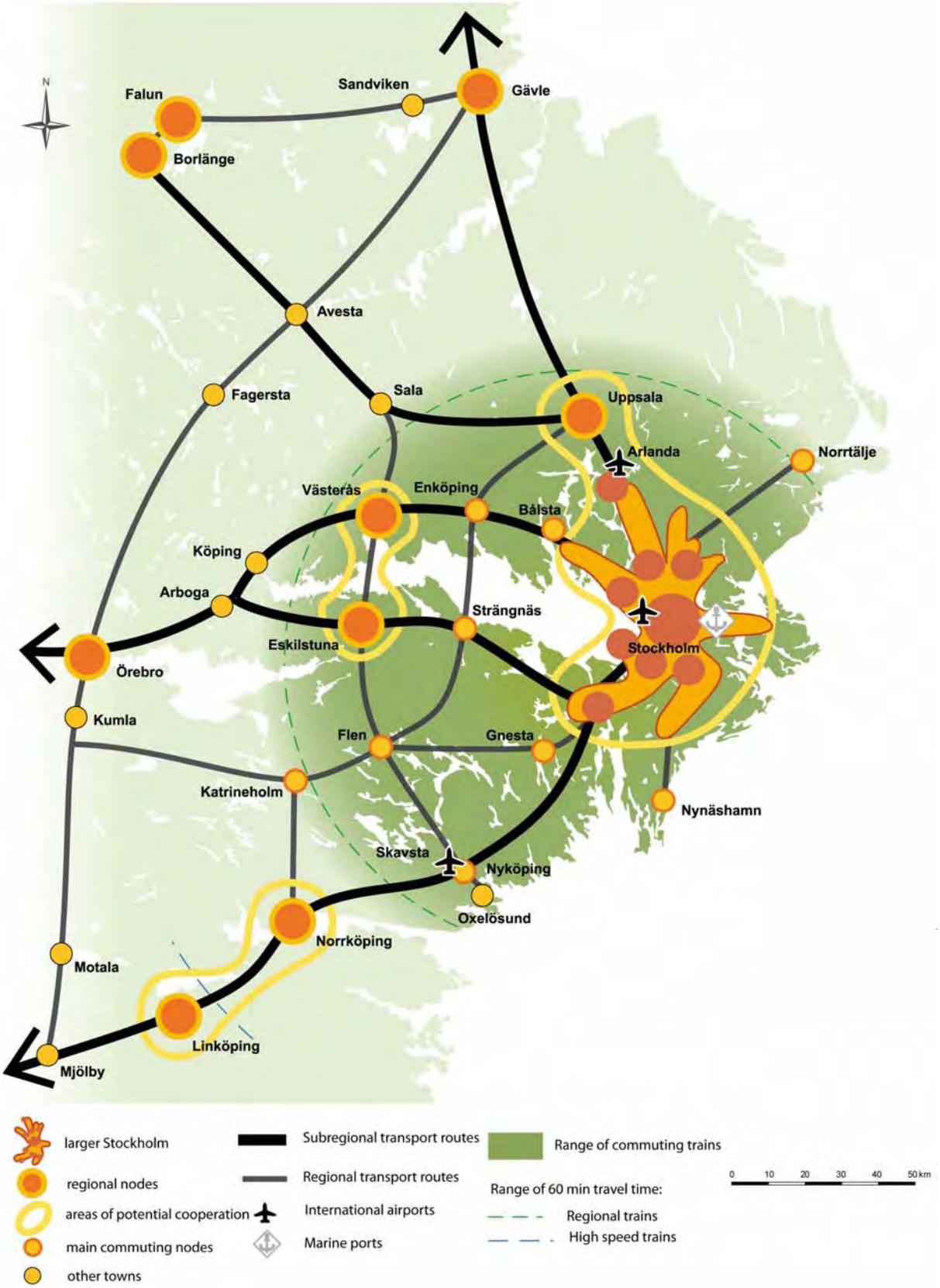


Figure 31. Functional metropolitan Stockholm Mälar region
Source: (Regionplaneämneden, 2010)

Regional migration doesn't seem to be an explanatory factor of the spatial range of the metropolitan region, as the external migration to the city (immigrants from abroad) exceeds the interregional migration. There are visible suburbanization processes motivated by education, jobs and self realization. Suburbanization ranges up to 30 km outside the central city. On the other hand, despite higher real estate prices some people are staying in Stockholm, as the number of households with children has grown in the last 10 years. This can probably explained by: deindustrialization of the inner city and housing developments (larger apartments, as earlier there was a tendency to build only studios).

The least important is the regional identity factor, as it is not as important as local identity vs. national identity. There is no such identity as Stockholm Mälar region identity. An interesting observation however, is the broad range of the "Stockholm" logo accepted as a regional branding strategy by the local administration representatives of municipalities located in Stockholm, Uppsala, Södermanlands, Västmanlands and Örebro counties.

Regardless of the adapted definition, it is acknowledged, that mainly due to the regional labour market demands, the spatial range of the metropolitan region of Stockholm has been constantly and rapidly expanding since the 1970s (Regionplaneämneden, 2010).

The range of the metropolis is usually defined by the administrative boarders of the Stockholm County (both NUTS 3 and NUTS 2 level), however this definition doesn't fully reflect the functional metropolitan area. Therefore there are several alternative definitions of the Stockholm metropolitan area. One of the criteria used for the purpose of planning is the population density which includes the Stockholm city, Solna and Sundbyberg municipalities. Another definition, based on the range of the labour market and commuting intensity includes the Stockholm and Uppsala counties and the northern parts of the Södermanland county (RTK, 2009a).

The most important strength of the Stockholm metropolitan area is its highly competitive, innovative an internationalized economy with a lot of multinational companies, diverse structure of knowledge-based branches, high levels of FDI and acknowledged position in the globalised economy. This is a result of a long period of successful performance in the global competition based on a model of an open, however relatively small, export-based economy which was developed even before these factors became crucial in international competition. Another important strength of Stockholm is the top quality human capital with the highest ratio of population with higher education, strong tradition of life-long-learning and practically bilingual population (English as second language). Moreover, Stockholm is located near to growing markets in the Baltic region. Finally, the urban structure of the city offers high quality of life with a lot of

recreation areas, high quality of air, water and landscape, but also high density of dwellings and excellent public transport system within the metropolitan area, which allows easy access to institutions and retail centres.

Among the weaknesses of Stockholm the most important include high real estate prices and housing shortage due to which the city is loosing its attractiveness. As a consequence there is a growing problem of spatial and social segregation, which is especially problematic in case of immigrants coming from the non-EU countries. Another weakness of the Stockholm metropolitan area is its peripheral location with regard to the Pentagon area. What is more, due to the ongoing globalization and lack of critical mass in terms of population size the city is loosing its importance in the global financial market and trade. Finally, the structure of knowledge economy sector is based on big companies without the expected spin-off effect that would encourage small and medium-sized enterprises to appear.

The strengths of the region surrounding the Stockholm metropolis include high quality of life with lower real-estate prices when compared to more central locations. Another strength is the awareness of the decision makers in terms of using the proximity of Stockholm in advantage to the local development, which is reflected by close cooperation with the city. Furthermore, the workforce is characterized by high working culture and efficiency even in the low-skilled and manufacturing sectors. Finally, the social structure is more homogenous, which causes less social tensions when compared to the metropolis.

Weaknesses of the region surrounding the Stockholm metropolitan area are connected to the economic dependency of the metropolitan economy with typical hinterland economic sectors such as industry, manufacturing, logistics and basic services. Furthermore, local human capital is subject to brain-drain and the most talented people tend to move to the city area leaving less skilled and educated workforce structure. Due to lower population density and underdeveloped transport network only several areas of the region have good access to the inner-city. Finally, the region doesn't fully benefit from its assets, since the functional roles of regional nodes such as Västerås or Eskilstuna aren't fully defined or agreed on.

The relationship between strengths and weaknesses of the metropolitan area and the metropolitan region are of complementary character, especially in term of the economic structure and real-estate market. The main differences include work productivity and human capital, access to specialized services and culture, labour market diversity as well as income level and social structure. The side effect of the complementary structure of strengths and weaknesses is the asymmetrical relation between the metropolis and the region in which the region is economically and functionally dependent on the city. The

current situation is posing new challenges to the region's economy which was to high extent based on manufacturing (automobile, machinery, caterpillars, printing) as this sector has been declining over time due to off-shoring. In order to sustain the competitiveness of the regional economy more focus was put on encouraging subcontractors to cooperate with the companies located in the city and developing the wholesale and logistics sectors (SBR, 2007). Another idea is to encourage spin-off companies in advanced sectors to be started in more remote areas of the region. This however demands more comprehensive solutions. Recent trends show growing awareness among local and regional decision makers in both areas considering the necessity to cooperate. There is a political consensus on a general level that the region's municipalities and Stockholm have to cooperate in order to maintain and strengthen the region's position in the global competition.

9.2. Relationships between the metropolis and the region

The industrial, economic and social links between Stockholm and its surrounding region are of historical character and were determined by the waterfront-like inland formation. The settlement structure of the region was determined by the location of the early medieval church towns such as Sigtuna, Västerås or Eskilstuna. On the other hand the north-west part of the region appeared to be rich in raw materials such as iron ore, which attracted both skilled labour force, craftsmen and capital to develop mining industry. The towns located along the lake Mälaren such as Västerås, Eskilstuna and Örebro took up the role of manufacturing. The development of the manufacturing industry contributed to the social and economic progress of the whole region, became a source of significant shift in regional gross product as well as created industrial, economic and social links between different parts of the region, which became functionally more dependent on each other. The main communication arteries were lakes, rivers and the sea. Stockholm as a separate city was established 200 years later as a result of functional division of branches in the region, to play the role of market, warehousing, trade and other business services. On the other hand, the growing demand for knowledge and sophisticated workers led to foundation of the Uppsala University in 1477. Another significant period which had a big influence on the settlement and functional structure of the Stockholm Mälar region was the industrialization in the late 19th century, that established Stockholm as a macroregional financial market and communication centre (dense telephone network provided by LM Ericsson) (Högberg, 2009).

Commuting to work

The population in the Stockholm County has increased by almost 400 000 during the last 3 decades. The main source of this growth was foreign migration and the internal migrations were minor in comparison. In the context of housing shortage the commuting

became a crucial factor of creating and widening the range of the functional metropolitan region. The map below illustrates trends in increase of commuting in the metropolitan region of Stockholm during the last 20 years. About 80-85% of commuting to Stockholm takes place across the county boarders. The overall number of commuters travelling to Stockholm is about 85 thousand of which 60% are the inhabitants of the Mälar region, that is Uppsala, Västmanland, Södermanland and Örebro counties. During the last decade the number of commuters increased by 50%, especially in case of Uppsala and Södermanland counties (Regionplaneämneden, 2010).

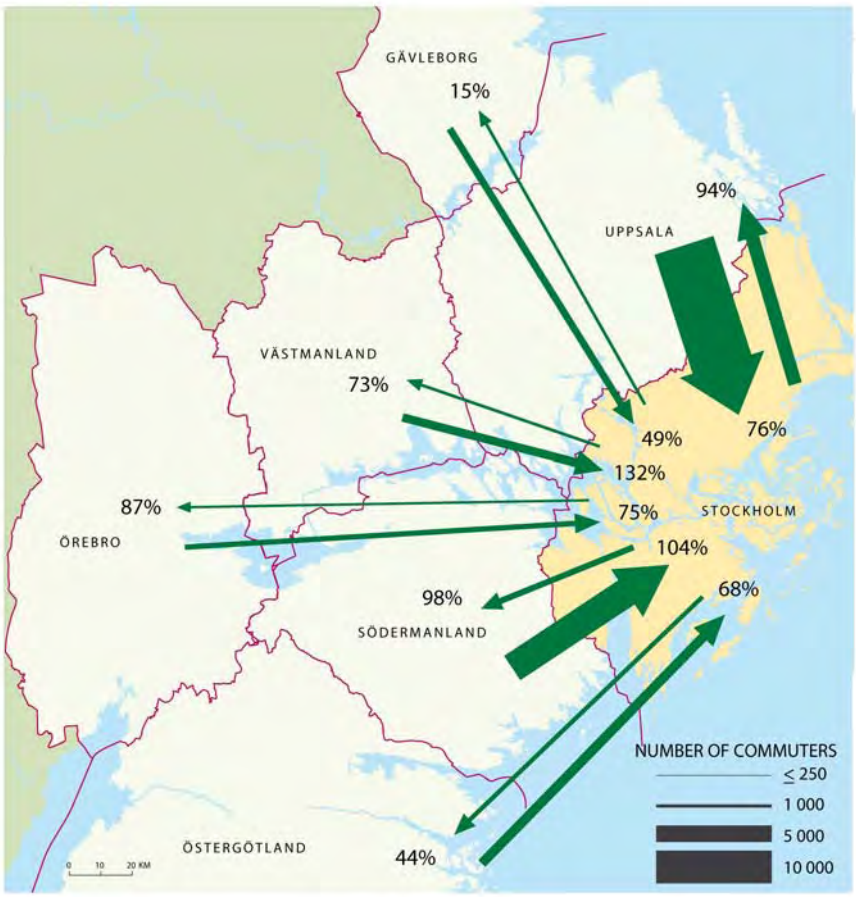


Figure 32. Commuting trends in the Stockholm Mälar region 1985-2006
Source: (Regionplaneämneden, 2010).

The most important factor behind commuting is the broad and diversified labour market of Stockholm. Furthermore, it's also the most important connection transport hub in the national scale. Today the metropolitan labour market comprises of Stockholms and Uppsala Counties, Strängnäs, Gnesta and Trosa in Södermanland County and Västerås and Eskilstuna. The traveling time of 45-60 minutes has been achieved in most of the regional nodes located within the radius of 100 km. The biggest growth in commuting is caused by development of railway connections, however still the biggest share of total traffic capacity in the region (60%) remains within the car journeys (SLL, 2009).

When analyzing the main purposes of commuting within the metropolitan area, the most important include everyday journeys to work and shopping. Due to high quality of education, school-related journeys of pupils are of a lesser importance. When it comes to the whole metropolitan region, the structure is similar with everyday journeys to work and for shopping as main purposes of commuting. Weekly mode of commuting appears to be more typical for the workers who live in the municipalities located outside the radius of 100km away from the central city.

The most important goal concerning commuting in the region is to shorten the travelling time in order to attract potential employees to utilize the commuting network in order to supply the metropolitan labour market. This goal applies mainly to the regional railway network. The most important routes from the Stockholm perspective connect other parts of the region and two biggest airports and these are:

• Stockholm/Arlanda–Malmö/Göteborg, via Nyköping/Skavsta, Norrköping, Linköping

• Stockholm/Arlanda–Oslo, via Strängnäs, Eskilstuna, Örebro

• Stockholm/Arlanda–Oslo, via Enköping, Västerås, Örebro

• Stockholm–Arlanda–Uppsala–Gävle.

Migrations

The most important factor of growth in the Stockholm region is the economic and structural fitting to the challenges posed by the globalization. Therefore the regional economy is highly dependent on skilled and well educated labour force supply. Because of the relatively low level of internal migrations to the region and low fertility rate the labour market has to rely on foreign migration. The share of population of foreign origin has been constantly growing to reach around 25% of the population. A side effect of this situation is caused bu certain problems with integrating immigrants in the labour market, which leads to lower income level among this group. It results in spatial segregation of this population, who tend to be concentrated in the lowest quality neighbourhoods built between the 60s-70s as a part of the so-called “million project” (Stadsledningskontoret, 2005).

Trade exchange between businesses

As in the rest of the country, the economy of the Stockholm Mälar region is highly dependent on export and foreign direct investments. It is especially typical for the metropolitan area in which more than 40% of workforce employed in the private sector is working for export companies involved in commerce, manufacturing and business consulting. The largest of this group of companies are in the branch of finance and communications. In general more than half of the foreign-owed companies in Sweden reside in the Stockholm Mälar region and they are concentrated within the metropolitan

area. In this context the most important role of the regional surrounding is logistics and transport connection between the suppliers of goods and services and customers (Tidestav & Zetterberg, 2008).

Other platform of business links between the metropolis and the region is a result of the functional and spatial localization of economic clusters. Business activities, especially biotech, financial, automobile, ICT and R&D clusters are still concentrated in the Stockholm city, however their functional links are constantly expanding to other parts of the region:

- Biotech cluster: ranges across the whole region with Uppsala, Stockholm as main creative centres and Strägnås and Sigtuna as main industrial basis for the cluster;
- Financial cluster: concentrated in the Stockholm City
- Automobile and robotic cluster: located in the south-western part of the region includes Södertälje, Västerås, Eskilstuna and Örebro;
- ICT industry: located longitudinally between Uppsala, Kista and Stockholm;

Higher-order services for individuals

Academic institutions located in Stockholm have excellent reputation and are recognized for the quality of teaching and R&D activities and are therefore an important factor of commuting. The intensity of commuting to universities has been constantly growing and now ranges across the whole metropolitan region. This situation is a result of binary higher education model in Sweden with visible division to universities and colleges. While universities are targeted at most talented and competitive students, their recruitment area is of national scale, whereas colleges are more accessible, but offer less prestigious education programs (RTK, 2009b).

Cultural and entertainment offer of the Stockholm city together with the creative cluster are also a significant factor of human flows across the region. The intensity of commuting related to cultural and entertainment activities was comparable to the flows motivated by education. In comparison to the metropolis, the regional cultural offer is poor and less diversified. It is necessary to underline, that cultural sector of Stockholm is one of the most innovative and recognized in the European scale and in case of music scene it's the third biggest market in the world (after USA and UK) with the highest number of recording studios per capita in the world.

Other services, such as health care, didn't have any significant impact on regional flows. The reason behind this is probably the welfare state policy which assures every citizen equal access to high quality public services regardless of their residence.

Entertainment and leisure

Quality and availability of leisure and recreation possibilities in the area surrounding the Stockholm metropolis play an important role in raising the quality of life and the attractiveness of the whole region. The main advantages of the leisure and recreation offer result from the seaside location, unique landscape of skerries and qualities of the area where Lake Mälaren merges with the Baltic Sea. The most popular recreational area is therefore coastal area, where a significant number of city inhabitants traditionally have their summer cottages. Another popular area includes the northern parts of the Södermanland County, which is famous for a concentration of castles and other historic buildings. The main tourist and leisure attractions include activities based on the natural heritage of the region such as National Parks, nature reserves but also recreation possibilities such as golf, sailing, cycling, horse riding. Leisure and recreation in the Stockholm Mälaren region is characterized by high quality tourist infrastructure and excellent management of natural heritage (Regionplaneämneden, 2010).

Relationships of public authorities

The most significant feature of relations between different representatives of public authorities in the Stockholm Mälar region is the bottom-up type of cooperation. It is driven by the common conviction that in order to remain competitive globally the local authorities need to cooperate and come up with development –oriented solutions that are to benefit the whole metropolitan region.

The formal range of power on the regional level is relatively limited. The division of competences can be described as an hour-glass model in which the state is powerful, the region is weak and the municipality is powerful. With the lack of powerful authority on the regional level there is a bottom-up initiative concerning the coordination planning and development activities and coordinating these processes between different local authorities representing the formal power structures and various associations of municipalities and counties. This process is facilitated by the fact, that representatives of most of the institutions responsible for local and regional planning are located in the same building (Berggren & Hermansson, 2008).

In this configuration the Regional Planning Office (Regionplanekontoret) is playing the role of a research and development unit that collects, processes, analyses and publishes social and economic data concerning the regional development. The quality of the analytical capacity of this institution is very high and the analytical support is of constant and comprehensive character. The Regional Planning Office is therefore responsible for formulating recommendations, and suggestions concerning the overall area of the region. It also coordinates the cooperation between representatives of the city of Stockholm and 36 municipalities who have formal competences in terms of spatial planning, transport

and infrastructure, housing and labour market policy and support for enterprises (SALAR, 2009).

A good example of such an initiative, which illustrates mutual trust and dominance of cooperation rather than competition between local authorities is the „En Bättre Sits - On the right track" project. The aim of the project is to improve the accessibility, quality and capacity of transport infrastructure in the region. One of the reasons behind the initiative was the fact that the specific demands of the spatial structure and relations of the Mälar region were not incorporated accurately in the plans prepared on the state level. The project is a communication platform uniting local and regional authorities as well as representatives of national institutions and agencies responsible for transport and infrastructure. The main goal of the project was to work out consensus concerning the investment priorities and incorporate interests and demands of all participating actors (local authorities, entrepreneurs, local communities and environment protection) as well as the overall development interest of the whole area (Högberg, 2009).

There are however some examples of competition between the smaller towns around Stockholm. The main subject of competition are the public-funded infrastructural investments, location of knowledge-intensive sectors, universities and the schedule of investments. At the same time leaders on smaller municipalities understand the necessity of investments in Stockholm city. A good example of this initiative is the fact that several municipalities located further away from Stockholm were financially participating in the construction of the city tunnel, which is to improve the communication in the whole metropolitan region.

9.3. Factors shaping the relationships between metropolis and its region

The most important factor affecting the interlinks between the metropolis and the region is the complementarity of the economic structure of the metropolis and subregional centres that results from the traditional and historic division of functions of regional production. The western part of the region, which used to be mining and industrial area, is still characterized by a significant role of the manufacturing sector. Today this sector is based on hi-tech and knowledge intensive production. On the other hand the eastern part of the region was traditionally shaped according to its transport and commerce functions, so the share of specialized services and more diversified economic structure was always the case (SBR, 2007).

Another factor contributing to interlinks between the metropolis and surrounding region is the developed transport network. This is especially crucial in terms of labour market demand and housing shortages in the metropolitan area. However, a significant part of the region is not well connected to the city centre, since the density of population on the most peripheral areas makes infrastructural investments economically inefficient.

Despite the bottom-up cooperation initiatives between various local authorities, the decision making processes are very slow and driven by the consensus culture. Territorial planning on the regional scale is also affected by the procedures considering the competences and logic behind constructing development plans. Unlike in many other countries this process is of a bottom-up character, which means, that initial planning takes place at the local level and only than particular local plans are integrated into a regional development plan. With a negotiated regional development plan, each municipality still has their autonomy not to conform to the compromise solutions made on the regional level (SALAR, 2009).

The most important spillover effect is caused by the improvement in transport network and housing shortages in the inner-city of Stockholm. Dynamic economic growth of the metropolitan area was accompanied by lack of housing and relatively slow tempo of new dwellings delivery when compared to growing demand. This situation has been negatively influenced by formal restrictions concerning the construction of new housing areas as well as real estate regulations that oblige landlords to register the apartments to be rented. The waiting lists for renting an apartment in the city exceed 100 thousand people. As a result of this process, the real estate prices and rental prices have shifted to the level that makes Stockholm one of the most expensive cities to live in and where the share of housing expenses in household budgets is among the highest in the EU (OECD, 2006). To a paradox, this phenomenon decreases the quality and level of life in the metropolis, despite Stockholm being characterized by the highest personal income levels in European cities. This phenomenon is also contributing to the spatial expansion of the metropolitan area and growing suburbanization. With significant improvements in public transport and access to neighbouring municipalities and housing resources in more remote areas became available, which contributed to the suburbanization processes. However central city remained dominant in terms of concentration of workplaces. This contributed to growing financial transfers, especially in the form of local taxes, to the municipalities located conveniently along main transport routes within the radius of 75-100 km away from the city.

On the other hand, municipalities located away from the main transport routes experienced significant backwash effect, which manifested itself mainly in the form of brain drain and outflow of well-educated, highly skilled labour force. The western part of the region was especially affected by these processes, as the adverse net internal migration was typical for all of the age groups of the population. In case of the eastern parts of the region and especially the coastal area, the net migration values varied according to the age group of the population with significant outflows of people between 15-30 and inflows of people aged 30-55. The municipalities experiencing biggest

population outflows are characterized by peripheral localization, low population density and fewer job opportunities (RTK, 2009c).

9.4. Mutual relationships between the metropolis and the region

The metropolis and the region are mutually dependent on each other and this is related to their functional and structural complementarity. There exists however a certain asymmetry in this relation. The main aspects in which the metropolis is to certain extent dependent on its surrounding include supply of the labour force and limited housing capacity of the city. The regional surrounding experienced minor relocation of companies, mainly in logistics and wholesale sector offering only less attractive employment opportunities. The expected appearance of spin-off companies or subcontractors in more advanced sectors, like ICT, R&D, creative sectors was not the case even in regional nodes.

On the other hand, the region is economically and functionally dependent on the metropolis to a much larger extent. The metropolitan area offers high quality jobs and diversified labour market, high order services and cultural activities. This potential and opportunities are however not fully utilized by the municipalities located in the region. The spillover effect is also highly dependent on the accessibility of a particular area and its placement within the regional transport network. What is more, most of the industries and sectors creation the economy of the region are of subordinate role to the high order activities in the centre, which makes them prone to any economic shifts in more advanced sectors. It is reflected by the deindustrialization of some parts of the region, which used to be part of the automobile cluster and are now loosing competitiveness due to the offshoring of manufacturing. Another factor that makes the region dependent on Stockholm is the lack of capacity to attract foreign capital. Because of its excellent reputation, Stockholm is a trademark in itself and therefore attracts companies and investors into the region. The significance of this factor is reflected by the fact, that the whole Mälar region promotes itself under the slogan “Stockholm, the capital of Scandinavia”.

9.5. Activities of public authorities in metropolis-region context

In the formal setting of planning in Sweden divides most of competences between the state and the municipality level with little power remaining at the regional level. The state is responsible for setting up the standards and main development priorities, whereas the municipalities have competences of implementing the policies proposed on the state level. Local authorities have significant autonomy concerning the ways, fields and financial resources devoted to implementation of policies (Berggren & Hermansson, 2008; Åkerlund & Legerius, 2009).

Infrastructural investments and polycentric development

One of the main strategies to assure spillover effects and more polycentric development is to constantly improve the transport network quality, speed and capacity. It applies both to improving the connection between the metropolitan area and the rest of the region, but also to improving the connections between various regional nodes such as Norrtälje, Uppsala, Bålsta, Enköping, Västerås, Strägnås, Eskilstuna, Gnesta, Flen, Oxelösund and Nyköping. Furthermore, the tools of polycentric development include strengthening of regional nodes by location of technology parks, logistic centres, and retail centres as well as new housing areas. Finally, certain municipalities such as Eskilstuna and Västerås are encouraged to strengthen their cooperation and become quasi twin-cities.

Education

Sweden is an example of the binary model of higher education which means that there is a coexistence of two types of academic institutions, namely universities and colleges. The universities located in the Stockholm city and Uppsala such as Royal Institute of Technology (KTH), Stockholm School of Economics, Stockholm University, Karolinska Institute and Uppsala University are the most prestigious in the country. The colleges (högskolan) are offering mainly bachelor and masters level of courses and therefore attract a significant number of mature students as part of the life-long-learning policy. In the Stockholm Mälar region there are 26 academic institutions, which employ 40% of all Swedish academic teachers. The most prestigious universities are located centrally and aim at research, development and technology studies and less relatively at teaching and education. On the other hand, the main function of colleges, which are mainly located outside the central city in the metropolitan area and macroregion, is teaching and education. One of the strategies to develop the regional surrounding of Stockholm was to invest in the second type of academic institutions. As a result they have noted the biggest increase in the number of students of which the most significant were Södertörn University located south of Stockholm and Mälardalen University located in the twin city of Eskilstuna-Västerås (OECD, 2006).

9.6. The metropolitan area governance

As previously mentioned regional planning the region is of a bottom-up character and is strongly affected by the consensus culture of decision making processes. Despite fewer competencies on the regional level Swedish legal framework offers a variety of solutions encouraging cooperation between local authorities. These include the ordinary contract, which applies to a very specific object of cooperation; local government federation, which is a form of cooperation between institutions representing various levels of local, regional and national authorities and can be additionally subsidized from the central budget;

joined ownership, which is a tool of rationalizing the supply of public services such as education or health care. In this context a very interesting initiative has emerged in the Stockholm-Mälar Region (OECD, 2006). The main activities concerning strategic regional planning are handled by the The Council for the Mälar Region, which is a non-profit special interest organization for municipalities and county councils in the Stockholm-Mälar Region. It consists of the five counties of Stockholm, Uppsala, Västmanland, Södermanland and Örebro. The activities of this organization are focused on three areas such as infrastructure, benchmarking and education. The objective of the Council for the Mälar Region is to promote the development of the Stockholm-Mälar Region into an attractive, future-oriented region within an integrated Europe (Högberg, 2009).

One of the results of this cooperation is a very comprehensive and broad Regional Development Plan for the Stockholm Region 2010 (RUFS 2010), which unlike previous documents of this sort, includes diagnosis, recommendations and proposals the whole metropolitan region (Regionplaneämneden, 2010).

The main effects of this policy tools are visible especially in terms of the labour market related issues with constantly growing commuting demand and intensity as well as growing suburbanization process and spatial expansion of the metropolitan area. On the other hand the attempts to diversify the structure of regional economy and attract companies from the more advanced sectors into the more remote areas of the region haven't brought any visible results yet.

9.7. Development prospects

The current trends suggest further growth of disproportions between the metropolitan area of Stockholm and its region in economic development. One of the main arguments behind this forecast is based on the differences in economic structure with a significant share of manufacturing and basic services in the region and highly internationalized, innovative and advanced branches in the metropolitan area. Currently the remote parts of the region are faced with competition from the manufacturing sector of developing countries and are undergoing restructuring due to its earlier monofunctional structure. On the other hand the metropolis is constantly strengthening its position in the international context due to its competitive advantages resulting from the metropolitan functions of Stockholm.

There are three possible scenarios that include both the structural conditions of the region and intended strategic approaches and policy tools declared by public authorities and proposed in strategic documents.

The first scenario “Growing monopoly of the city” is based on the assumption, that the ongoing processes will continue and the backwash effects will be dominant and will prevent the integration of the metropolitan region. According to this scenario further development will be monocentric and the economic dependency of the hinterland will grow. The limitations of regional planning procedures will prevent successful cooperation and bloc efficient decision making processes. The depopulation of the remote areas will therefore continue and most of new investments, company start-ups and development of clusters will be concentrated in the metropolitan area. The condition for this argument to take place would be substantial growth in number of dwellings inside the metropolitan area.

The second scenario “Infrastructure – spatial expansion of the city, residential function of suburban areas” also assumes extrapolation of current trends concerning the gap between the regional and metropolitan economic structure. However, according to this alternative, the improvement in transport infrastructure will shorten time of travelling, lead to better communication and interlinks between the region and metropolis and therefore contribute to suburbanization. The assumption here is that due to infrastructural improvements there will be a significant real estate boom in the municipalities located along main transport routes. As a result these municipalities will change their character to typically residential areas and will benefit from the financial transfers of their new residents working in the city.

The third, most optimistic scenario “Polycentric network of regional nodes, endogenous development” assumes that all intended policies and strategies will succeed and lead to diversification of regional economic structure and development of new functions of regional nodes. General improvement in infrastructure, strategic localization of technology parks and better investments in higher education will positively influence income levels, human capital and will therefore enable endogenous development. This will further attract more advanced sectors and contribute to further restructuring and growth.

All of the scenarios are based on the assumption of the economic complementarity between the region and the metropolitan area. Each scenario gradually includes the possibility of positive effects on both economic and policy levels. Taking into consideration recent improvements in communication and cooperation between local and regional authorities the first scenario is least possible. The other two scenarios are dependent on the effectiveness of cooperation, coordination and implementation of actions foreseen in the strategic documents.

10. City-region relationships: Toulouse – Midi Pyrenees case study

The Midi-Pyrénées region is situated in southern France and borders on Spain along the Pyrénées. This is the largest region in France (8.3% of the country's area), but weakly populated: it has slightly over 2.8 million inhabitants, i.e. ca. 61 inhabitants per 1 km2 (which is much less than the country's average of 113 inhabitants per 1 km2). The urban population accounts for the majority of the region's inhabitants, with the urbanisation rate of 68%. Toulouse is the key urban centre in the region. In 2006, the central municipality of the metropolitan area had 444 000 inhabitants, and the entire metropolitan area had a population of 1 103 000. Other urban centres in the region are markedly smaller: Tarbes (112 000 inhabitants in the urban area, 47 000 in the central municipality); Albi (93 000 and 51 000, respectively); Montauban (82 000 and 56 000); Rodez (69 000 and 26 000); Castres (63 000 and 45 000); Cahors (40 000 and 21 000); Auch (37 000 and 23 000) (INSEE 2009). We can say therefore that the region is strongly polarised and dominated by the centrally situated Toulouse, which is the administrative, economic and cultural capital of Midi-Pyrénées. This dominance is so great that the famous saying coined by Jean-Francois Gravier (1947) to describe the dominant role of Paris in the French space “Paris and the French desert” is frequently invoked. The situation in the region is therefore referred to as: “Toulouse and the desert of Midi-Pyrénées” (Gouardin 2008). Both these bon mots accurately capture the “fractality” of how Toulouse and Midi-Pyrénées function – just as Toulouse prevails over Midi-Pyrénées regionally, both the region and the metropolis are overshadowed by Paris when we look at the entire country. Nevertheless, Toulouse is a major centre in the French space. Its role in the perspective of longue durée processes was emphasised by the famous historian Fernand Braudel (1986). In the early 1960s, Toulouse was selected as one of 8 French equilibrium metropolises. At the time, as part of the French Government programme aimed to balance the country's spatial development (Hautreux, Rochefort 1965), and owing to its long aviation industry traditions started after the First World War, such institutions as a part of the National Centre for Spatial Research (Centre National d'Études Spatiales – CNES) and the National Civil Aviation School (École Nationale de l'Aviation Civile – ENAC) were moved from Paris to Toulouse (Grossetti 1995). In the second half of the 20th century, the city definitely evolved into a metropolis. Nevertheless, it is frequently pointed out that not all metropolitan functions are fully developed here – this refers to the concept of Toulouse as an “incomplete metropolis” proposed by Guy Jalabert, one of the major researchers of Toulouse, in a book published under the same title (Jalabert 1995).

10.1. The metropolitan region and its component parts

The Midi-Pyrénées region is made up of 3 020 communes [communes] (organised into 8 departments [départements]: Ariège, Aveyron, Haute-Garonne, Gers, Lot, Hautes-Pyrénées, Tarn, Tarn-et-Garonne (cf. Map 1). Toulouse is located in the Haute-Garonne department, and its metropolitan area occupies the whole of the region's northern part, which in some places moves into the adjoining departments (Ariège, Gers, Tarn, Tarn-et-Garonne and Aude, which belongs to the Languedoc-Roussillon region).

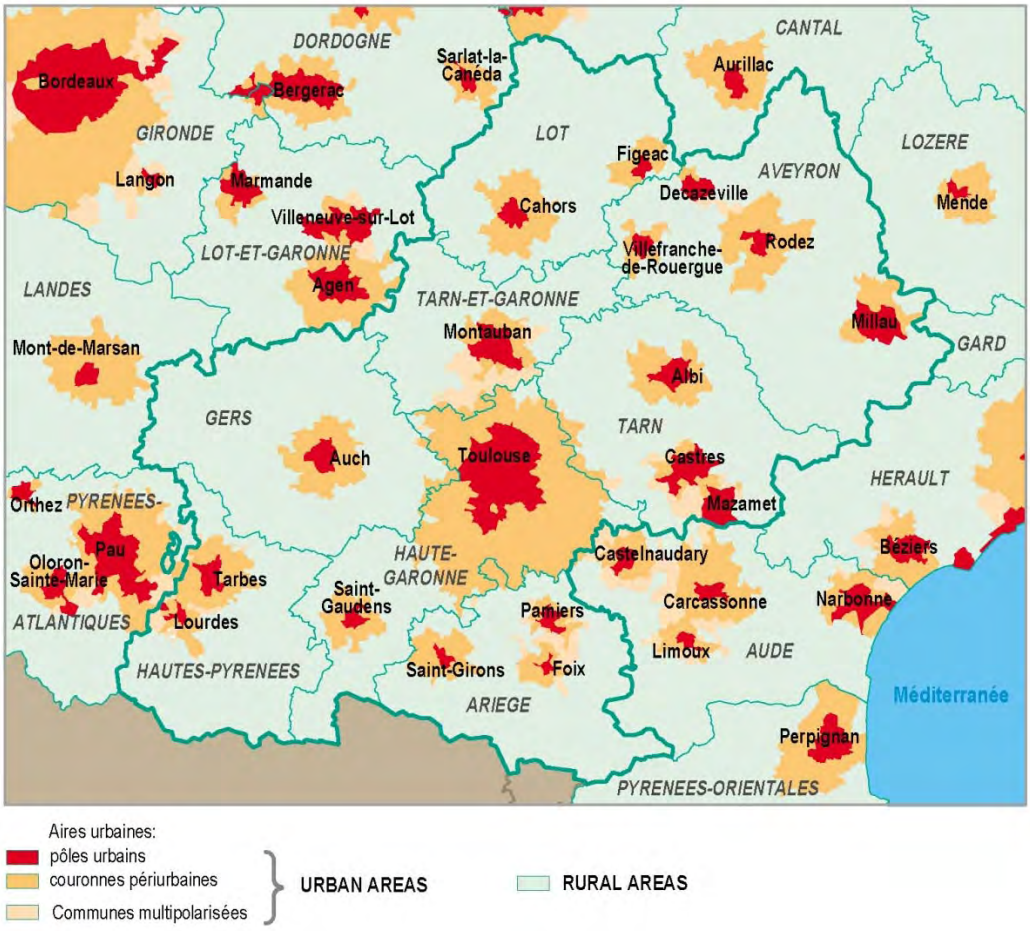


Figure 33. Midi-Pyrénées region, departments, major cities and urban areas
Source: Projetti 2001.

The region is not a structure which is important for regional identity nor which is well rooted in history – in its present boundaries, it is a relatively new entity, established in the 1960s (Poumarede 1991), and did not become an administrative entity until the 1980s (Dugot, Laborderie, Taulelle 2008). For the inhabitants of Midi-Pyrénées, their local identifications matter more than regional, although Toulouse, as a city which enjoys international recognition, plays a considerable role in the building of supra-local identity.

In France, metropolitan areas (Aire Urbaine) are established by Institut National de la Statistique et des Études Économiques – INSEE based on functional analyses. According to the methodology used, a metropolitan area is a compact group of communes (without

enclaves) composed of the communes making up the central urban centre and the communes surrounding the centre, where at least 40% of inhabitants work in the central urban district or the surrounding communes . With such delimitation criteria adopted in 1999, the Toulouse metropolitan area had 342 communes with an area over 4 000 km2 (cf. Map 1). A new delimitation is planned for 2010 – in view of the rapid development of Toulouse, it can be expected that its metropolitan region will be significantly increased.

Nonetheless, the officially delimited metropolitan area is primarily a statistical and analytical entity, not transposed into administrative structures. The fragmentation of communes (basic units of territorial division) is typical of France; communes are here frequently very small in terms of their area, and the number of the population makes cooperation within the metropolitan region complicated. Nevertheless, the law provides for the possibility to set up special-purpose and general-purpose associations of communes (depending on the character of the area, these include: communauté d'agglomération, communauté Urbaine, communauté de communes). Such general-purpose associations take over a broad range of competences from communes (cf. e.g. Kerrouche 2008), but there is a great deal of latitude in this regard. One pertinent aspect in particular is that several general-purpose associations of communes may exist within one metropolitan area. For instance, in the case of the metropolitan region of Toulouse, in 2010 there existed one communauté Urbaine (Communauté urbaine du Grand Toulouse – 25 communes, with a total population of 666 000), 2 communautés d'agglomération (Communauté d'agglomération du Muretain – 14 communes, 71 000 inhabitants, and Communauté d'agglomération du Sicoval – 36 communes, 66 500 inhabitants) as well as 30 small communautés de communes (cf. Map 6). However, this is not an uncommon situation in France. In 2008, only one in 10 metropolitan areas in France (Air Urbaine) had a uniform mode of management, i.e. based on one association of communes which comprised most of the communes of the area (Estèbe 2008).

The entire Midi-Pyrénées region unquestionably remains under a strong influence of Toulouse, which results both from its sheer size as well as the lack of other major city centres. The impact of Toulouse is also visible in the western part of the Languedoc-Roussillon region which borders on Midi-Pyrénées from the east, particularly the Aude department, the western boundaries of which run 40 km from the centre of Toulouse. Moreover, some communes from this department are included in the metropolitan region of Toulouse in the official delimitation. However, its immediate surroundings, defined as an area lying 30-60 minutes by car from Toulouse have the strongest functional ties with the metropolitan area. This mostly includes smaller cities, as a rule capitals of the departments: Albi, Auch, Castres, Castelnaudary, Foix, Mazamet, Montauban, Pamiers, Saint-Gaudens **(Figure 33).** These cities make up an urban network with Toulouse as its obvious hub. The area of influence defined in this way (referred to as the Aire

Métropolitaine de Toulouse) is important because it is used in analytical and strategic studies (cf. AUAT 2008).

Toulouse is the headquarters of Airbus, the aerospace industry giant. The role of this company for the city is so great that Toulouse has been dubbed as “Airbus-ville”. The modern aerospace industry is definitely the strongest asset of the city. Aviation industry includes not only Airbus, but also ATR, Latécoere, EADS, Cimpa and a large number of cooperating companies. Other dynamic industries include space, aircraft flight controls systems, aerospace security, electronics, mechanics, as well as chemical, pharmaceutical and medical industries (Pierre Fabre, Sanofi-Aventis, the Pôle de compétitivité Cancer-Bio-Santé initiative). These sectors are characterised by a great degree of innovation and international competitiveness, which is transposed into a significant role of exports for the city and its capacity to attract foreign capital – which are the city’s other assets. Toulouse is also an important national academic and research centre , with unique courses and specialisations of study (primarily those connected with aerospace industry). One proof of the attractiveness of the metropolitan region is that in the past decade its population constantly increased, at a rate of ca. 1.9% in the years 1999-2006, both as a result of natural increase and migrations (Tornéro 2010).

The significant role of the aerospace industry (which is e.g. expressed by the 70% share in the value of the region’s exports, according to 2007 data) at the same time poses a potential threat to the sustainability of the city’s development – in a situation of a potential downturn in this market or loss of its competitive advantage by Airbus and its cooperators. It should be emphasised at this point, however, that the economic structure of the metropolis is quite diverse and has a modern sectoral make-up (with over 70% of jobs in services). In addition to that, diversification attempts are being made (e.g. development of activities in the pharmaceutical sector). The dynamic spatial and demographic development of the city creates a strong demand pressure in regard to technical infrastructure, particularly in transport, the main problems being the “bottlenecks” in public transport: the lack of a speedy connection (metro, railway) with the industrial zone in SICOVAL and with the airport. The complex structure of the administrative units is another important weakness, because it makes necessary elaborate cooperation networks, and this undoubtedly makes the decision-making process unduly long. Another threat to the city’s development, also in the context of technical and social infrastructure, is posed by suburbanisation processes, which are difficult to control also because of the complex structure of spatial units.

The main strength of the regional hinterland of the Toulouse metropolitan region is primarily a high quality of life: the scenic landscape, easily accessible basic social services and an extensive transport network which ensures speedy cooperation with the

metropolis. Other assets include the relatively well-developed subregional centres which are the capitals of the departments (with branches of higher education institutions, business environment institutions, modern industries such as for example pharmaceutical industry in Castres, aerospace industry in Tarbes, Figeac and others, La Mecanic Vallée with its heart in Figeac and Decazeville). The region also has a modern, specialised and profitable agriculture (with 6% employment, it generates 5% of the region's exports) and the food industry with some 100 000 jobs (that is, more than the aerospace industry, directly and indirectly) – the competitiveness of these activities receives supports from the public authorities as part of the Agrimp-Innovation scheme. Another strength of the region is its potential for tourism, particularly significant in the southern part of the region: the Pyrénées, with its well-developed mountain tourism (summer and winter) and Lourdes – a pilgrimage tourism centre. Altogether, tourists spend ca. 80 million nights per year in the region, and the tourism sector generates some 45 000 jobs (of which some are seasonal, and 29 000 permanent).

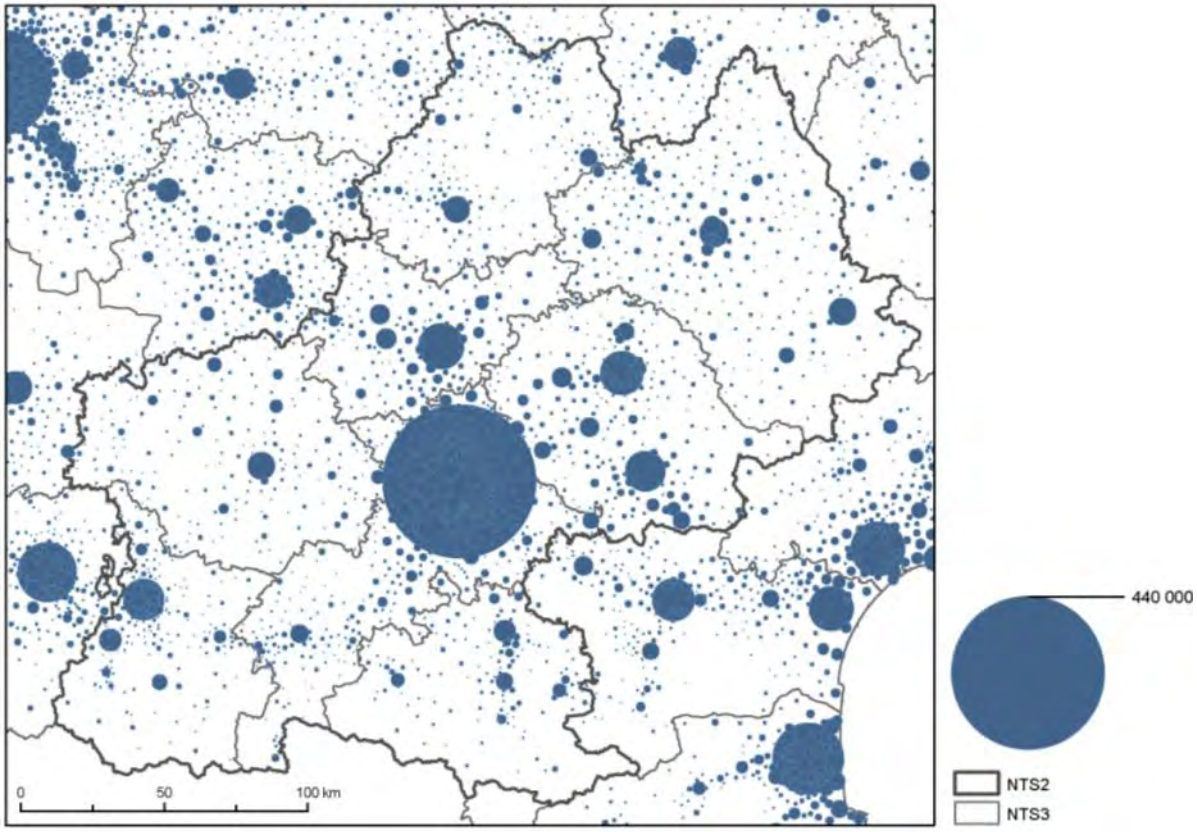


Figure 34. Midi-Pyrénées – population 2006
Source: prepared by the author based on INSEE data.

Among the weaknesses of the region is the structure of the transport network, built around connections with Toulouse, at the expense of inferior-quality connections between the subregional centres (this refers to public and railway transport in particular). Also, the small size of cities other than Toulouse can be considered as a weakness, although not as significant (**Figure 34**). Due to the relatively limited demographic potential of

these cities, the evolution of a polycentric network of cities to balance the influence of the metropolis is not very likely in the foreseeable future.

In the case of the analysed region, the differences between the metropolitan area and its regional hinterland are in a way natural, arising from the characteristics of these areas. The metropolis is a big modern city, whereas its hinterland is rural, with small or medium-sized subregional centres. The aerospace industry, however, is present both in the metropolis and outside its area (see below), so as the chemical and pharmaceutical industries (e.g. Pierre Fabre in Castres). Agricultural activity is naturally present outside the metropolis, although food processing is located both in the metropolitan area and elsewhere in the region. Moreover, despite the concentration of higher education, research institutions and innovative enterprises in Toulouse, they are also present in other cities of the region (albeit obviously on a relatively smaller scale). The living standards of the population are regarded as high both in the metropolitan area and in the regional hinterland. Even though some disparities are visible in the level of education, or the age or income structure (the inhabitants of the metropolis being better educated, younger and wealthier), these are only relative disparities which do not justify any statements on significant structural differences between the two.

10.2. Relationships between the metropolis and the region

Commuting to work

Commuting to work is a factor that connects the region with the metropolis. It can be analysed from two perspectives: flows as part of the metropolitan area and flows between the metropolitan area and its hinterland. The majority of work-home commuting covers travels to work in Toulouse from outside the city. About 110 000 people, i.e. 40% of those working in the city (AUAT 2009), commute daily to work in Toulouse from its metropolitan region. The reverse direction of such flows is also visible, although on a smaller scale: some 35 000 inhabitants of the central city work outside the city, but live in the metropolitan area (the total employment in the metropolitan area but excluding the central city is some 250 000, mostly residents of this area).

Another dimension of these types of linkages are flows of employees in the region, between the major cities. In this case, flows are significant, but on a much lesser scale. For instance, slightly over 8 000 inhabitants of the subregional centres surrounding Toulouse commute to work to the city and its metropolitan area. Castelnaudary is the city with the strongest ties with the metropolis – 10% of economically active population living in this city (and its area of influence – Air Urbaine) commute to work in the Toulouse metropolitan area. This is a particularly interesting example because Castelnaudary is situated outside the Midi-Pyrénées region. This shows the artificiality of administrative boundaries on the one hand and on the other – the power of attraction of

Toulouse. Commuting to work to the Toulouse metropolitan region is also popular in the case of Pamiers and Saint-Gaudens (9% of people in work in each), Montauban (8%), Foix, Saint-Girons, Albi (each 4.5%), Castres (slightly over 4%). The distance within which Toulouse is attractive for incoming employees is about 100 km. Movement in the opposite direction is also visible. Slightly over 5 000 inhabitants of Toulouse and its metropolitan area commute to work to the subregional centres, most of them to Montauban (about 1 800), Albi (800), Pamiers and Castres (500) (INSEE, AUAT 2009).

Aerospace valley – cooperation links

In Midi-Pyrénées, about 55 000 jobs are connected with the aerospace industry (40% directly, 30% indirectly, while the remaining 30% represents employment generated by other types of activity), of which 10 000 are provided by Airbus. Employees in the aerospace industry account for slightly over 5% of all people working in the region (Ruhlmann 2007). The aerospace industry is concentrated in the Toulouse metropolitan area, which offers 3/4 of jobs associated with the aerospace industry in the region. Important aerospace industry centres are also located in other parts of the region. These include in particular: Pamiers, Villefranche-de-Rouergue, Figeac, Tarbes, Louey (cf. Map 3). The aerospace industry is also well-developed in Aquitaine, a region west of Midi-Pyrénées. Both these regions are in fact one functional area of the aerospace industry (and related activities), with over 1 000 companies having strong cooperation links. Its development is stimulated by a dynamic organisation called the “Aerospace Valley”, which brings together some 550 enterprises and institutions associated with the aerospace industry situated in both regions (Aerospace Valley, INSEE 2008). This is an aerospace cluster with extensive internal cooperation structures and strong international links, robust R&D facilities and specialised higher education, which is promoted by both regional and national authorities (cf. e.g. Jalabert, Zuliani 2009; Dugot, Laborderie, Taulelle 2008). Toulouse is unquestionably the hub of the cluster, which proves that the metropolis’ control functions play a significant role not only in the regional, but also supra-regional context.

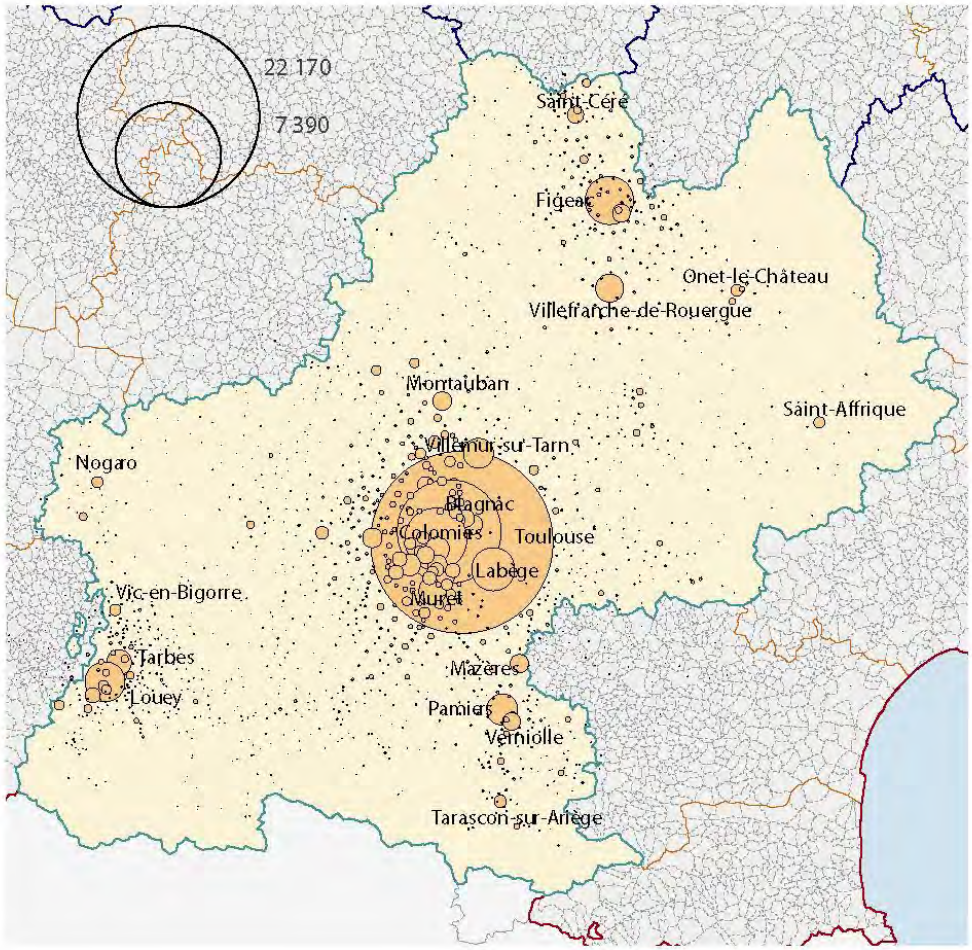


Figure 35. Jobs related to the aerospace sector in 2006.
Source: Ruhlmann 2007.

Higher-order services

Toulouse concentrates many functions which do not occur elsewhere in the region. First and foremost, its is the main academic centre which attracts students from all over the region – higher education institutions in subregional centres offer a small range of specialisations, most of them at the undergraduate level. A similar situation – although on a much smaller scale – can be observed in secondary education; in this case, the range of impact is much smaller than in case of tertiary education (AUAT 2008).

Toulouse is the major centre of specialised medical care in the region – subregional centres have limited specialisations, whereas the metropolis offers a broad range of high-quality medical services and access to specialist medical equipment. The metropolis can also offer consumer goods which are not attainable elsewhere in the region. In addition, the metropolis is the main culture centre which caters to the entire region; this is true in particular for high-culture institutions (theatres, opera, concert halls, museums and art

galleries). Toulouse is also the main transport hub in the region – primarily its international airport, but also long-distance train connections.

Migrations

Significant migration flows can be observed within the region both from the metropolis to the region and in the opposite direction. In 1990-1999, about 55 000 people moved from the region to the metropolitan area, and nearly 40 000 people emigrated from the metropolitan area to other parts of the region. As we can see, the dominant direction was towards the metropolis, which attracted new residents (it should be noted that this trend was visible not only in the movement between the metropolis and the region, but also in general terms: in the period in question, Toulouse attracted over 230 000 new residents, and lost only 130 000 inhabitants). The largest age group migrating to the metropolis are people aged 15-24 (which means that many of them are students; thereby the city's academic function is strongly manifested). On the other hand, most people moving out of Toulouse are in their thirties. Those who migrate from the metropolitan area usually settle somewhere in its vicinity or in the subregional centres. This trend was also noticeable post 2000 (AUAT 2006).

Entertainment and leisure

The region is attractive for tourists and serves as a natural recreational base for the residents of the metropolitan area, both with regard to longer typically tourist travels (especially the Pyrénées), weekend stays (interesting historical small and medium-sized cities), spa tourism, and second homes, as the region's rural areas are attractive leisure and recreation locations. The well-developed infrastructure (which e.g. includes hiking trails, navigable canals, bicycle lanes, skiing facilities in the Pyrénées, and the south-western edge of the Massif Central) fosters the development of tourism. On the other hand, Toulouse is also an attractive leisure destination for the inhabitants of the region, mainly because of its major cultural and entertainment functions.

Relationships of public authorities

Despite extensive centralisation and a complicated, multi-tier system of territorial administration, France has elaborate and efficient mechanisms for coordinating activities and cooperation between different territorial units, especially in the case of urban areas (cf. e.g.: Kaczmarek, Mikuła 2007; Kerrouche 2008). Nevertheless, the system of cooperation between the communes as part of the metropolitan area is characterised by a great deal of freedom (that is, the top-down identification of areas for cooperation is limited). For this reason, there are three large general-purpose associations of communes (see above) in the Toulouse metropolitan area, although it is difficult to find a substantive explanation for this. In this case, the local interests and competitions are the

decisive factors (cf. also Nevers 2002, Nicholls 2005). In spite of these difficulties, and the frequently open competition at the local level, coordination of activities in the metropolitan area is effective and efficient. In the regional dimension, cooperation of public authorities is largely coordinated by the regional authorities, especially with respect to spatial planning.

10.3. Factors shaping the relationships between metropolis and its region

The metropolis and the region are complementary vis-à-vis each other. This complementarity is facilitated by the lack any marked socio-economic disparities with negative consequences. Midi-Pyrénées can serve as an example of a strongly polarised region, with a significant concentration of the population, business activity and services in Toulouse, but at the same time with a considerable attractiveness of the regional hinterland as a place to live, rest and conduct business activity – all this is fostered by a well-developed transport infrastructure, good availability of basic social services, available land for development, as well as modern agriculture.

Diffusion is manifested most distinctly through migration flows. On the one hand, they take place within the metropolitan area (usually in the direction from the central city to the metropolitan area), but on the other, they are also common from the metropolitan area to the region. In 1990-1999, nearly 40 000 people left the metropolitan area and settled down in the region. The destinations of such migrations were as a rule areas located in the vinicity of the metropolitan area as well as the subregional centres and transport corridors connecting them with the metropolis (cf. Map 4). Migrants very frequently maintain strong ties with the metropolis, both with regard to employment in the metropolitan area, and services offered by the metropolis.

The considerable role of migration does not only refer to movements from the metropolitan area to the region. The Midi-Pyrénées region attracts new residents also from other regions, which, coupled with positive natural increase, produces an overall increase in the number of the population in many areas of the region. However, the highest positive dynamics can be observed in the Toulouse metropolitan area and its direct environs, as well as the subregional centres and their suburbs; the demographic development in the corridors connecting Toulouse with the subregional centres, mentioned above, is also well visible. However, an increase in the number of the population is not only limited to urban areas – it can also be clearly observed in some rural areas, e.g. the rural areas of the Lot department, lying at a distance from Toulouse. It should be emphasised at this point that in the case of rural areas we can observe a reversal of the depopulation trend, observable in the second half of the 20th century (AUAT, INSEE 2009).

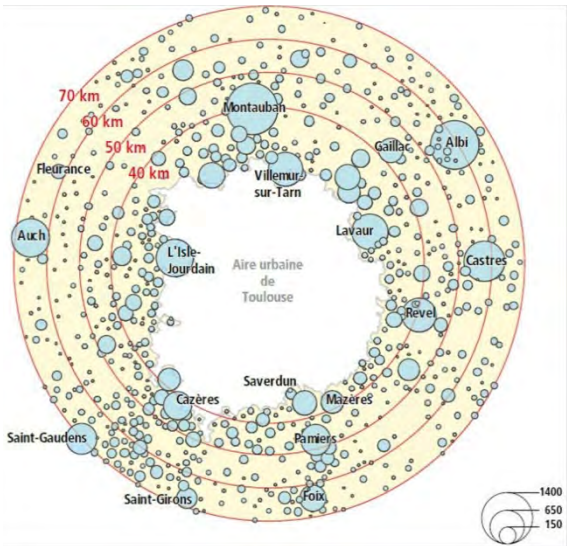


Figure 36. Destination of migrations from the metropolitan area (2000-2006)
Source: AUAT 2006.

An increase in the number of the population is transposed into an increased demand for flats, houses and development sites, and consequently implies price rises. This is particularly well visible in the metropolitan area and its immediate hinterland. During the past decades, the development of transport infrastructure – especially expressways– increased the range of commuting to work in the metropolitan area, and thereby extended the range of impact of the diffusion of development.

Another aspect of diffusion refers to cooperation links of companies from the metropolitan area with companies from other parts of the region. This is most readily visible in activities associated with the aerospace industry (see above), but also other industries such as the pharmaceutical and cosmetics industry. Laboratoires Pierre Fabre, a large corporation operating globally, with EUR 1.8 billion turnover in 2009, can serve as an example of the latter. It has its main seat located in a relatively small (ca. 50 000 inhabitants) city of Castres (in the Tarn department), situated east of Toulouse. The corporation has operated from Castres since 1961 and does not intend to move its headquarters. Still, it has very strong cooperation linkages with Toulouse, particularly concerning R&D aspects, including for example the European Centre of Skin Research, founded and run together with the Paul Sabatier University and the city hospital, or participation in the new project for a centre for cancer research (Cancéropôle) (cf. e.g. Abbot 2005), which is being developed on the site of the AZF plant, the explosion of which in 2001 was one of the gravest industrial catastrophes in contemporary Europe (CIEU 2002; Dechy et al. 2004).

Diffusion is also visible in the stepping up of economic activity outside the metropolitan area. This mainly applies to the growth in retail and office space. In 1999-2004, new trade and office facilities outside the metropolitan area were mostly opened in THE subregional centres and in the transport corridors going out of Toulouse; with a particularly intense development observable in the Toulouse-Montauban and Toulouse-Albi corridors (cf. AUAT 2008).

An important manifestation of diffusion has also been the development of higher education in the subregional centres, promoted by the public authorities. Currently, all the major subregional centres have higher education institutions within their bounDaries. Most of these are branches of colleges and universities from Toulouse, with two notable exceptions, Albi and Tarbes, which have independent technical universities.

In addition to that, the development of the business environment infrastructure is visible in the subregional centres. These facilities can take different forms (such as innovation centres, technology transfer centres, technological platforms, competence centres, etc.), and their activities frequently involve developing cooperation networks between institutions from the metropolis and its hinterland. These efforts have been moderately successful, which is proved by the fact that out of 32 companies which left the regional business incubator, as many as 9 chose their locations outside the metropolitan area, mostly in the subregional centres (AUAT 2008).

The phenomenon of backwashing is much weaker in the region than the diffusion of development. Migrations are probably the most important aspect of backwashing. The metropolitan area is an attractive place to work, live and study, and therefore attracts considerably large numbers of people. In 1990-1990, migration flows between the metropolitan and the region were distinctly favourable for the metropolitan area, whose population increased by over 15 000 inhabitants net (40 000 emigrated to the region, but 55 000 moved from the region to the metropolitan area) (AUAT 2006). Such a tendency has been maintained in the recent years. People who migrate from the region to the metropolis include mainly students and people in working age who take up employment in Toulouse or the metropolitan area (Le Boëtté, Ruhlmann, Laurin 2008).

Migrations and the natural increase result in the growth of the population across the region. However, there can be wide disparities in this regard between the region's individual areas. In the years 1990-2006, a considerable population increase was recorded primarily in the metropolitan area of Toulouse and its direct vicinity, as well as – to varying degrees – in the subregional centres and their suburban zones (here, we can see some analogy with the distribution of jobs associated with the aerospace industry – see Map 3). On the other hand, there was a population decrease in a large part of the region's rural areas (cf. Map 5).

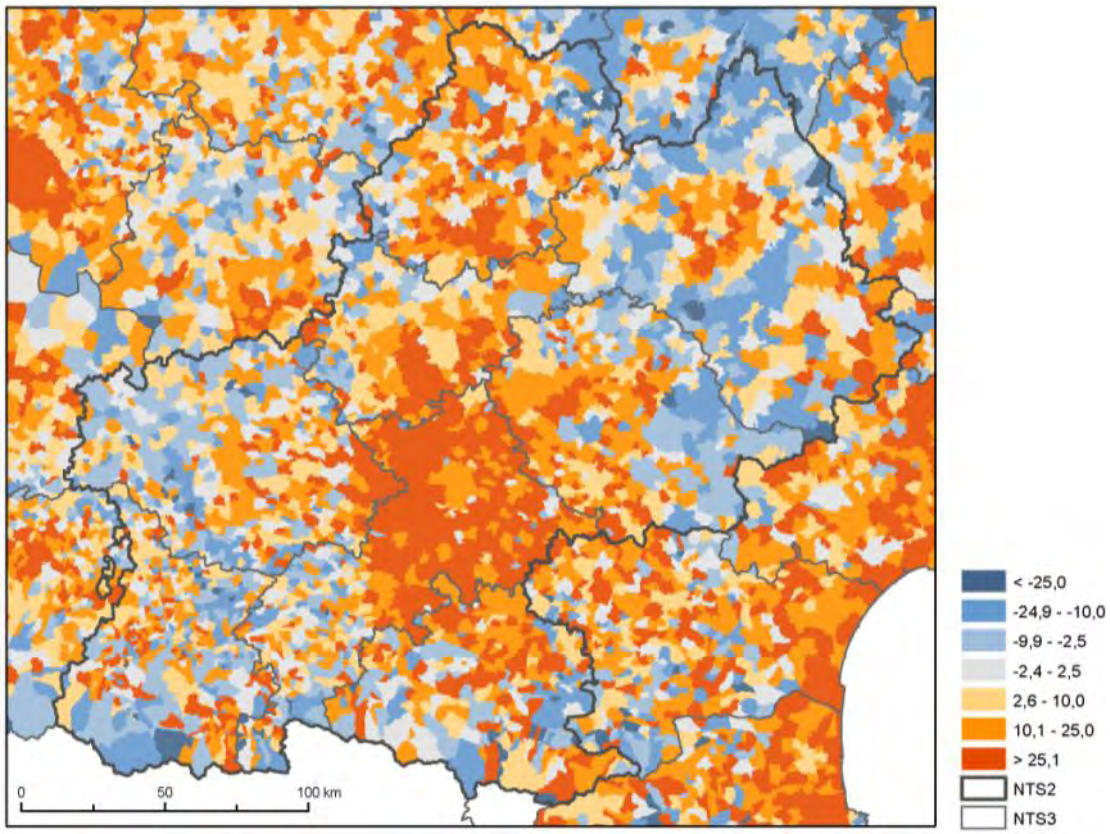


Figure 37. Midi-Pyrénées – population change in % (1990-2006)
Source: prepared by the author based on INSEE data.

A considerable difference in scale between the metropolis and the region undoubtedly fosters the concentration of economic activity in the metropolitan area. However, it is difficult to assess the scale of this phenomenon, especially in view of the clearly visible development of the entire region, both the metropolitan area and its hinterland.

10.4. Mutual relationships between the metropolis and the region

Despite the various aspects of ties between the metropolis and the region discussed above, it can be said that, for Toulouse, the linkages going beyond the region are far more important. This is particularly well visible in the case of modern industries (aerospace, electronics, pharmaceutics), in which the metropolis has a global presence, participates in international cooperation networks (e.g. Airbus parts are manufactured in several European countries) and is subject to global competition. Owing to its relatively small scale, the regional hinterland does not influence the functioning of the metropolis in any significant way. Still, some elements of complementarity could be noticed. The regional hinterland, which provides good opportunities for leisure and recreation, is also an attractive housing location and has plenty of available land for development (a factor which can gain in importance in view of the dynamic development of the metropolis). In

addition to that, a well-developed food sector ensures balance (diversification) to the region's economy.

On the other hand, the region seems to be strongly dependent on Toulouse. This is primarily due to the fact that Toulouse represents an unquestionable centre, whereas other cities in the region cannot offer services available in the metropolis due to their small demographic scale. This dependence, however, is not excessive – the region has endogenous resources which enable it to function – at least to some extent – in isolation of the metropolis (agriculture and food industry, tourism, pharmaceuticals in Castres, textile industry in the departments of Tarn and Ariège, etc.) (cf. Dugot, Laborderie, Taulelle 2008).

Positive results of developmental diffusion prevail in the relationships between the metropolis and the region. To a certain extent, this is a natural phenomenon, but activities of the public authorities which promote such diffusion also play an important part.

10.5. Activities of public authorities in metropolis-region context

Activities of the public authorities are multifaceted and tackle many different spheres. This is possible owing to an elaborate institutional system. However, the activity of its individual players is well coordinated by extensive cooperation structures.

Competition poles

The competition poles policy (Pôles de compétitivité) (cf. e.g. Weil, Fen Chong 2008), pursued since 2004 at the national level, has been an important factor promoting economic development. These are clusters developed at the regional level with financial and organisational supports, aimed to promote regional specialisations while ensuring coordination and complementarity of actions at the national level. Midi-Pyrénées has identified three such poles: the Aerospace Valley (www.aerospace-valley.com), agriculture and food (Agrimp-Innovation: www.agrimipinnovation.com), and cancer research (Cancer-Bio-Santé www.cancerbiosante.fr). These initiatives refer to the regional level and, as such, develop competitiveness both of the metropolis (as a first priority) and of the region. Activities inspired by the central authorities are launched are coordinated by the regional and local authorities, with considerable commitment on the part of enterprises and R&D institutions.

Strategic and spatial planning

The system of development planning is well-developed in the region. The majority of plans are devised at the regional level: Schéma Régional d'Aménagement et de Développement du Territoire – current version from 2009 . Another planning section which is important for the analysed topic is planning for the broad metropolitan area,

comprised of Toulouse, its metropolitan area (Aire Urbaine) and the surrounding areas along with the nearest subregional centres (Aire Métropolitain) (cf. AUAT 2008). At both these levels, the polarisation and diffusion approach. Toulouse is perceived as a growth engine for the region; on the one hand, the planning activity aims to foster the development of the metropolis and facilitate diffusion mainly through reinforcing the potential of subregional centres and on the other to ensure the best possible connections between them and the metropolis.

Higher education

In the past 20 years we have seen a consistent policy aimed to develop higher education in the subregional centres. This has been possible owing to cooperation of the national, regional and local authorities. Currently, academic centres operate in all the major cities of the region, usually as branches of higher education institutions from Toulouse. These initiatives are mostly local in character. The number of students in subregional centres is not large, similarly to the number of courses and specialisations offered. As a rule, the subregional centres offer undergraduate courses (see above).

Economic activity zones and business environment institutions

Economic activity zones (areas furnished with complete infrastructure) are established outside the metropolitan area on the initiative of the regional authorities. Currently, about 30 such zones are either in operation or at the planning stage (Région… 2009). Business environment institutions are also being developed, similarly to specialised institutions focused on innovation (AUAT 2008).

Transport infrastructure

The road infrastructure connecting the metropolis with the regional centres is sufficiently well developed. Currently, initiatives aimed to streamline communication between the subregional centres are under way. However, activities in the sphere of transport infrastructure focus on the modernisation of rail connections between Toulouse and the subregional centres. In this case, the scale of neglect is quite considerable, with obsolete infrastructure and some single-track railway routes. At present, a comprehensive plan for the modernisation and extension of the railway network is under way (Région… 2009).

10.6. The metropolitan area governance

The management system in the Toulouse metropolitan area (Aire Urbaine) is both complicated and not uniform. First and foremost, there is no single authority in charge of the entire area. The metropolitan area is composed of many communes, which may set up general-purpose associations (furnished with broad powers taken over from their constituent communes, but with ensuring the superior and control role of the communes). However, a great deal of freedom in establishing such associations has

resulted in their clearly excessive number (cf. Map 6), and the spatial ranges of the associations hardly correspond to the functional areas (cf. e.g. Lanusse 2006). In the very core of the metropolitan area, there operate 3 associations of communes (see above: PART 1. The Metropolian Region and Its Component Parts). However, spatial planning is currently conducted for a different, more functional division. At present, 4 supra-municipal spatial development plans (SCOT – Schéma de Cohérence Territoriale) are being prepared for the metropolitan area (cf. Map 7), which have been synchronised in the planning document entitled: "InterSCOT de l'Aire Urbaine de Toulouse" (AUAT 2005).

Coordination of activities in such a fragmented institutional structure requires efficient cooperation mechanisms. It should be emphasised that, in this case, these mechanisms work quite well. The planning and coordination of activities in the metropolitan area rests with the Agency for Urbanisation and Spatial Development of the Toulouse metropolitan area (AUAT – Agence d'Urbanisme et d'Aménagement du Territoire Toulouse Aire Urbaine, www.auat-toulouse.org), made up of several public institutions representing different administration levels (both state authorities and local governments).

10.7. Development prospects

In the coming few years, economic development and continued population increase will represent major factors determining the relationships between the metropolis and the region . The demographic and economic development will mainly be concentrated in the Toulouse metropolitan area and the subregional centres, and to some extent in rural areas (in the latter case, some depopulation trends may also be expected in certain areas). The development of the metropolis will increase the extent of its direct influence, which may have some negative consequences in the form of suburbanisation pressure and overburdened infrastructure. Activities initiated by the authorities to strengthen the subregional centres many however prevent such negative phenomena and create conducive conditions for a more polycentric development. Nevertheless, taking into account the wide differences in the scale of the metropolitan area and the surrounding cities, no evolution of a fully polycentric system should be expected in the foreseeable future. Toulouse will remain an indisputable growth engine for the region. This will be fostered by the diversification of economic activity, primarily in hi-tech industries (space, electronics, pharmaceuticals, biotechnology, etc.) and launching a high-speed railway connection (by 2020, a journey to Paris will take about 3 hours). In this way, conditions will be created for a further metropolisation of Toulouse and the enhancing of its status in the European network of cities.

The biggest threat for the city and the region may be posed by a crisis in the aviation industry (but such a risk in the coming years is regarded as minimal). The fall of large

enterprises would entail problems in companies cooperating with them and qould lead to a severe crisis in the labour market in activities directly and indirectly associated with aviation. Such a scenario, however, is neutralised by activities aimed to maintain the competitive edge of the aerospace industry on the one hand, and on the other – to diversify the region's economic structure.

11. City-region relationships: Warsaw – Mazovia case study

Mazowieckie voivodship (province) situated in central Poland occupies an area of 35 600 km^2 and has 5 200 000 inhabitants. There are 85 cities within the voivodship, of which Poland's capital, Warsaw, is the largest. It has a population of 1 700 000, and its metropolitan area has some 2,600,000 inhabitants. Mazowieckie is structured as a hub, being distinctly divided into the metropolitan area of Warsaw and its regional hinterland, which in many cases is rural in character. In the remaining parts of the region, there are a number of medium-sized cities such as: Radom (224 000), Płock (127 000), Siedlce (77 000), Ostrołęka (54 000) and Ciechanów (45 000). Generally speaking, however, the region's rate of urbanisation outside the Warsaw metropolis is low not only in comparison with the highly-developed Western European countries but also with the national average (61.2%).

From the very beginning of economic transition, Mazowieckie voivodship has been a driver of change and a leader of the transformation, and currently is the fastest-developing region of the country. Its privileged position is primarily due to the capital city, which has become the leading centre of the transformation (including privatisation) and has attracted the bulk of USD 125 billion of inward capital invested in Poland (until 2008). In Warsaw, being a seat of transnational corporations, the sector of higher-order services (mostly related to finance and information) has developed to cater to their needs. In contrast, the remaining part of the region trails far behind the capital city and its direct hinterland in terms of the level and dynamics of growth. Low-productivity agricultural sector still dominates in the economy of these areas, and the restructuring of the industrial sector there has been longer, frequently leading to the closing down of enterprises, which has severely affected many local labour markets.

As a result of the 1998 administrative reform, 16 voivodships with mixed system of administrative authority (shared by government-appointed voivode and an elected regional assembly) were formed, Mazowieckie being one of them. The elected regional authorities are responsible inter alia for drawing up development strategies, and since recently (2007) – also for the preparation of the Regional Operational Programme (ROP) which provides the basis for using structural funding assistance from the ERDF.

11.1. The metropolitan region and its component parts

Warsaw, as any big city, has a broad zone of influence owing to its capital city and metropolitan functions. The public administration sector in Warsaw employs 64 000 staff, which accounts for ca. 8% of its entire working population; this does not make it substantially exceptional when compared to other large Polish cities, but the figure is over twice as high as the national average. It is metropolitan functions that are of cardinal importance for the city's economy. This is associated e.g. with Warsaw being a seat of enterprises, including branch offices of transnational corporations which operate across Poland. Their needs are catered to by the well-developed B2B services sector employing 110 000 staff and the financial intermediation sector (58 000 employees) with the highest location rate values in Poland. In addition, Warsaw is the country's leading academic centre (280 000 students) and a city with the greatest concentration of R&D potential. Cultural functions are also well developed, even though other large Polish urban centres are worthy competitors in this sphere. Warsaw is also an important location on the national map of tourist traffic (the largest airport in Poland, handling ca. 9 000 000 passengers per year, but with a growing significance of regional airports), mostly business in character, but with poorly developed facilities for congress tourism.

The Warsaw labour market is both attractive (high salaries) and open (a high degree of diversity). The majority of those who settle down in Warsaw explain their decision to do so by job opportunities offered here. Daily commuting to work is also popular, and its extent goes beyond the administrative boundaries of the voivodship. Two types of commuting can be distinguished: daily travels (which prevail in the belt up to 80 km from the city centre) and weekly travels, with distances in many cases exceeding 200 km.

Although Mazowsze (Masovia) is a region with a long history, its regional identity is not strong. The historical region covered only the northern and central part of what now makes the voivodship, and its boundaries have changed during the ages. In the past, the southern part of Mazowsze belonged to Małopolskie (Lesser Poland) voivodship, and its border running along the River Pilica can still be easily noticed inter alia on the map of gminas' (municipalities) own incomes. Another reason for this deficiency of regional identity is the fact that since it became a capital city in the 16th century, Warsaw has always had relatively weak ties with its direct surroundings. This situation slightly changed towards the end of the 19th century as cooperation linkages grew within the industrial economy.

Mazowieckie voivodship in its present shape came into being as a result of the administrative reform of 1998. The boundaries of all the 16 new regions reflect the spheres of influence of the respective voivodship seats relatively well; this is also the

case of Warsaw. Only small fragments of the neighbouring voivodships belong to the sphere of influence of the national capital (Figure 38).

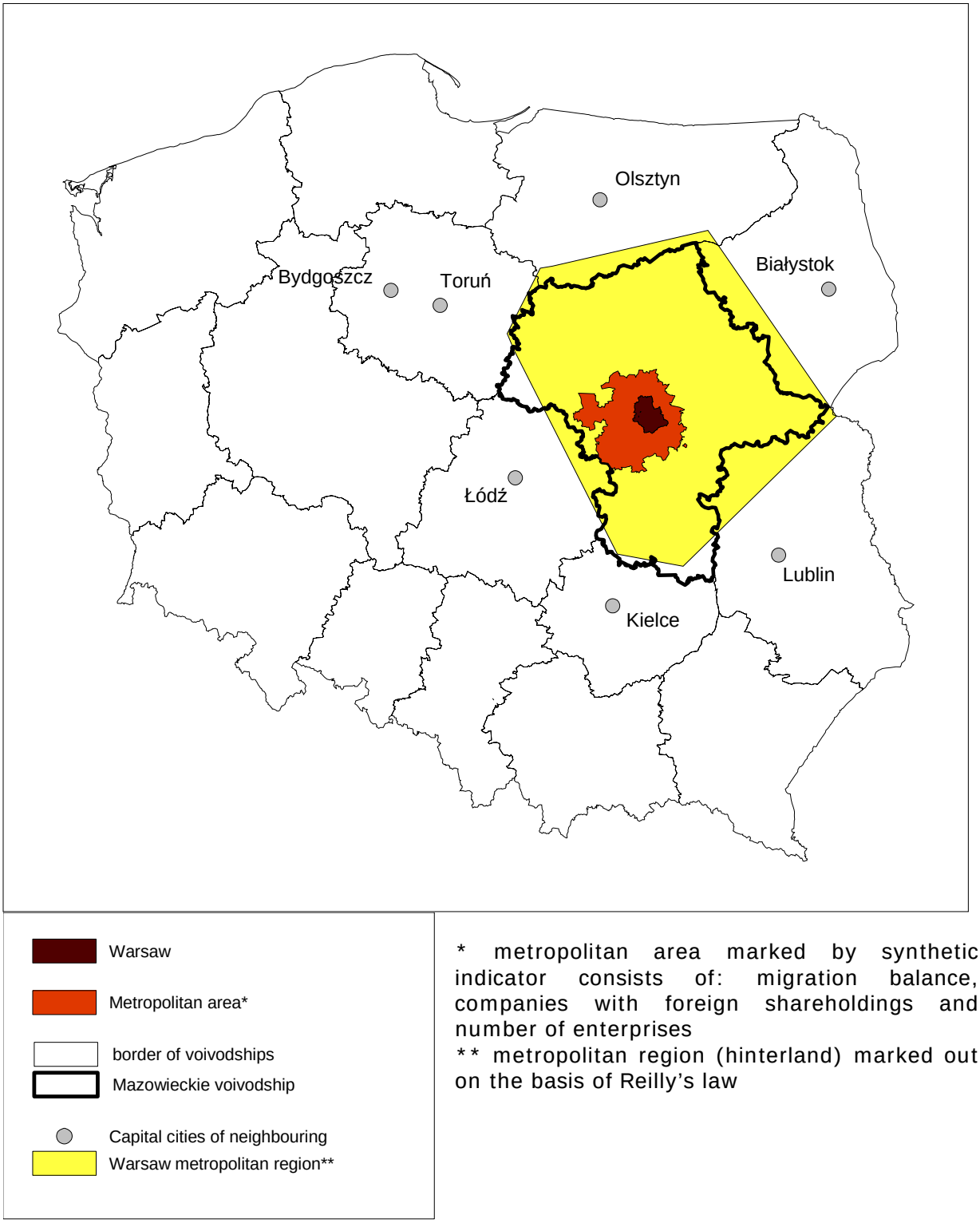


Figure 38. Warsaw and its spheres of influence in the context of Poland's administrative division

Source: M. Smętkowski (2005a).

There are 314 gminas (NUTS5) in Mazowieckie voivodship, which are concentrated in 42 districts - powiats (NUTS4). The majority of analyses delineating the metropolitan area of Warsaw use gminas as the basic delimitation units **(Figure 38)**. Despite some differences between the individual approaches, a metropolitan area is usually enclosed within a 50 km distance from the central city, and its actual shape is determined by the routes of the major transport corridors. This area stretches most visibly westwards and southwards (directions of the main economic linkages), and less so in the eastern direction, which is partly associated with the communication barrier posed by an insufficient number of bridges on the Vistula. In addition to that, the boundaries of the metropolitan area largely overlap with the borders of the former capital city voivodship existing in the years 1976-1998. Unlike the present Mazowieckie voivodship, this administrative unit was not a self-governing one, and its scope of competences was relatively narrow.

The strengths of the Warsaw metropolitan region include a high-quality human capital, expressed for example by the share of people with tertiary education, which is the highest in the country. Secondly, Warsaw has strongly developed nation-wide control functions, which is proved by its being a seat of major enterprises, including transnational corporations. Thirdly, the B2B sector has a considerable share in the metropolitan economy, including e.g. financial intermediation and information services: accounting, IT, advisory services, advertising or public relations. For these reasons, the Warsaw market for office space is booming, and the capital can offer over 3 million square metres of modern office space.

In contrast, Warsaw's weaknesses are the poorly developed external transport links (the city is not included in the trans-European motorway network) and a standard of living which is relatively low when compared to other European metropolises. The latter is compounded by a low quality of the public space and the growing spatial chaos in the suburban zone, propelled by uncontrolled suburbanisation processes. Furthermore, despite the robust R&D potential, linkages between science and business have so far been weak in Warsaw and failed to produce any synergy effects.

When compared with Warsaw, its regional hinterland hardly shows any strengths. Instead, certain and as yet unutilised development opportunities may be indicated: firstly, those associated with the existence of large subregional centres, which in the future (e.g. following the development of transport links) could serve as supra-local growth poles. Secondly, some of the region's areas have favourable conditions for specialised market-oriented agriculture. In addition to that, some potential for tourism

can be observed in several locations, also based on agri-tourism farms and associated tourist products.

The weaknesses of the regional hinterland of the Warsaw metropolis include a considerable role of subsistence agriculture. Also, due to excessive employment in this sector, the voivodship is struggling with a high hidden unemployment rate. On top of that, the non-metropolitan part of the region is not very attractive for investors from Poland and abroad, which can be attributed to low-quality human capital and poor transport accessibility. The resources needed for endogenous growth are rather limited and in effect the SMEs sector outside the Warsaw metropolis is not very well developed.

The above review of the strengths and weaknesses points to a distinct dichotomy of socio-economic structures existing between the metropolis and the region. As a result, Mazowieckie is one of Poland's regions characterised by widest internal disparities. Apart from development disparities (GDP per capita 2 to 1), this dichotomy between the metropolis and region is well visible in the economic structure, mostly the divergent shares of farming activity in the labour market. Furthermore, it should be observed that Warsaw's economic structure has been coherent regardless of the indicator applied, i.e. the number of employees or gross value added. On the other hand, the remaining part of Mazowieckie voivodship is characterised by a large share of agriculture (excluding hidden unemployment in agriculture) with lower productivity (53% share in the employment structure and 9% share in gross added value). In addition to that, in comparison to Warsaw, the region shows a relatively higher significance of industry – mostly in traditional industrial sectors. Other major differences included the quality of human capital: whilst in Warsaw the percentage of people with higher education represented ca. 30%, it did not exceed 1% in some rural gminas of Mazowieckie voivodship.

11.2. Relationships between the metropolis and the region

Commuting to work

Commuting to work belongs to basic linkages between the Warsaw metropolis and its regional hinterland. The scale of daily commuting to Warsaw is high, and estimated at some 170 000 people (about 20% of the city's employees), while only 12 000 employees move in the opposite direction. It should be pointed out that the rate of daily commuting to work has a strong negative correlation with the physical and temporal distance from the centre of Warsaw. The distance beyond which weekly commuting begins to prevail over daily commuting (which involves renting accommodation in Warsaw) may be set at ca. 80 km from the centre of Warsaw, with the time of travelling by passenger car of 95 minutes. Daily commuters usually travel from gminas situated in the close vicinity to Warsaw. Such commuting involves transfer of incomes, which may lead to the

development of the endogenous sector in a given gmina. In addition to that, commuting increases budgetary revenues of gminas through personal income tax. On the other hand, less developed and more distant gminas serve as providers of cheap labour for Warsaw, with most such travels done at weekly intervals.

Migrations

Migration flows are partly correlated with commuting to work, discussed above. Migrations in Mazowieckie comprise two segments. The first segment refers to the outflow of inhabitants from the central city which began in the early 1990s and involves suburbanisation processes in the suburban zone. Its larger part is directed to gminas surrounding the city; in 1988-2002, they received ca. 70% of 114 000 former Warsaw residents. As a rule, these people maintain close links with Warsaw, starting from work to education, culture, leisure and daily shopping. A mere 10% of people who had earlier had permanent residence in Warsaw moved to other parts of the region. On the other hand, the majority (63%) of the population incoming to Warsaw (151 000) came from peripheral areas of Mazowieckie voivodship. This particularly applies to people with tertiary education aged 24-30 (29 000), whereas gminas of the remaining part of the metropolitan region accounted for 76% of the inflow to Warsaw.

Trade exchange between businesses

Warsaw's metropolitan area played a considerable role in Poland's foreign trade turnover, which accounted for ca. 30% share in the imports of goods and services and ca. 16% share in exports. Imports which are twice as high as exports distinctly point to the intermediary function of Warsaw enterprises in foreign trade, which to some extent was a corollary to the location of foreign trade enterprises supplying the nation-wide market in Warsaw. At the same time, the 2002 survey of companies with locations within the Warsaw metropolitan area showed that the metropolis' regional linkages were poorly developed. The remaining part of Mazowieckie voivodship had a marginal (less than 10%) share in the supply and sales of enterprises outside the local market – usually lower in the case of more processed goods or specialised services (Gorzelak, Smętkowski 2008).

Higher-order services for individuals

Warsaw's higher education institutions were very popular with secondary school leavers from Mazowieckie voivodship. The rate of this type of commuting to Warsaw was the highest within a 60 km radius from the city centre. The role of this type of commuting increased in nearly all gminas of the region as compared to the period prior to 1989. This

can be viewed as a proof of the growing educational aspirations in the society, coupled with a significant role of Warsaw as the leading academic centre.

Warsaw's institutions of culture were also popular with the residents of other gminas of the metropolitan region. Nevertheless, the intensity of commuting for cultural purposes was not as strong as in the case of student commuting. It was clearly visible within a radius of 30 km from the city; less so at a greater distance, and beyond the threshold of 60 km this type of commuting was only episodic.

The role of Warsaw as a centre of medical services was smaller in comparison with the above types of commuting, and applied only to some of the region's areas.

Entertainment and leisure

Journeys of Warsaw residents outside the city for entertainment and leisure purposes can serve as an example of movement in the opposite direction. This type of commuting as a rule involved the construction of holiday homes, which in many cases represented densely built-up enclaves in places with outstanding natural assets – most frequently in river valleys. The intensity of such travels decreased visibly as the distance from the city increased; this phenomenon did not occur at all in gminas situated at the north-western, southern and eastern borders of Mazowieckie voivodship. The rate of commuting was the highest within a 90 km radius from the centre of Warsaw, particularly in the gminas bordering on the metropolitan area. At the same time, competition from more distant areas of the country should be emphasised, especially from Warmińsko-Mazurskie voivodship.

Relationships of public authorities

Mazowieckie voivodship provides a good example of how national policies affect the relationships between various actors responsible for the region's development. The capital's decision-makers are seriously involved in national-level politics, and the office of the mayor (or commissioner) as a rule is held by politicians with careers in the government, presidential election runners or leaders of major political parties. On the other hand, since 1998 the position of the marshal who is responsible for regional government has been held by a politician affiliated with the Polish People's Party (PSL), which is a farmers' party. This leads to political rivalry, manifested inter alia during the process whereby the principles for allocating the Regional Operational Programme funds are agreed. Quite frequently, the exercise is biased in favour of entities operating in the non-metropolitan parts of the voivodship. Apart from very few examples such as a joint ticket for city public transport (Warsaw's authorities) and regional railways (the region's authorities) for journeys within the agglomeration and the Mazowsze Loan Guarantee Fund (*Mazowiecki Fundusz Poręczeń Kredytowych*), there are no initiatives of projects to be implemented jointly by the city and regional authorities. The relationships between

public authorities and enterprises are similar in character; it is difficult to indicate effective communication channels between them or joint public and private initiatives.

By contrast, more examples can be found to illustrate the well functioning cooperation networks between gminas in different areas of activity, starting from access to public services to joint infrastructure projects to development planning (Zegar, 2003). Inter-municipal cooperation is relatively the least developed between Warsaw and the neighbouring gminas. This is an area fraught with most serious conflicts of interests. Nevertheless, successes are possible, e.g. the recently introduced joint public transport ticket for the Warsaw agglomeration, co-financed by the gminas from the metropolitan area – but based on bilateral agreements with Warsaw, and not negotiated as an initiative of a coalition of gminas formed for this purpose.

11.3. Factors shaping the relationships between metropolis and its region

The key factor affecting the linkages between the metropolis and the region involves the structural mismatches described above, which relate to the social and economic spheres. The Warsaw metropolis operates in a global network of information economy, which is also its source of major development resources. In this regard, the attractiveness of endogenous resources in the other parts of Mazowieckie voivodship is rather small. In addition, owing to inefficient agriculture in the vicinity of the city, even the traditional food-producing zone is poorly developed in the region. Its role is decreased even further by the development of large-format retail trade facilities in Warsaw, which considerably expands the range of services to the city in terms of food provision. In addition to that, barriers related to an insufficient capacity of the existing transport network obstruct the development of strong linkages between the metropolis and the region. In effect, the accessibility of the region's peripheral areas is limited, which further reduces their attractiveness for private investors.

In these circumstances, it is difficult to maintain the region's cohesion politically as the huge differences in the electoral make-up hamper the consensus between the different local government levels. This situation also makes it difficult to implement a pro-development policy for the entire region despite the fact that the marshal's office is furnished with all the requisite competences.

As all these factors are closely interrelated, the traditional central functions play a minor role in Warsaw's economy on the one hand, and on the other – the region so far has not been able to make use of potential benefits associated with the development of the country's key metropolis.

Manifestations of the spreading of Warsaw's development processes are rather limited spatially and usually take place within its metropolitan area. The major indications of

such processes included the relocation of enterprises or the opening of branch offices in the gminas situated near Warsaw. For instance, the range of foreign investments has been restricted to the area within a 30 km radius from the city. **(Figure 39a)**. Certain structural differences are also well visible in this area: while service sector investments prevail in the central zone, manufacturing, logistics and storage activity is developing in the region's peripheries. This specialisation is also manifested by the fact that some service enterprises operating in the environs of Warsaw move their head offices to the capital. In addition to that, investors interested in conducting business activity outside Warsaw very frequently register their company in Warsaw and in many cases (also for marketing purposes) also locate the company's seat in Warsaw.

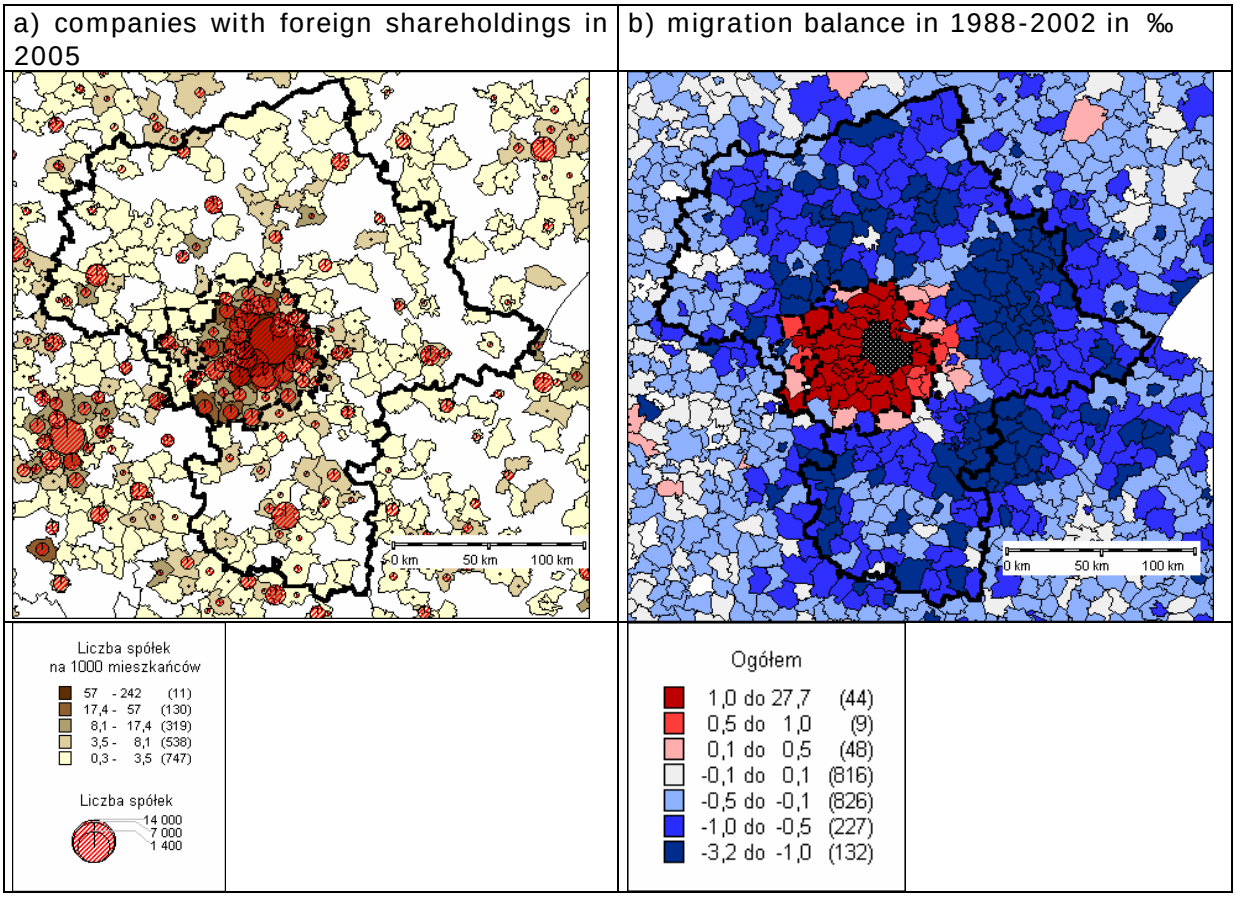


Figure 39. Development dynamics of the gminas in Mazowieckie voivodship
Source: M. Smętkowski (2005b).

Another symptom of diffusion processes is the outflow of residents from Warsaw in search of better housing conditions. Gminas situated in the immediate vicinity of Warsaw are usually chosen by people in working age who maintain close ties with the city, mostly in the form of commuting to work. On the other hand, areas situated further from the city centre are selected by people in post-working age, which is partly due to their earlier family ties with a given area. Nevertheless, it should be pointed out that the gminas situated in the close vicinity to Warsaw played a major role in the population outflow

from the capital (mostly with higher education), followed by other Polish metropolises or the capitals of the neighbouring voivodships. In this respect, the role of the main subregional centres of Mazowieckie voivodship was only marginal.
Furthermore, daily commuting to work in Warsaw played a certain role in capital transfers from Warsaw to peripheral areas, but their greatest intensity was basically limited to the metropolitan area.

Based on the map showing the migration balance between Warsaw and the remaining gminas (Figure 39b), we can say, with respect to the number of the population in these gminas (net rate of migration), that the negative balance could mainly be observed in the gminas lying within the radius of 150 km from Warsaw. In this area, gminas situated near the subregional centres had a relatively low net balance of migration: north-west of Płock and south of Radom, and along route no. 8 north-east, towards Białystok. On the other hand, two compact areas with a considerable outflow of population to Warsaw were clearly visible in the east of the region, and two less compact ones in the north and the south of the voivodship. Isolating the group with higher education (including those aged 24-30) from migratory outflows did not have any significant influence on this picture.

The gminas characterised by a high negative balance of migration with Warsaw are as a rule less developed. As a result, they function as sources of cheap labour for Warsaw, mostly commuting at weekly intervals. In this case, the relationship between commuting and the level of development is bilateral in character. A low level of gmina development and a weak local labour market prompts the local residents to emigrate in search of work. The barriers that hinder a steady migration outflow include high costs of housing and living in Warsaw. For this reason, some migrants rents flats (rooms) in Warsaw and return to their families on days off work. However, such migratory outflows may have negative consequences related to spending a large part of their income in Warsaw, and – in the long term – it may lead to a steady outflow of some residents to Warsaw and the resultant capital transfers for real property purchases.

11.4. Mutual relationships between the metropolis and the region

From the perspective of the metropolis, the linkages between the metropolis and the region were weak and irrelevant. Regional concentration processes dominated in Mazowieckie voivodship both in absolute and in relative terms, expressed by the concentration of jobs outside agriculture mostly in the metropolitan service sector. In contrast, deindustrialisation processes more strongly affected Warsaw's metropolitan area, which led to a relative increase of production functions elsewhere in the metropolitan region. Nevertheless, the role of the regional hinterland in providing supplies for Warsaw's enterprises was rather marginal and largely limited to simple products, with little added value. Similarly, labour force from the regional hinterland in

many cases lacked necessary qualifications to be able to participate in the mainstream of development associated with the increasing role of specialised services. In addition, deconcentration of business activity and locating branch offices of Warsaw's enterprises as a rule did not reach beyond the borders of the Warsaw metropolitan area. On the other hand, the region's non-metropolitan areas most frequently provided locations for traditional and most noxious types of activity, e.g. cement industry.

The development of the Warsaw metropolis opened a window of opportunity for its regional hinterland, but it was not fully utilised. For instance, in the case of the population with higher education, processes of a relative regional deconcentration could be observed, which however was mostly due to the development of subregional academic centres. At the same time, development diffusion processes associated with shuttle migrations of the population (including daily commuting to work) were limited in scope to the gminas neighbouring with the metropolitan area, mostly those situated in transport corridors. Their positive impact was largely reduced by commuting to work on a weekly basis, which was mainly the case in gminas situated in the region's periphery. The capital balance of the remaining types of commuting suggested their centripetal character, which in turn increased the trade exchange deficit and was only partially offset by entertainment and leisure travels of Warsaw residents and the resultant development of construction activity. This was associated by the deficit of the metropolitan region in trade exchange with the metropolis, both with regard to simple and processed resources.

To sum up, the economy of Warsaw was characterised by a considerable degree of diversity, with a growing significance of specialised B2B and financial intermediation services, and the diminishing production activity. The role of the service sector was much smaller in the case of Mazowieckie voivodship, which however did not entail any clear sectoral specialisation in manufacturing. In effect, the development paths of the metropolis and the region were not significantly intercorrelated, although the region could to some extent benefit from the development of the capital city.

11.5. Activities of public authorities in metropolis-region context

In the recent years, the regional government of Mazowieckie voivodship prepared a number of strategic and operational documents outlining key policy directions for the region's development. These documents correctly identified the voivodship's strengths and weaknesses while clearly indicating the dichotomy between Warsaw's metropolitan area and the remaining part of the region. The planned projects are expected to gradually close development gaps between the metropolis and the region. The planned activities may be divided into financial instruments addressed to enterprises and local governments, and investment tools related to the development of "hard" infrastructure, intended inter alia to boost Warsaw's positive impact, as well as "soft" initiatives" aimed

to foster the development of human resources, which can help reduce the results of the backwashing of development resources from the regional hinterland to the metropolis.

Financial instruments

At the national level, a map of regional assistance was drawn up to limit public support for enterprises. In the case of the Warsaw metropolis, this cap is set at 30%, as compared to 50% in other parts of Mazowieckie voivodship. In addition to that, the Regional Operational Programme adopted by the regional government allocated 23.5% of its EUR 1.8 billion budget to the development of enterprise and innovation. The disbursement of these funds depends to some extent on the terms of calls for tenders, which in many cases include provisions giving preference to projects and beneficiaries located in peripheral or rural parts of the region. Nevertheless, the effectiveness of these activities has not been staggering so far, and most active are companies operating in the Warsaw metropolitan area.

Moreover, the national system for the financing of territorial self-governments uses an equalising mechanism whereby some of the wealthiest gminas' own revenues are transferred to the poorest gminas. This severely affects Warsaw which in effect loses some EUR 250 million every year, with the city budget totalling ca. EUR 3.5 billion.

Infrastructural projects

The development of transport infrastructure largely rests with the national authorities. The network of modern roads and railways in Mazowieckie region is rather poorly developed. Some progress could be observed in this regard in the recent years as several sections of dual carriageways were opened for use. However, an effectively functioning transport network is still a far cry. The rail transport has also been neglected, which is due not only to tardiness in the implementation of infrastructure investments (despite EU co-financing, which allowed for repairing some major rail lines in the east-west direction), but also to deficient organisation skills, manifested by poorly matching the railway offer with the needs of passengers. This, coupled with the obsolete rolling stock and depreciated railway stations, makes competing against public transport providers difficult. Furthermore, several public carriers use the railway infrastructure, including the Mazowieckie Railways (*Koleje Mazowieckie*) run by the regional government, and this – with a small degree of coordination in these activities – does not serve to improve the quality of the offered transport opportunities.

Education

Activities planned nation-wide in education (Human Capital Operational Programme) include inter alia the strengthening of the education system in rural areas, also by extending the pre-school experience to include children aged 3-5. The ROP allocated ca.

9% of the budget (EUR 164 million) to human resources development, and the main anticipated areas of activity include: increasing social cohesion, equalising development opportunities and supporting structural changes in rural areas.

It should also be observed that the recent years have seen a rapid development of public higher education institutions in the subregional centres of Mazowieckie voivodship (considerable increase in the number of students). This was supported by private investments and led to the establishment of a number of non-public higher education institutions, which serves to broaden the educational offer but at the standard of teaching that is frequently questioned.

Summary

The results of activities discussed above have so far been modest, and their coordination may be summarised as mildly satisfactory. In effect, they have not made any significant contribution to the development of linkages between the metropolitan centre and the remaining part of the metropolitan region. It should be remembered however that a large part of the plans and projects have not been launched or completed yet. The disbursement of cohesion policy funds in the years 2007-2013 may considerably change this picture. However, the short period set for the implementation of operational programmes in this financial perspective does not allow for their comprehensive evaluation.

11.6. The metropolitan area governance

The discussion on the creation of metropolitan areas in Poland has been going on in Poland since 2001, when the amendment to the Spatial Planning and Management Act was enacted, pursuant to which such areas should be delineated as part of the National Spatial Arrangement Policy (KPZK). Irrespective of the still ongoing work on the KPZK and work on the draft bill on metropolitan areas, the crucial issue on whether metropolitan areas should be instruments of regional policy or exclusively elements of spatial policy still remains unresolved. The debates so far have primarily focused on identifying the number of metropolitan centres, rules for delineating their boundaries, as well as the scope of competences and governance. Currently, it is difficult to predict what general and specific decisions will ultimately be made in this matter.

Regardless of the lack of central solutions, in the light of the legislation in force, gminas in Poland may set up special-purpose associations of their own accord for addressing specific issues or making use of development opportunities. In the vicinity of Warsaw, however, propensity to cooperate is not particularly great, particularly in comparison to the environs of other cities e.g. Wrocław or cooperation of cities making up the Silesian conurbation.

As shown above, in the recent years a number of concepts concerning the delimitation of the Warsaw metropolitan area have been prepared. None of them, however, is legally binding. Work on this issues is currently under way i.e. at the Mazowsze Bureau for Regional Development, which reports to the regional self-government authorities.

As a result of bilateral agreements between Warsaw and individual gminas in its direct vicinity, a joint public transport ticket has been introduced for a large part of Warsaw's metropolitan zone. The agreements inter alia laid down the rules governing participation of gminas in the operational costs of the system, which are covered from ticket sales only in 40%. In this particular project, it was possible to reconcile the interests of the city authorities (buses servicing the areas outside Warsaw's administrative boundaries) and the regional self-government (regional railways) in the metropolitan area. Work on continued integration of the transport system is now under way.

The regional self-government authorities are also responsible for the adoption of the spatial development plan for the Warsaw metropolitan area. However, many different problems are associated with planning at the local level. So far, only a very small area of the gminas making up Warsaw's metropolitan area (ca. 3%) have valid local spatial development plans, and work to prepare such plans in the remaining gminas is proceeding slowly. In Warsaw alone, less than 20% of the city's area have valid local spatial development plans. In this situation, it can hardly be expected that the spatial development plan for the metropolitan area, if adopted (at the moment, no guidelines for this have been issued as yet), could change this picture in any significant way.

11.7. Development prospects

In the coming years, further increase in the development disparities between the Warsaw metropolis and the surrounding region can be expected. In many cases, the scale of disparities between the metropolis and the region is so huge that it hampers any potential opportunities to make use of the complementarity of their socio-economic structures. In other words – Warsaw and its surroundings increasingly operate in a modern information economy, while the region as such – in traditional agriculture and industrial economy. In effect, it seems that only large-scale migration flows could, in the long term, partly reduce the scale of the present disparities in the level of economic development. As regards Warsaw itself, it can be expected that its internationalisation will be further increased and its position in the European and global network of cities will be strengthened even more. This will have a specific impact on the situation of the surrounding region which – considering the development mechanisms outlined above – may develop according to three general scenarios described below,

According to the first scenario, the regional hinterland will be depopulated owing to the migratory outflow to Warsaw, coupled with population ageing processes. The speed of

this process will largely depend on the development of residential housing in Warsaw and the speed at which the polycentric structure of the metropolitan area will evolve as it affects better accessibility of cheap housing. In the long term, the decreasing population and the growing quality of human capital may lead to a relative increase in the wealth of the population living in other parts of the metropolitan region.

The second scenario envisages the development of transport infrastructure, leading to enhanced internal cohesion of the metropolitan region. Together with the development of the polycentric structure of the metropolitan region in terms of jobs, this could foster the increase of daily commuting to work and eliminate commuting on a weekly basis. In addition to that, increased accessibility may encourage investors to establish new companies in locations outside the metropolis, mainly in the largest subregional centres.

The third scenario involves a transformation of the social and economic structure of non-metropolitan areas through human capital investments and increased availability of modern technologies. This in turn could trigger endogenous development processes, especially in subregional centres provided with the requisite infrastructure, and could halt the widening of developmental disparities between the metropolis and the rest of the region.

All the above scenarios are based on contemporarily observable development mechanisms, which suggests adopting the polarisation and diffusion model as the basis for considerations about the region's future. In the event there is no intervention of the public authorities, the first scenario is the most plausible. The remaining two depend on giving a specific direction to the public intervention and its coordination with the activities of the local authorities, particularly within the metropolitan area, and with the policies pursued by the authorities of the region's major urban centres.

12. Comparison of case studies: towards synthesis

12.1. General characteristics of the analysed metropolitan macroregions

The analysed macroregions operate within dissimilar administrative structures. Two of the cities covered by analysis, Stockholm and Warsaw, were state capitals, while the remaining cities were regional centres. To some extent, this affected their functions: as a rule, the capital city status was associated with a greater diversification of the economy, while the regional centres were more specialised. The surveyed metropolitan macroregions corresponded to NUTS2 units or aggregated NUTS3 subregions, and reflected the range of the central city's dominant influence relatively well. The relatively widest mismatches in this regard could be observed in the Glasgow region, in the case of which the functional linkages were both complex and historically varied, which was mostly due to the close proximity of Edinburgh, and also to the diversity of the

geographical environment (differences between the northern and southern parts of the region). Except Catalonia, the close correspondence between the administrative division and the functional ties did not imply the existence of a strong regional identity; for this reason, regional identity did not play any key role in the linkages between the metropolis and the region.

The disparities in the development level between the metropolis and the region were the widest in the case of Mazowsze, in which there was a clear "divide" between the metropolitan region and the more distant regional hinterland of Warsaw, manifested inter alia by the different economic structures (services in the metropolis vs. agriculture and traditional industry in the regional hinterland) and the quality of human capital. A similar situation could be observed in Scotland where the Glasgow metropolitan region was historically strongly industrialised (metallurgy, ship-building, engineering, and earlier hard coal mining), whereas the regional hinterland of the metropolis was much less industrialised. On the one hand, this implied a need for a thorough restructuring of the metropolis, but on the other hand the level of education and qualifications of people, also due to the presence of higher education institutions, was much higher in the centre of the macroregion. Similarly, in the Stockholm macroregion, intraregional disparities were on the increase, which was a result of the industrialisation of the non-metropolitan part of the region and necessitated the restructuring of traditional sectors, as opposed to the economy of the metropolis with a robust service sector, including well-developed IT and financial services. On the other hand, there was a visible social polarisation of the metropolitan area itself regarding the class and ethnic dimensions. In the case of Midi-Pyrénées, the disparities between the metropolis and the region were also wide, which was primarily due to the concentration of higher-order services in Toulouse. At the same time, social differences associated with the quality of life were relatively small. The most interesting situation could be observed in Catalonia, where – despite the disparities in the economic structure – the development level was similar throughout the entire metropolitan macroregion, and in some non-metropolitan local systems it was even higher than in the metropolis itself. The reason for this uncommon situation is widely believed to be the (now completed) process of depopulation of the remaining parts of the region due to the dynamic industrialisation and urbanisation of the core of Catalonia. In effect, the population decrease, coupled with the modernisation of the non-metropolitan economy, not only resulted in a statistical increase of per capita income but also in the real improvement of the quality of life.

The strengths of the analysed metropolitan areas were primarily connected with their international significance. In case of Stockholm, the R&D and hi-tech sector was such a strength, in particular the ICT, biotechnological and the technologically advanced automotive sectors, associated with the presence of large transnational corporations of

domestic origin. In Toulouse, it was the well-developed aviation industry and the developing space industry, supported by the R&D and academic potential. By contrast, as early as the 19th century, Barcelona was one the major industrial centres in Europe which, coupled with its role as an important trade and transport centre in the western part of the Mediterranean Sea, accorded it a crucial position in Spain. Currently, Barcelona is also a major culture and tourism centre. Both these sectors are believed to supersede traditional industrial sectors, which, however – despite the serious initiatives undertaken to this end for a number of years now - to date have not been replaced by hi-tech sectors. The role of Glasgow was determined by the gradual reworking of the city's image associated with the overcoming of the negative consequences of the collapse of traditional branches of industry. At present, efforts are aimed to foster development in 8 strategic sectors (natural sciences, energy, financial services, tourism, creative industries, food industry and electronics), which is hoped to foster transformation towards a knowledge-based metropolis. On the other hand, in case of Warsaw, the high development dynamics accompanying the influx of foreign capital was of crucial importance, so as the control and management functions performed nation-wide by the capital city owing to well-developed human resources.

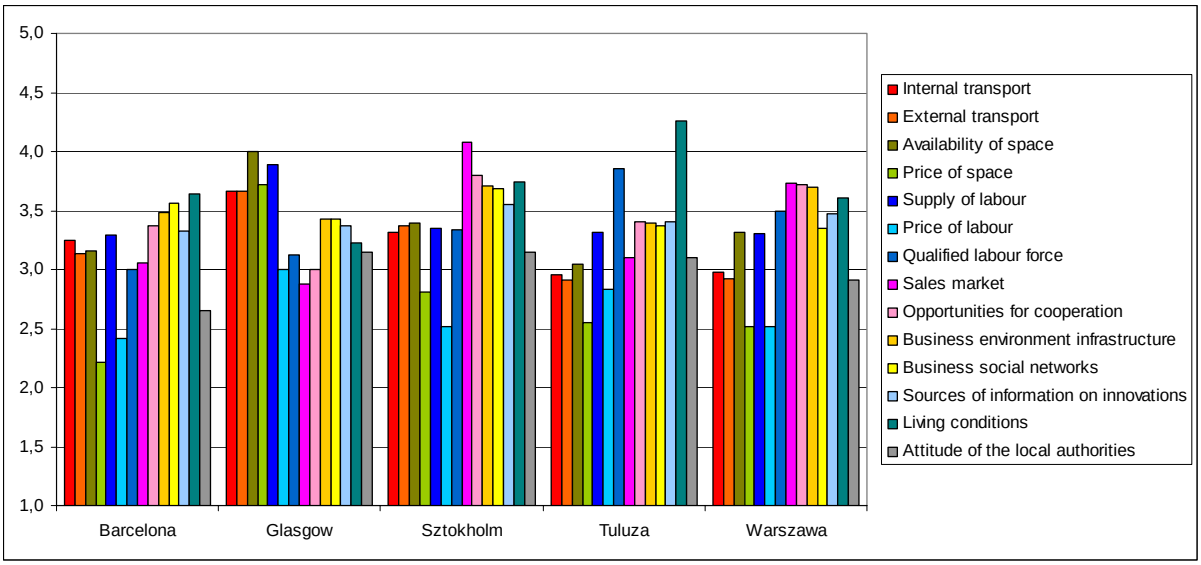
In most cases, the weaknesses of the metropolis were associated with difficulties and limitations in using the international potential. The weaknesses of Warsaw included the poorly-developed external transport links (the city is not included in the trans-European motorway network), and also the relatively low standard of living when compared to other European metropolises. The latter aspect was aggravated by the low quality of public space and the growing spatial chaos in the suburban zone, caused by uncontrolled suburbanisation processes. In addition, despite its significant R&D potential, the linkages between science and the business sector were weak in Warsaw and did not produce any synergy effects. In contrast, Glasgow was still struggling with its industrial past and the negative effects of the restructuring process (for more information see Box 1). On the other hand, the problems experienced by Stockholm were side-effects of the fast and stable growth of the city in the last two decades and the position achieved in the process, manifested by an excess of demand over supply in the housing market, which in effect led to increases in purchase prices of the real estate and rent rates. Paradoxically, this in consequence resulted in lowering the standards of living because in spite of the highest salaries in Sweden, the metropolitan region of Stockholm is characterised by one of the highest shares of housing expenses in the salaries of the population. Furthermore, this fuels the ongoing social polarisation which also has a spatial dimension, and causes difficulties in the labour market integration of immigrants. In Toulouse, inferior transport accessibility (by comparison with the neighbouring metropolises of Bordeaux and Montpellier) is a certain drawback, especially the lack of high-speed railways connecting

the city with Paris and Spain (which is offset to some extent by a well-developed network of airline connections). On the other hand, Barcelona has not been able so far to develop the hi-tech sector so as to replace traditional industrial branches. The problem of Barcelona also affects the city; here, for some years now, efforts have been made to bring in domestic and foreign services and hi-tech companies to the old industrial district (eastern Barcelona), but so far it has mostly attracted office blocks and some hotels. For reasons which are not clearly understood, modern companies and foreign investors are definitely more willing to locate their business in Madrid. The local experts emphasise that not only new, significant investors omit Barcelona, but also major companies, once located here, are moving elsewhere. On the other hand, the traditional industry centres (deconcentrated many years ago) from the so-called Arc surrounding Barcelona are now undergoing an accelerated process of deindustrialisation and unemployment increase.

Box 1. Restructuring of the Glasgow metropolitan area

The economic restructuring of the Glasgow metropolitan area not only brought about adverse social consequences in the form of structural and long-term unemployment (poverty, break-up of families, health problems), but also made it necessary to remove the remnants of industrial past associated with environmental degradation (contaminated soil, post-industrial areas). Until the 1970s, new investments were located in areas with a considerable availability of "greenfield" sites, in particular in the so-called "New Towns" (East Kilbride, Cumbernauld and Irvine). However, from the 1980s onwards, efforts have been made to develop degraded, "brownfield" areas for both housing and industrial purposes. These weaknesses of the Glasgow metropolitan area associated with restructuring negatively affect the city's image, which is undoubtedly one of the factors hampering the location of large international companies in the metropolis.

Regarding attractiveness of the metropolitan area for new investment we can conclude, based on the questionnaire surveys of enterprises **(Figure 40)**, that in all the metropolises (including Warsaw), the costs of labour and costs related to the purchase or lease of space needed to conduct business activity were evaluated the most negatively. In addition, entrepreneurs were rather sceptical about the positive attitude of the public authorities regarding the creation of conditions conducive for new investments (this aspect was ranked the lowest in Barcelona and Warsaw). On the other hand, the conditions and standard of living in all the metropolitan areas belonged to the most highly evaluated aspects of their competitiveness (particularly in the case of Toulouse).



* From: 1 – very poor, to 5 – very good / results for Glasgow for a small sample (N=10)
Figure 40. Evaluation of the attractiveness of the metropolis for new investment*
Source: prepared by the author.

There existed certain differences between the surveyed metropolises in the evaluation of some of the remaining location factors. In Barcelona, the quality of life was viewed by the respondents as the most important of "soft" factors, and transport infrastructure as the most crucial among "hard factors". In Stockholm, entrepreneurs paid special attention to the size of the sales market, coupled with a well-developed transport infrastructure (both external and internal) and extensive social networks in business. Toulouse – the smallest of the analysed metropolises – was most highly evaluated in terms of the quality of life, and the quality of labour (the greatest difference in comparison to labour supply). On the other hand, in case of Toulouse, the size of the local sales market and the development level of the transport infrastructure were evaluated as the weakest. In Warsaw, the sales market played an important role, whereas the development level of the transport infrastructure was regarded as weak. In addition, among soft location factors, accessibility to information on innovation and the development level social networks in business were evaluated as weak.

In some macroregions, the regional hinterlands of cities had few advantages when compared to the metropolis (Warsaw, Glasgow). In these cases, certain development opportunities could be indicated, most of them connected with the strengthening of the subregional centres through investments in transport and telecommunication and IT infrastructure. Secondly, some opportunities could be seen in the utilisation of their endogenous potential: agriculture, tourism and renewable energy. In case of the remaining macroregions, the strengths of the regional hinterland included in particular a high quality of life associated with high-quality infrastructure. Among more specific

strengths, we can indicate high work culture in the case of the Mälar region, which attracts foreign capital and generates high productivity in traditional business activities. By contrast, in Toulouse and Barcelona, the strengths of the regional hinterland include highly productive, modern agriculture and the accompanying food industry (particularly in western Catalonia), associated with a significant attractiveness of many areas (coastal and mountain) for tourism.

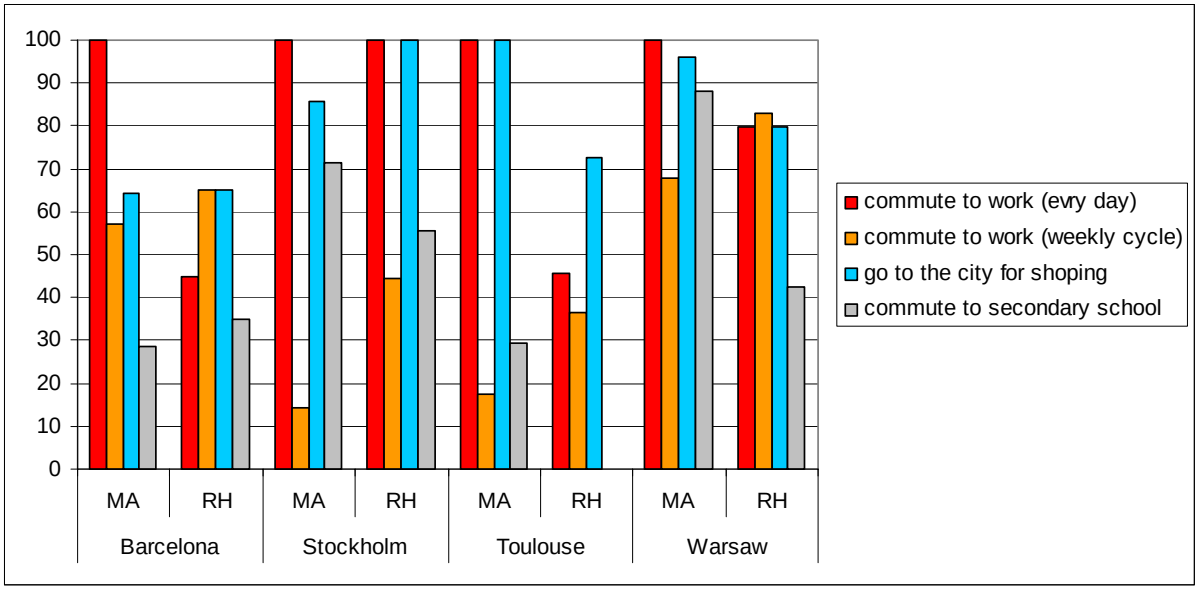
The weaknesses of the regional hinterland of the metropolis were mostly associated with low productivity of labour in traditional sectors, such as: agriculture (Warsaw) or industry (Glasgow), with a simultaneous low level of economic activity. Another important problem was the lack of sufficient human capital resources, which inter alia was connected with the outflow of the most enterprising individuals to the central cities (also in Toulouse, Stockholm and Glasgow) or the influx of unqualified foreign immigrants to the regional hinterlands which remain dependent on traditional industries and agriculture (Barcelona). In effect, the regional hinterland of the metropolis as a rule lost in the competition for investment capital with the central city's metropolitan area.

12.2. The relationships between the city and the region

In all the analysed metropolitan areas (broadly speaking, municipalities situated within 50 km from the centre of the metropolitan centre were classified as ones belonging to the metropolitan area), the local government authorities identified the following linkages with the central city **(Figure 41a)**:

- Daily commuting to work (with relatively the smallest intensity in Barcelona and the greatest in Stockholm and Warsaw);
- Commuting for shopping (save for the Barcelona metropolitan area);
- Commuting of students to universities;
- Commuting for cultural and medical services.

a) labour and simple services [% of responses]



b) higher services and emigration [%of responses]

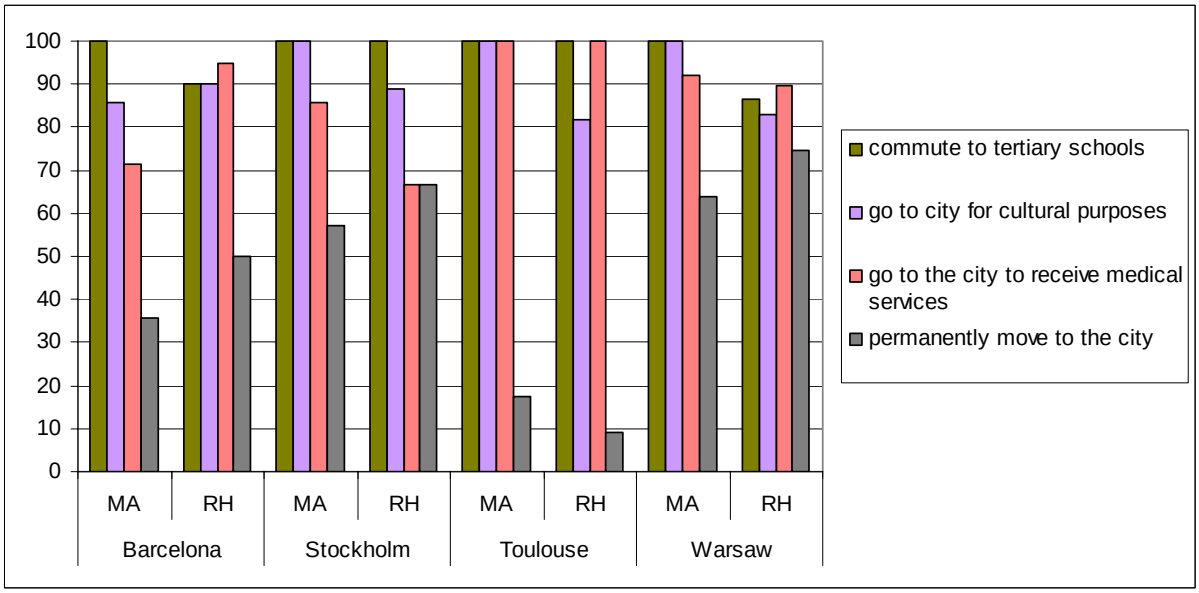


Figure 41. Linkages of municipalities in the macroregion with the metropolitan centre [% of surveyed municipalities]
Source: prepared by the author based on research findings.

Some differences in the organisation of secondary education could be observed between individual metropolitan areas: commuting to school was easily visible in Stockholm and Warsaw, and much weaker in Toulouse and Barcelona. On the other hand, commuting home for the weekend of those who worked in the city during the week were characteristic for Warsaw and Barcelona. In contrast, permanent emigration of residents from the suburban zone to the city could mainly be observed in Warsaw and Stockholm (but with a relatively small intensity and a weakening of this trend observable in the recent years). In most spheres, there was an increasing tendency concerning the intensity of commuting (save for Stockholm) or maintaining its existing levels, which

could be viewed as a proof of a small increase in the degree of polycentricity of metropolitan areas, manifested by the deconcentration of jobs and certain services.

In case of the external zone of the metropolitan macroregions **(Figure 41b)**, commuting in order to participate in higher-order services (e.g. higher education, institutions of culture and health care) played the most important role. Daily commuting to work was also important in the case of Stockholm and Warsaw (over 80% of the surveyed municipalities), which could indicate a greater range of the functional influence of the city. In Barcelona and Toulouse, this affected less than a half of the municipalities, and the role of such commuting was viewed as insignificant. In all these cases, we could observe commuting to work at weekly intervals, which was done on the greatest scale in the Warsaw and Barcelona macroregions. Commuting for shopping was also quite popular, but the scale of this phenomenon was not extensive (particularly in the case of Barcelona), but even in Stockholm – where such commuting was very popular – it did not have any significant intensity. In this context, commuting to secondary schools was done on a minimal scale. At the same time, metropolitan centres represented attractive locations for migration, which was particularly noticeable in Warsaw (growing tendency) and Stockholm (falling tendency).

Commuting to work was also an important factor identifying the functional metropolitan macroregion in all the analysed cases. As a rule, such commuting had the form of daily travels, although in some macroregions (Warsaw, Barcelona) it was also done a weekly basis (which implied renting accommodation and returning home for the weekend). Such travels were of a clearly centripetal character. As a result, no processes concerning the evolution of the polycentric structure of functional ties, characteristic e.g. for Randstad Holland could be observed in the analysed macroregions. In case of Barcelona, this was partly due to the region's geographical features, where mountain ranges separate many settlements (districts, municipalities) of the metropolitan area, and the main valleys host strategic transport routes connecting these areas with their surroundings. As a result, centripetal connections definitely prevail, and there is a shortage of ring roads to integrate the peripheral centres of the metropolitan area. In addition, in some cases the metropolitan region was rather enclosed as regards commuting to work; for example, in Glasgow travels to work did not exceed the distance of 50-70 km. Unlike Glasgow, in Stockholm, the number of commuters to work from region to the metropolitan area was some 85 000 people, of whom nearly 60% were residents of the remaining part of the Mälar metropolitan region. Moreover, the increase dynamics of such commuting was very high, and in some areas exceeded 50% over a decade. These processes may be explained by an improved transport accessibility of Stockholm owing to the extension and enhancing the quality and speed of the transport infrastructure.

Box 2. Commuting to work in the Midi-Pyrénées region and the administrative boundaries

Commuting to work within the metropolitan macroregion can be analysed from two perspectives: flows within the metropolitan area and flows between the metropolitan area and its hinterland. The majority of work-home commuting covers travels to work in Toulouse from the metropolitan area - about 110 000 people, i.e. 40% of those working in the city. The reverse direction of such flows is also visible, although on a smaller scale: some 35 000 inhabitants of the central city work outside the city, but live in the metropolitan area which provides some 250 000 jobs).

Another dimension of these types of linkages are (much smaller) flows of employees between the major cities of the macroregion. Slightly over 8 000 inhabitants of the subregional centres surrounding Toulouse commute to work to the city and its metropolitan area. Castelnaudary is the city with the strongest ties with the metropolis – 10% of economically active population living in this city commute to work in the metropolitan area. This is a particularly interesting example because Castelnaudary is situated outside the Midi-Pyrénées region, which shows certain artificiality of the existing administrative boundaries. Generally speaking, the distance within which Toulouse is attractive for incoming employees is about 100 km. Movement in the opposite direction is also visible. Slightly over 5 000 inhabitants of the Toulouse metropolitan area commute to work to the subregional centres

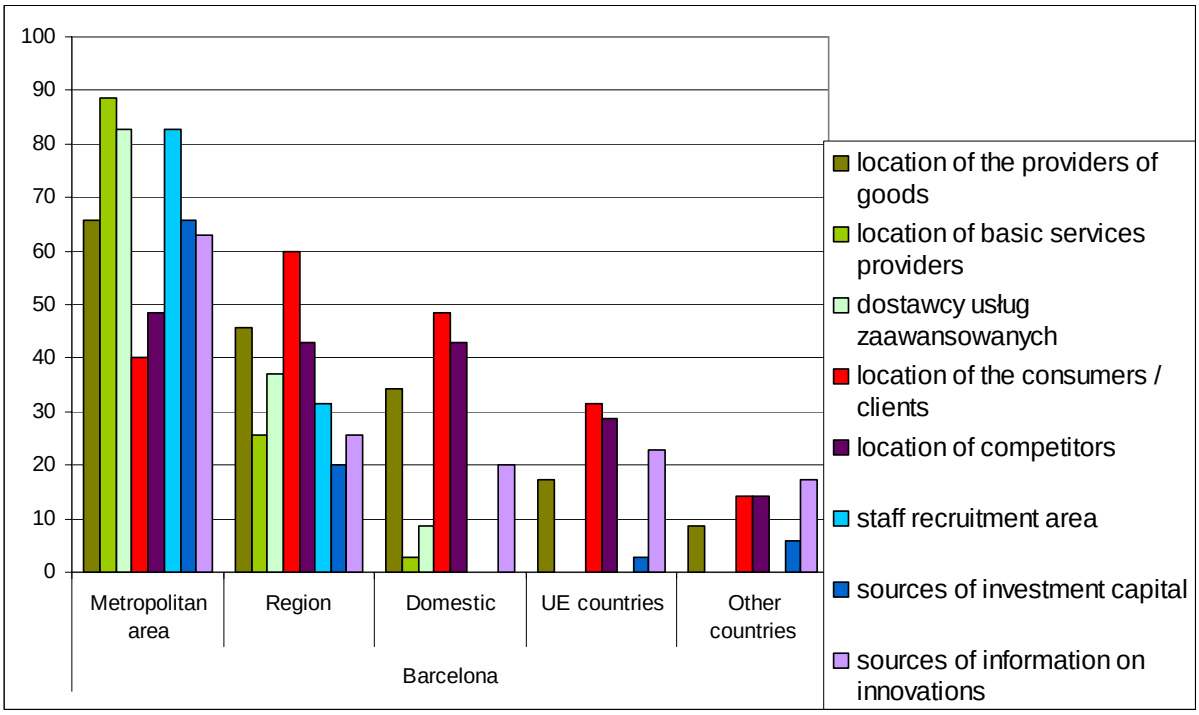
In many cases, metropolitan centres were monopolists in the provision of higher-order services. Practically all municipalities of the metropolitan macroregions generated commuting of their residents with the aim of using such services, but this was usually done on a minimal scale. Health services and cultural services were relatively the most deconcentrated services in the macroregions, while higher education was the least deconcentrated (mainly in the regions of Barcelona and Warsaw, as well as branches of higher education institutions in the region of Toulouse, and Uppsala in the region of Stockholm). At the same time, it should be pointed out that the potential of metropolitan centres in terms of higher-order services would as a rule reach beyond the boundaries of the analysed macroregions. Furthermore, in some regions, there were no other urban centres which could compete in this regard with the metropolis (Glasgow, but with a tangible impact of the rival Edinburgh).

Migration flows within the metropolitan macroregions were varied in character. One significant dimension of such differences was the division into domestic and international migration. The latter was particularly pertinent in the regions of Stockholm and Barcelona, the only difference being that, in the case of the Mälar region, immigrants were mostly attracted by the metropolitan region, and in the case of Catalonia both the

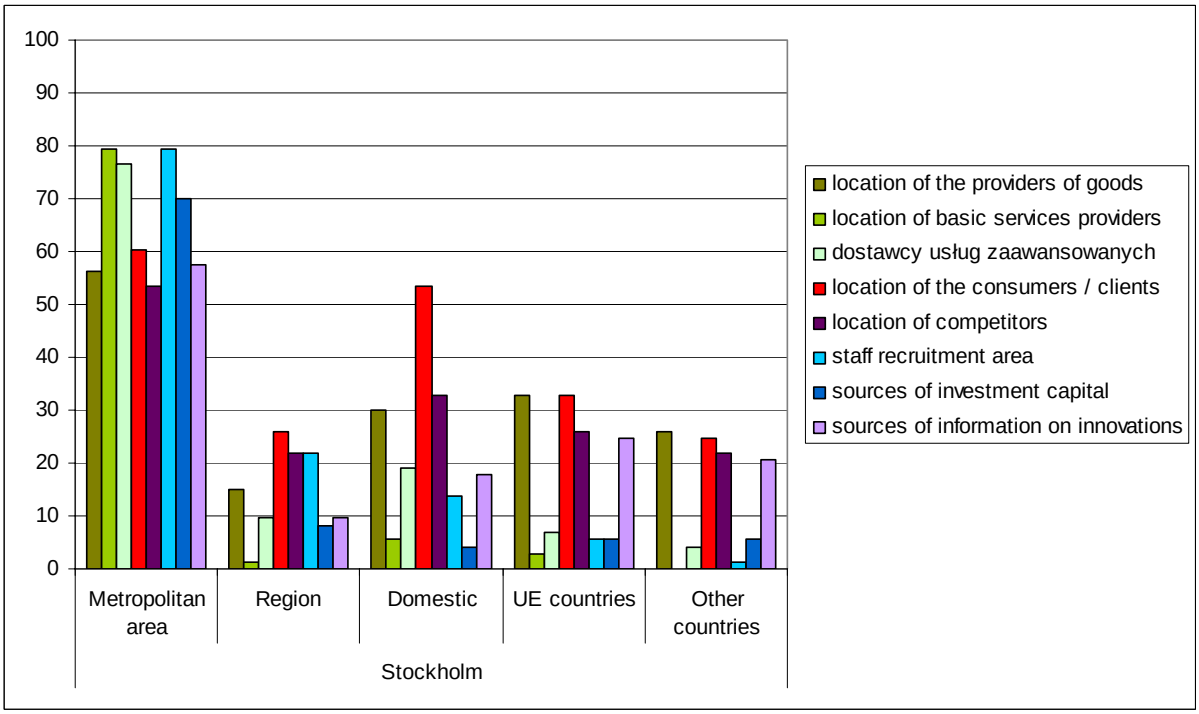
core of the macroregion and its peripheries were attractive for immigrants. Segmentation of migration flows was visible between the metropolis and the region. On the one hand, suburbanisation processes which were taking place in the metropolitan area involved middle-aged population, especially families with children. On the other hand, people in post-working age were those who migrated to most distant locations, frequently their places of origin. As a rule, this outflow was compensated by the inflow of young people with higher education to the metropolitan centres (for example in Warsaw and Glasgow). An important source of such migrations was the regional hinterland of the metropolis, and in the case of the Barcelona metropolitan area in the last decade, migration also originated from other provinces of Spain and, particularly recently (just as in Glasgow), other EU Member States (primarily the new MS).

In the analysed regional macroregions, production systems were developed to varying degrees (Figure 42). Based on the questionnaire surveys of enterprises concerning the role of the individual market ranges e.g. for supply chains and sales, we could observe that economic processes were largely enclosed within the metropolitan areas, particularly regarding the use of services (both simple and specialised), personnel recruitment and sources of investment capital. The role of the regional hinterlands of the metropolises was extremely varied. In case of Barcelona, the considerable role of the metropolis' regional hinterland was clearly visible, mainly as the location of both recipients and clients of enterprises from the metropolitan area (the region played a greater role than the national market). To a lesser extent, this applied to providers of goods and services (primarily advanced services). Moreover, the regional competition did not fall much behind the competition on the national scale. Interestingly, the region was also a source of information about innovations implemented by enterprises operating in the city's metropolitan area. Toulouse also had quite strong linkages with its regional hinterland (providers, recipients and employees), yet the regional ties were on the whole significantly smaller than those with other regions of the country (primarily with regard to the sources of investment capital and sources of information about innovations). In this context, the marginal significance of foreign markets was striking; this could be due to the fact that only a narrow group of major enterprises was operating on such markets (cf. Box 3). In case of Stockholm and Warsaw, the role of the regional hinterland was marginal. The Stockholm metropolis was the most strongly internalised one in terms of suppliers' locations (but also in terms of recipients and sources of information about innovations) – both in the national and European dimension. In case of Warsaw, the degree of internationalisation was not uniform, i.e. foreign provisions and supplies (including information about innovations) were more important than sales of goods, which were primarily sold on the domestic market.

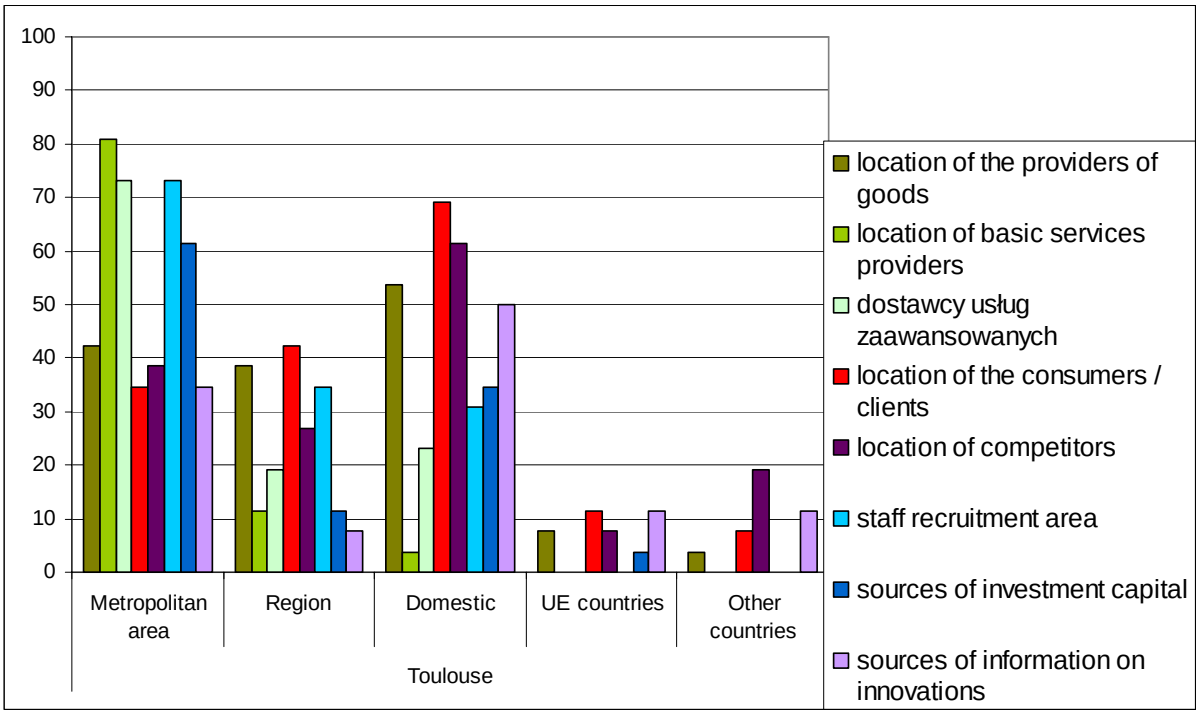
a) Barcelona



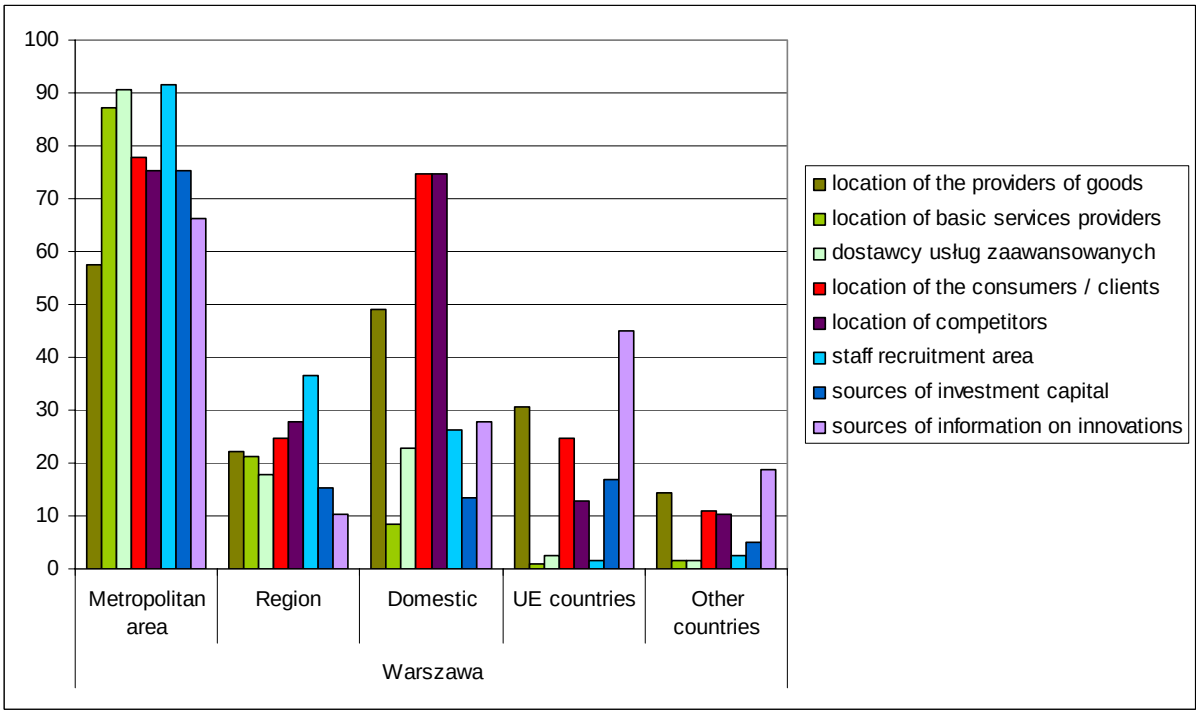
b) Stockholm



c) Toulouse



d) Warsaw



Two key markets / spatial ranges could be indicated in the answer.

Figure 42. Spatial linkages of enterprises located in the metropolitan areas*
Source prepared by the author.

Box 3. The Aerospace Valley in the Toulouse macroregion – cooperation links

In Midi-Pyrénées, some 55 000 jobs are connected with the aerospace industry (40% directly, 30% indirectly, while the remaining 30% represents employment generated by other types of activity), of which 10 000 are provided by Airbus. Employees in the aerospace industry account for slightly over 5% of all people working in the region (Ruhlmann 2007). The aerospace industry is concentrated in the Toulouse metropolitan area, which hosts 3/4 of jobs associated with the aerospace industry. Important aerospace industry centres are also located in other parts of the region (Pamiers, Villefranche-de-Rouergue, Figeac, Tarbes, Louey). The aerospace industry is also well-developed in Aquitaine, a region west of Midi-Pyrénées. Both these regions are in fact one functional area of the aerospace industry (and related activities), with over 1 000 companies having strong cooperation links. Its development is stimulated by a dynamic organisation called the "Aerospace Valley", which brings together some 550 enterprises and institutions associated with the aerospace industry situated in both regions (Aerospace Valley, INSEE 2008). This is an aerospace cluster with extensive internal cooperation structures and strong international links, robust R&D facilities and specialised higher education, which is promoted by both regional and national authorities (cf. e.g. Jalabert, Zuliani 2009). Toulouse is unquestionably the hub of the cluster, which proves that the metropolis' control functions play a significant role not only in the regional, but also supra-regional context.

Figure: Jobs associated with the aerospace industry in 2006.

Source: Ruhlmann 2007.

In all the regions, the regional hinterlands of the metropolis performed recreation and leisure functions. However, their role in the regional development was significantly varied

and largely depended on their supra-regional attractiveness (e.g. Catalonia – the coastal and mountain areas). Recreation and leisure functions were insignificant only in case of the regional hinterland of Warsaw, which can partly be explained by the competition of other regions of the country in this respect. By contrast, tourist functions played a considerable role in case of certain local systems in Scotland, which supplemented the offer of Glasgow as a cultural, conference and retail centre. As a rule, recreation and leisure assets of the regional hinterland were important factors in improving the quality of life and the attractiveness of the entire area (e.g. the region of Stockholm - nature and sports tourism, with a very high quality of the recreation infrastructure and intensive management of the natural assets). In the Midi-Pyrénées region, the regional hinterland also provided a recreation base for the inhabitants of Toulouse (diverse landscape, well-developed mountain tourism, spas, attractive rural areas, historic small and medium-sized cities).

12.3. Determinants of linkages and processes of polarisation and diffusion

As the analysed case studies revealed, considerable differences in socio-economic structures, which suggested potential complementarity between the metropolis and its regional hinterland, were not a sufficient factor fostering the development of linkages between these territorial systems. This was most clearly visible in Mazowsze, where the Warsaw metropolitan region basically functioned within a framework of the global information economy whilst the rest of region – in a traditional agricultural and industrial development paradigm **(Box 4)**. On the other hand, despite the dissimilarities existing between the socio-economic structures, the functional ties in the Barcelona region were strong, mostly due to the well-developed endogenous potential for growth in both these territorial systems. The situation in the Mälar region to some extent resembled that in Mazowsze, but the regional hinterland of the former region was able to make an effective use of the endogenous development potential associated with the processing activity and logistic services catering to the metropolis. Nevertheless, the historical division of economic activity between the subregional centres could still be visible in the region. In the western part, traditionally based on industry and mining, manufacturing (which today has a relatively high technological level) still represented a significant part of the economic structure. On the other hand, the eastern part of the region which traditionally evolved on the basis of trade and transport functions, performed higher-order functions and had a more diversified economic structure. By contrast, in the Toulouse region, the existing linkages were determined on the one hand by the functions provided by the metropolitan centre to its hinterland, and on the other by the high quality of life in the regional hinterland. In the region of Glasgow, the role of the hinterland was limited to providing the recreation and leisure base for the inhabitants of the metropolis, the alimentary zone, as well as a source of compensating the shortages in the metropolitan

labour market. On the other hand, Scotland provides a different example of structural complementarity in the financial sector between Glasgow and Edinburgh – in the former, back office and contact functions prevailed, and in the latter – high quality functions.

Box 4. Mazowieckie voivodship – an example of intraregional civilisational disparities

In case of the Warsaw metropolitan macroregion, there existed a clear dichotomy in the socio-economic structures between the metropolis and the region, expressed by the level of internal disparities in the voivodship, which was the highest in the country. In addition to the above disparities, the dichotomy between the metropolis and the region (GDP per capita ratio of 2 to 1) was also manifested in the economic structure – the well-developed sector of higher-order services with nation-wide significance in the deindustrialised metropolis and low-productivity agriculture with a primarily social function prevailing in the remaining parts of the region except the industrial subregional centres (with traditional industry branches). Another key disparity was related to the quality of human capital – while in Warsaw the share of the population with higher education was about 40%, it did not exceed 1% in some rural areas of Mazowieckie region. Also, despite certain deficiencies in the capital city and its environs, the level of infrastructure was low mostly in the peripheral rural areas. In addition, the level of the region's internal integration associated with the existing transport networks was very low due to a huge scale of neglect and very small traffic capacity of the road and railway infrastructure.

The similarity between the socio-economic structures - whether observable for the entire region or only in the major subregional centres - fostered the development of intraregional linkages. In the latter case, it was associated with a specific hierarchy of linkages (metropolitan centre – subregional centres – regional hinterland). In particular, the similarity between the metropolis and the region in terms of the quality of human capital and degree of innovation was a significant factor which promoted the development of linkages between the two. This was particularly well visible in the case of Barcelona, where such linkages were very strong also because of a high level of civilisational development both in the metropolitan area and in the remaining parts of the region, and due to a strong sense of ethnic (according to the Spanish authorities) or national (according to Catalonians) identity.

The development of the regional hinterland largely depended on the quality of life offered there, as this could prevent the outflow of top professionals from the region to the metropolis. In effect, this facilitated the development of activities with high added value, which required hiring high-quality specialists. On the one hand, they could be recruited

from the region's inhabitants; on the other, this posed an opportunity for hiring relevant specialists from outside the metropolitan labour market. The example of Barcelona corroborates this thesis, although it should be taken into account that, particularly in the case of migrants (and in the period 2002-2006 alone, the population of the Barcelona metropolitan area increased by 10%), the choice of the place to live was largely determined by the costs of living, which were the highest in Barcelona.

In the development of linkages between the metropolis and the region, well-developed transport networks could play an important role, which inter alia was proved by research carried out by the local government authorities in metropolitan macroregions **(Figure 43)**. In particular, the transport infrastructure was of cardinal importance at a distance from 80 to 160 km from the metropolitan centre. Within this distance, the ties were strong or moderate[43] in the case of municipalities which declared that the travelling time was shorter than 90 minutes. At the same time, a longer travelling time would imply much weaker linkages. On the other hand, in case of shorter distances from the centre of the metropolis, the travelling time under 60 minutes was less important than the location with regard to the centre of the region.

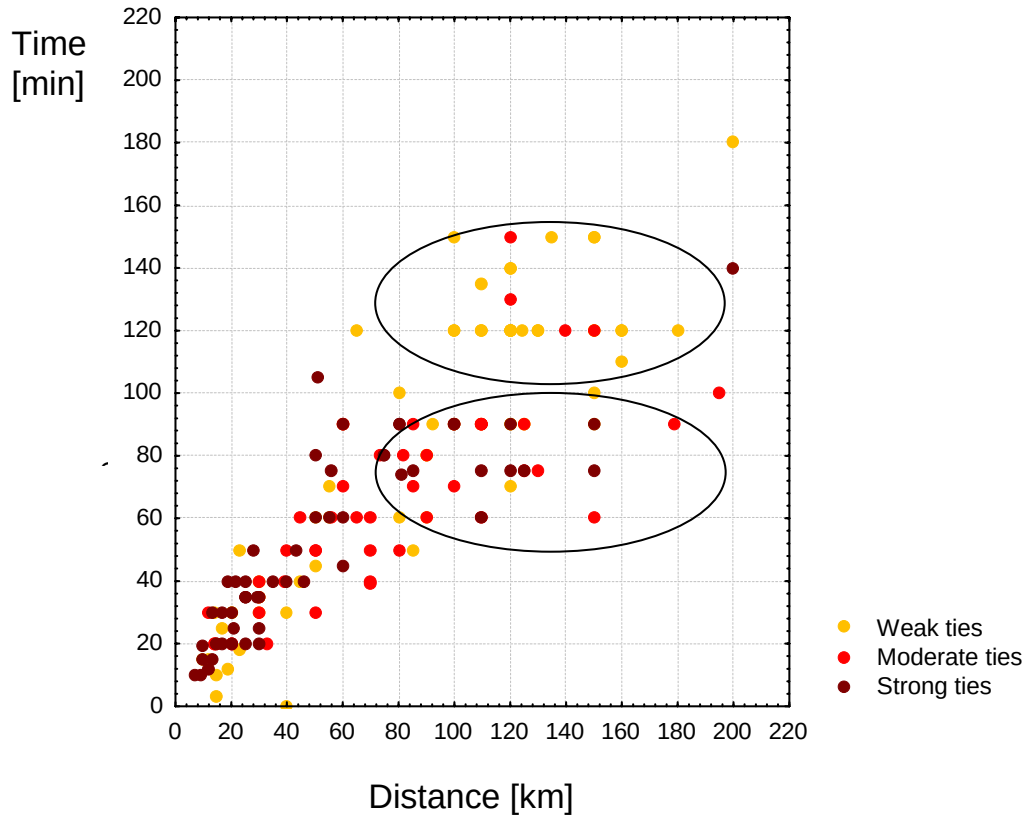


Figure 43. Relationships between accessibility and impact on development

[43] Strength of ties between municipality and metropolitan centre was calculated as a sum of indications in question 6-8 (scoring: weak - 1, average - 2, strong - 3) in questionnaire to local governments (Annex 9). In the next stage municipalities were classified into three ranges based on natural break method.

Source prepared by the author.

Moreover, it should be observed that in the local governments' opinion, transport accessibility of the central city affected the development of the municipality (from 50% in the case of the Toulouse region to 80% in the case of the Warsaw region). At the same time, the majority of municipalities which had efficient transport connections with the metropolitan centre believed that this had a positive impact on their development, and that poor transport accessibility had a negative influence. On the other hand, in most cases, the most weakly developed areas of the macroregions were those which had the weakest transport connections with the metropolitan centre – that is those situated between transport corridors or in the region's periphery.

The centrifugal movements observable in the metropolitan areas were mostly related to suburbanisation processes, the intensity of which visibly increased in the recent years (excluding Stockholm). The development process of a polycentric structure of metropolitan areas was the most advanced in Barcelona and Stockholm, as the majority of municipalities situated within 50 km from the city centres looked at daily commuting to work in the same way as they did on the residents' settling down in those municipalities (Figure 44). However, using the example of Barcelona, we could see certain changes in this process. The increasing costs of living in Barcelona itself, coupled with well-developed transport links with the non-metropolitan areas, fostered suburbanisation. On the other hand, the dynamic development of the Barcelona metropolitan area stimulated immigration which covered different zones of the metropolitan area. To some extent, these processes cancelled each other out in the last decade, but overall they generated a rapid growth of the Barcelona metropolis.

In the Warsaw metropolitan area, over a half of the municipalities acknowledged commuting to work of Warsaw inhabitants, but both their intensity and rate of increase was moderate. In the case of Toulouse, only 25% municipalities made a similar declaration, but this was associated with a much greater intensity and rate of increase of commuting than in the case of Warsaw. There was a similar situation in terms of commuting for shopping to the central city, which was occasional in Toulouse and Warsaw and quite popular in Barcelona and Stockholm. In the metropolitan areas of Warsaw and Barcelona, commuting for recreation purposes were relatively the most important, whereas in Toulouse this was acknowledged by less than a half of the municipalities, and in Stockholm only by 1/3.

Similarly, the majority of municipalities in the regional hinterland performed recreation and leisure functions for the residents of the metropolis. In comparison with the municipalities of the metropolitan area, this was particularly well visible in the regions of Stockholm and Barcelona. Only in Warsaw, the role of this function significantly

decreased with the distance from the centre. There is good reason to conclude that this kind of linkages most significantly affected later migration decisions. This is corroborated by the fact that residents of the central city moved out to live in the regional hinterland on the largest scale in the Barcelona and Stockholm regions, while in the regions of Warsaw and Toulouse the scale of this phenomenon was rather limited. In the case of Stockholm and Toulouse, commuting to work played a certain role in the development of municipalities in the regional hinterland – on a daily basis in the former case, and on a weekly basis in the latter. In case of Barcelona, this type of commuting was indicated by 30% of municipalities, and in Warsaw – only by 15% municipalities situated further than 50 km from the city centre.

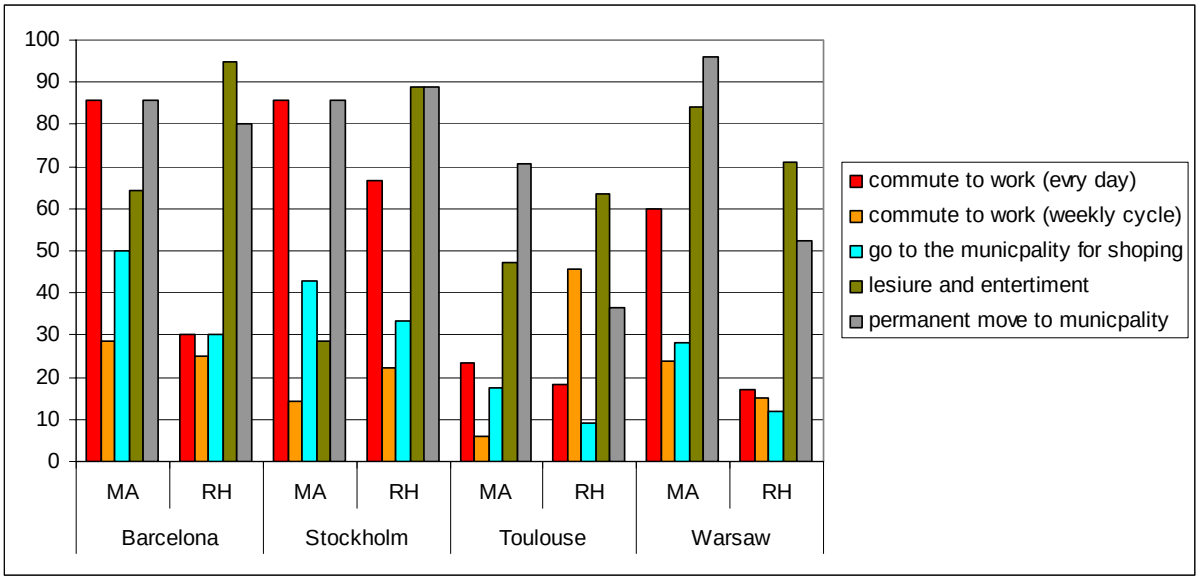


Figure 44. Ties of the macroregion's municipalities with the metropolitan centre – commuting or movement of the metropolitan centre residents [% of municipalities surveyed]
Source: prepared by the author.

In all the metropolitan areas except Toulouse, about a half of municipalities declared that enterprises which have their headquarters in the central city locate their branches in those municipalities (Figure 45)[44]. Relatively most often, these were facilities associated with logistic functions, but other types of activity such as production, trade or services were nearly as popular. In the metropolitan areas of Barcelona and Stockholm, the role of branches of trade companies was significant, in case of Toulouse the majority of such locations were production companies, while Barcelona showed the greatest degree of

44. The results obtained for Toulouse could be affected by the structure of the spatial units: the municipality of Toulouse (the central city) is relatively small, and is surrounded by many municipalities urban in character, where a very large number of enterprises are located. For his reason, the respondents, when answering the question on linkages between the central city, might not indicate connections with the municipalities surrounding Toulouse, which represented a coherent urban functional region.

stagnation in this respect. At the same time, it should be observed that the accelerated development activity of the metropolitan area has led to the emergence of pockets of prosperity and also of poverty. As a rule, this was caused by classical segregation and succession processes described by social ecology, which are currently taking place on a larger spatial scale in metropolitan areas.

Based on the questionnaire surveys, it can also be observed that, as a rule, the regional hinterlands save for Catalonia did not matter considerably as locations for the branches of companies operating in the central city. Metropolitan enterprises would most frequently launch storage and warehousing activity in the regional hinterland, although in the case of Warsaw this also applied to the company headquarters, a situation which was not observed at all in the case of the Mälar region.

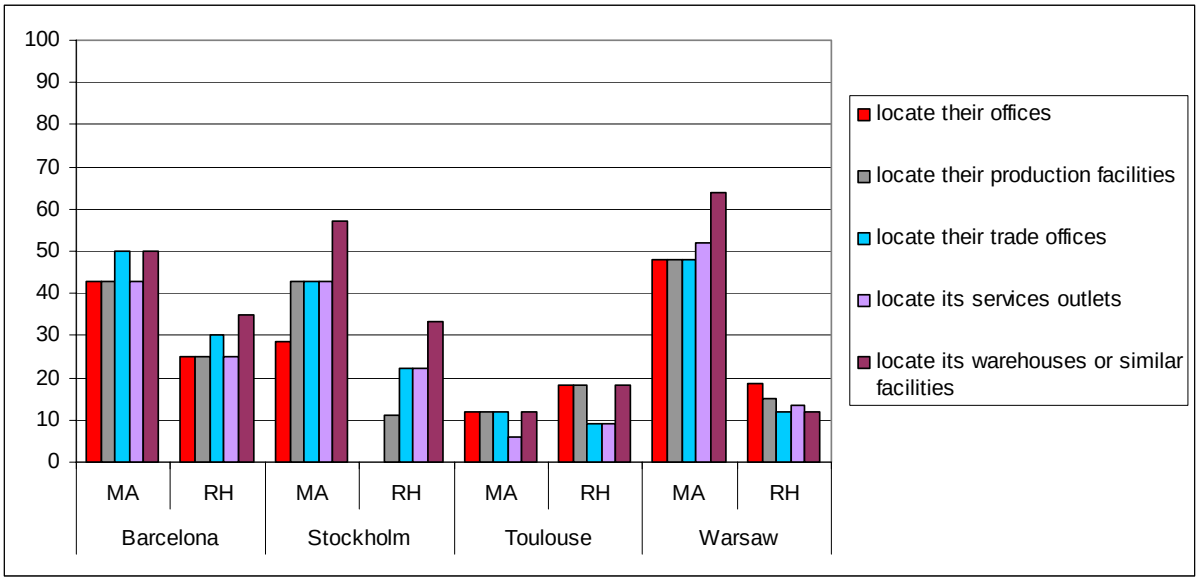


Figure 45. Location of businesses from metropolitan centres
Source: prepared by the author.

Definitely, the process of the "backwashing" of employees with the highest qualifications and young people in education or training from the regional hinterland to the metropolis could be observed in all the regions (the migration balance of the surveyed municipalities in the metropolitan macroregions is shown in Annex 11). The main reason for this was the concentration of the best paid jobs in the metropolitan centre and its direct hinterland. It was also associated with the technological advancement of activities in the centre of the region, the level of innovation of new projects and ventures, and with the well-developed sector of information services. Development opportunities offered by the regional hinterland, including a high quality of life, as a rule did not offset the attractiveness of the labour market in the metropolitan area. This was one of the basic reasons for an increase of disparities in the development level between the metropolis and the region. The exception here was the macroregion of Toulouse, where the backwashing and spreading of developmental processes remained in a relative balance.

On the one hand, young people went to study in Toulouse, where as a rule they would start employment. On the other hand, middle-aged people who started a family would go to live outside the city, most frequently in a location within the metropolitan area, but also further away (including the subregional centres), which is facilitated by a well-developed road network connecting Toulouse with the subregional centres.

12.4. Change in land use as an outcome of the polarisation-difussion processes in metropoliatan macroregions

Socio-economic development is connected with transformations of land use. Population increase results in necessity of devoting new areas to residential purposes. Development of business (particularly industry) also requires suitable land. Development of housing estates and business zones necessitates, in turn, development of technical infrastructure, particularly transport infrastructure. Thus demographic and economic development influences transformation of land use. New functions are introduced particularly to undeveloped areas or extensively developed areas. In European conditions new functions are most frequently introduce to areas previously used for agricultural purposes and through transformations of degraded post-industrial areas or wastelands.

Development and the connected demand for new areas obviously create ecological problems. In European conditions, however, numerous legal regulations are quite effective in limiting this negative impact. It should be noted, however, that in some places the pressure is strong, which in combination with e.g. inconsequent enforcement of law results in negative developmental impact on natural environment. This pertains particularly to, inter alia, the vicinity of large cities subject to suburbanization pressure.

Land use structure in the four analyzed regions differs quite significantly (see details in Annex 11). This results mostly from different geographical and climate conditions and is reflected mostly in differences between the share of agricultural land and natural land, including forested and other non-forested land. In Warsaw metropolitan area, both in the centre of the region and in its hinterland, agricultural land dominates, and 22-24% of the area is covered with forests. Similar intensity of agricultural development of land is visible in Toulouse metropolitan region, while it is more prominent in the centre (which results from the shape of Haute-Garonne department, in the north including Toulouse and its metropolitan area, and to the south extending along Garonne River as far as the Pyrenees). Significantly smaller area is used for agriculture in Barcelona and Glasgow metropolitan areas (with the smaller share of the land in the hinterland of Glasgow, consisting of open areas of highlands and islands with bad conditions for agriculture).

There is a clear tendency for artificial areas in metropolitan regions to have greater share in the centre of the metropolitan region than in the hinterland. The most intensively developed metropolitan region's centre is that of Glasgow (13.5%), and only slightly

smaller percentage of artificial areas occurs in centres of metropolitan regions of Barcelona (10.1%), Warsaw (9.3%), and Toulouse (with the smallest share of 7.2%). Artificial areas constitute the smallest part of region's hinterland in the metropolitan region of Glasgow (1.1%), while in other cases they amount to 2% in Toulouse, 2.1% in Warsaw, and 2.4% in Barcelona (Fig.46).

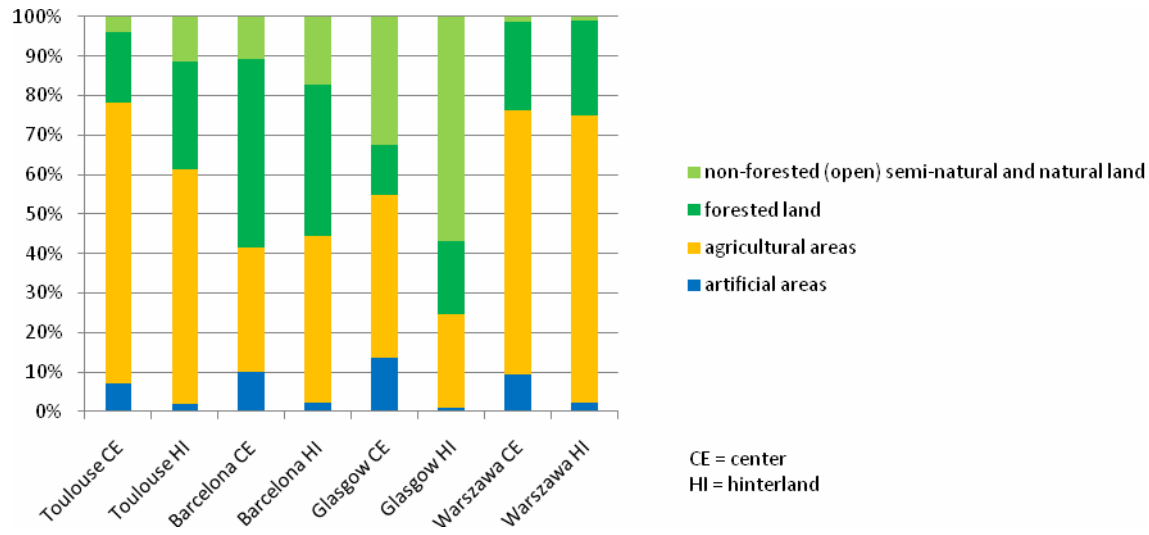


Figure 46. Land use in metropolitan regions (centres and hinterlands) 2000
Source: prepared by the author based on CORINE Land Cover data.

CORINE land cover data allow to analyze the changes in land use in 1990-2000. In all the discussed metropolitan regions the extent of artificial areas increased. It is particularly well visible in the case of Barcelona and Toulouse (cf. Fig. 47). In the case of Barcelona the share of artificial areas increased by over 10% in the centre and by 11.5% in the hinterland. In Toulouse 10% increase was recorded only in the centre, while in the hinterland it amounted to less than 6%. Smaller increases were recorded in Glasgow. In this case they are more prominent in hinterland (1.9%) than in the centre (1.3%). In the metropolitan region of Warsaw the increase amounted to over 2% in the centre, and in the hinterland to only 1.2%. In the case of Warsaw it is worth noticing that the discussed data reflect the period of 1990-2000. After 2000 a significant development of all housing estates took place in areas previously non-developed or used for agriculture, both in the central city and its vicinity. This is already observable in the discussed maps (cf. Fig 12), prepared on the basis of data for years 1990-2006. It should be expected therefore that in the first decade of the 21st century increase in artificial area in the metropolitan region of Warsaw (particularly the centre of the region) is going to be much higher than 2%.

In all the considered regions there was a decline in agricultural land recorded. The highest decline was recorded in central areas of metropolitan regions of Barcelona and Toulouse. Therefore increase in artificial areas took place mostly at the expense of

agricultural areas. Only in the case of Barcelona there was also a decline in natural areas recorded. In other regions their share slightly increased or remained the same. Negative impact on nature was therefore most significant in the case of metropolitan region of Barcelona. Taking into account the fact that development of new residential, business, and infrastructure functions in this regions takes place to a large extent along the coastline, one can expect developmental conflicts between natural and business assets, as well as upsetting the environmental balance.

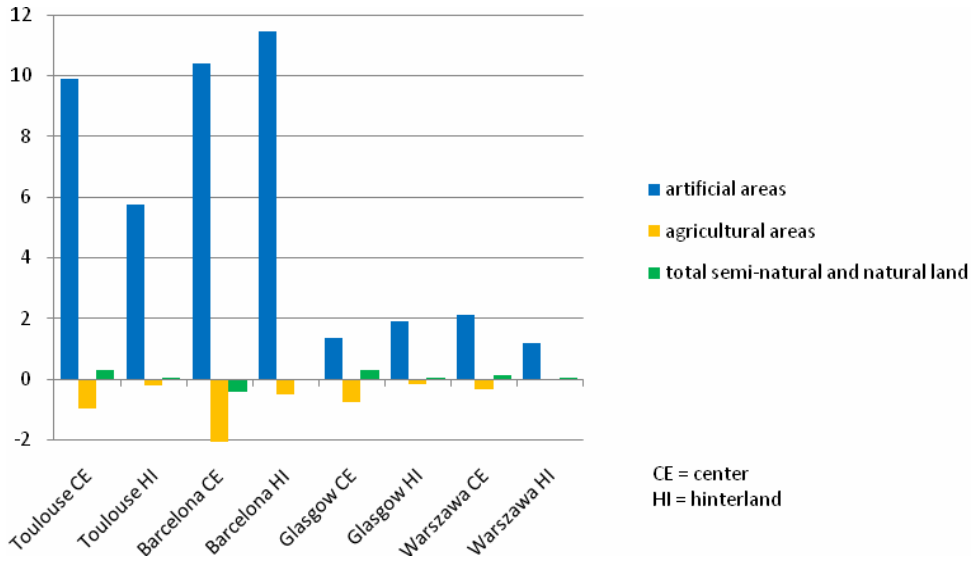


Figure 47. Land use change (%) in metropolitan regions (centres and hinterlands) 1990-2000
Source: prepared by the author based on CORINE Land Cover data.

The analyzed metropolitan regions, despite their differences resulting from location as well as developmental and geographical conditions, have some common features. First of all, there is a clear tendency for the most intensive changes in land use to take place in the centres of the regions. This, however, does not preclude occurrence of the phenomenon also in other parts of the regions, especially in presence of sub-regional centres and transport infrastructure or, as in the case of Catalonia, attractiveness of the coast. Development of residential and business functions as well as infrastructure takes place mostly in areas previously used for agricultural purposes. Changes in land use (e.g. from industrial to residential function) are slightly less visible and concentrate in centres of metropolitan regions, with Warsaw clearly standing out in connection with deindustrialization during the period of systemic transformations.

Analysis of data from CORINE land cover at NUTS3 level allows for capturing the general trends. Informative value of the data on the level is rather small, therefore helpful is the analysis of population distribution and its growth/decline in smaller spatial units (optimally NUTS5), as well as the maps based on CORINE land cover source data, used in

the study and showing precise location of the most important changes. It is just the analysis at this level that allows to notice certain processes taking place in the region, as well as to indicate directions for deeper analyses (in the case of Catalonia, for instance, connected with pressure on ecosystem of the Mediterranean Sea coast).

12.5. Activities of public authorities in metropolis-region context

Cooperation networks in the analysed metropolitan macroregions were rather varied. The case studies revealed that one factor which impeded the development of cooperation was the region's dependence on the current political situation (e.g. Mazowsze and Catalonia), while the ability for working out an institutionalised model of cooperation was a factor conducive to development. The current administrative division was also an important factor in the creation of such networks. In the case of Warsaw and Barcelona regions, the existence of authorities in charge of regional development in a situation of overly politicised relationships did not make the development of cooperation easier. On the other hand, the absence of such authorities forced certain bottom-up activities which in many cases were more effective than solutions imposed from above. The most important examples of such cooperation at the macroregional level included spatial planning (Glasgow, Toulouse) and development of transport networks (Barcelona, Stockholm).

Box 5. Transport integration – the example of Stockholm

In case of Stockholm, the authorities of five subregions and their municipalities proposed an initiative entitled "*En Bättre Sits* - On the right track", which was aimed to improve the accessibility, quality and speed of the transport infrastructure. One of the reasons for this was neglecting the specific needs of the Mälar region in the central-level planning. The initiative operates as a forum for dialogue between the regional and local public authorities and representatives of specialised central institutions dealing with transport. Its aim is to arrive at a consensus concerning the investment priorities, and addressing the interests of individual actors, the entire metropolitan region, entrepreneurs, inhabitants as well as environmental protection issues.

The authorities of the metropolitan centre were as a rule the dominant entity determining mutual relations between the metropolis and the region. In some case, however, the city authorities had greater, nation-wide ambitions (Warsaw), whereas elsewhere the regional and city authorities showed no interest in the establishment of an additional – metropolitan - tier of administration (Barcelona). The latter case, in which usually conflicts are sought in relation to the Autonomous Community of Catalonia, shows how difficult this issue is, and proves that in the case of Catalonia the significance of intraregional interests is usually underestimated. The establishment of the metropolitan authorities in 1974 immediately met with a negative response both from the city of

Barcelona, and the regional authorities, as a result of which, 13 years later (in 1987), the metropolitan authorities were abolished by a decision of the regional authorities.

Competition in the metropolitan macroregions was manifested in a variety of ways, primarily by efforts to ensure the location of strategic inward investments, which to a smaller or greater degree could be observed in all the macroregions. In this regard, competition was particularly severe in the metropolitan areas, which also included plans to attract the wealthiest residents.

Another symptom of competition was fighting for political influence and voters' support, which was most visible in those regions which had regional authorities. It was also manifested by the ambitions of the subregional centres which strived to attract some of the higher-order services from the metropolitan centre (the region of Toulouse – higher education; the region of Warsaw – academic and cultural functions).

The coordination level of activities regionally was varied. The paradox is that such coordination was relatively weak in those regions where self-government authorities were furnished with broad competences (Mazowsze: e.g. railways run by the regional government, regional roads, specialised health care, spatial planning; Catalonia – own treasury, police, numerous companies, e.g. General Roads Directorate, Catalonian Railway Infrastructure, Audiovisual Media Corporation). For instance, in Catalonia intensive spatial planning work is carried out for the region; however, due to the lack of the required funds, the effects of this are meagre. It is because the municipalities have most powers and funds, and they engage in territorial cooperation networks very cautiously, only in justified situations and specific spheres (transport, environmental protection, etc.). The situation is similar in Mazowsze, where – despite the existence of a regional spatial development plan - the decision-making power in this regard rests with the local governments, which pursue their own policy.

In contrast, in case of the Midi-Pyrénées region, the coordination of activities is quite extensive. This is possible owing to efficient forms of cooperation between different administration levels (both horizontally and vertically). Coordination is also facilitated by the fact that the regional authorities have been furnished with broad powers and investment budgets: the region is inter alia responsible for secondary and vocational education, spatial planning, economic development, and transport (road and railway infrastructure, financing and organisation of public road and railway transport).

In many cases, the analysed regions lacked institutions furnished with relevant powers at the regional level. The non-governmental Mälar region in Sweden was in charge of the coordination of bottom-up activities, including promotional ones, in order to increase the competitiveness of the metropolis and its regional hinterland. Sweden is an exceptional example here because the division of competences can be described using the hourglass

metaphor, which means that considerable powers related to planning, setting standards and decision-making processes are vested in the central level, whereas the implementation of programmes and policies takes place at the level of municipalities, which have both extensive competences related to making decision on the ways of executing specific tasks, as well as far-reaching fiscal autonomy and freedom in the expenditure of funds.

Similarly, in the case of Western Scotland, the key competencies are concentrated at the local level. In consequence, the local networks of cooperation between municipalities are well developed, but there is a deficiency of coordination at the macroregional level. To some extent, this gap is filled at the governmental level (Scottish Government) as the powers vested in it include inter alia: railways, environmental protection, flood protection. Another example of national-level activities is the Government Relocation Programme, which aims to transfer some public services outside London and the south-eastern region. The results of its activity include inter alia the location of a computerised government register and statistical data centre in Western Scotland (Dumfries).

In addition, in many cases individual areas of the macroregions seek ways to release the endogenous potential on their own. For example, Dumfries and Galloway, the largest agricultural area in Western Scotland, undertakes joint activities together with the Scottish Borders region located in the zone of Edinburgh's influence, relating e.g. to applications of modern design in the traditional textile industry.

The relationships between the city and the surrounding region were ascribed varying roles in the strategies of public authorities at different levels. In some cases, efforts to equalise development disparities by favouring peripheral areas could be observed (Mazowsze – equalising instruments addressed to enterprises and local governments; United Kingdom – government-level relocation programme to peripheral regions; the strategic goal in Scotland is to reduce the intraregional development gap). In other macroregions, a clear domination of the metropolitan area could be noticed. For example, the Barcelona metropolitan region, depending on the mode of its delimitation, has from 3.7 to 4.9 million inhabitants – i.e. hosts the definite majority of Catalonia's population. In addition, the bulk of economic activity with regional and supra-national significance, including international, is concentrated there. In contrast, activities have been undertaken in Sweden to create functional links throughout the macroregion by strengthening second- and third-order subregional centres, primarily by the establishment of technological parks, logistics and retail centres and new housing estates. Technological parks are developed via branches of higher education institutions with a view to attracting companies operating in the ICT and biotechnology sectors (Kista and Flemingsberg) and reinforcing the region's R&D potential.

Box 6. The concept of polarisation and diffusion in the Midi-Pyrénées region

In Midi-Pyrénées, the development policy is based on the polarisation and diffusion concept. It is believed that development opportunities for the region should be sought primarily in the development of Toulouse (modern technologies, R&D in aerospace industry, pharmaceuticals and medicine, chemistry and food processing) and in creating conditions for the diffusion of development – mainly through the development of high-quality transport network, promoting the building of human capital (development of higher education in the subregional centres) and zones of industrial activity outside the metropolitan area. Modern specialised agriculture is also supported (including ecological, traditional agriculture, also combined with agri-tourism); it is regarded (together with food industry) as a significant endogenous resource of the region's rural areas.

In the majority of macroregions, the undertaken activities focused on attempts to utilise the endogenous potential of individual areas, on the assumption that the development of the metropolitan area has a positive impact on its regional hinterland.

The extension of the transport infrastructure was one of the major tasks undertaken to disseminate development from the metropolis to more peripheral areas of the region. However, key decisions in this regard as a rule rested with the central authorities. In some situations, in view of the passivity of the central-level authorities, such activities were initiated "on the ground", as for example in the case of Stockholm, where the initiative "*En Bättre Sits* - On the right track" was aimed to integrate and coordinate decision processes at different levels (see above). This was associated with placing special emphasis on the development of the transport infrastructure in the Stockholm-Mälar region as it was believed to be of crucial importance for maintaining the region's competitiveness and good performance of the labour market. This is particularly important when we take into account limited accessibility of housing in the area of the metropolis. Transport accessibility was also regarded as crucial in Western Scotland, which is corroborated by activities at the level of the Scottish Government concerning the development of the railway network. In the Midi-Pyrénées region, efforts were concentrated on the strengthening of the subregional centres (development of business activity centres and branches of higher education institutions) and upgrading the railway infrastructure (key road investments have already been completed), while the major investment in this regard – the construction of a TGV route (Bordeaux – the Mediterranean Sea) rests with the central authorities.

Most frequently, activities related to the development of the transport infrastructure helped build supra-regional linkages of the metropolises, which catered to their regional hinterlands only incidentally, with a simultaneous existence of gaps in the transport

networks and "tunnelling" effects. These activities are supplemented by efforts to ensure conducive conditions for the creation of new jobs around smaller urban centres.

Some of the activities were associated with attempts to build a polycentric structure of the metropolitan areas. For instance, efforts were made in Barcelona (in its eastern part) to create a centre of hi-tech sectors, but these attempts have not been particularly successful. The metropolitan region of Barcelona is relatively polycentric, owing to the purposeful deconcentration of industry many years ago (although the centripetal arrangement of the transport system strengthens the role of Barcelona). Problems experienced today are mostly related to difficulties with finding an alternative for the last declining zones of traditional industry (also as a result of their off-shoring to Eastern Europe and Asia). In case of Western Scotland, we can list the location of regional airports as an example of actions building the polycentricity of the metropolitan area. The two international airports are situated outside the boundaries of the city of (Glasgow Airport in Renfrewshire and Prestwick in South Ayshire). Moreover, measures are implemented to improve the external image of the individual parts of the metropolis, which inter alia include the regeneration project of the River Clyde waterfront (with a shipbuilding past), the redevelopment of the former steelworks in Ravenscraig (North Lancashire), restructuring of Motherwell and Wishaw (metallurgy), building new housing estates and the Building Society in Glasgow, urban renewal of downtown Glasgow and regional cities or regeneration of free urban space.

Box 7. Polycentric development of the Stockholm metropolitan area

RUFS 2010, the Regional Development Plan for the metropolitan of Stockholm, stipulates the consolidation of the area' polycentric structure inter alia by the strengthening of the role of second- and third-order regional urban centres. Activities, which are implemented at several levels, involve e.g. strengthening cooperation between the local authorities particularly with regard to taking account of the local development plans and spatial development plans, developing a networked structure of transport connections (concentrically around Stockholm), cooperation in the field of education and higher education, development of housing and adaptation of infrastructure to the needs of the regional labour market. In addition to that, the development plan identifies areas which call for closer cooperation and integration. One such area is the central area which comprises Stockholm, the Arlanda Airport, Uppsala and Södertälje. Another is the planned bi-city of Västerås-Eskilstuna. The third area for integration is the research centre and the technological park of Linköping, the environs of the Nyköping Airport and the city of Norrköping. Ultimately, the entire area (except the third component) is to have transport connections with the travelling times of one hour at the most to Stockholm and to the Arlanda Airport.

Source: RUFS 2010.

Activities related to the development of education were the major instruments to counteract the backwashing of developmental resources. In Mazowsze, there were plans related to the development of education at the lowest (pre-school) level, but this was a nation-wide initiative. Furthermore, non-public higher education institutions spontaneously developed in the subregional centres of the Warsaw region. In Midi-Pyrénées, attempts were made to develop academic functions in the subregional centres, but such activities are done on a limited scale (small number of courses offered, only undergraduate programmes), as a result of which Toulouse remains an unquestionable academic centre of the region. In Catalonia, the attempts to deconcentrate higher education institutions (e.g. *Universidad Autonoma Barcelona*) have been only partly satisfactory and have led to creating additional burdens for the transport system of the metropolitan area. In view of a high level of the concentration of the population in the Barcelona metropolitan area, such extensive deconcentration does not make much sense. Similarly, efforts are made in Western Scotland to develop modern vocational education centres outside the metropolis (a branch of the University of Glasgow in Dumfries). By contrast, Sweden operates a binary higher education model, which means that elite universities such as the Royal Institute of Technology (KTH), Stockholm School of Economics, Stockholm University, Karolinska Institute and Uppsala University function side by side with smaller higher education institutions, the so-called *högskolan*, which mainly offer undergraduate and graduate courses. Altogether, there are 26 higher education institutions in the Stockholm-Mälar macroregion, which give employment to 40% of the country's academic staff. The most prestigious higher education institutions are located in Stockholm and focus on research activity and technology rather than on teaching. This function is partly discharged by the *högskolan*, which are frequently located outside the city, both in the metropolitan area and in the macroregion itself. The highest expenditure on education, including adult education, and increase in the number of students was made by the Södertörn University and the Mälardalen University, located in Eskilstuna-Västerås, a bi-city that is now being established.

12.6. The metropolitan areas governance

Many European cities have tried to create a comprehensive model for the management of metropolises, understood as functional entities comprised of the centre and the metropolitan area. The following models for managing metropolitan areas can be distinguished (cf. METREX, 2004):

- Comprehensive: the authorities are elected and have extensive powers in the running of social, economic, infrastructure and environmental policies, which allow

them to devise and implement integrated development strategies for the metropolis (e.g. Hanover);

- Key tasks: the authorities are elected or appointed but have limited powers, as a result of which they can only solve specific problems related to metropolitan development (e.g. Stuttgart, Helsinki, Paris, Athens, Thessaloniki, Lisbon, Porto);
- Advisory: there is no separate tier of authority at the level of the metropolis, and the tasks related to the strategic planning of metropolitan development and providing advisory functions in their implementation are executed by development agencies or joint advisory committees appointed by the current public authorities (e.g. Glasgow, Berlin, Munich, Copenhagen-Malmö, Zurich).

Model	Spatial planning	Infrastructure	Environment	Economy	Society
Comprehensive	Metropolitan planning	Roads Public transport Water management Waste management	Natural protection and conservation administration	Development agencies Training agencies	Healthcare Education Higher education Social assistance Social housing
Selected tasks	Metropolitan planning	Roads Public transport	Environmental protection agencies	Development agencies	
Advisory	Metropolitan planning				

Table 44. Management model for metropolitan areas and tasks performed
Source: prepared on the basis of (METREX 2004).

In order to establish a level of elected authorities responsible for strategic planning on the metropolitan scale, and which will into account all the basic aspects of its development, the existing territorial self-government structures at the local level as a rule need to redesigned. This is undoubtedly a challenging task and has rarely been attempted so far. More frequently used forms of managing metropolitan development are

based on voluntary cooperation of the existing territorial self-government units in solving specific problems, primarily those related to transport and economic development. The growing pressure from the global and local environments is a stimulus for creating various institutionalised forms of such cooperation to facilitate more effective performance. Arguably, if regional and national strategies dealing with these issues function properly, with the involvement of major local and regional actors and the existence of efficient cooperation networks at the metropolitan level, the establishment of institutionalised forms is not as necessary (METREX 2004).

In all the analysed metropolitan macroregions except Barcelona, cooperation between the central city and the municipalities situated in its closest vicinity was not as good as between inter-municipal cooperation networks (Figure 46). Cooperation of municipalities with the metropolitan area was most negatively evaluated in Warsaw and Toulouse (in the latter case this was the consequence of the adopted model of extensive horizontal cooperation networks). In Stockholm, this cooperation was evaluated as good, but still not as good as cooperation with the neighbouring municipalities. In Barcelona, the very good cooperation between the city and the municipalities in the metropolitan area could to some extent be a consequence of poor cooperation between the municipalities and the regional authorities.

* 1 – very bad, 5 – very good

Figure 48. Evaluation of cooperation with the central city by municipalities of the metropolitan area*
Source: prepared by the author.

Box 8. Incoherence of administrative and planning divisions in Catalonia

In case of Catalonia, there was a discrepancy between the traditional administrative division established in the early 19th c. and the planning division, certainly better suited to the actual structure of economic activity and employment in the period after Catalonia's industrialisation. Admittedly, the duality of this division (administrative and planning) has a political context (related to the dissimilarity of interests, which also divide the Catalonian community). The appointment of the authorities of the Catalonian metropolitan area and their subsequent abolishment may serve as an example here. The strong metropolitan authorities, representing the majority of the region's population, were not welcome by the political elites of Barcelona, much less by the autonomous region of Catalonia.

In the analysed cities, as a rule there were no regulations imposed by the central authorities governing the cooperation within the entire metropolitan area. We should not, however, be oblivious of the attempts at their implementation in Poland (with no effect so far), and their functioning in the case of Glasgow (Box 8) and Catalonia, where they were ultimately abolished, mostly due to political conflicts.

Box 9. Liquidation of the Glasgow metropolitan area

In 1975-1996, Scotland had a two-tier system of local administration. In this period, the city of Glasgow operated as part of the Strathclyde Regional Council, which was the most populated and largest region in Scotland. The Council was inter alia responsible for education, transport and strategic planning. The reasons for its abolishment included e.g. blurred powers and mismatches concerning the spatial range of the provided services. However, regional experts emphasise that political interests played an important role in this process, and that the 1996 reform was a mistake as far as Western Scotland is concerned. At present, there is no political nor social willingness to return to the earlier organisation of the regional government.

In case of Barcelona, difficulties in this regard are multifaceted, associated with engaging the national authorities in this process, in addition to the regional and urban authorities. As mentioned above, intraregional interests also played a role; in consequence, the metropolitan corporation (authority) was dismantled after only 13 years of operation.

In Sweden, no attempts have been made so far to implement the arrangements imposed by the central authorities. However, legal forms of establishing bottom-up associations of the local authorities are quite popular, e.g. on the basis of the so-called "ordinary contract" used for specific objects of cooperation; "local government federation" – a form

of cooperation between various levels of local government authorities (Sweden has over 60 such authorities), and the broadest form, subsidised from the central government – the "Regional Co-operation Council", which groups representatives of municipalities from across the region, with the possibility for inviting representatives of subregions.

In the existing situation, bottom-up initiatives seem to be the key to the effective and efficient management of metropolitan areas. However, they encounter many barriers, mostly associated with the lack of trust between the authorities of the metropolitan centre and the surrounding municipalities (e.g. Warsaw where, despite the legal arrangements regulating the functioning of special-purpose associations of municipalities, cooperation is poorly developed). In case of Toulouse, there are 3 rival general-purpose associations of municipalities in the core of the metropolis, the establishment of which was driven by a desire to gratify the local ambitions; this hampers cooperation and makes coordination of activities much more complicated. It should be emphasised, however, that extensive cooperation networks between different administrative units (and their associations) facilitate an efficient management of metropolitan areas. On the other hand, in the metropolitan area of Stockholm, activities are hindered by lengthy decision-making processes (the consensus culture), but cooperation is well developed and covers many areas, being supervised by the County Administrative Board which is appointed by the central authorities. Additionally, regional planning is made more difficult by the fact that municipalities have broad powers in the sphere of spatial planning, and the County Administrative Board draws the regional plan (which is however not compulsory for the municipalities) on the basis of the plans prepared by municipalities. On the other hand, in the metropolitan area of Glasgow, cooperation "on the ground" does not encounter any considerable obstacles, which is an effect of continuing the earlier traditions in this regard as well as strong functional linkages. Nevertheless, it is pointed out that some harmonisation concerning the territorial scope of local agreements and special-task organisations would be useful. The most important example of cooperation at the level of the metropolis is the Clyde Valley Community Planning Partnership, established in 2003 by the political leaders of 8 local governments in order to initiate joint strategic actions for the regeneration of the Glasgow metropolitan area.

Similarly, in Barcelona, the actual metropolitan region (understood as an area where activities are coordinated and decisions are made jointly) is determined by municipal cooperation in three areas. The first covers 31 municipalities (with Barcelona) furnished with powers in the sphere of environmental protection; the second covers 18 municipalities (with Barcelona, in the sphere of transport), and the third includes 36 municipalities which cooperate in the preparation of the strategic metropolitan development plan. Even though there are no integrating elements here, it is believed that the municipalities, acting jointly, express the interests of the metropolis.

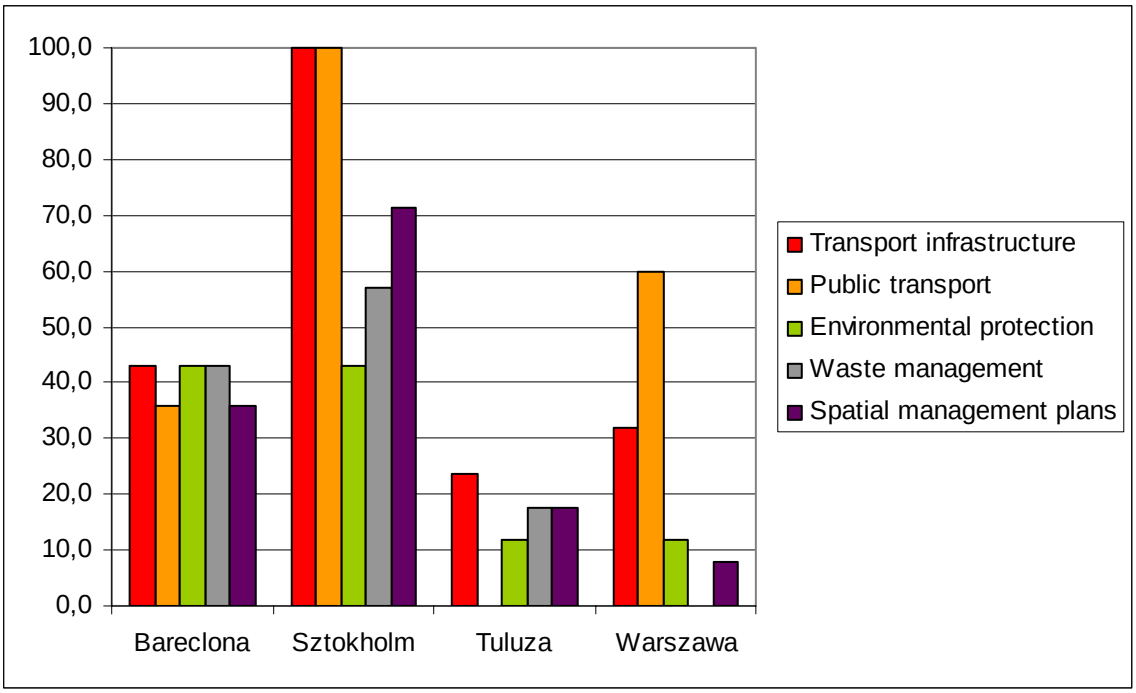
The scope of activities undertaken by the metropolitan areas most frequently included transport and spatial planning. All the analysed metropolitan areas had some achievements in this respect: they were relatively the smallest in the case of Warsaw, and fully operable in the case of Stockholm, and in Toulouse (while taking account of the coordination of activities between different administrative units as part of the *Communauté Urbaine du Grand Toulouse*, which had quite extensive powers: municipal housing, culture, public transport, spatial planning, municipal services (water, sewerage), environmental protection, social services, economic development). Activities also cover more specific areas, e.g. tourist traffic services and environmental protection in Barcelona (which is connected with managing the deficit water resources) or development projects in Glasgow (Advanced Research Centre, Science Technology Diamond).

In case of Barcelona, also environmental protection issues (including water and sewage management) are covered by inter-municipal cooperation in the core of the metropolitan area. Likewise, cooperation efforts between the industrial cities surrounding Barcelona (from Villanova through Martorell and Terrasa to Mataro) initiated to address the threat of marginalisation and costs of deindustrialisation have been interesting. For these cities, the goal of their efforts is the construction of a road connecting them with Barcelona.

In the metropolitan area of Stockholm, state and local government administration function in parallel. The government administration (County Administrative Board) is in charge of:

- Coordination of government policies at the regional level;
- Natural environment protection;
- Monitoring and inspections of local and subregional governments.

The tasks of the subregional local government (County Council) include administration of the health care system, public transport (including transport of people with disabilities), regional planning, and to some extent higher education, while the sphere of regional planning and public transport rests with the Office for Regional Planning and Transport.



* In case of Toulouse, we should bear in mind the specific structure of the metropolitan area, where the central city occupies a relatively small area. For the respondents, a more pertinent point of reference could be the key association of municipalities operating in the metropolitan area of the *Communauté urbaine du Grand Toulouse* – 25 municipalities, including the central city, and furnished with extensive powers.

Figure 49. Scope of cooperation with the central city by municipalities of the metropolitan area*
Source: prepared by the author.

Based on the questionnaires distributed among the municipalities, the key areas of cooperation in the metropolitan areas were the following (Figure 47):

- Public transport (Stockholm, Barcelona (lesser extent), some indications in Warsaw);
- Environmental protection and waste management (Barcelona and Stockholm, some indications in Toulouse);
- Spatial planning (Stockholm, certain indications in Barcelona, marginally in Toulouse and Warsaw).

It should also be pointed out that in the case of the Stockholm region, cooperation networks also covered municipalities situated further than 50 km away from the city.

The majority of municipalities which have not as yet been engaged in cooperation see a need for it. In the case of the Barcelona metropolitan area, this pertained to cooperation in the sphere of transport (including public transport), environmental protection and planning (in various groups of municipalities), while in Toulouse and Stockholm – to environmental protection and spatial planning. In contrast, the respondents in the

metropolitan area of Warsaw saw a need for developing cooperation in all of the aforementioned spheres.

12.7. Development prospects

Practically in all the regions except Catalonia and Midi-Pyrénées, we can expect an increase in developmental disparities between the metropolis and the surrounding region. In most cases, this is associated with the polarisation and diffusion development model, which stipulates that the range of the spreading of development processes is usually small, with a simultaneous backwashing of resources from the more distant parts of the metropolitan macroregion. Warsaw can be viewed as a classical example of this model, even though some of its elements can also be found in Glasgow. In the case of Stockholm, the complementary model associated with the functioning of modern industry outside the metropolitan areas is also partly applicable. In Barcelona, so far there are no indications of polarisation, although the consequences of an accelerated deindustrialisation of the cities of the so-called Arc surrounding Barcelona may generate faster polarisation within the metropolitan area. This is partly a consequence of globalisation since the hinterland of the metropolis (including rural areas) probably will not be directly affected by these processes.

The scenarios concerning further anticipated developments vary, and largely depend on the regional context. In the first model, a growing depopulation of peripheral rural areas is the most likely. This trend can be reversed based on the local resources (more likely in case of Glasgow) or investments to disseminate the scale of the metropolis' development (more likely in case of Warsaw). In case of Stockholm, one of the probable scenarios envisages emergence of a polycentric metropolitan area which will foster development processes across the region. In contrast, the future of the Toulouse region relies most heavily on the diversification of the economy in the metropolitan area, which can lead to the expansion of the present cooperation links and a better integration of the metropolitan hinterland. On the other hand, the future of Barcelona and Catalonia will significantly depend on their ability to meet the challenges posed by globalisation and international competition, which can hardly be expected to be manifested on the regional scale. Undoubtedly, however, some local systems in the metropolitan area of Barcelona are seriously threatened by the diminishing significance of the industrial sector, which the region has so far been unable to offset by creating alternative jobs.

CONCLUSIONS

In the analysed European metropolitan macroregions, trends for the increase of development disparities between the metropolis and the surrounding region could be observed in the period 1995-2004. This can be viewed as a consequence of metropolisation processes, which lead to a faster development of large urban centres which pool the resources indispensable for the development of information economy than that of their regional hinterlands, which in many cases function in the previous, industrial and agricultural development paradigm. Similarly, middle-sized cities “eclipsed” by the large metropolis are developing more slowly. Nevertheless, opposite processes were taking place in some of the macroregions, but this was usually either a consequence of enormous intraregional disparities or of a lower rate of economic growth in the countries in which they were located.

The national context plays an important role in analysing the development dynamics of metropolises as the nation-wide rate of growth is as a rule strongly correlated with the rate of development of metropolitan areas. Furthermore, by comparing the rates of growth in the component parts of the metropolitan macroregions with the national average, we were able to identify the four basic types of regions. Consequently, we indicated macroregions where a fast development of the metropolitan area was accompanied by a speedy development of its surroundings. This could be viewed as a proof of the lack of barriers to the diffusion of developmental processes. On the other hand, an inverse situation could point to structural differences or low accessibility which hampered the diffusion processes or, alternately, to the backwashing of developmental resources from the periphery into the regional centre. In a situation of a slower development of the centre, its surroundings as a rule coped slightly better than the mean value. This could either indicate relatively weak intraregional linkages or point to a competent use of endogenous resources by the regional hinterland (e.g. related to the development of tourism or modern industries). Nevertheless, there also existed macroregions where both the metropolis and the remaining part of the macroregion were developing tangibly more slowly than the national average; this could be seen as a proof either of their strong intraregional ties or of their structural affinities.

Metropolitan macroregions were strongly divergent in terms of the correspondence of demographic processes, structural changes and labour market fluctuations taking place in the analysed component parts of metropolitan macroregions (i.e. in metropolitan areas and their regional hinterlands). This, however, makes generalisation difficult and points to a significant role of the national and regional contexts, which prove a clear *differentia specifica* of each of the surveyed macroregions.

However, in the majority of metropolitan macroregions an increase in the number of the population could be observed; it was primarily caused by migration inflows both to the metropolitan areas and their regional hinterlands. This was probably connected with the segmentation of migration – young people in working age would immigrate to metropolitan areas to seek employment or to study, whereas middle-aged or retired people would move to areas situated further from the centre, seeking a higher quality of life and better living conditions.

On the contrary it is difficult to identify linkages between structural changes occurring in metropolises and in their regional hinterlands. In some regions, similar processes take place (e.g. an increasing role of services), whereas opposing trends can be observed in other macroregions (e.g. increasing share of services in the metropolitan area's economy, accompanied by a simultaneous industrialisation of the metropolitan regional hinterland). The role of services in metropolitan services usually results from a growing role of specialised services, whereas the service "advancement" of the metropolis is usually accompanied by an increased role of services in the regional hinterland.

On the other hand, there were marked linkages between the labour market situation in metropolises and in their regional hinterlands, but this applied to the dynamics rather than the situation on the macroregional labour market – and was largely a consequence of changes in the nation-wide labour market. Simultaneously the situation in macroregional labour markets was rather stable despite a period of good economic performance, and economic growth was mostly produced by an increase in productivity. The disparities in productivity between the metropolis and the region were still relatively wide, both in case of the industrial and services sectors.

One of the major factors differentiating both metropolises and their regional hinterlands was the modern character of the economic structure, expressed by a large share of services, including specialised services, which was associated with a high level of economic development. In addition, the disparities in the demographic potential of the macroregions also played an important role as they signalled the size of the local labour pool and sales markets, which in turn would usually foster the development of the service sector. In case of metropolitan areas, their place in the respective national settlement structures was important, with an additional differentiating factor being the degree of integration of the suburban zone with the metropolitan centre, expressed by the disparities in the economic structure and labour productivity. On the other hand, for regional hinterlands of metropolises, the labour market situation was more important; in many cases it was linked to the level of industrialisation of the regional economy. Furthermore, the level of the duality of the economy, expressed by the disparities in the

labour productivity between agriculture and non-agricultural activity, was another significant factor.

Taking into account the above dimensions of disparities, we identified several main types of conditions determining the economic relationships between the metropolis and the region observable in Europe. Most of the types of such conditions could be encountered across Europe and were spatially dispersed. Nonetheless, there were also groups of macroregions with similar conditions which could be found in one or several neighbouring countries, e.g. southern Germany, northern Italy, Austria and Slovenia, as well as the remaining macroregions of large German cities. On the other hand, the capital city macroregions of Central and Eastern European countries were the most conspicuous of metropolitan macroregions. In this group, it could be clearly observed how metropolises break the ties with their regional hinterlands. This was probably caused by the rapid pace at which the capital city metropolises joined the mainstream of an open networked economy, with a dominance of traditional functions such as low-productivity agriculture and declining traditional industries in the economies of their regional hinterlands. To some extent, this type was imitated by other, usually smaller cities with peripheral locations, where similar processes took place but with a lower degree of macroregional divergence. At the same time, highly industrialised regions ("industrial" or "problem" regions) were relatively the most internally coherent. However, during the process of adapting their economic structures to the conditions of global information economy, their intraregional convergence would as a rule decrease. The remaining types of regions were quite varied despite a similar scale of intraregional disparities in the economic development level. Divergence could be observed both in highly-developed monocentric and in polycentric regions. Nevertheless, in the former type of regions, this process took place in the conditions of an extensive and complex network of flows both regarding migration and local labour market linkages, whereas in monocentric regions the degree of complexity of these relationships was much smaller. In contrast, metropolitan regions situated in Germany, Austria and Slovenia manifested the greatest stability in terms of development disparities between the metropolis and the region, which was largely a result of a similar situation in the macroregional labour markets and could be seen as a proof of considerable integration of regional production systems. However, capital city macroregions yielded the least to such attempts at generalisation – particularly those in smaller countries, where the relationships between the metropolis and the region were uniquely distinctive.

The key factor affecting the disparities in the economic development level and their change was the similarity of the economic structures of the component parts of the metropolitan macroregion. A similar economic structure could point to the existence of direct or indirect linkages between metropolitan areas and their regional hinterlands

which lessened the disparities in the development level. Wider structural differences were manifested in dissimilar development paths for the metropolises and their regions and led to macroregional divergence. Nonetheless, the increasing level of similarity between the economic structures of the metropolis and the region was not the key factor underlying macroregional convergence.

Similarity of the labour market situation was a manifestation of minor intraregional disparities in the level of economic development, which could be seen as a proof of linkages within the macroregional labour market. Furthermore, an improved situation in the metropolitan labour market with its simultaneous deterioration in the regional hinterland was the main reason (or consequence) for the macroregional divergence in the development level. Seen together with the migratory outflow from the regional hinterland to the metropolis, this could testify to the backwashing of development resources (mostly human capital), from the periphery to the core.

Labour productivity was very strongly correlated with the development level that to some extent was a result of the structural disparities. This was manifested *inter alia* by the differences in labour productivity in industry reflected by varied degree of capital intensity of the sector, and thereby probably to the level of its technological advancement.

It should also be pointed out that both the scale of intraregional disparities and their changes were quite strongly dependent on the national and regional contexts, and the indicators used as well the regression models applied revealed only some of the factors that determine them. It is quite likely that incorporation of indicators related to the quality of human capital and innovation of the enterprise sector into these models would have allowed for a better explanation of the observable intraregional disparities and their changes. Furthermore, the capital city macroregions would most often evade such generalisation, particularly in smaller countries whose very nature added specific qualities to the relationships between the metropolis and the region.

The case studies selected for analysis (Barcelona-Catalonia, Glasgow-Western Scotland, Stockholm-Mälar Region, Toulouse-Midi-Pyrénées, Warsaw-Mazowsze) represented extreme situations regarding both the scale and the dynamics of intraregional disparities. Such a selection made it possible to present a broad spectrum of mechanisms underlying the relationships between the metropolis and the region. These studies showed those factors for which no comparable statistical data at the European level could be compiled, and which were pertinent for the relations between the metropolis and the region, while simultaneously taking into account the opinions of both regional and local authorities.

In the analysed cases (except Catalonia), the regional hinterland did not play a significant role in metropolitan development. This proved inter alia that the strengths and

weaknesses of the cities concerned were primarily related to their functioning in an international dimension. Moreover, economic processes were as a rule enclosed within the metropolitan areas, and the regional linkages of enterprises were poorly developed when compared to their linkages with the rest of the country or internationally. At the same time, the regional hinterlands in many cases were not able to take advantage of the opportunities created by the metropolitan centre, which typically led to the excess of the backwashing of developmental resources over diffusion processes.

The key factors which foster strong linkages between the metropolis and the region included intraregional similarities between the socio-economic structures (notably the quality of the human capital and degree of innovation). In this context, the quality of life in the metropolitan hinterland played a crucial role in retaining or attracting top professionals. Another major factor of intraregional integration was transport accessibility, which was particularly important at a distance of 80-160 km from the centre (with the special significance of the isochron of 90 minutes' travelling time for the intensity of linkages with the metropolitan centre). In addition to that, the polycentric structure of the metropolitan area played a part as it facilitated access to the metropolitan labour market of the residents of the regional hinterland; it also fostered the development of linkages between enterprises regionally.

Activities which were most frequently undertaken by public authorities in the analysed regions in the context of the relationships between the metropolis and the region included the development of transport infrastructure, particularly with regard to creating supra-regional connections between the central city and other metropolitan centres. In consequence, this led to the emergence of transport corridors (roads and railways) which acted as development networks, as well as growth poles or sectors located in the vicinity of regional airports. The development of transport infrastructure was also associated with efforts to develop a polycentric structure in metropolitan areas. Another important type of activities were human capital investments, which frequently were manifested by the development of academic centres in the regional hinterlands of the metropolises. Such undertakings have been successful to varying degrees since these centres as a rule were no competition for the academic potential of the metropolis as the quality of their educational offer would normally be lower, and the scope of the offered courses would be more limited.

References

Adam, B.,2006, Medium-sized cities in urban regions, European Planning Studies, 14(4), 547-555.

Aguilera, A., 2005, Growth in Commuting Distances in French Polycentric Metropolitan Areas: Paris, Lyon and Marseille, Urban Studies, Vol. 42, No. 9, 1537–1547.

Batten D., 1995, Network cities: creative urban agglomerations for the 21st century, Urban Studies 32(2): 312-327.

Boudeville J., R., 1966, Problems of regional economic planning, Edinburgh

Camagni R., 1994, From city hierarchy to city networks: reflections about emerging paradigm, [in] T.R. Lakshmanan, P. Nijkamp (eds.), Structure and change in the space economy: Festschrift in honor of Martin Beckmann, Springer Verlag, Berlin.

Castells M., 1982, Kwestia miejska, PWN, Warszawa.

Castells M., 1998, The Information Age: Economy, Society and Culture – The rise of network society, Blackwell Oxford.

Cattell, R. B.,1966, The Scree Test for the Number of Factors, Multivariate Behavioral Research, 1(2), s. 245–276.

Christaller W., 1933, Die zentralen Orte in Suddeutschland. (Ośrodki centralne w południowych Niemczech), Przegląd Zagranicznej Literatury Geograficznej, PAN 1.

Couch, C., Karecha, J., Nuissl, H., & Rink, D., 2005, Decline and sprawl: an evolving type of urban development - observed in Liverpool and Leipzig, European Planning Studies, 13(1), 117-136.

Drewett R., Knight R., Schubert U., 1992, The Future of European Cities. The Role of Science and Technology, E.C.FAST FOP 306, Brussels.

Dziewoński K., 1971, Baza ekonomiczna i struktura funkcjonalna miast. Studium rozwoju pojęć, metod i ich zastosowań, Prace Geograficzne IG PAN, t. 87, Warszawa.

Esparza A., Kremenec A., 1994. Producer Services Trade in City Systems. Evidence From. Chicago, Urban Studies, Vol. 31 No. 1, 29-46.

Feranec J., Hazeu G., Christensen S., Jaffrain G. (2007). Corine land cover change detection in Europe (case studies of the Netherlands and Slovakia). Land Use Policy. 24(1).

ESPON, 2004, Project 1.1.1., Potentials for Polycentric Development in Europe, NORDREGIO, Stockholm, http://www.espon.eu.

ESPON, 2004, Project 1.1.2., Urban-rural relations in Europe, http://www.espon.eu

ESPON, 2006, 1.4.1. The role of small and medium sized towns (SMESTO), Austrian Institute for Regional Studies and Spatial Planning, Wien, http://www.espon.eu

ESPON, 2006, Project 1.4.3, Study on urban functions, http://www.espon.eu

ESPON, 2007, Project 1.4.4, Preparatory study on feasibility of flows analysis, http://www.espon.eu

Fishman R., 1990, Americas's new city, The Wilson Quarterly, 14, s.24-48.

Geurs, K. T., & van Wee, B., 2006, Ex-post evaluation of thirty years of compact urban development in the Netherlands. Urban Studies, 43(1), 139-160.

Gorzelak G., 1979, *Dobór zmiennych w statystycznej analizie porównawczej*, część 1, Wiadomości Statystyczne, 3; część 2, Wiadomości Statystyczne, 4., 17-21.

Gorzelak G., Smętkowski M., 2008, Metropolis and its region – new relations in the information economy, European Planning Studies, Vol. 16(2008). No. 6, 727-743.

Gluckler J., 2007, Economic geography and the evolution of networks, Journal of Economic Geography 7 (2007) pp. 619–634.

Gordon I.R., McCann P., 2005, Innovation, agglomeration, and regional development, Journal of Economic Geography 5 (2005) pp. 523–543.

Grzeszczak G., 1999, Bieguny wzrostu a formy przestrzeni spolaryzowanej, Prace Geograficzne nr 173 IGiPZ PAN, Continuo, Wrocław.

Hall P., Pain K. (eds.), 2007, The polycentric metropolis: learning from mega-city regions in Europe, Earthscan, London.

Healey M.J., Ilbery B.W. (eds.), 1985, The industrialization of the countryside, GeoBooks, Norwich, England.

Hirschman A. O., 1958, The Strategy of Economic Development, Yale University Press New Haven, Conn.

Hoover E. M., 1980, An Introduction to Regional Economics, Alfred A. Knopf, New York.

Hoyler M., Kloosterman R.C., Sokol M., 2008, Polycentric Puzzles – Emerging Mega-City Regions Seen through the Lens of Advanced Producer Services, Reg. Studies 42(8), 1055-1064.

INTERREG IIIB, 2005, "SEBco" - City-hinterland cooperation as motor for regional development in the South Eastern Baltic, http://www.sebco.eu/

Jauhiainen, J., 2006, Demographic, employment and administrative challenges for urban policies in Estonia, European Planning Studies, 14(2), 273-283.

Keeble D., Tyler P., 1995, Enterprising bahaviour and the urban-rural shift, Urban Studies vol 32, no 6, 975-997.

Korcelli P., 2000, Europejski system miast, Przegląd Geograficzny t. LXXII, z.4, PWN, Warszawa

Krätke S., 2007, Metropolisation of the European Economic Territory as a Consequence of Increasing Specialisation of Urban Agglomerations in the Knowledge Economy, European Planning Studies, 15(1), 1-27.

Kunzmann K. R., 1998, World city regions in Europe: Structural change and future challenges, [in:] Lo F., Yeung Y. (eds.), Globalisation and the world large cities, UN University Press, Tokyo – New York – Paris.

Lo F., Yeung Y. (eds.), Globalisation and the world large cities, UN University Press, Tokyo – New York – Paris.

Lösh A., 1961, Gospodarka przestrzenna, PWN, Warszawa. (Oryg.: Die raumliche Ordung der Wirtshaft, 1944).

Maik W., 1997, Podstawy geografii miast, UMK, Toruń.

McKenzie R., D.,1933, The metropolitan community, McGraww Hill New York

Minar Z., 1997, The Process of Globalization and Social Transformation in Central and Eastern Europe,. Paper for European Science Foundation Conference, Praga.

Myrdal G., 1957, Economic Theory and Underdevelopment Regions, Duckworth, London.

Perroux F., 1950, Economic Space. Theory and Applications, Quarterly Journal of Economics(64): 89-104.

Parr, J. B.,2007, Spatial Definitions of the City: Four Perspectives. Urban Studies, 44(2), 381-392.

Pelorosso R., Leone A., Boccia L. (2009). Land cover and land use change in the Italian central Apennines: A comparison of assessment methods. Applied Geography. 29(1).

Pred A., 1973, The growth and development of system o cities in advanced economies, [in:] Systems of cities and information flows: two essays, Lund Stud. in Geogr.Ser. B, nr 38, s.1-82.

Pred A., 1975, On the spatial structure of organizations and complexity of metropolitan interdependences, Pap. Reg. Sci. Assoc. nr 35.

Pred A., 1976, The interurban transmission of growth in advanced economies: empirical findings versus regional-planning assumptions, IIASA, Laxenburg, Austria.

Preston R.E., Mitchell C.J.A., 1990, Notes on a Combined Economic Base - Central Place Theory and The Study of Urban Systems, [in:] Bourne L.S., Sinclair R., Ferrer M., d'Entremont A., (eds.), The changing geography of Urban Systems, U. of Nevarra Press, Pampalona.

Sassen S., 1991, The global city, Princetown University Press.

Sassen S., 2000, Global City and Global City-Regions: A comparison, [in:] Scott A. J. (eds.), Global City-Regions: trends, theory, policy, Oxford University Press, Oxford.

Schneider A.. Woodcock C.E., 2008, Compact, Dispersed, Fragmented, Extensive? A Comparison of Urban Growth in Twenty-five Global Cities using Remotely Sensed Data, Pattern Metrics and Census Information, Urban Stud 2008; 45(3); 659-692.

Schöller P., 1953, Aufgaben und Probleme der Stadgeographie, Erdkunde(7).

Scott A. J., 1998, Regions and The World Economy: The Coming Shape of Global Production, Competition, and Political Order, Oxford University Press.

Scott A.J, Agnew J., Soja E. W., Storper M., 2000, Global City – Regions, [in:] Scott A. J. (eds.), Global City-Regions: trends, theory, policy, Oxford University Press, Oxford.

Simmie J., 2003, Innovation and urban regions as national and international nodes for the transfer and sharing of knowledge, Reg. Studies Vol. 37 No.6/7, 607–620.

Simmie J., Sennett J., Wood P., Hart D., 2002, Innovation in Europe: a tale of networks, knowledge and trade in five cities, Reg. Studies Vol. 36, No 1, p. 47–64.

Simmie J., Wood P., 2002, Innovation and competitive cities in the global economy. European Planning Studies No 10, p. 149-51.

Śleszyński P. (2004). Prace Geograficzne nr 196. Kształtowanie się zachodniej części centrum Warszawy. IGiPZ PAN. Warszawa.

Smętkowski M., 2000, Przedsiębiorstwo zagraniczne w otoczeniu lokalnym, Kwartalnik Studia Regionalne i Lokalne nr 4, EUROREG, Warszawa.

Smętkowski M., 2004, Program Współpracy Przygranicznej Phare Polska-Niemcy 1994-1999 w opinii przedsiębiorców zlokalizowanych na obszarze wsparcia programu oraz wykonawców projektów, [in:] G. Gorzelak, J. Bachtler, M. Kasprzyk (eds.), Współpraca transgraniczna Unii Europejskiej: doświadczenia polsko-niemieckie, EUROREG, Warszawa.

Smętkowski M., 2005, New Relationships between the Metropolis and the Region in Information Economy: Warsaw Metropolitan Region - A Case Study [in:] Eckardt F., Hassenpflug D. (eds.) 2005, Paths of Urban Transformation, Nr. 5 der Reihe "The European City in Transition". Frankfurt: Peter Lang Verlag.

Smętkowski M., 2007, Nowe relacje metropolia-region w gospodarce informacyjnej na przykładzie Warszawy i Mazowsza, [in:] G. Gorzelak (eds.) Polska regionalna i lokalna w świetle badań EUROREG-u, Wydawnictwo Naukowe Scholar, Warszawa: 163:188.

Smętkowski M., Wójcik, 2009, Regiony w Europie Środkowo-Wschodniej: tendencje i czynniki rozwojowe, Raporty i analizy EUROREG 3/2009, CESRiL, Uniwersytet Warszawski.

SPESP, 2000, Study Programme on European Spatial Planning, http://www.nordregio.se

Stephens G.R., Wikstrom, 2000, Metropolitan government and governance: theoretical perspective, empirical analysis and the future, Oxford University Press: New Jork, Oxford.

Tacoli C., 1998, Rural-urban interactions: a guide to the literature, Environment and Urbanization, Vol. 10, No. 1(98).

Taylor P.J., 2007, World city network: a global urban analysis, Routledge London and New York

Thomson A. G., Manchester S. J., Swetnam R. D., Smith G. M., Wadsworth R. A., Petit S., et al. (2007). The use of digital aerial photography and CORINE-derived methodology for monitoring recent and historic changes in land cover near UK Natura 2000 sites for the BIOPRESS project. International Journal of Remote Sensing. 28(23).

Ullman E., L., 1957, American Commodity Flow, University of Washington Press Seattle and Washington.

Waser L. T., Schwarz M. (2006). Comparison of large-area land cover products with national forest inventories and CORINE land cover in the European Alps. International Journal of Applied Earth Observation and Geoinformation, 8(3).

Winther L., Hansen H. G. K.,2006, The Economic Geographies of the Outer City: Industrial Dynamics and Imaginary Spaces of Location in Copenhagen. European Planning Studies, 14(10), 1387-1406.

Yılmaz R. (2010). Monitoring land use/land cover changes using CORINE land cover data: a case study of Silivri coastal zone in Metropolitan Istanbul. Environmental Monitoring and Assessment. 165(1).

Barcelona – Catalonia case study

AMB (Area Metropolitana de Barcelona), 2003, El Territori Metropolita de Barcelona. Datos basicos, evolucion reciente y perspectivas, Barcelona

Barcelona, 2009, In: Aglomeracions Metropolitanes Europees, Regio Metropolitana de Barcelona. Territori-Estrategies-Planejament, Papers 50, IERM, Barcelona

Cebollada A., Riera P., 2008, Daily mobility in the Comarques Centrals, in: La Mobilitata Qoutidiana a Catalunya, Regio Metropolitana de Barcelona. Territori-Estrategies-Planejament, Papers 48; IERM, Barcelona

DIBA (Diputacio de Barcelona), 2009, website,http://www.diba.cat/ladiputacio/en/default.asp, [15.12.2009]

Kaczmarek T., Mikuła Ł., 2007, Ustroje terytorialno-administracyjne obszarów metropolitalnych w Europie, Bogucki Wydawnictwo Naukowe, Poznań

Kozak M.W., 2009, Turystyka i polityka turystyczna a rozwój: między starym a nowym paradygmatem, Wyd. Scholar, Warszawa

Matheu J. M., 2003, The Metropolitan Territory of Barcelona. Basic data, Recent Developments, Perspectives, w: El Teritori Metropolita de Barcelona

Miralles-Guasch C., Donat C., 2007, Poligons d'Activitat Economica: Tendencies de Localizacio I Accessibilitat, Regio Metropolitana de Barcelona. Territori-Estrategies-Planejament, Papers 45; IERM, Barcelona

Munoz-Torrent X., 2008, Terrassa. The Gate of a Territorial Network, speech for the opening session of eurocities's meeting of the Economic development Forum, Terrassa, April 2008

Redondo J. L., 2009, The Regional Spatial Plan of the Metropolitan Region of Barcelona, presentation ppt, 22.04.2009 (courtesy of Author)

Stasiński M., 2008, Barcelona żebrze o wodę, w: Gazeta Wyborcza, 2008. 04. 16

STAT (Statistics), data for Catalunya and the Province of Barcelona (NUTS 3), based on EUROSTAT

Strijp A.G.P., 2008, Administrative crowdedness in Barcelona. An exploration of the significance of a Dutch phenomenon in the context of a foreign metropolis, Report on a foreign internship of two months in the context of the MPA study programme at the Netherlands School of Public Administration (NSOB) in The Hague

Barcelona, (courtesy of Author)

The 22@ Barcelona Project, http://www.insyncbv.nl/pdf/22aBarcelona.pdf; [October 2009]

Wywiady 2009, (interviews 2009), made in metropolis of Barcelona in October 2009 by Marek W. Kozak.

Glasgow – West Scotland case study:

Carmichael P., Midwinter A., 2000, Metropolitan Government in Decline: Lessons from Scotland, The American Review of Public Administration 30/2000.

Fleming A. D.,2005, Scotland's Census 2001 - Statistics on Migration.

Glasgow and the Clyde Valley Joint Structure Plan 2006.

Highlands & Islands Scotland European Regional Development Fund 2007-201, 2008, Structural Funds Operational Programme, The Scottish Government 2008.

Jones C., Leihsman C.,2006, Spatial Dynamics of the Housing Market: An Interurban Perspective, Urban Studies, vol. 43 no 7.

Lowlands & Uplands Scotland European Regional Development Fund Programme 2007-13, 2008, Structural Funds Operational Programme, The Scottish Government.

McConnell, 2006, Central-local government relations in Scotland, International Review of Administrative Science Vol72(1).

Metropolitan Glasgow - Our vision for the Glasgow city region 2008 – 2013.

National Planning Framework for Scotland 2, The Scottish Government.

Rae G., Brown C., 1966, A Geography of Scotland, G. Bell and Sons Ltd., London 1966.

The City Region Boundaries Study, 2002, Scottish Executive Central Research Unit, .

Town and Country Planning (Development Planning) (Scotland) Regulations 2008.

Turok T., Bailey N., Atkinson R., Bramley G., Docherty, Gibb K., Goodlad R., Hastings A., Kintrea K., Kirk K., Leibovitz J., Lever B., Morgan J., Paddison R., Sterling R., 2003, Twin Track Cities? Linking Prosperity and Cohesion in Glasgow and Edinburgh, Department of Urban Studies, University of Glasgow and School of Planning and Housing, Heriot-Watt University.

Turok I., Bailey N., 2001, Does Central Scotland Need a Development Strategy? Urban Change and Policy Research Group, Discussion Paper No., University of Glasgow, Glasgow..

Turok I., Bailey N., 2004,The Theory of Polynuclear Urban Regions and its Application to Central Scotland, European Planning Studies vol. 12 no 3.

Turok I., 2008, Harnessing the Potential of Scotland's Cities, Scottish Affairs No. 63.

Turok I., 2007, Urban Policy in Scotland: New Conventional Wisdom, old Problems? [in:] Keating M., Social Democracy in Scotland, Peter Lang, Brussels, pp. 141-168.

West Region Economic Review, Scottish Enterprise, 2009.

Web sites:http://www.gcvcore.gov.uk; http://www.gro-scotland.gov.uk; http://www.scotland.gov.uk;
http://www.oultwood.com/localgov/countries/scotland.php

Stockholm – Malar Region case study:

Åkerlund, M., & Legerius, B., 2009, The Economy Report. On Swedish Municipal and County Council Finances – October 2008. Stockholm.

Berggren, H., & Hermansson, A., 2008, Local government financial equalisation Information about the equalisation system for Swedish municipalities and county councils in 2008. *Local Government Finance*. Stockholm.

Högberg, J., 2009, Gemensam målbild för Stockholm-Mälarregionen - en syntes av de regionala utvecklingsprogrammen. Stockholm.

OECD., 2006, OECD Territorial Reviews Stockholm, Sweden.

RTK., 2009, Regionala stadskärnor. Stockholm.

RTK., 2009, Stockholmsregionen som kunskapsregion Stockholmsregionens behov, studenternas efterfrågan och lärosätenas attraktivitet. Stockholm.

RTK., 2009, Årsstatistik 2009 för Stockholms län och landsting 2009. Stockholm.

Regionplaneämneden, 2010, *Regional utvecklingsplan för Stockholmsregionen RUFS 2010*. Stockholm: Stockholm Läns Landstig.

SALAR, 2009, Levels of local democracy in Sweden. Stockholm.

SBR, 2007, Facts about Stockholm's business industry. Stockholm.

SLL, 2009, Review of the Draft Stockholm Region RUFS 2010. Stockholm.

Stadsledningskontoret, 2005, Framtidsutredningen Stockholms stad Om stadens ekonomiska utveckling på lång sikt. Stockholm.

Tidestav, K., & Zetterberg, O., 2008, Facts about business in Stockholm Facts about Stockholm ' s business industry. Stockholm.

Tuluza – Midi Pyrenees case study:

Abbott A., 2005, France lays plans for premier cancer centre in Toulouse. Nature. 3/3/2005, Vol. 434. Issue 7029.

Aerospace Valley, INSEE, 2008, Aéronautique – espace en aquitaine et Midi-Pyrénées regions d'Aerospace Valley. Aerospace Valley, INSEE.

AUAT, 2005, Charte interSCOT pour une de l'Aire Urbaine toulousaine. AUAT.

AUAT, 2006, Qui sont les nouveaux arrivants dans l'aire urbanie de Toulouse. AUAT.

AUAT, 2009, L'aire urbaine de Toulouse, une activité à dominante productive, Observatoire partenarial de l'économie et de l'emploi - janvier 2009, Perspectives Villes.

AUAT, INSEE, 2009, Territoires et emploi – aire urbaine de Toulouse – les relations domicile – travail. INSEE, AUAT. Toulouse.

Braudel F., 1986, L'identite de la France. Espace et historie. Paris.

CIEU - Centre interdisciplinaire d'études urbaines, 2002, L'explosion de l'usine AZF à toulouse : une catastrophe inscrite dans la ville. Mappemonde. 65.

Dechy N., Bourdeaux T., Ayrault N., Kordek M., & Le Coze J., 2004, First lessons of the Toulouse ammonium nitrate disaster, 21st September 2001, AZF plant, France.

Dugot P., Laborderie S., Taulelle F., 2008, Midi-Pyrénées, région d'Europe, CRDP Midi-Pyrénées. Toulouse.

Estèbe Ph., 2008, Gouverner la ville mobile. PUF. Paris.

EUROSTAT, 2009, Eurostat regional yearbook 2009.

Gouardin E., 2008, etalement urbain et mobilite : quel avenir pour nos territoires? (Etude d'un cas français), www.vrm.ca/documents/Releve5_Elodie_Gouardin.pdf

Gravier J-F., 1947, Paris et le désert français. Flammarion. Paris.

Grossetti M., 1995, Science, industrie et territoire. Presses Universitaires du Mirail. Toulouse.

Hautreux J., Rochefort M., 1965, Physionomie generale de l'armature urbaine francaise. Annales de Géographie. Vol. 74. No 406.

Jalabert G.,1995, Toulouse métropole incomplète. Anthropos. Paris.

Jalabert G., 2009, Toulouse, l'avion et la ville. Privat. Toulouse.

Journal of hazardous materials, 111(1-3), 131-8. doi: 10.1016/j.jhazmat.2004.02.039.

Kaczmarek T., Mikuła Ł. , 2007, Ustroje terytorialno-administracyjne obszarów metropolitalnych w Europie. Wydawnictwo Naukowe Bogucki. Poznań.

Kerrouche E., 2008, L'intercommunalité en France. Montchrestien. Paris.

Lanusse B., 2006, Toulouse : quel territoire pour quel projet? Agravox. http://www.agoravox.fr/actualites/info-locale/article/toulouse-quel-territoire-pour-quel-16909

Le Boëtté I., Ruhlmann O., Laurin L., 2008, La forte attractivité toulousaine infule sur le marché du logement. 6 pages de l'Insee. 113(2008).

Nevers, J., 2002, Metropolitan government in Toulouse: From fragmentation to federalism. GeoJournal. 58(1).

Nicholls W. J., 2006, Between Growth and Exclusion in Technopolis: Managing Inequalities in Toulouse, France. City and Community. 5(3).

Poumarede J. ,1991, Préhistoire de Midi-Pyrénées, Revue géographique des Pyrénées et du Sud-Ouest, 1991 (3e trimestre, No 62). pp. 245-264.

Projetti H. , 2001, Urbanisation croissante de la region. 6 pages de l'Insee. No 47: avril 2001.

Région Midi-Pyrénées, 2009, Schéma Régional d'Aménagement et de Développement du Territoire, www.midipyrenees.fr/Schema-regional-d-amenagement-et-de-developpement-durable-du

Ruhlmann O., 2007, En Midi-Pyrénées, plus de 55 000 emplois salariés sont liés à l'industrie aéronautique, 6pages de l'Insee. No 104: octobre 2007.

Thierry W. Fen Chong S. , 2008, Les pôles de compétitivité. Futuribles. No 342 - juin 2008.

Tornéro M., 2009, Augmentation record de la population en Haute-Garonne, 6 pages de l'Insee. No 104: octobre 2007.

Weil T., Fen Chong S., 2008, Les pôles de compétitivité. Futuribles. No 342 - juin 2008

Warsaw - references

Gorzelak G., Smętkowski M., 2008, *Metropolis and its region – new relations in the information economy, European Planning Studies*, Vol. 16(2008). No. 6, 727-743.

Smętkowski M., 2005a, *New Relationships between the Metropolis and the Region in Information Economy: Warsaw Metropolitan Region - A Case Study* [in:] Eckardt F., Hassenpflug D. (eds.) Paths of Urban Transformation, Nr. 5 der Reihe "The European City in Transition". Frankfurt: Peter Lang Verlag.

Smętkowski M., 2005b, *Rola infrastruktury transportowej w integracji obszaru metropolitalnego Warszawy* [in:] Z. Makieła, T. Marszał (eds.) Infrastruktura techniczno-ekonomiczna w obszarach metropolitalnych, Biuletyn KPZK PAN, z. 222, Warszawa.

Zegar T., 2003, *Procesy integracji obszaru metropolitalnego Warszawy*, Kwartalnik Studia Regionalne i Lokalne, EUROREG, Nr 1(11).

13. List of annexes

Annex 1. Delimitation of metropolitan macroregions

Annex 2. Characteristic of metropolitan macroregions

Annex 3. Accessibility of statistical data at NUTS3 level

Annex 4. Principal components to differentiation of metropolitan areas (Varimax rotation)

Annex 5. Principal components to differentiation of regional hinterlands (Varimax rotation)

Annex 6. Correspondence analysis of metropolitan areas and regional hinterlands

Annex 7. Typology of metropolitan macroregions – selection of case studies

Annex 8. Structure of in-depth interview

Annex 9. Questionnaire for local governments

Annex 10. Questionnaire for enterprises

Annex 11. Settlement structure and change in population number in analysed metropolitan macroregions

Annex 1. Delimitation of metropolitan macroregions

Based on these assumptions and remarks, the first step of this research has been to define metropolitan and urban areas **(MA)** based on the comparison of Urban Audit Larger Urban Zones (LUZ) and EUROSTAT population data for NUTS3 regions. The following basic rules have been applied:

Rule 1) Size of LUZ

1. Only LUZs with over 250,000 inhabitants have been included in the city-region analysis **(MA)**.
2. Larger LUZs with over 1 million inhabitants have been considered as metropolitan areas **(MAM)** while smaller agglomerations - as urban areas **(MAU)**.

Rule 2) Correspondence between LUZ and NUTS3

1. Only LUZs exceeding 70% of the population threshold of NUTS3 have been included in the city-region analysis **(MA_REG)**[45]**.**
2. In case of LUZs consisting of more than one NUTS3, only regions with at least 50% of the population living within LUZ were considered as a part of the metropolitan area **(MA_REG_PART)**.

Rule 3) Combination of metropolitan areas

Polynuclear metropolitan areas **(MA_POLI)** have been defined in the following circumstances:

1. The distance between LUZ's core cities have been smaller than: 60 km in case of LUZs with over 500,000 inhabitants (at least one) or 30 km in case of smaller LUZs.
2. Rule 2 applies to the whole polynuclear metropolitan area.
3. Polynuclear metropolitan areas have been considered as a compact (MA_POLI_COMP) or scattered (MA_POLI_SCAT) ones depending on other NUTS3 regions that separating them apart.

The regional hinterlands **(RH)** for such metropolitan and urban areas **(MA)** have been delineated using surrounding NUTS 3 combination approximations. Another set of rules has been applied here:

[45] The result has been checked against ESPON 1.4.3. project results and LUZ not classified as large cities (100,000 and more) has been rejected (i.e. Bajadoz (ES) and Maribor (SI)) as well as ESPON 1.1.1. project results to accept selected cities below the threshold (but over ca. 65%) classified as MEGA (i.e. Bordeaux in France, Gdańsk, Łódź and Szczecin in Poland, Sevilla and Valencia in Spain).

Rule 4) Neighbouring regions

1. The regional hinterland **(RH)** consists of all NUTS3 regions directly neighbouring on the metropolitan area in a respective country **(MA_REG).**
2. The regional hinterland consists of NUTS3 regions whose at least 75% of their total area is within the range constituted by the maximum distance between LUZ's core city and the farthest point of the neighbouring regions.

Rule 5) Predominance of larger metropolitan area regions

The neighbouring metropolitan area regions (**MA_REG**) or a metropolitan area situated in the regional hinterland of another metropolitan area constitute a part of the regional hinterland of a larger metropolitan area region if the ratio of their population size is more that 3.

Rule 6) Separate hinterlands

1. The NUTS3 region that is a part of two different regional hinterlands constitutes a part of the regional hinterland: a) of a larger metropolitan area region if the ratio of their population size is more that 3 b) of the neighbouring metropolitan area's hinterland c) of metropolitan area region situated in the same NUTS2 region.

The typology of NUTS3 regions based on these rules allows for identifying two main groups of regions: NUTS3 regions included in city-region analysis and other NUTS.

Table 1. Types of NUTS3 regions

Abbreviation	Code	Name	Description
NUTS3 selected for the city-region analysis			
MA_REG	1,0	Metropolitan area region	Region with LUZ with over 250,000 population and LUZ population > 70% NUTS3 population
MA_REG_PART	1,1	Metropolitan area – part	Regions with LUZ that consists of more than one NUTS3
MA_POLI	1,2	Polynulcear metropolitan areas region	Region with more than one MA_REG and LUZ's core cities within certain distance
RH	2,0	Regional hinterland	NUTS3 neighbouring MA_REG or situated in NUTS2 within certain distance from MA_REG
RH_MA_REG	2,1	Metropolitan area – part of regional hinterland	Region with LUZ three times smaller than larger LUZ of neighbouring MA_REG
RH_MA_REG<70	2,2	Metropolitan area – part of regional hinterland	Region with LUZ three times smaller than larger LUZ of neighbouring MA_REG; LUZ population < 70% NUTS3 population
Other NUTS3 regions			
MA_REG<70	3,0	Metropolitan area – weak LUZ-NUTS3 correspondence	Region with LUZ with over 250,000 population and LUZ population < 70% NUTS3 population
MA_SMALL	4,0	Small urban area region	Region LUZ with less than 250 000 population
RH_MA_SMALL	4,2	Small urban area region – part of regional hinterland	Region LUZ with less than 250 000 population constitutes part of regional hinterland
NUTS3_IND	5,0	Other regions without LUZs	Regions situated outside influence of MA_REG or a part of two separate regional hinterlands

Source: own elaboration.

Annex 2. Characteristic of metropolitan macroregions

Table 2 shows selected components from the profiles of the national settlement systems, highlighting in particular their specific nature related to LUZs as defined in the Urban Audit, as well as NUTS3 administrative divisions. In addition to that, the Table shows LUZs with a population over 250 000, which were excluded from the analysis of city-region relationships due to the following considerations:

- Non-fulfilment of the correspondence criterion (Rule 1),
- Being "dominated" by larger urban centres located in the vicinity (Rule 5),
- Impossibility to delimit the regional hinterland due to penetrating influence of the neighbouring urban centres or geographical barriers (Rule 6).

In particular, this applies to the relationship between metropolitan areas and their surroundings in the case of polynuclear metropolitan regions, which were singled out in the Netherlands, Belgium, central England and northern Spain. Secondly, it refers to LUZs with a large surface area as defined by the Urban Audit, which led to the setting of the extent of their impact quite broadly, on the basis of the adopted delimitation procedure (e.g. Berlin, Prague). On the other hand, such relationships may de distorted in the case of small LUZs (e.g. Bucuresti, Porto and Lisboa). We tried to take these considerations into account while interpreting the results. For the case studies selected for detailed analysis, we attempted to make the research polygons more unified.

Table 2. Characteristics of the metropolitan macroregions sample in individual countries

Country	Number of selected macroregions	Characteristic features	LUZ with more than 250 000 inhabitants (rejected)		
			a) weak correspondence with NUTS3	b) dominate be larger Urban centers	c) difficulties in delimitation of regional hinterland
Austria	5	Relatively small LUZ of Wien in comparison to other urban centres in the country. Potential transborder relations of Wien.	-	-	-
Belgium	2	One dominant polynuclear metropolitan macroregion as a result of small distances	-	-	-

		between Brussels, Antwerp, Gent and Charleroi.			
Bulgaria	2	The capital city macroregion covers substantial part of the east part of the country.	Plovdiv	-	-
Cyprus	0	Geographical barriers as a result of location on the island (including division of the Cyprus).	Lefkosia		
Czech Republic	1	Large surface area of Prague LUZ and as a result very large regional hinterland that consists of number of smaller LUZs regions Penetrating influence of urban centres situated in Silesia and Moravia.	Brno	Plzeň	Ostrava
Denmark	2	Penetrating influence of urban centres situated in Jutland. Potential transborder relations of Copenhagen. The role of geographical barriers e.g. Odense.	-	-	Aalborg, Odensee
Estonia	1	The capital city macroregion covers substantial part of the whole country.	-	-	-
Finland	1	Helsinki macroregion covers substantial part	Tampere	Turku	-

		of the country and the most densely populated areas.			
France	4	Significant number of LUZ rejected mainly as a result of weak correspondence with NUTS3 regions. Large metropolitan macroregion of Paris consists of number of LUZ regions. Penetrating influence of urban centres situated in Alsace, Loraine and Provence.	Lille, Nice-Grasse, Marsylia, Metz, Nancy, Strasbourg, Dijon, Caen, Renes, Nancy, Tours, Limoges	Amiens, Rouen, Orleans, Reims, Clermont-Ferand, Grenoble	-
Germany	18	Small size of NUTS3 regions lead to strong correspondence between LUZ and NUTS3 regions. This allows delineation of macroregions even for small urban centres (like Gottingen). Berlin LUZ has a very large surface area as a result of administrative division (LAU2). Penetrating influence of urban centres is observed very often. The macroregion of Hamburg consists of former East Germany territories.		Kiel, Schwerin, Karlsrue	Koblenz
Greece	2	Athena	-	-	-

		macroregion covers large number of islands.			
Hungary	1	The capital city macroregion covers substantial part of the whole country. Penetrating influence of urban centres situated in the east part of the country.	Miszkolc, Debrecen	-	-
Ireland	1	Artificial boundaries of Dublin macroregion as result of NUTS3 division of the country.	-	-	-
Italy	8	The number of polynuclear metropolitan macroregions: Bologna-Modena, Venezia-Padova, Napoli-Caserta-Salerno. The macroregion of Genua has specific shape as result of geographical barriers. Penetrating influence of urban centres situated in the north and south part of the country.	Verona, Bari, Pescara	Brescia	Taranto
Latvia	1	The capital city macroregion covers substantial part of the whole country.	-	-	-
Lithuania	1	Penetrating influence of LUZs Vilnius and Kaunas that have also	Kaunas	-	-

		very large surface areas.			
Luxembourg	1	Potential transborder interactions.	-	-	Luxembourg
Malta	0	Geographical barriers as a result of location on the island.	-	-	-
Netherlands	2	One dominant polynuclear metropolitan macroregion as a result of small distances between Randstad Holland urban centres as well as Breda, Tilburg, Eindhoven, Arnhem and Nijmegen. Relative importance of Groningen situated in the north part of the country.	Twente	-	-
Norway	2	Large surface area of NUTS3 regions and as a result large macroregions of Oslo and Bergen.	Stavanger	-	-
Poland	6	Polycentric settlement system whit large number of smaller cities (but usually weak correspondence between LUZ and NUTS3). Penetrating influence of urban centres. LUZs of Szczecin, Gdansk and Lodz have very large surface areas.	Kraków, Poznań, Olsztyn, Opole, Kielce, Bydgoszcz, Toruń.,	Częstochowa, Radom	-

Portugal	2	Small LUZs of Lisboa and Porto.	-	-	-
Romania	1	Small LUZs and as a result weak correspondence between LUZ and NUTS3. LUZ of Bucaresti has small surface area.	Cluj-Napoca, Craiova, Timişoara	-	-
Slovakia	1	Potential transborder relations of Bratislava. Penetrating influence of smaller urban centres.	Košice	-	-
Slovenia	1	The capital city macroregion covers substantial part of the whole country.	Maribor	-	-
Spain	6	Macroregion of Madrid is very large. Penetrating influence of urban centres in case of Andalusia and in the macroregion of Valencia. LUZs of Saragossa and Seville have very large surface areas. Polynuclear metropolitan macroregion in Basque Country and Cantabria.	Badajoz, Oviedo, Gijon, Vigo, Cordoba, Malaga, Pamplona	Valladoid, Alicante, Murcia	-
Sweden	1	Large surface area of NUTS3 regions. Potential transborder relations of Malmo.	Goeteborg, Malmo		
Switzerland	1	Potential transborder	Bern	-	Geneve, Lausanne.

		interactions.			
United Kingdom	10	Very large polynuclear metropolitan macroregion of Central England. LUZs of Aberdeen, Kingston-upon-Hull, Newcastle upon Tyne have very large surface areas. Penetrating influence of urban centres in case of Glasgow-Edinburgh and Bristol-Cardiff.	Exeter	Cambridge, Portsmouth, Stoke-on-Trent, Worcester, Wrexham	

Source: prepared by the author.

Table 3. Population in selected NUTS3 types

Type of LUZ/NUTS correspondence	No	% of total	Population LUZ	% of total	Population NUTS3	% of total	Population ratio LUZ / NUTS3
Metropolitan areas regions (fitted)	126	40.9	172 177 948	77.3	188 560 444	37.5	91.3
- single NUTS	*36*	11.7	*50 352 896*	22.6	*57 538 575*	*11.4*	*87.5*
- combination of NUTS	*36*	11.7	*73 797 740*	33.1	*78 408 726*	*15.6*	*94.1*
- polynuclear areas	*48*	15.6	*48 027 312*	21.6	*52 613 143*	*10.5*	*91.3*
Metropolitan areas (unfitted)	63	20.5	30 921 373	13.9	59 011 649	11.7	52.4
Metropolitan areas subordinated within metropolitan macroregions	21	6.8	8 499 365	3.8	14 383 432	2.9	59.1
Urban areas (LUZ<250 000) subordinated within metropolitan macroregions	33	10.7	5 089 015	2.3	15 216 131	3.0	33.4
Urban areas (LUZ<250 000)	65	21.1	11 164 121	5.0	27 082 682	5.4	41.2
Other NUTS3 regions (848)	:	:	:	:	198 834 137	39.5	:
Total	308	100.0	222 762 807	100.0	503 088 475	100.0	44.3

Source: prepared by the author.

In conclusion (Table 3), of a total of 308 LUZs (including also Marseilles, Lille and Nice-Grasse) in the EU27, Norway and Switzerland, 126 (40%) were accepted for further analyses. These areas, however, were inhabited by nearly 80% of the overall LUZ population, while almost 40% of the population of the entire researched area were living

in NUTS3 regions corresponding to these LUZs. Among them, 72 LUZs were predominantly monocentric in character, whereas 48 LUZs were parts of 11 polynuclear systems having at least a bipolar character (Table 4).

Table 4. Characteristics of polynuclear metropolitan regions

Polynuclear metropolitan areas region	Number of LUZ	Names	Population of metropolitan areas regions [mln]	Population of regional hinterland
Central England	10	Wolverhampton Leicester Sheffield Wrexham Manchester Liverpool Bradford-Leeds Birmingham Nottingham Coventry	12,0	8,8
Rheine-Ruhr	6	Bonn Köln Düsseldorf Mönchengladbach Wuppertal Ruhrgebiet	10,2	6,2
Netherlands	9	Utrecht Breda Eindhoven Tilburg Arnhem/ Nijmegen Rotterdam s' Gravenhage Amsterdam	7,1	5,0
Frankfurt am Main	4	Mainz Darmstadt Wiesbaden Frankfurt am Main	3,8	3,0
Central Belgium	4	Gent Charleroi Antwerpen Bruxelles / Brussel	3,5	3,8
Munchen	2	Munchen Augsburg	3,2	2,9
Napoli	3	Salerno Caserta Napoli	3,1	2,1
Bilbao-Santander	3	Santander Bilbao Vitoria/Gasteiz	1,5	1,2
Leipzig-Halle	2	Leipzig Halle an der Saale	1,4	1,7
Bologna-Modena	2	Modena Bologna	1,1	2,0
Padova-Venezia	2	Padova Venezia	1,2	2,2
Geneve-Lausanne	2	Lausanne Geneve	0,8	-

Source: prepared by the author.

At the same time, the barrier identified in the case of 63 LUZs (20% of their aggregate number) was their poor fit with NUTS3 regions. This meant that on average slightly over 50% of the NUTS3 population where a given LUZ was located inhabited an urban area. It should be noted that as a rule these were smaller cities' LUZs. This is proved by the fact that they had a lower than 15% share in the population of all the urban areas defined in the Urban Audit. Another important group was made up of LUZs (regardless of their population) which were incorporated in the regional hinterlands of much bigger urban centres. Although there were as many as 54 of such LUZs, they had a minor share in the aggregate population (6%). As insignificant in terms of the population were smaller urban areas with a population under 250 000, which were also poorly fitted with the NUTS3 administrative level (on average, only 40% population were living in a given urban area).

Annex 3. Accessibility of additional to ESPON database statistical data at NUTS3 level

	R&D employment (2002, 2005)	Population with higher education (2002)	Tourist arrivals (2002, 2005)
Austria	-	+	+
Belgium	-	-	-
Bulgaria	-	+	+
Czech Republic	+	+	+
Denmark	-	-	-
Estonia	-	+	+
Finland	+	+	+
France	-	+	-
Germany	-	-	-
Greece	-	-	-
Hungary	+	+	+
Ireland	-	+	-
Italy	-	-	-
Latvia	-	+	+
Lithuania	-	+	+
Luxemburg	-	-	-
Netherlands	-	+	-
Norway	-	-	-
Poland	+	+	+
Portugal	-	+	-
Romania	+	+	+
Slovakia	+	+	+
Slovenia	+	+	+
Spain	-	+	-
Sweden	-	+	-
Switzerland	-	+	-
United Kingdom	-	+	-
Cyprus	Not relevant for the metropolis-hinterland relationships study		
Iceland			
Malta			

\+ available
\- not available

Annex 4. Principal components to differentiation of metropolitan areas (Varimax rotation)

Variables	**Components**			
	„Modern economy"	„Population potential"	„National growth pole"	„Weak suburban zone"
Principal component value	4,6	2,8	2,2	2,2
Share of variance (%)	25,5	15,8	12,2	12,2
Population	0,00	**0,75**	0,07	-0,35
Density of population (person/sq km)	0,10	0,53	0,22	-0,43
GDP per capita (EUR)	**0,89**	0,06	-0,09	-0,12
GDP per capita (respective country=100)	0,16	0,16	**0,84**	0,20
Population of metropolitan area	-0,04	**0,81**	0,10	0,04
Share of metropolitan city in total population (%)	-0,13	0,11	0,10	0,56
GVA in agriculture (%)	-0,57	-0,29	-0,04	-0,09
GVA in industry (%)	-0,03	**-0,71**	0,28	-0,28
Labour productivity in agriculture (EUR)	0,42	0,14	-0,10	**-0,77**
Labour productivity in industry (EUR)	**0,74**	-0,10	-0,10	-0,29
Labour productivity in agriculture (% total productivity)	-0,12	0,11	-0,03	**-0,74**
Labour productivity in services (% total productivity)	-0,46	0,18	0,23	0,22
GVA simple services (%)	**-0,73**	0,07	0,41	0,23
GVA specialised services (%)	**0,62**	**0,66**	0,01	0,02
GVA public services (%)	0,17	0,07	**-0,88**	0,04
Share of specialised services in service sector (%)	**0,74**	0,44	0,12	-0,10
Employees per 100 inhabitants	**0,67**	-0,01	0,41	0,33
Unemployment rate (%)	**-0,73**	0,02	-0,39	0,01

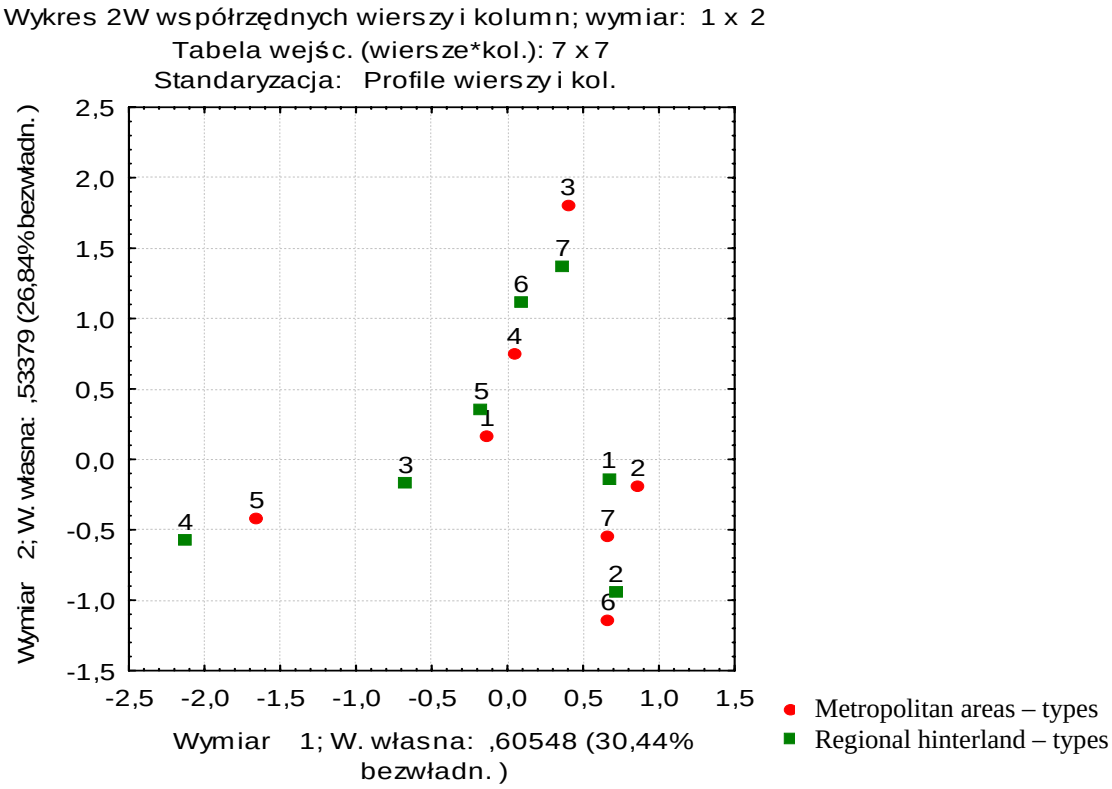
Source: prepared by author.

Annex 5. Principal components to differentiation of regional hinterlands (Varimax rotation)

Variables	**Components**			
	„Modern economy"	Rozwinięty rynek pracy	„Population potential"	Dualność gospodarki
Principal component value	3,8	3,0	2,6	1,9
Share of variance (%)	19,9	16,0	13,8	10,1
Population	0,10	0,15	**0,81**	-0,06
Density of population (person/sq km)	0,34	0,23	**0,61**	-0,15
GDP per capita (EUR)	**0,78**	0,43	0,06	-0,14
GDP per capita (respective country=100)	0,00	0,59	0,30	0,40
Population of the largest city	0,06	0,06	**0,84**	-0,16
GVA in agriculture (%)	**-0,67**	-0,37	-0,08	0,06
GVA in industry (%)	-0,46	0,59	0,04	-0,14
GVA in services (%)	**0,92**	-0,22	0,04	0,07
Labour productivity in agriculture (EUR)	**0,70**	0,04	0,45	-0,01
Labour productivity in agriculture (% total productivity)	0,16	-0,30	0,54	-0,46
Labour productivity in industry (% total productivity)	-0,03	0,12	-0,14	**0,69**
Labour productivity in services (% total productivity)	-0,28	-0,23	0,06	**0,70**
GVA simple services (%)	0,03	-0,01	-0,18	0,59
GVA specialised services (%)	**0,68**	0,08	0,42	-0,20
GVA public services (%)	0,58	-0,57	-0,11	-0,25
Employees per 100 inhabitants	0,21	**0,75**	-0,03	-0,04
Activity rate (%)	0,01	0,56	0,08	-0,12
Unemployment rate (%)	-0,22	**-0,72**	-0,01	0,01

Source: prepared by author.

Annex 6. Correspondence analysis of metropolitan areas and regional hinterlands



Annex 7. Typology of metropolitan macroregions – selection of case studies

Typology of macroregions			GDP per capita MA/RH ratio – change (1995-2004)					
			Growing		Stable		Declining	
			RH good performance	RH weak performance	RH good performance	RH weak performance	RH good performance	RH weak performance
GDP per capita MA/RH ratio – level (1995)	High	MA good performance	Budapest **Warszawa** Bucureşti	Tallinn Madrid Riga **Stockholm** Ljubljana Bratislava Sofia Edinburgh Hamburg Kobenhavn Paris	Regensburg Munchen		Graz **Toulouse** Lisboa	
		MA weak prrformance			Linz	Oslo Aberdeen	Dublin Groningen Porto Central Belgium Frankfurt	Wien
	Moderate	MA good performance	Lyon Netherlands Nürnberg Roma	Helsinki Vilnius Gdańsk Praha Dresden	Bordeaux Milano			
		MA weak prrformance			Salzburg		Szczecin Saarbrücken Lipsk/Halle	Berlin Hannover
	Low	MA good performance	London Bristol Firenze Padova/Venzia	Wrocław Belfast Varna Athina Zürich	Magdeburg Erfurt Stuttgart Arhus		Freiburg	
		MA weak prrformance		Central England Bilbao/Santander Zaragoza Thessaloniki Cardiff Newcastle upon Tyne Liege Genova **Glasgow** Kingston-upon-Hull	Valencia Łódź Bremen Ruhr-Rheine	Torino Bergen Neapol	**Barcelona** Sevilla Innsbruck Bielefeld Bolonia/Modena	Katowice-Żory Göttingen

Annex 8. Structure of in-depth interview

PART 1: METROPOLITAN REGION AND ITS CONSTITUENTS

1. What is the spatial range of the metropolitan centre's (city's) influence on the following aspects in its surrounding area?

2. Is there a commonly accepted delimitation of the city's metropolitan area and what are its criteria?

3. Does the dominant city have an administrative or statistical counterpart reflecting the area of its influences (metropolitan region)?

4. Does the existing administrative division on the regional level (NUTS2) and subregional level (NUTS3) corresponds to the city's influence areas, i.e.: a) the metropolitan area, b) the metropolitan macroregion?

PART 2: RELATIONS BETWEEN THE METROPOLIS AND THE REGION

1. What are the most important examples of links between the metropolis and its surrounding region?

2. Are there large differences between the metropolis and the remaining part of the metropolitan region, of the following type: a. economic, b. social?

3. Does the metropolis and its surrounding region become homogenous in respect of: a) economic structure b) social structure?

4. Are there examples of cooperation / competition of public administration within the metropolitan region? Which one dominates?

PART 3: FACTORS DETERMINING ECONOMIC RELATIONS BETWEEN THE METROPOLS AND THE REGION

1. What are the most important factors determining the economic links between the metropolis and its surrounding region?

2. Are the factors mutually related?

PART 4: IMPORTANCE OF THE LINKS FOR METROPOLIAT REGION'S DEVELOPMENT

1. What are the most important examples of positive influence of metropolis on its surrounding region?

2. What are the most important examples of negative impact of metropolis on its surrounding region?

3. Do the metropolis and its surrounding region mutually need each other?

a. Does the metropolis need the region?

b. Does the region need metropolis?

PART 5: STRENGTHS AND WEAKNESSES OF THE METROPOLIS AND THE REGION

1. What are the most important strengths and weaknesses of the metropolis (the metropolitan area)?

2. What are the most important strengths and weaknesses of the region surrounding the metropolis?

3. Is it possible to show relationship between strengths and weaknesses of the metropolitan area and the metropolitan region?

PART 6: ACTIVITIES OF THE PUBLIC ADMINISTRATION

1. Are the actions of various actors coordinated in: a) the metropolitan area b) the metropolitan macroregion?

2. Do the actions of public authorities take into account intraregional differences?

3. What actions are taken in order to increase the positive influence of the metropolitan centre on its surrounding region?

4. What actions are taken in order to limit the negative impact of the metropolitan area on its surrounding region?

PART 7: DEVELOPMENTAL PERSPECTIVES

1. Will the differences between the metropolis and the region increase or diminish?

2. What is going to be the main cause of this process?

Annex 9. Questionnaire for local governments – Glasgow example

a. ***SECTION 1 Location***

1. Name of the council area					
2. Is the are of the municipality crossed by:	Motorway or expressway	□			
	Primary route	□			
	Other A road	□			
	Railway (with station)	□			
3. Please estimate a distance to the center of Glasgow (km)					
3.1. What is the estimated average travel time to the centre of Glasgow [in minutes]?	By passenger car (min)				
	Bus, minibus (min)				
	Train (min)				
4. Please rate the quality of communications with Glasgow for the following:	Very good	Good	Average	Bad	Very bad
Travel time by passenger car	□	□	□	□	□
Travel time by public transport	□	□	□	□	□
Availability of public transport	□	□	□	□	□
Frequency of public transport	□	□	□	□	□
General assessment of communication with Glasgow:	□	□	□	□	□

5. Do you think that the state of communication with Glasgow has an influence on development of your council area?

1. Yes □ → If so, the impact of the current state of communication with Glasgow on your council area is:
2. No □ □
positive
3. Difficult to say □ □
negative

SECTION 2 Metropolitan centre's influence

6. Do the inhabitants of the council area (if so: to what extent):	**Please tick if yes**	**i. Please indicate whether you consider this relationship:**				**Please classify the extent of change over the past 3 years:**			
		Weak	Average	Strong	Difficult to say	Increase	No change	Decline	Difficult to say
- commute to work in Glasgow (every day)	□	□	□	□	□	□	□	□	□
- commute to work in Glasgow in weekly cycle (come back for weekends only)	□	□	□	□	□	□	□	□	□
- go to Glasgow for shopping	□	□	□	□	□	□	□	□	□
- commute to Glasgow secondary schools	□	□	□	□	□	□	□	□	□
- commute to Glasgow tertiary schools	□	□	□	□	□	□	□	□	□
- go to Glasgow for cultural purposes (e.g. cinema, theatre, exhibitions, etc.)	□	□	□	□	□	□	□	□	□
- go to Glasgow to receive medical services	□	□	□	□	□	□	□	□	□
- permanently move to Glasgow	□	□	□	□	□	□	□	□	□

7. Do the inhabitants of Glasgow (if so: to what extent):	**Please tick if yes**	**ii. Please indicate whether you consider this relationship:**				**Please classify the extent of change over the past 3 years:**			
		Weak	Avera-ge	Strong	Difficult to say	Increase	No change	Decline	Difficult to say
- commute to work in the council area (every day)	□	□	□	□	□	□	□	□	□
- commute to work in the council area in weekly cycle (come back for weekends only)	□	□	□	□	□	□	□	□	□
- go to the council area for shopping	□	□	□	□	□	□	□	□	□
- go to the council area for recreation	□	□	□	□	□	□	□	□	□
- permanently move to the council area	□	□	□	□	□	□	□	□	□
8. Do the Glasgow-based enterprises:									
- locate their offices in the council area	□	□	□	□	□	□	□	□	□
- locate their production facilities in the council area	□	□	□	□	□	□	□	□	□
- locate their trade offices in the council area	□	□	□	□	□	□	□	□	□
- locate its services outlets in the council area	□	□	□	□	□	□	□	□	□
- locate its warehouses or similar facilities in the council area	□	□	□	□	□	□	□	□	□

9. Please indicate whether there are following facilities within your council area and whether these have had a positive, neutral or negative impact on the development of your council area	**Please tick if yes**	**Number**			**Impact on your council area**			
		Large	Average	Small	Positive	Neutral	Negative	Difficult to say
- complexes of multi-family homes inhabited by the Glaswegians*	□	□	□	□	□	□	□	□
- fenced complexes of single-family homes inhabited by Glaswegians*	□	□	□	□	□	□	□	□
- single-family homes inhabited by Glaswegians*	□	□	□	□	□	□	□	□
- recreational houses belonging to Glaswegians	□	□	□	□	□	□	□	□
- allotments belonging to Glaswegians	□	□	□	□	□	□	□	□
- accommodation (conference) facilities offering services to inhabitants of Glasgow and Glasgow-based companies	□	□	□	□	□	□	□	□
- agrotourist farms	□	□	□	□	□	□	□	□
- private nursing homes for old-age pensioners from Glasgow	□	□	□	□	□	□	□	□
- distribution centres handling Glasgow-based enterprises	□	□	□	□	□	□	□	□
- disposal sites receiving waste from Glasgow	□	□	□	□	□	□	□	□

* The term refers to inhabitants of Glasgow who have moved to the gmina in the last 5 years

SECTION 3 Cooperation

10. Please indicated if the council cooperates with the following organisations and where appropriate rate the quality of this cooperation	**Please tick if yes**	***Assessment of the cooperation***				
		Very good	Good	Average	Bad	Very bad
Community councils	□	□	□	□	□	□
Local council	□	□	□	□	□	□
Scottish government	□	□	□	□	□	□
Glasgow City Council	□	□	□	□	□	□

11. Please indicate the areas in which your council currently cooperates or plans to cooperate with Glasgow City Council from the list below	**Currently**	**In the future**	**Difficult to say**
Transport infrastructure	□	□	□

Public transport	□	□	□
Environmental protection	□	□	□
Waste management	□	□	□
Spatial management plans	□	□	□
Other (what?) ……..	□	□	□

Annex 10. Questionnaire for enterprises

SECTION 1. Basic information

1. Type of the main activity of the enterprise	Manufacturing	Industry (or NACE 2004 code)	Services	Industry (or NACE 2004 code)
	☐	.....	☐	.....

2. Location of the enterprise (see the map)			**2a. Please estimate a distance to the center of Glasgow (km)**	
	Glasgow City within administrative borders	☐		
	Glasgow metropolitan area (ie Lanarkshire, Renfrewshire, Durbantonshire)	☐		

3. What is the number of employees in the enterprise?			**4. For how many years is the enterprise economically active?**	
	1-9	☐	up to 2 years	☐
	10-24	☐	3 - 5 years	☐
	25-49	☐	6 – 10 years	☐
	50-249	☐	11 – 20 years	☐
	250 and over	☐	20 and over	☐

5. Is there foreign capital invested in the enterprise?		
	yes	☐
	no	☐

SECTION 2. Spatial relations

Organizational structure			**If so, please indicate the location of the main office**				
			Glasgow metropolitan area **(see the map)**	The rest of the South Western Scotland or Southern part of Highlands and Islands **(see the map)**	Other regions of the UK	EU countries	Other countries
6. Is the enterprise a local / branch office of a larger company?	yes	☐	☐	☐	☐	☐	☐
	no	☐					

	If so, please indicate the location of branch offices more than one area may be indicated				
	Glasgow metropolitan area **(see the map)**	The rest of the South Western Scotland or Southern part of Highlands and Islands **(see the map)**	Other regions of the UK	EU countries	Other countries

7. Does the enterprise have own local / branch offices?	yes	☐	☐	☐	☐	☐	☐
	no	☐					
8. Is the company going to create new local offices in the next 3 years?	yes	☐	☐	☐	☐	☐	☐
	no	☐					

9. What is the spatial extent of the enterprise's contacts?	**Please indicate up to two most important markets / areas**				
	Glasgow metropolitan area **(see the map)**	The rest of the South Western Scotland or Southern part of Highlands and Islands **(see the map)**	Other regions of the UK	EU countries	Other countries
location of the providers of goods	☐	☐	☐	☐	☐
location of basic services providers (e.g. cleaning, security services, etc.)	☐	☐	☐	☐	☐
location of the higher-order services providers (e.g. advertising, accountancy, consulting, etc.)	☐	☐	☐	☐	☐
location of the consumers / clients	☐	☐	☐	☐	☐
location of competitors	☐	☐	☐	☐	☐
staff recruitment area	☐	☐	☐	☐	☐
sources of investment capital	☐	☐	☐	☐	☐
sources of information on innovations	☐	☐	☐	☐	☐
10. What changes in the share (%) of the metropolitan region (ie. South Western Scotland and Southern part of Highlands and Islands except Glasgow Metropolitan Area) have occurred in the last 3 years regarding:	No relations	Share increase	No change	Share decline	Difficult to say
location of the providers of goods	☐	☐	☐	☐	☐
location of basic services providers (e.g. cleaning, security services, etc.)	☐	☐	☐	☐	☐
location of the higher-order services providers (e.g. advertising, accountancy, consulting, etc.)	☐	☐	☐	☐	☐
location of the consumers / clients	☐	☐	☐	☐	☐
location of competitors	☐	☐	☐	☐	☐
staff recruitment area	☐	☐	☐	☐	☐
sources of investment capital	☐	☐	☐	☐	☐
sources of information on innovations	☐	☐	☐	☐	☐
10 a . What changes in the share (%) of foreign markets have occurred in the last 3 years regarding:	No relations	Share increase	No change	Share decline	Difficult to say

location of the providers of goods	☐	☐	☐	☐	☐
location of basic services providers (e.g. cleaning, security services, etc.)	☐	☐	☐	☐	☐
location of the higher-order services providers (e.g. advertising, accountancy, consulting, etc.)	☐	☐	☐	☐	☐
location of the consumers / clients	☐	☐	☐	☐	☐
location of competitors	☐	☐	☐	☐	☐
staff recruitment area	☐	☐	☐	☐	☐
sources of investment capital	☐	☐	☐	☐	☐
sources of information on innovations	☐	☐	☐	☐	☐

SECTION 3. Local environment

11. Please rate the attractiveness of the Glasgow metropolitan area for investors on the following issues using the ratings:	**Ratings**					
	Very low	Low	Average	High	Very high	Difficult to say
Well-developed transport infrastructure in the metropolitan area	☐	☐	☐	☐	☐	☐
Well-developed transport infrastructure linking the metropolis with other areas	☐	☐	☐	☐	☐	☐
Availability of space for business activity	☐	☐	☐	☐	☐	☐
Good price of space for business activity	☐	☐	☐	☐	☐	☐
Large supply of labour	☐	☐	☐	☐	☐	☐
Low price of labour	☐	☐	☐	☐	☐	☐
Highly qualified labour force	☐	☐	☐	☐	☐	☐
Large sales market	☐	☐	☐	☐	☐	☐
Opportunities for cooperation with other companies	☐	☐	☐	☐	☐	☐
Developed business environment infrastructure	☐	☐	☐	☐	☐	☐
Developed business social networks	☐	☐	☐	☐	☐	☐
Numerous sources of information on innovations	☐	☐	☐	☐	☐	☐
Good living conditions	☐	☐	☐	☐	☐	☐
Business-friendly attitude of the local authorities	☐	☐	☐	☐	☐	☐

SECTION 4. Innovativeness

12. Has the enterprise in the last 3 years undertaken any of the following activities?		
Marketing own, new, or modernized, products, goods or services	Yes	☐
	No	☐
Introduction of new technological processes	Yes	☐
	No	☐
Organizational or technical changes	Yes	☐
	No	☐

13. If the enterprise has undertaken any of the aforementioned actions,	Please	**Please indicate the location of the information sources** Please indicate up to two most important areas

what were the sources of information on the introduced innovations?	tick if yes	Glasgow metropolitan area (see the map)	The rest of the South Western Scotland or Southern part of Highlands and Islands (see the map)	Other regions of the UK	EU countries	Other countries
Own research and development infrastructure, management staff	□	□	□	□	□	□
Other companies in the same corporate group	□	□	□	□	□	□
Competitors	□	□	□	□	□	□
Clients	□	□	□	□	□	□
Consulting companies	□	□	□	□	□	□
Providers of equipment, materials, components	□	□	□	□	□	□
Research institutes / universities	□	□	□	□	□	□
Patent disclosures	□	□	□	□	□	□
Conferences, meetings, specialist press	□	□	□	□	□	□
the Internet	□	□	□	□	□	□
Trades, exhibitions	□	□	□	□	□	□

Annex 11. Change on land use in analysed metropolitan macroregions

This study shows changes in land use in 4 metropolitan regions: Barcelona, Glasgow, Toulouse, and Warsaw. The analysis supplements case studies conducted as part of cities and their hinterlands relation study within ESPON FOCI project. This part of the paper discusses only 4 metropolitan regions out of the 5 analyzed in case studies within the complete study, i.e. excluding Stockholm. This results from the fact that the data on land use applied in the study are not available for Stockholm metropolitan region.

The study is based on the land use data coming from CORINE land cover (cf. European Commission 1994) for years 1990, 2000, and 2006. For years 1990-2000 prepared and discussed are data for metropolitan regions at NUTS3 level (discussed in the last part of the study), while for years 1990-2006 (in the case of Glasgow 1990-2000) prepared were 3 maps for each of the metropolitan regions, showing the most important changes at the local level. The maps show the intensity of changes by smoothing them in a 5 km radius. The maps represent three major types of land use changes related to urban areas:

- Urban land management. Internal transformations of urban areas. This includes recycling (changing the use of existing urban land). This type of changes may be related to more compact cities and also to certain level of economic activity (redevelopment of city centre, infilling discontinuous urban fabric).
- Growth of residential areas. Land uptake by residential buildings with associated services from non-urban land. It may be somewhat related to urban sprawl.
- Growth of economic sites and infrastructure, Land uptake by new economic sites and infrastructure from non-urban land.

Moreover, in order to provide context for analysis of land use, employed were also data on population and its change at NUTS5 level, and population maps prepared for each of the discussed metropolitan regions

The purpose of the study is to discuss the changes in land use in the subject metropolitan regions and show the respective possibilities offered by CORINE land cover, particularly maps of changes at the local level prepared on its basis (similar analyses were presented by e.g. Waser, Schwarz 2006; Feranec et al. 2007; Thomson et al. 2007; Pelorosso et al. 2009; Yılmaz 2010.

BARCELONA

In Catalonia population concentrates mostly in Barcelona and its closest vicinity. There are also population centres at the coast of the Mediterranean Sea and a couple of interior sub-regional centres (mostly Lleida and Girona) (cf. Map 1). Fast population increase

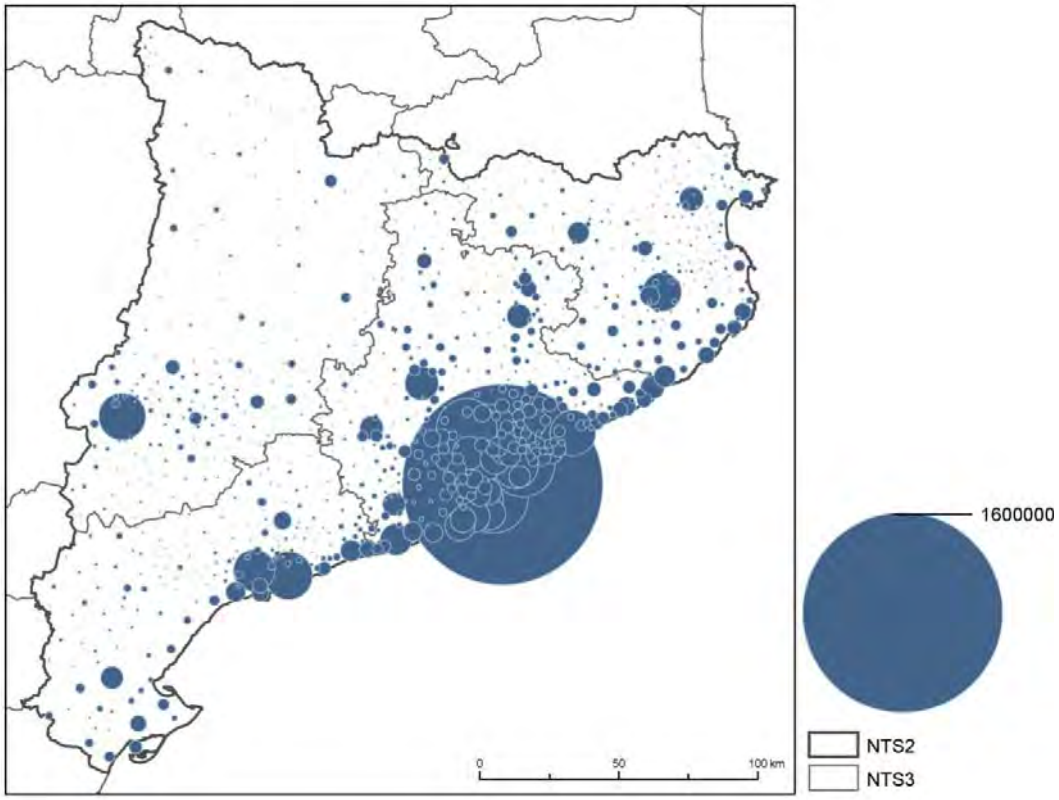
could be observed in many places in the region in 1991-2006 (cf. Map 2). The phenomena occur around Barcelona (even though the city itself and its closest communes record population decline). A significant increase was also recorded in a relatively wide coast belt, as well as in Lleida in Catalonia region and north ends of that region near the Pyrenees. In the latter case the percentage changes are relatively large, but it should be noted that the areas are generally poorly populated and consequently population increase is generally small and mostly connected with development of tourism in the Pyrenees.

Changes in land use quite clearly reflect distribution of population and demographical trends in the region. Increase in land used for residential functions and respective services for its inhabitants is visible in places with significant population centres and fast growth in the number of inhabitants (cf. Map 3 “Growth of residential areas”). Noticeable is also the significance of the most important transport routes along which the new estates develop. Another attractive area is obviously located along the coast, where changes in land use, most likely negatively affecting the ecosystem, can be clearly observed. Simultaneously in the peripheral north-west areas of the region the uptake of non-urban land by residential buildings and associated services is very small.

Development of business activity areas and technical infrastructure (cf. Map 3 “Growth of economic sites and infrastructure”) significantly repeats the pattern of development of residential functions. In this case, however, one can see much more significant concentration in the centre of the metropolitan region. There are also 5 places with significant area devoted to new business functions located in the north part of Lleida province.

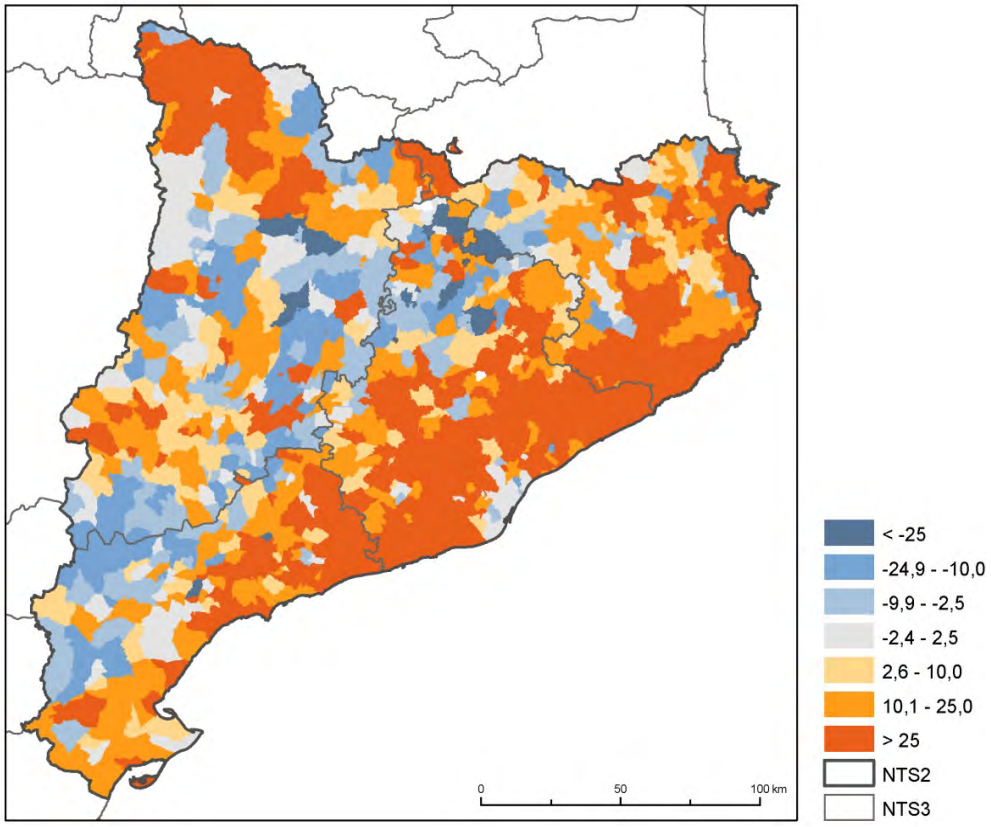
Changes in use of developed land (e.g. changes from industrial to residential function) are significantly smaller than in the case of use of the previously undeveloped land for new functions. In this case, however, visible is also the concentration around Barcelona as well as a significant concentration along the coast (cf. Map 3 “Urban land management”).

Fig. 1. Catalonia – population in 2006



Source:
Prepared by the author based on INE data.

Fig. 2. Catalonia – population change in % (1991-2006)

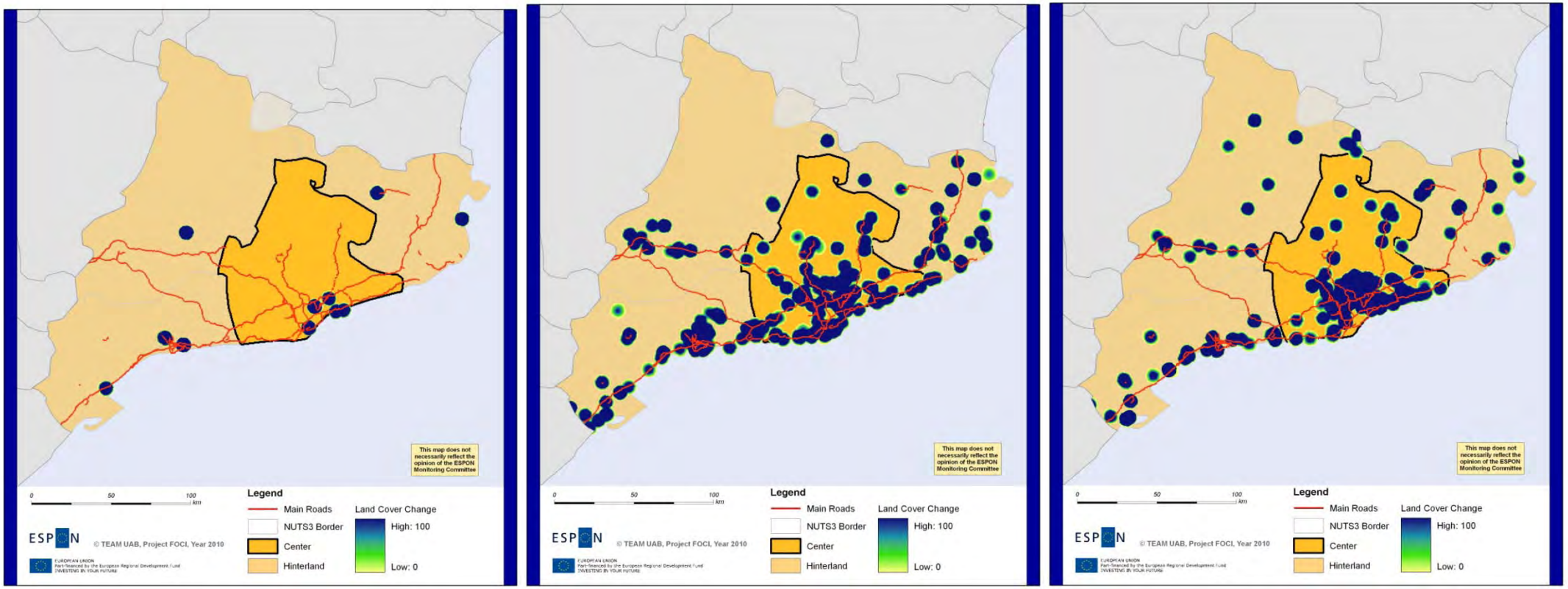


Source: prepared by the author based on INE data.

Fig. 3. Catalonia – land use change (1990-2006)

URBAN LAND MANAGEMENT
GROWTH OF ECONOMIC SITES AND INFRASTRUCTURE

GROWTH OF RESIDENTIAL AREAS



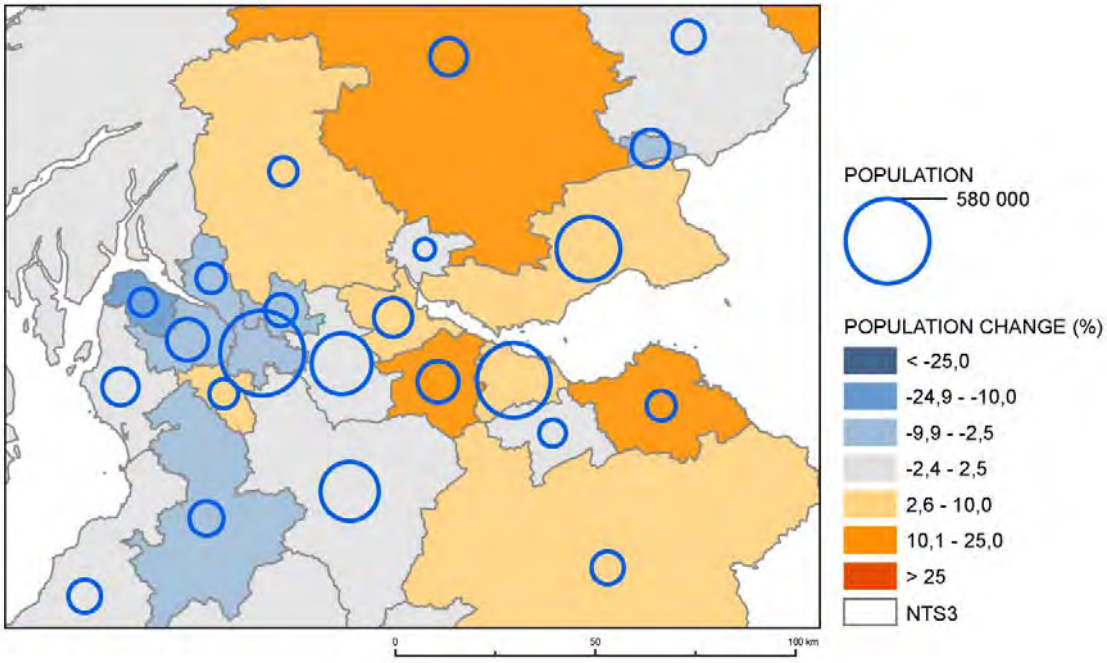
Source: prepared by Jaume Fons-Esteve based on CORINE Land Cover data.

GLASGOW

Glasgow metropolitan area is an example of an area significantly depopulated in 1990-2006. It lost in the competition for new residents with the eastern part of Scotland (cf. Map 4). The population decline was particularly significant in Inverclyde council area. The only council area in the metropolitan region which recorded population increase was East Renfrewshire, located south of Glasgow.

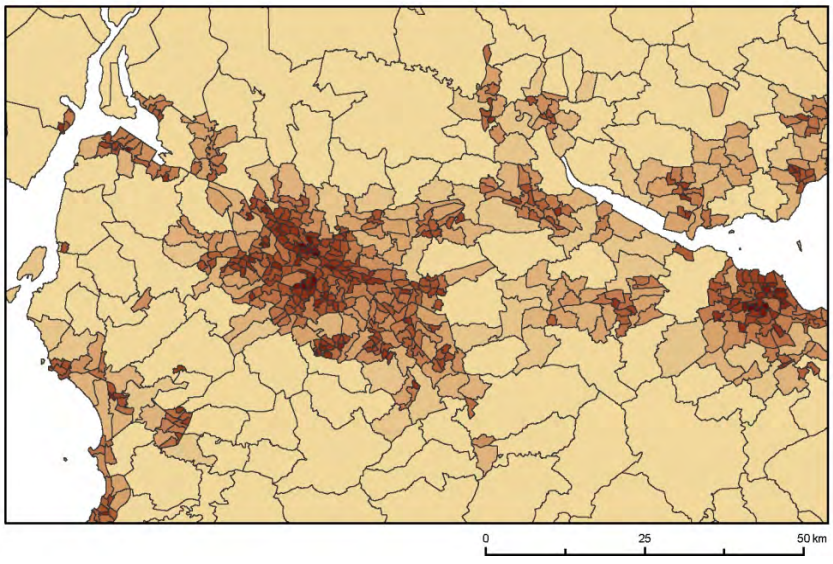
The population decline translates into lower pressure on uptake of new areas for residential or business purposes than e.g. in Catalonia. Most active in this respect are the central areas of the metropolitan region, i.e. in the vicinity of Glasgow. Activity related to residential function is also visible in areas located west of Glasgow, towards the coast (cf. Map 6 “Growth of residential areas”). Development of business functions and technical infrastructure in the new areas is to a lesser degree focused in the centre of the metropolitan region. There is a couple of new investment areas south of Glasgow (cf. Map 6 “Growth of economic sites and infrastructure”). Significant changes in function of developed areas in the analysed period took place, however, only in the centre of the metropolitan region (cf. Map. 6 “Urban land management”).

Fig. 4. West Scotland - population in 2006 and population changes in 1990-2006



Source: prepared by the author based on GROS data.

Fig. 5. Glasgow metropolitan area – population density in 2001



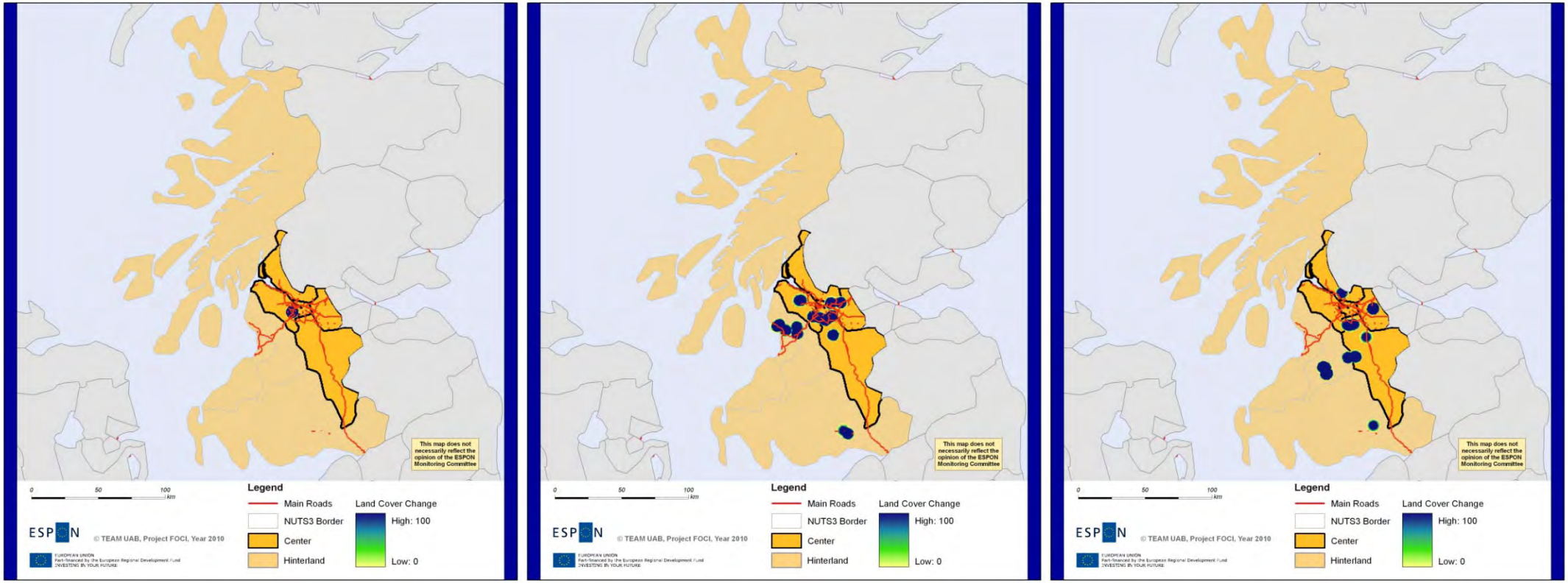
Source: prepared by the author based on GROS data.

Fig. 6. West Scotland – land use change (1990-2006)

URBAN LAND MANAGEMENT INFRASTRUCTURE

GROWTH OF RESIDENTIAL AREAS

GROWTH OF ECONOMIC SITES AND



Source: prepared by Jaume Fons-Esteve based on CORINE Land Cover data.

TOULOUSE

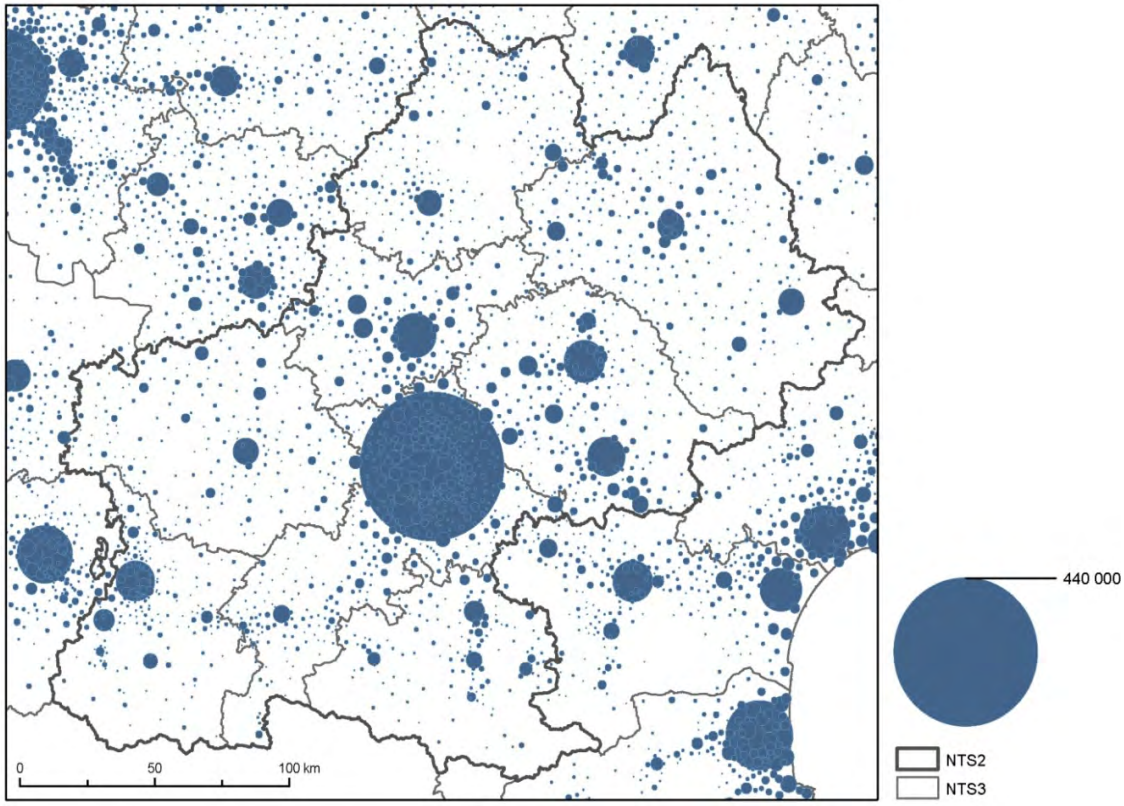
Toulouse metropolitan region is extensive and having single centre. Dominated by its central city it also has well developed sub-regional centres, however with significantly lower population than the central metropolitan area (Fig. 7). In 1990-2006 population of the region increased significantly. The most significant increase focused in Toulouse metropolitan area, but there was also increase in sub-regional centres and some rural areas. Large part of rural areas, however, particularly those located in the peripheries, was depopulating (cf. Fig. 8).

Demographic development translated into uptake of previously undeveloped land for residential buildings (and connected functions), which applies particularly to agricultural land. The process is particularly noticeable in regional centres (cf. Map 9 “Growth of residential areas”). The phenomenon, however, can also be observed in the whole region. This applies to the smallest extent to the south of the region, which results from its mountainous and sub-mountainous land formation.

The new business and technical infrastructure developments are as noticeable as the new residential functions. The centre of the region is again very attractive. Even more noticeable, on the other hand, is the concentration of investments along the main transport routes (cf. Map 9 “Growth of economic sites and infrastructure”).

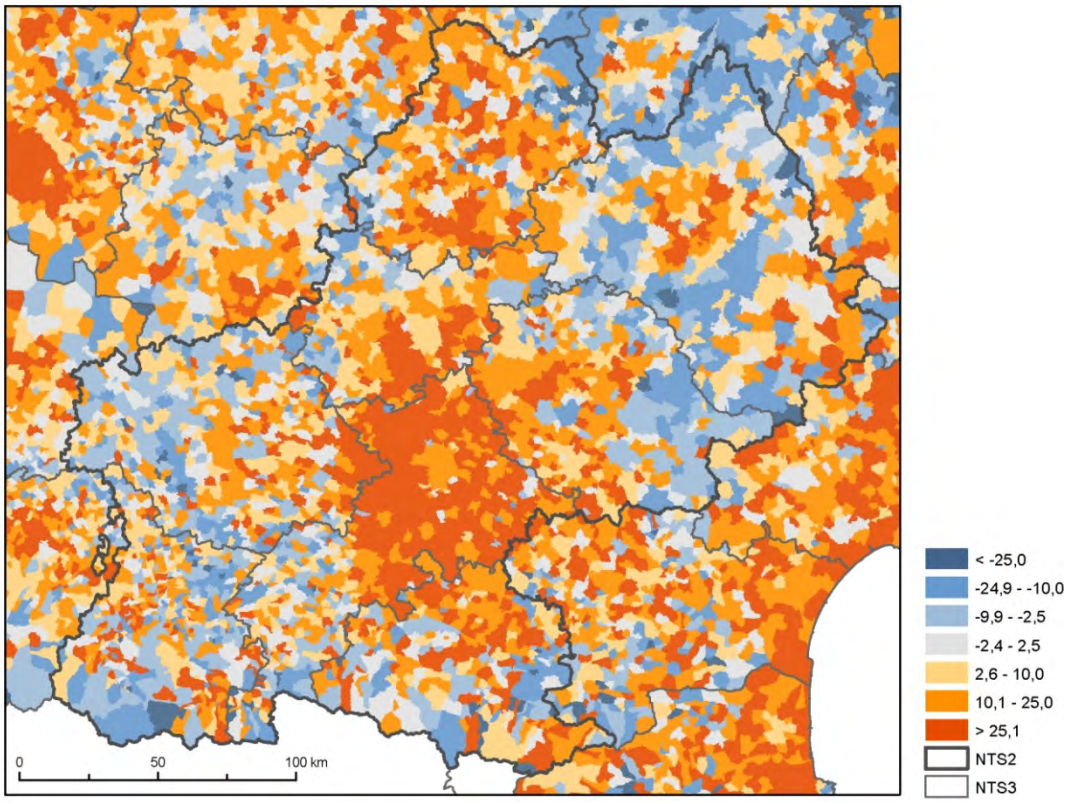
Significant changes in developed land use in the analyzed period were much less intensive than new land development. This is particularly visible near Toulouse and in the Mediterranean Sea coast, as well as in 3 other individual locations in the metropolitan area (cf. Fig. 9 “Urban land management”).

Fig. 7. Midi-Pyrénées – population in 2006



Source: prepared by the author based on INSEE data.

Fig. 8. Midi-Pyrénées – population change in % (1990-2006)



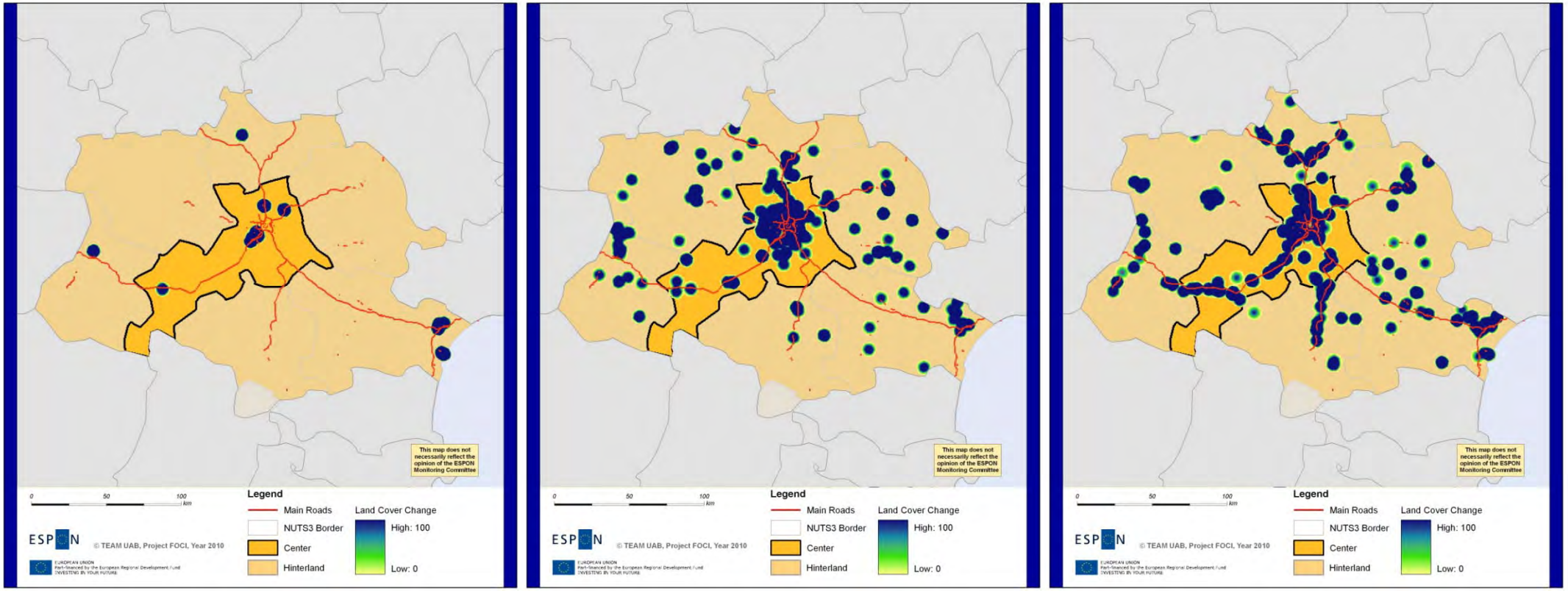
Source: prepared by the author based on INSEE data.

Fig. 9. West Scotland - land use change (1990-2006)

URBAN LAND MANAGEMENT INFRASTRUCTURE

GROWTH OF RESIDENTIAL AREAS

GROWTH OF ECONOMIC SITES AND



Source: prepared by Jaume Fons-Esteve based on CORINE Land Cover data.

WARSAW

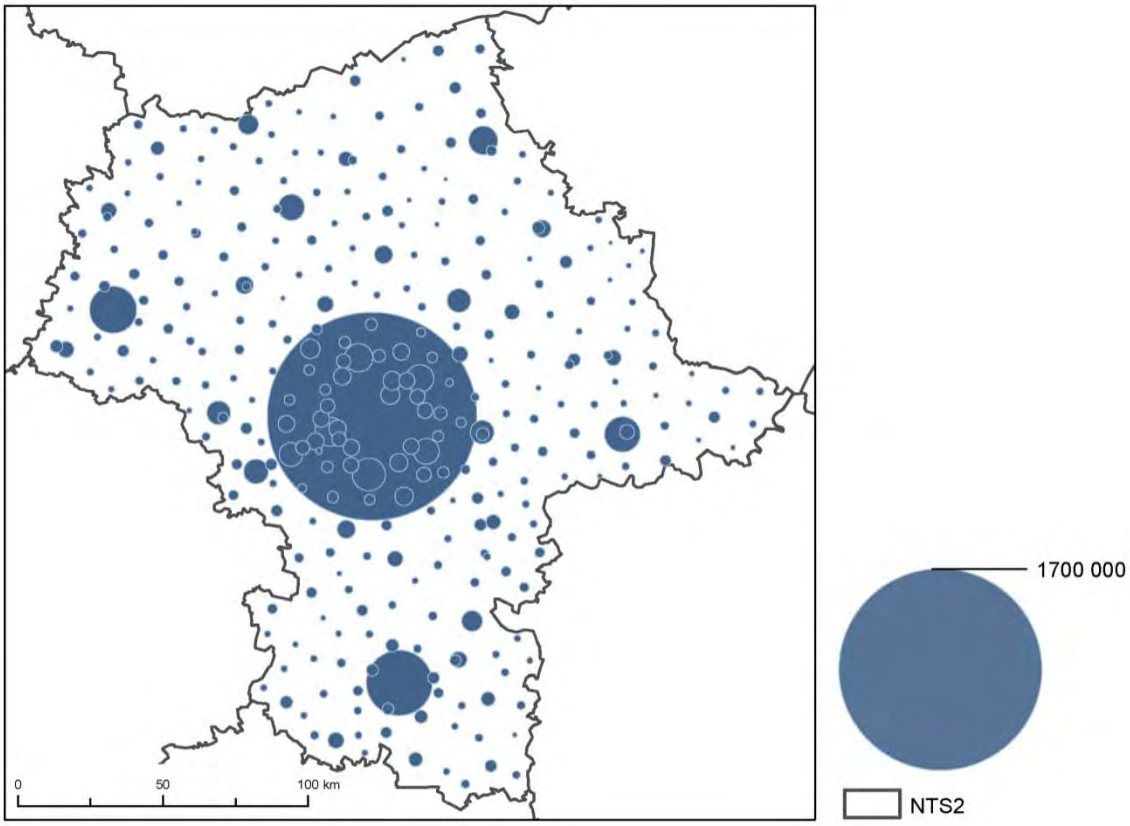
Warsaw metropolitan region is extensive and has one centre, similarly as Toulouse metropolitan region. Warsaw with its vicinity concentrates most of the region's inhabitants. There are also some significantly smaller centres of sub-regional importance (among them: Płock, Radom, Siedlce, Ostrołęka, and Ciechanów) (cf. Fig. 10.). In the analyzed depopulation affected a significant portion of the region. Increases were observed mostly in Warsaw metropolitan area (particularly in the suburban zone, which is connected with suburbanization processes) and, on much smaller scale, in areas connected with the aforementioned sub-regional centres (cf. Fig. 11).

In Warsaw metropolitan region much more important than in the previously discussed cases (Barcelona, Glasgow, and Toulouse) was the functional change in developed areas (cf. Fig. 12. "Urban land management"). The process was particularly intensive in the central city and its closest vicinity. This was connected with deindustrialization resulting from political transformations and introduction of office and residential buildings to post-industrial areas (cf. e.g. Śleszyński 2004), as well as more intensive land development (transformation of "discontinuous urban fabric" into "continuous urban fabric"). Outside Warsaw the change in function of developed areas also occurred in sub-regional centres.

Residential function developments also concentrated in the central town and its hinterland. The phenomenon, however, is visible also in other parts of the region, including the most important sub-regional centres (cf. Fig. 12 "Growth of residential areas").

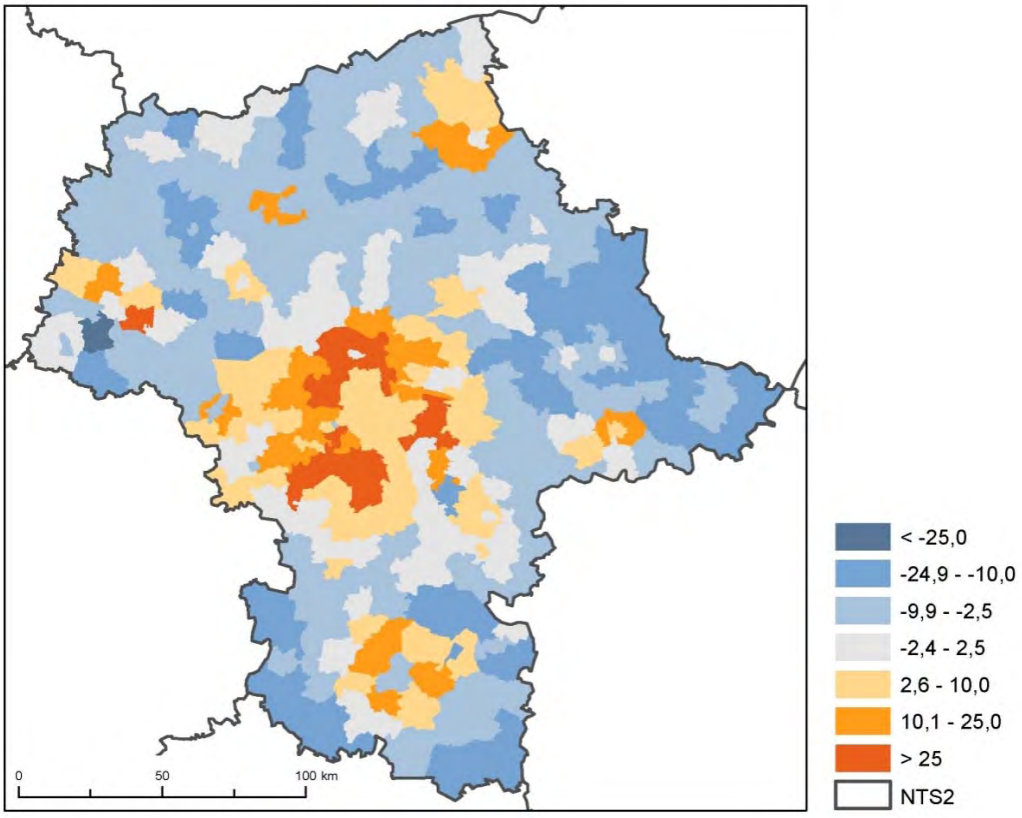
New business activity areas and technical infrastructure (cf. Map 12 "Growth of economic sites and infrastructure") take place in various parts of the region. Noticeable phenomena include concentration in the vicinity of the central town, particularly in the west and north, as well as the importance of the main transport routes and sub-regional centres (except for Siedlce, located in the east part of the region).

Fig. 10. Mazowieckie Voivodship – population in 2008



Source: prepared by the author based on CSO data.

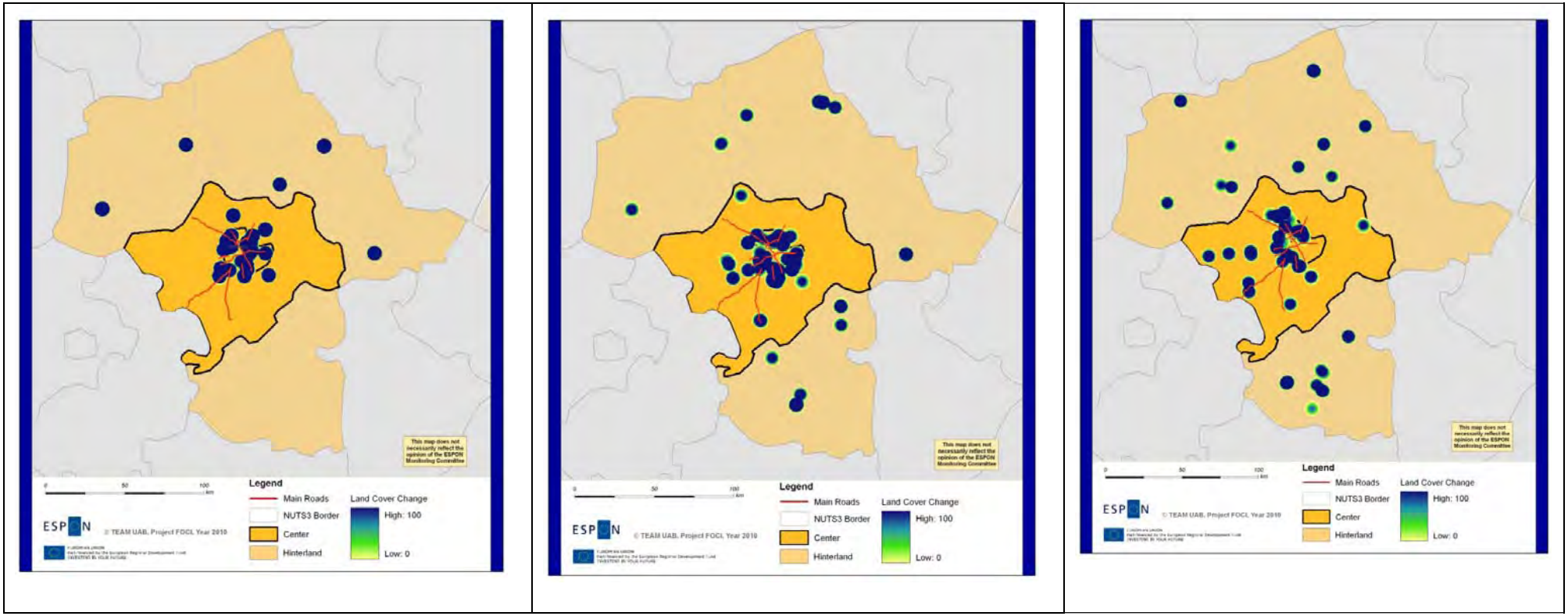
Fig. 11. Mazowieckie Voivodship – population change in % (1995-2008)



Source: prepared by the author based on CSO data.

Fig. 12. Mazovieckie voivodship – land use change (1990-2006)

URBAN LAND MANAGEMENT SITES AND INFRASTRUCTURE	GROWTH OF RESIDENTIAL AREAS	GROWTH OF ECONOMIC



Source: prepared by Jaume Fons-Esteve based on CORINE Land Cover data.

Chapter 10 – Opportunities through "polycentric" cooperation

National Technical University of Athens[46]

Part A. The ESPON space: methods and first empirical results

Abbreviations

APS: Advanced Producer Services
FUA: Functional Urban Area
GDP: Gross Domestic Product
HT: High Technology
PP Polycentric Potential
US: Urban System
UN: Urban Network

1. Introduction[47]

1.1. Polycentric Potential urban systems approach: clustering, complementarities and integration[48]

Polycentricity and cooperation trends and driving forces

Often to a large extent, it is not easy to define polycentricity policies according to the conclusions of the polycentricity analyses as both (analyses and policies) are to a large extent *dependent on the scale / territorial level, the functional content as well as the morphology of different polycentric / mono-centric spatial patterns and the overall economic and social context in which they are embedded.* A recent widespread literature (in ESPON and outside) has examined different aspects of polycentricity. As for the analytical aspect, many researchers examined which indicators, criteria and types of analyses give a better picture not only of the hierarchies but also of the networking (of activities and of cities) at different territorial scales. Concerning the polycentricity policy aspect, they discussed in

[46] Authors of the working paper: M. Angelidis and G. Karka. Contributions: K. Santimpantakis, E. Tsigkas and V. Bazoula -in the elaboration of data and Maps and in the documentation, other members of the team -in specific topics of the research.
[47] This Report presents the work of the NTUA team on WP4: "Opportunities through Polycentric Cooperation". The plan of this work was presented in the Interim Report. However, as necessary data on firms and commuting was given to us on April 2010, our team was obliged to analyse these data in a short time.
[48] See in more extent in the respective Annex of the FOCI Interim Report (2009).

many ways contradictions of polycentrism policies (developed mostly in the line of the ESDP) which are restrained to the support of more morphological polycentricity. For example, Davoudi (2003 pp 991–995) demonstrates that *the ESDP uses polycentricity in a normative approach, not as an existing condition that can be measured* (see also in Taylor 2003, Hall & Pain 2006).

The polycentricity debate becomes more useful for territorial planning in case it is embedded in the **territorial synergies / complementarity / integration of urban networks** approach (see, among others, in Meijers 2006). **Territorial cooperation** among cities and regions is believed to enhance clustering and complementarities of activities by integrating infrastructures through planning implementation. This cooperation is interpreted as more efficient in existing "Polycentric Potentials" Urban networks. From this scope cooperation constitutes a very important aspect of the territorial governance. See, among others, Hall and Pain 2006 and Halbert et al 2006.for the contradictions at different spatial levels in relation with "polycentric" cooperation policy dilemmas.

Thus, **polycentricity trends and driving forces** should be necessarily approached at **different levels** of the European territory and in close relation to **networking, clustering, complementarities and cooperation.** In next we draw mainly on the ESPON 2006 projects 3.2 – Scenarios (2007), 1.1.1 (2004), 1.1.3 (2005) and 1.4.3 (2007) as well as in Hall & Pain (2006).

Different ESPON 2006 projects envisaged the basic trends concerning polycentricity as following[49]:

At a Europe-wide scale, the metropolitan areas of the pentagon, together with a few others, strengthen their leading European position. The "pentagon", as defined in the late 1990s, expands along major corridors with significant metropolitan areas, towards the British Midlands, the southern parts of the Nordic Countries, the Rhone Valley and the Danube Valley up to Budapest. The network of high-speed trains connects most of the metropolitan areas of the wider pentagon. A number of networks of cities emerge inside and outside the pentagon, supported by the major firms' internal cooperation as well as cooperation in research and technological development. The consolidation of these networks leads to the development of wider areas, especially the Baltic Sea Region and the new "Triangle" of Central and Eastern Europe, formed by Vienna, Warsaw and Budapest, including Prague, Dresden and Bratislava. A lower intensity networking emerges in the CADSES area. **The development of polycentricity takes place through the expansion of the pentagon rather than through the development of alternative global economic integration areas.** Remote peripheral regions, and even those with large cities, are not generally successful in generating or maintaining sustained development processes, so that no global economic development area emerges outside the wider pentagon. As a result, **the majority of the large cities in the peripheries remains rather isolated** in

[49] Some first elements of these trends were ascertained in projects ESPON 1.1.1 (2005) and 1.1.3 (2006). They have been further developed in the first ESPON 2006 ESPON evidence report. Further on, they have been more developed in the ESPON 2006 project 3.2 – Scenarios. The NTUA team contributed in such analyses in ESPON 1.1.3 and ESPON 3.2 (the respective section on urban areas trend was done under the responsibility of J. Robert.

their development processes and does not significantly benefit from network and synergy effects.

At an **intermediate (meso) scale**, **the level of polycentricity in the national urban systems of the countries of Central and Eastern Europe and of the southern peripheries tends to be reduced.** This is a result of the empowerment of capitals and some other big cities which ameliorate their position in transport / communication and firms / research networks. They also receive an important part of internal migrants which desert the national agricultural and industrial regions as well as external migrants. In Western Europe, MEGAs and some other big cities receive the major part of migrants from Eastern Europe and outside Europe. In a significant number of regions with traditional industries, both in Eastern and Western Europe, large, medium-sized and small towns decline in the context of accelerating globalisation and face serious difficulties in their attempts to recover and to generate new activities. In Europe as a whole, a number of regions which are attractive for tourist and residential functions however develop. Some of this development is quite strong even in the absence of significant cities.

At **regional / local level,** contrasting evolutions, strongly depending on the context, are ongoing. In the majority of potential urban networks, transport infrastructures are considerably ameliorated enhancing the connectivity among neighbouring cities mainly in Eastern Europe where the road transport networks were poor. However, the enfeeblement of the rail transport networks which served relatively satisfactorily all the medium-sized and small cities together with the development of more selective road transport networks profit to bigger cities and to cities situated along the new transport corridors. The level of implementation of national and regional strategies to enhance cooperation and complementarities also counts on polycentricity at this level.

Globalisation and European integration ***strengthen impressively*** the economic, transport / communication and other ***flows among the ESPON cities*** (see in Castells 1996 and the other wide literature on the “space of flows”). This intensification is a ***major driving force of the actual change / trends of European urban networks.*** However, this networking intensification is ***twofold.*** A first aspect is related to the flows ***at distance***. It mainly concerns the (inter- and intra-) firms, long-distance transport (air transport, TGV etc) and higher level services flows. The second aspect is about the ***flows among neighbouring areas*** at national, regional and local levels.

If a very important change in economic and territorial policies will not occur in the next two decades, the intensification of flows will remain a very important factor of change of Polycentric integration (PI) of European urban networks (UN). Of course, the reorientation of economic development as well as the impacts of energy and environmental issues and policies will influence PI of UN; these issues are examined in other parts of the Report.

Evidence on polycentric potentials at different territorial levels

Polycentricity has been agreed upon as a major policy goal within European territorial policies; however, evidence on how to exploit "Polycentric Potentials" is still not sufficient.

As we have mentioned, *European level* polycentricity has been studied in more depth by relevant ESPON 2006 and other research projects, based on sufficient evidence. Exploiting *"regional polycentric potentials"* aim at improving networking and complementarities between cities at the inter-regional and intra-regional levels. Generally, at this level existing research did not have enough data to use. The most important recent research project which went in depth on "regional polycentricity" (Hall - Pain 2006) studied only a part of the Western Europe. Thus further relevant research is needed for the entire ESPON territory.

Specifically, intensification of each type of clustering and networking influence differently Polycentric Potentials urban networks (PPUN) at different territorial levels and throughout different parts of the European territory. The intensification of *at distance flows* favours the integration of urban networks at the European "macro-regions" level and makes difficult the integration at lower territorial levels. The intensification of *flows among neighbouring areas* favours integration at these levels mainly on the provision of lower level services and strengthens to some extent complementarity and integration on "regional" urban networks.

We should point out that clustering and networking differ considerably throughout the ESPON space. As we have already mentioned, the urban systems of the extended Pentagon area are much more integrated than in the rest of Europe. Mainly, their internal connectivity is much higher.

We should also remark that ***the degree and the type of clustering and complementarity in urban systems play an important role.*** Also, some specific activities: the ***« Advanced Producer Services » (APS)*** as well as the ***« High Technology » (HT) activities*** have a primary importance for the performance of the urban systems. They could together be called ***«dynamic activities»***

As for the ***methods and the data to be used***: evidence on global cities and, even more, on lower level urban networking, remains very often based on ***attributes*** because the relevant data are abundant while ***data on direct links, or even flows,*** which could more clearly inform on the relationships among the cities as nodes of networks ***are poor.*** In this respect, recent research has attributed growing importance to the ***use of the internal structure of firms and, even more, of large Advanced Producer Services (APS) and High Technology (HT) activities as a proxy to measure actual flows of information among cities.*** *The analysis of the territorial effects of real flows through transport means (air-lines, train-lines and motorways) also becomes important.* However, research on all the latter has been mainly conducted on regional and national case studies, not covering the entire ESPON space.

The concept of "Polycentric Potential" urban networks is also closely related to ***"territorial complementarities"***. Promoting territorial complementarities means that, local and regional authorities, by combining appropriate infrastructures can improve the use of the assets as well as the provision of services in their common territory, thus better address actual economic, social and environmental challenges.

More specifically, concerning the urban systems:

The intensified networking among the cities-nodes of the contemporary "Polycentric" Urban Regions is closely related to the presence of complementary relationships between the cities-nodes. Inversely, enhancing complementarities by integrating infrastructures through planning implementation could enhance cities networking and its positive effects. A relatively recent theoretical attempt to characterise complementarity in urban networks states that "different settlements or regions can fulfil different and mutually beneficial roles, through simultaneously embracing the advantages of competition but also overcoming the associated disadvantages" (Hague and Kirk, 2003 cited in Meijers 2006). Complementarity can be about the whole range of urban functions, not just business and economic development (ibid). According to Meijers (2006a), in order for cities in PURs to be complementary, there must be differentiation between the cities in terms of urban functions or activities as well as the geographical markets of demand for their urban functions/activities or environments must at least partly overlap. Activities in one city should provide their services also to businesses or citizens located in the other city. Businesses and households should consider the working and residential environments in several parts of the PUR with respect to their location decisions.

Several recent studies underlined that promoting clustering and complementarities which foster the role of small cities in a network dominated by a strong city could have negative effects. In the same argumentation line: economic actors generally seem to prefer more concentration of Advanced Producer services (APS) and High Technology (HT) activities in "First" cities. Thus, the different types of clustering and complementarities should be further examined in the perspective of the monocentricity and agglomeration / polycentricity and balanced distribution dilemma. According to some researchers, ***measuring complementarity in a "Polycentric Potentials" area needs to measure the extent of differentiation (opposite to duplication) between its cities.*** This differentiation can be related to a wide variety of urban functions. However, the effects of this differentiation on the efficiency of each specific urban system depend on the type / level of complementarities (see above) and need to be further examined.

We will use the ***correspondence analysis method*** to measure the degree of differentiation of urban functions as an indication of clustering and complementarity in PP urban systems – *see in more detail in chapter 12.*

"Polycentric Potentials" and Integration areas

In the line of the previous arguments, a "Polycentric Potentials" area includes an urban network that presents better pre-conditions to develop clustering and complementarities among its cities, in order for the entire area to become more integrated. Studying the potentials to enhance clustering and complementarities and integration this seems more important than the measuring existing morphological polycentricity of the urban network.

First relevant research within the ESPON 2006 programme started by the ***hypothesis that neighbouring cities with overlapping travel-to-work-areas can be functionally integrated and can gain from co-operation.*** Thus it used 45 minutes isochrones as proxies for travel-to work areas and a threshold of 10% overlapping among those areas to define 'Polycentric Integration Areas" (PIAs).

As it resulted from this exercise, ***there are many PIAs in West Europe, while there are few in Southern and Eastern Europe, because in the first population densities are much higher and distances between cities are much smaller. PIAs in West Europe are strong while they are weak in the rest of Europe.***

> This approach of "Polycentric Potentials" was criticised by other researchers, both concerning the conceptualisation of PIAs and the use of a uniform isochrone level for all the cities of the ESPON space. An alternative concept was proposed, that of ***poly-FUAs,*** *groups of relatively equal potential FUAs with overlapping travel-to-work areas.*
>
> In our opinion, the respective ESPON 2006 projects did not go in depth in the analysis of the internal structures and external linkages of the "Polycentric Potentials" areas at regional level, due to the lack of data and lack of resources for their research.
>
> Further on, in our opinion, their work refers rather to lower level relationships as the commuting of the entire workforce and less to "regional" relationships which rather correspond to business travels of the high level workforce and to the provision of high level services to the firms and to the population (including public administration). As we have remarked regarding the extreme density of PIAs in some specific parts of North-Western Europe, in these areas the configuration of the commuting areas of the entire workforce does not differ very much from the configuration of regional urban systems and territories. However, in the rest Europe the commuting areas of the entire workforce (even if the configuration of an initial commuting area is further extended through successive overlapping as in PIAs) differ often very much from the configuration of the regional urban systems and territories defined as just previously.

As the notion of polycentricity is highly scale and size-dependent, ***it is necessary to more appropriately link the different types (and levels) of urban systems with their surrounding ("Potential integration") areas.*** A first such typology takes into account: (a) Cities (or urban networks) with more than 1 million people ("global" and "sub-global" cities) and their hinterlands, (b) "Regional" cities (or urban networks) with 250.000-1.000.000 inhab. in territories with more than 500.000 inh. (c) "Provincial' cities (or urban networks) with 100.000-250.000 inhab. in territories with less than 500.000 inhab.

We should do here an important clarification: using this division does not mean that our approach pertains to the Christallerian approach of cities networks. *It is only a necessary simplified means to study some aspects of the structure and performance of PP urban networks.* Previous research has shown that multi-level polycentric relationships among cities are much more complex than the absolutely hierarchical Christallerian urban networks (see, also in the respective FOCI IR working paper). In reality, the city by city network relationships are not uniform and complying to a single hierarchy, as in the Christaller theory. They are multiform and comply with multiple hierarchies. For example, a city can have much more intense networking relationships with some distant (not neighbouring) cities of similar potential (population etc) than with its closest centre of higher level.

Another quite similar typology takes more into account the urban-rural spatial patterns, together with the density of the regions and their proximity to big urban centres.

As previous research suggests, *more important linkages to study are the internal linkages of regional territories and the linkages of these last to the upper levels of urban systems, with emphasis on the direct linkages / flows described previously.*

1.2. General objective of the study, territorial levels, main question

As we explained, our ***general objective*** *is to* ***move from an approach based on the attributes of individual cities to a more network oriented one***, thus going from the past morphological approaches based on potential links to one trying to assess "real" links.
Taking into account scale-dependency, our research examines polycentricity at the ***"mega-region" (including trans-national), national and regional levels.***
We study how to improve networking and complementarities between cities at these levels.
We examine which urban networks, polycentric or monocentric, are already integrated and which present potentials to become more integrated.

We can distinguish, taking into account our previous remarks**, *three types (or levels) of polycentric relationships*** (see in more extent, in the respective FOCI IR (2009) working paper).

Higher Level (HL): Cooperation in business and on higher level infrastructures, creating competitive networks and network clusters and improving provision of higher level services

Research here concentrates in evaluating the degree of existing complementarities and networking and the lack of linkages by infrastructures and services among the sub-centres and the sub-units of each one territory. On this base we will evaluate its performance.

Lower level (LL): Daily commuting, lower level transport and other infrastructures and services, allowing a group of cities to share resources and possibly reach a "critical mass" for economic competition through the exploitation of their complementarities.

Research here prioritises the collection of the necessary local data to understand both existing links and complementarities, notably in terms of infrastructure and resource sharing". We will also study the governance structures and existing cooperation policies

Service provision (SP) Cooperation in service provision in order to allow service providers to retain a sufficient size for efficiency while ensuring service coverage for the entire population.

Research here should concentrate on how to combine the location and potential of infrastructures and services at different territorial scales. We did not further investigated this level in this project.

2. Linking the levels of cities with the levels of "Polycentric Potential" territories

For this task, PIAs of ESPON 1.1.1 *-see Fig. 1 and 2 in next-* are not suitable, because their definition presents several problems as well as because they do not cover each entire national territory.

Each **Polycentric Potential territory** should include, apart from the respective cities / FUAs, a number of smaller settlements so as to constitute a whole zone which cities provide with services. Therefore, all cities (and small territories) of a national territory should be included in PP territories.

According to a great number of researches, the **First city of each PP territory** (whether this last is monocentric or polycentric) **has a more or less first role in providing the PP territory with services.** The First city role is very often related to its prime position in the administrative system of each country.

Therefore, a **starting hypothesis on a "combined" typology of First "cities" and the corresponding Polycentric Potential territories ("areas of interest")** constitutes obviously a necessary methodological choice in studies focusing on interactions / complementarities among cities (as "places", "points) as well as between the cities and their wider areas.

We will use here as a basis the typology of relationships of First cities / PP territories defined by the POLYNET study[50].

From this scope, we discern **three types of urban systems associated to their areas of interest (territories):**

(A) **Metropolitan areas (MAs)**, mono-nuclear or poly-nuclear, whether they are MEGAs or not, associated to their wider territories.

We included here the 76 MEGAs defined by ESPON 1.1.1 project and the poly-nuclear metropolitan areas defined by ESPON 1.4.3 project -see in next the Map 1.

(B**) "Regional" cities -population 250,000–1,000,000**- associated to **territories with more than 500.000 inhab.**

(C) **"Provincial" cities -population 100,000–250,000**- associated to **territories with less than 500.000 inhab.**

3. Type of relationships to be studied per type of urban systems and their associated territories

(HL) Higher level

This first type of relations concerns essentially the two first types of urban systems / their areas of interest: **(A) – Metropolitan Areas and (B) - "Regional".**

(LL) Lower level

These types of relationships are relevant within both **the previous types (A) and (B) of urban systems / their areas of interest**: the MAs and "regional" territories (mono-nuclear or poly-nuclear large entities -see previously**) as well as the "provincial" territories,** in other words, the territories which are not dominated by large cities.

(SP) Service provision

Despite the fact that this level of relationships is important, it was not possible to examine it in depth because of lack of data and resources.

4. Identification and delimitation of PP urban networks[51]

4.1. The three steps applied

We should clarify here that, for all kinds of potentially polycentric territories, we needed **first identify the respective urban networks** and **then delimit the area of each respective territory**.

This was necessary **in order to be able to "measure" different indicators** (both "attribute» and "network" indicators) that have enabled us to **evaluate the**

[50] This typology is also used to a considerable extent by other studied as for instance by the ESPON 1.4.3.

[51] Associated with Metropolitan Areas (MAs), "regional" territories and "provincial" territories.

polycentricity degree, the performance, the complementarities etc of each Potentially Polycentric Territory.

For both the **identification and delimitation** of the previous territories as well as for the **evaluation** of the polycentricity degree etc, **we have used both "attribute" and "network" data and analyses, but *not the same kind of analyses for each step*.**

While it is relatively easy to identify the Metropolitan Areas and delimit the respective territories, this is **much more difficult in the case of the "regional" and the "provincial" territories**.

4.2. Search and organisation of data, creation of a FUAs network geo-database

- First, we have approximated FUAs (in Metropolitan Areas and "regional" territories) with NUTS3 units. We have also used data for the FUAs included in the ESPON 1.1.1 FUAs Database: population 2000, population density, indicators on economy, tourism, administration etc. In this project, FUAs were mainly defined on the basis of LAU2 units.

- We used Eurostat data at NUTS3 level (in cases we approximated FUAs to NUTS3 units) in order to create the profiles of cities per economic sector- see in next.

- In order to be able to analyse different kinds of territorial data on links among the European FUAs, we considered it more appropriate to create (with ESRI ArcGIS) a *network geo-database linking all 1500 ESPON FUAs.*

The foundation of this geo-database is a *matrix of links among 1500 x 1500 FUAs* (evidently we will not use all the links in our analyses).

The respective shapefile, of course, includes a very big number of links (2,5 millions).

We first attributed to the **nodes** of the shapefile the respective data from ESPON 1.1.1 FUAs (point) shapefile (population and several indicators on economic activities etc)

We have loaded gradually all necessary categories of data to the nodes (FUAs) of this geo-database: Urban Audit data, transport data etc.

4.3. Identification and delimitation of the Metropolitan Areas, links studied in this case

In order to define the Metropolitan Areas (MAs) to include in this category, we started from the 77 MEGAs of the ESPON 2006 1.1.1 and 1.4.3 projects.
Some of them are **mono-nuclear (more monocentric) (category A-1) while others are part of poly-nuclear entities («poly-FUAS») (category A-2).**
Apart from them, there are some **other poly-nuclear metropolitan areas which do not contain any MEGA (category A-3)**. In any case the population of the respective territory (PP area) is higher than 500.000 inhabitants.

Links studied in this case:

The links among the different Metropolitan Areas and from the Metropolitan Areas to the “regional” cities / territories

5. Definition of “Regional” PP urban networks and territories

While the definition of the Metropolitan Areas is enough clear, the “regional” and “provincial” urban networks / territories should be defined more concretely. This definition could be made to a considerable extent according to the correspondent type of polycentric relationships.

We used for this purpose both “attribute” and networking data and we have developed several appropriate methods – see in next

We remark that there is a kind of circularity here noted however, among others, by POLYNET study. In other words, we made a starting hypothesis that is checked during the following analysis.

Here, evidently we needed to examine the whole group of cities constituting the urban network of the Polycentric Potential territory. In some cases the most populated city of this network has less than 250.000 inhabitants but there are two or three important cities which all together have a population over 250.000 inh.

Links studied

(a) The Internal links within “Regional” cities / territories,

(b) The links from “Regional cities” (B) to the Metropolitan Areas (A) and the ‘Provincial cities” (C).

6. Identification of “regional” urban systems: mainstream methods for the entire ESPON territory

As the identification of “regional” urban systems is of crucial importance for our subject, we tried to develop several different methods for this identification. Some of them are “mainstream” in the sense that they are elaborated or suggested by previous ESPON projects: identification of PIAs by the ESPON project 1.1.1 or improvement / reorientation of this method suggested by the ESPON project 1.4.3. We present them in 6.1. Further on, we developed a method of identification of “regional” urban systems using isochrones from the “regional” or “provincial” centres as not overlapping “service” territories -see in 6.2.

We also tried to develop “innovative” methods taking into account more appropriate properties of the networking among cities. These methods could not be applied for the entire ESPON territory due to the lack of data for some countries. They have been used beneficially in the case studies. We present these methods in the section 7.

6.1. The Potential Integration Areas (PIAs) of ESPON 1.1.1

The identification of PIAs in ESPON 1.1.1 was based on the proximity of cities to each other*: The preconditions for polycentricity are best where cities are located in proximity to each other…* Morphological proximity is of course no guarantee of co-operation, but proximity does nevertheless provide cities with a better opportunity for functional integration…”.

In this sense, they suggested ***Potential Urban Strategic Horizons (PUSHs) and Potential Polycentric Integration Areas (PIAs -***Maps 1 and 2). For each of the FUAs, they have calculated *the area that can be reached within 45 minutes by car from the FUA centre.* The resulting areas are labelled ***PUSH.*** In a next step, they have identified ***PIAs***, based on the *hypothesis that neighbouring cities with overlapping travel-to-work-areas can be functionally integrated and can gain from co-operation*. A total of *249 PIAs* were found where at least two PUSH areas shared more than 1/3 of their area with each other. These areas concern 1,139 PUSHs, while the remaining 456 PUSHs are more isolated.

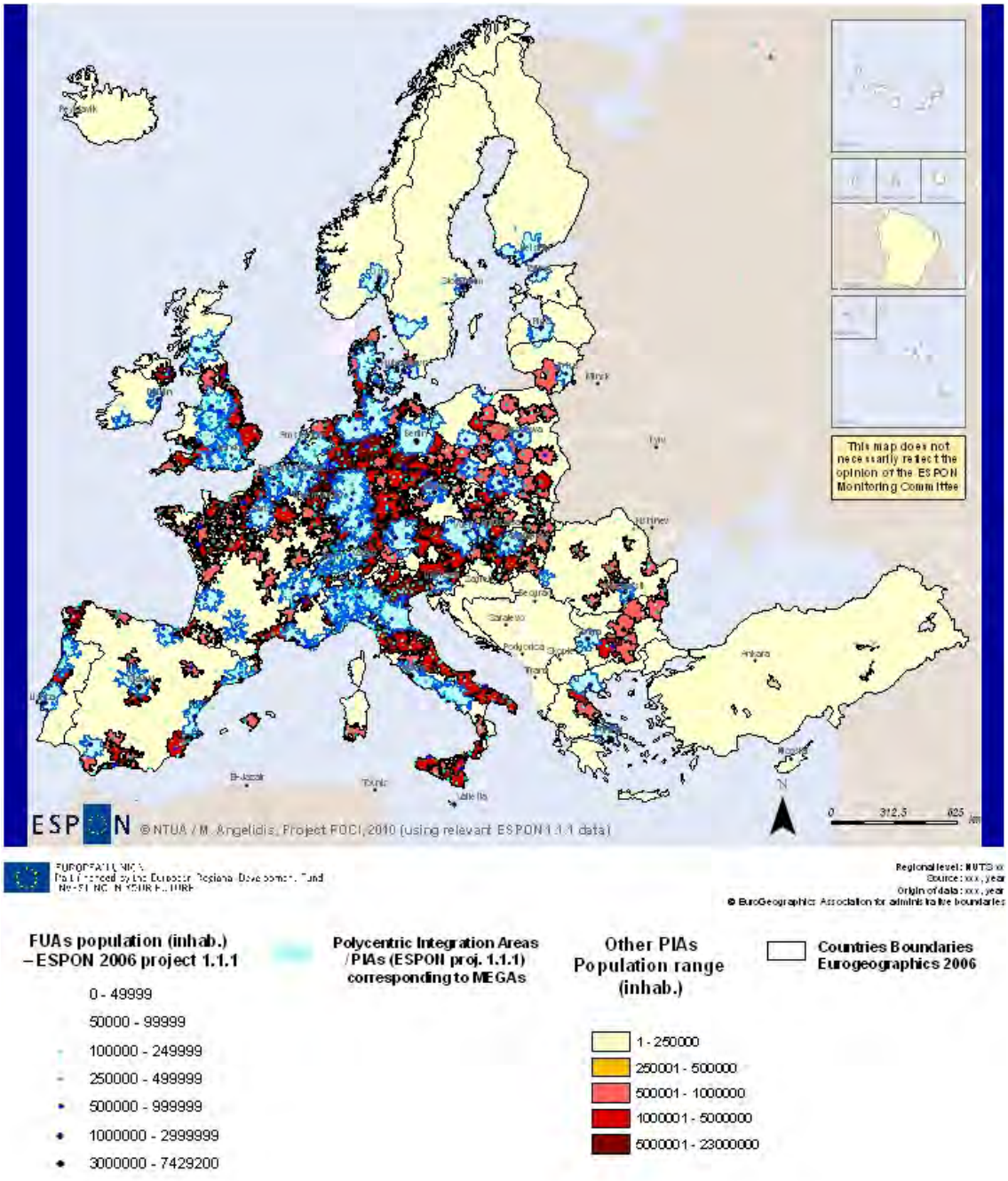


Figure 1. Attempts to build a typology of EU 'Polycentric Potential" areas to be used in FOCI: ESPON 1.1.1 PIAs of MEGAs and PIAs with population more than 500.000 inhab.

They correspond to a considerable extent to "regional" cities / territories in "Intermediate" regions

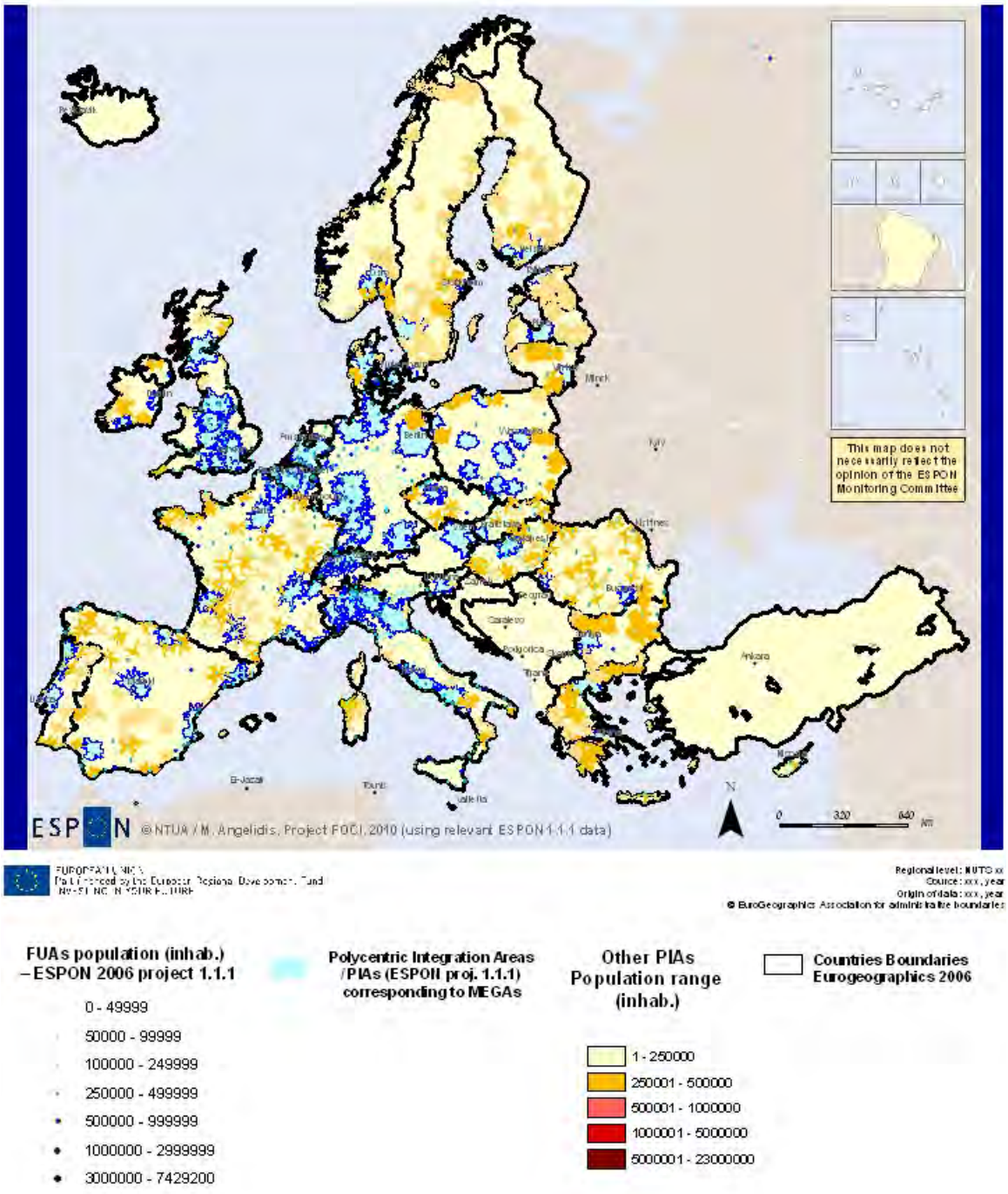


Figure 2. Attempts to build a typology of EU 'Polycentric Potential" areas to be used in FOCI: ESPON 1.1.1 PIAs with population less than 500.000 inhab.

They correspond to a considerable extent to "Provincial" cities / territories in "Intermediate" regions.

We could make here some useful remarks:

- The PIAs with more than 500.000 inhabitants coincide more or less to the *"Regional" cities -population 250,000–1,000,000-* associated to **t***erritories with more than 500.000 inhab***.** -see in Map 1.

- The PIAs with less than 500.000 inhabitants coincide more or less (however not fully) to the **"***Provincial" cities -population 100,000–250,000-* associated to *territories with less than 500.000 inhab. - see in Map 2.* In this category of PIAs, rural areas remote from big urban centres are mainly included, situated mainly outside the EU "blue banana", mostly in Southern and Eastern Europe.

Despite the weakness of their definition, PIAs represent in many cases plausible "regional" urban networks thus we considered that it was useful to evaluate their complementarity degree -see in Chapter 12.

6.2. Improving the definition of PIAs: towards more appropriate Polycentric Potential urban networks and respective territories

We started here from the criticism of ESPON 1.4.3 to ESPON 1.1.1 stating that "it was not realistic to assume that all FUA centres, including the smallest ones, can extend their zones of influence over the area situated within the 45 minutes travel time isochrone. If clusters of PUSH and PIA areas were to form magnets for further concentration of economic and demographic potential, they would have *to be based upon the network of large cities which offer real attracting power in terms of labour market and the range of specialized services".*

In our opinion a very important insufficiency of PIAs is that they were based on Labour Market Areas (extending them partly artificially through iterations)which correspond to lower level than the regional relationships. This was less problematic in very dense areas of the Pentagon where LMAs are not very different from the areas of the regional urban systems. It was inversely much more problematic for the rest Europe where the LMAs are much more dissociated from regional relationships areas. For this reason, ESPON 1.1.1 PIAs are rare in Eastern and Southern Europe.

Our goal in the following is exactly to emphasise on the use of regional (higher level) relationships for the definition of the regional urban systems and territories. This comply much more with the territorial objectives of provision of services the "density" and configurations of the respective infrastructures, the higher level links among companies and so on.

The criterion of the 90 minutes time distance comply with the literature on this matter (while it, evidently, differ considerably among specific types of territories – see in more detail in next sections).

For this purpose we have defined PP urban networks as following:

- We started from the 45 minutes isochrones from the FUAs

- We have included in each "area of interest" the neighbouring LAU2 units if more than 50% of their area included in the isochrone

- For the creation of isochrones, we have used the European road network provided by Transtools package of projects[52] -see more details for "Transtools" in section 7.2. For the speed rate by segment of the network we used the "Free speed" field containing the values of the allowable speed in each segment. The speed rate data have been provided to Transtools by official providers.

- We defined the 45', 60', 90' and 120' isochrones from cities with more than 250.000 inhabitants as well as with more than 200.000, 150.000 and 100.000.

- A major problem regarding the evaluation of performance of PIAs is that their areas are overlapping; therefore *a city is included in two or more urban systems.*

Thus we have tested (using the appropriate methods of GIS software) different *cases of territories overlapping less than in the case of PIAs or not overlapping at all.*

- We concluded that, from the above numerous alternatives, the one which is closest to the "regional relationships" in PP urban networks is that of the territories which are defined as ***not overlapping "service areas"*** *the boundaries of which are not distant more than 90 minutes of cities with more than 250.000 inhabitants –see in the Map 3.*

There are 256 such regional urban systems and respective territories in total.

[52] Transtools is a package of projects directed by the EC JRC (Joint Research Center). We used the 2009 version of this package.

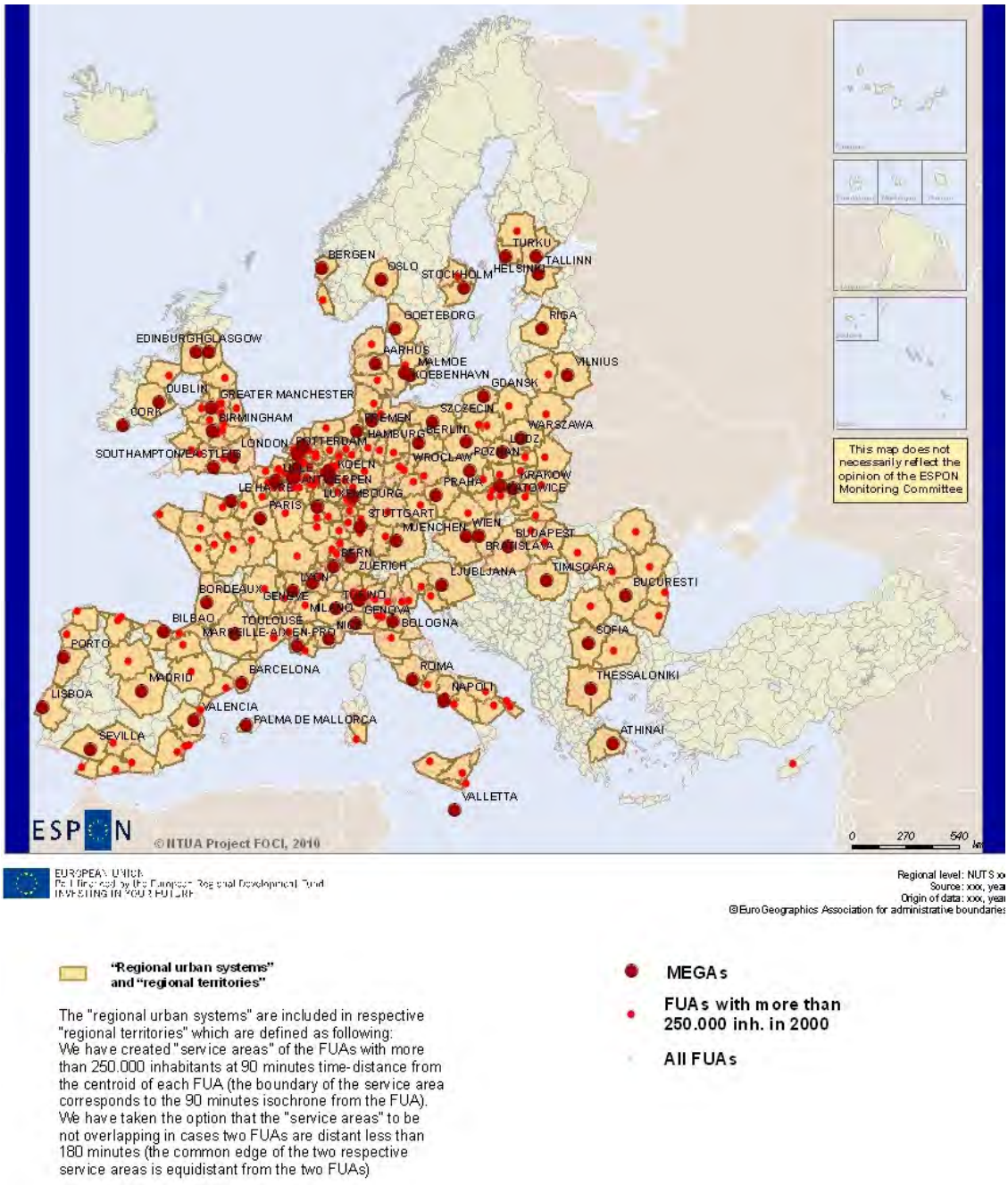


Figure 3. Polycentric Potentials urban systems and respective "regional territories" defined as not overlapping "service areas" of the FUAs with more than 250.000 inhabitants at 90 minutes time-distance
Data analysis: NTUA team

The advantage of this method is exactly that we do not have overlapping PP urban systems / territories, thus we could more efficiently compare the specific urban systems than in the case of PIAs.

In the respective Map we can see that in some countries (Spain, Greece etc) there are zones which are distant more than 90' from cities with more than 250.000 inhabitants, therefore they are not included in the latter territories.

We have further examined the case to replace these “empty” zones with “service areas” at a distance of 90 minutes from “First cities” with 100.000-250.000 inh.

Further on, in cases where the potential time distance of provision of regional level services is obviously much lower than 90 minutes we have unified the areas of the respective regional urban systems and territories. This happened in the more densely populated areas of the Pentagon. Therefore the number of cities (FUAs) included in these “unified” regional territories in much higher.

We present the results of this work in the *Map 4*. As some additional checks of this work are needed, we will present in detail this method in a respective publication.

Finally, we have evaluated the performance, the complementarities and the urban networking of the retained urban systems and territories (corresponding to the first above division -presented in the Map 3) using the same methods as for PIAs -see in the section 9.2 and the Chapters 10, 11 and 12.

Evidently, there are some problems regarding such use of the above urban systems – see in more detail in Chapter 12.

The use of the “new” division of the ESPON space in “regional territories” faces appropriately a large part of these problems.

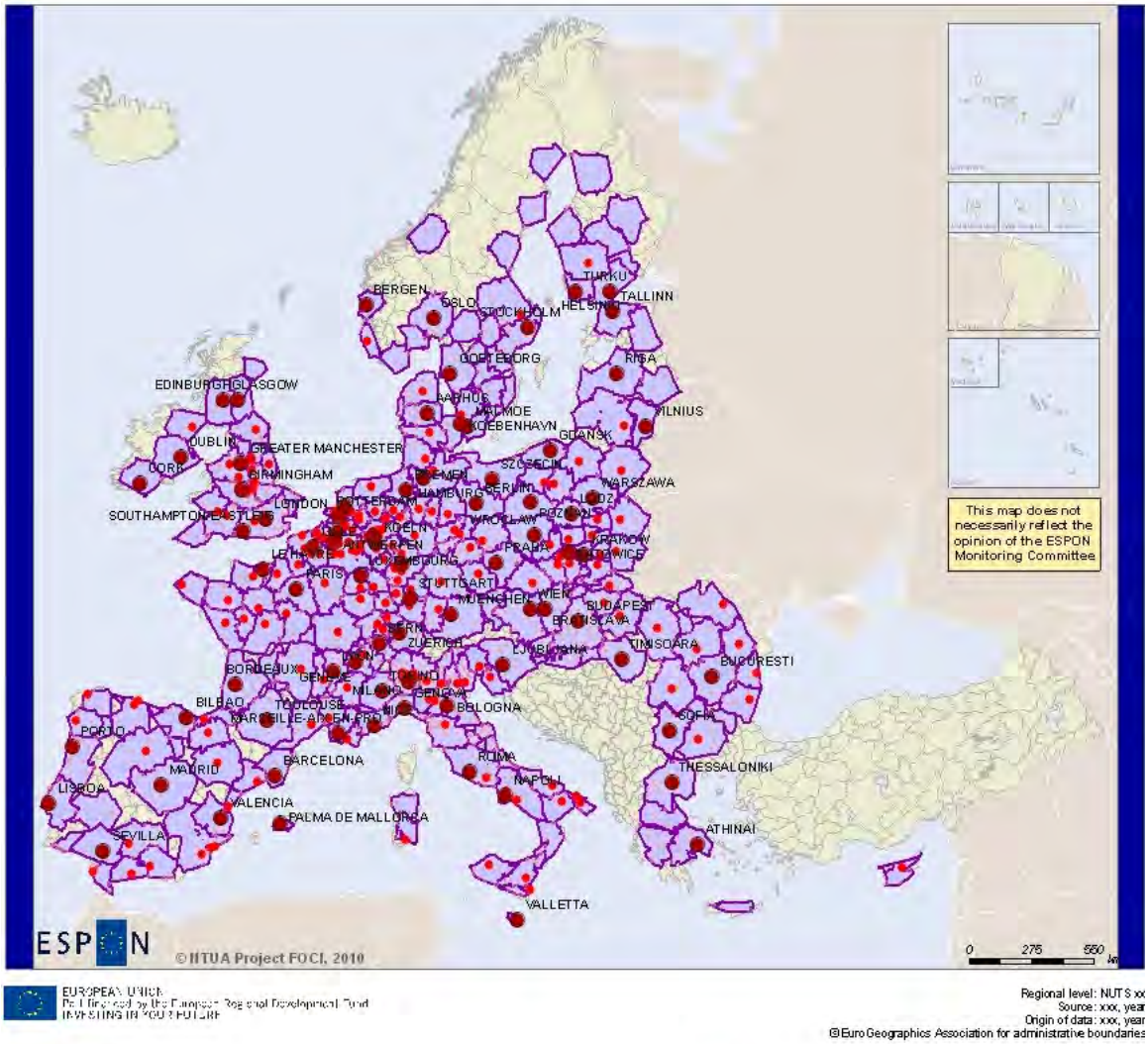


Figure 4. Polycentric Potentials urban systems and respective "regional territories" defined as not overlapping "service areas" of the FUAs with more than 100.000 inhabitants at 90 minutes time-distance; very dense territories are unified

See in detail in the text. Data analysis: NTUA team

7. Identification of “regional” urban networks: innovative methods to be gradually applied for the entire ESPON territory

7.1. The steps to apply

We proceeded in two steps:

1st step:

We created a first scheme of “regional” territories using “attribute” data: population of supposed “regional” cities (above 250.000 inh.), population of supposed “provincial” cities (below 250.000 inh.) and distances among the cities.

We made this analysis only for the case of Eastern Balkans countries

2nd step:

We identified strong relationships from supposed “regional” FUAs to “provincial” and other FUAs.
We used for this purpose data on flows among the cities in relation to the population of cities.
We used primarily the intensity of the road traffic among the FUAs.
We made this analysis for the case of France and the cases of the Eastern Balkans countries.
This analysis could be made for a large part of the ESPON space, except for the cases of countries where there are not data from the Transtools package (see in next) on road traffic.

We present in next the different methods used and their results.

7.2. Methods applied and results taken from the use of transport flows for the identification of "regional" territories / Comparison and selection of links from "regional" to "provincial" and other FUAs

(a) Use of the Road transport flows /

Road transport is more important as it represents 80% of the total transport traffic
We present next some of the several attempts made using total traffic from FUA to FUA, average traffic, coefficient k taking into account the intensity of road traffic and the population of cities etc.

(a1) Use of the average daily traffic from FUA to FUA

We used the road transport data provided by the **"Transtools" package of projects** directed by the **EC JRC** (Joint Research Center). We used the 2009 version of this package, referenced as: Rich J., Bröcker J., Hansen C.O., Korchenewych A., Nielsen O.A., Vuk G. (2009): *Report on Scenario, Traffic Forecast and Analysis of Traffic on the TEN-T, taking into Consideration the External Dimension of the Union – TRANS-TOOLS version 2; Model and Data Improvements*, Funded by DG TREN, Copenhagen, Denmark.
We used, more specifically: (a) The European road network provided by Transtools. (b) The data on Annual Average Daily Traffic / AADT by segment of the network, provided by Transtools. While several values used in Transtools are calculated by its models, the AADT values were provided to Transtools by several sources. The sources of these data are listed in the "ANNEX - Sources of historical traffic data" of the document": Leduc G (2008)., Road Traffic Data: Collection Methods and Applications; Working Papers on Energy, Transport and Climate Change JRC 47967 – 2008.
The AADT values used are specified in the following: "The preload base year table contains 2005 AADT figures for road links within a zone. Road links passing a zone border carry, in principle, exclusively inter zonal trips and therefore traffic is not preloaded. Since the preload figures are not split by vehicle type, we assume generally a split of 80% passenger cars and 20% goods vehicles (heavy and light goods vehicles). Busses are not considered, because their share is marginally on roads considered in the model. Intra zonal vehicle km (T) preloaded to the model network is then the product of AADT (x) and length (l) for links within the zone

We present below the example of Bulgaria.
During this work, we used different sets of values of parameters of the population of First cities ("regional" centres) and "provincial" cities. We present below the final set of parameters used.
The links go from FUAs with > 150.000 inh. (First cities of "regional" territories) to FUAs with < 150.000 inh. ("provincial" FUAs). The intensity of links corresponds to the average traffic density per link: ***median AADT / total length.*** Only the links at a distance less than 250 Km from the First cities have been taken into account.

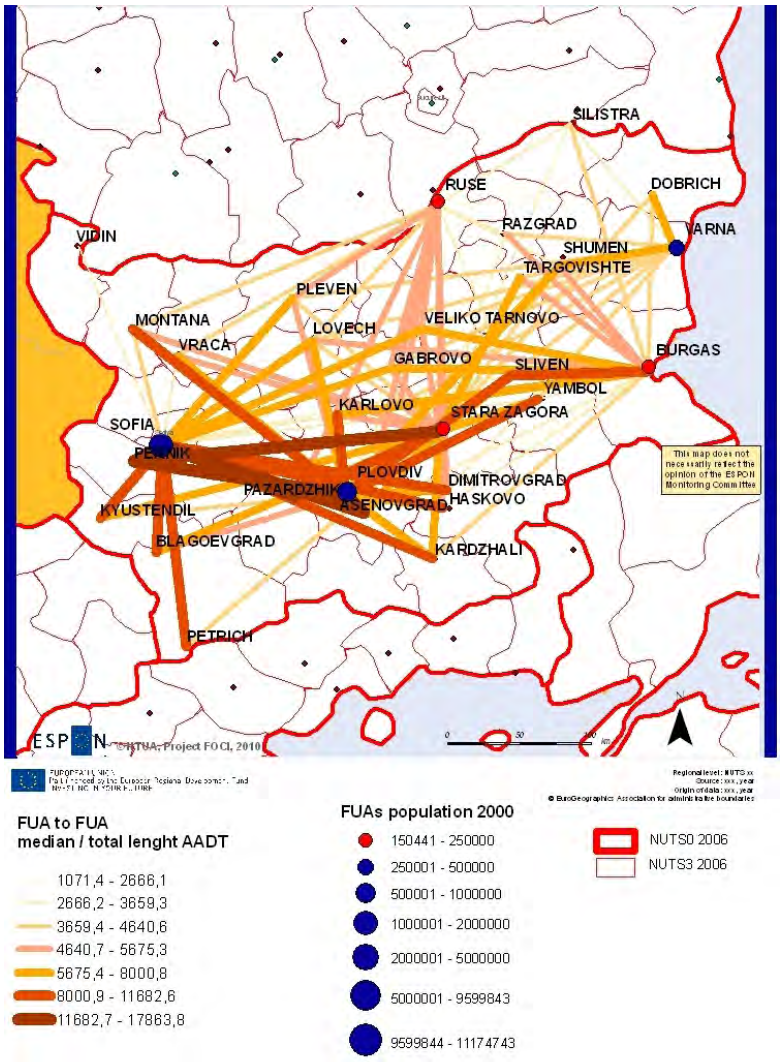


Figure 5. Bulgaria FUAs road links intensity from "regional" centres to lower level centres: FUA to FUA median AADT / total length

(a2) Use of the rates of the coefficient k taking into account the intensity of road traffic and the population of cities

Indicator k measures the intensity of FUA to FUA relationships.

k = observed traffic / theoretical traffic

Theoretical traffic = a * (m x m') / d ^{2}, where:

- **m and m'** represent the population of the considered FUAs
- **d** their **distance** (we could use d or d ^{2} according to the specific use of the model)
- **a is a simple coefficient of adjustment** of data on the national average of the considered traffics.

We present below one of the attempts for the cases of France, Bulgaria and Romania (Maps 6, 7a and 7b).

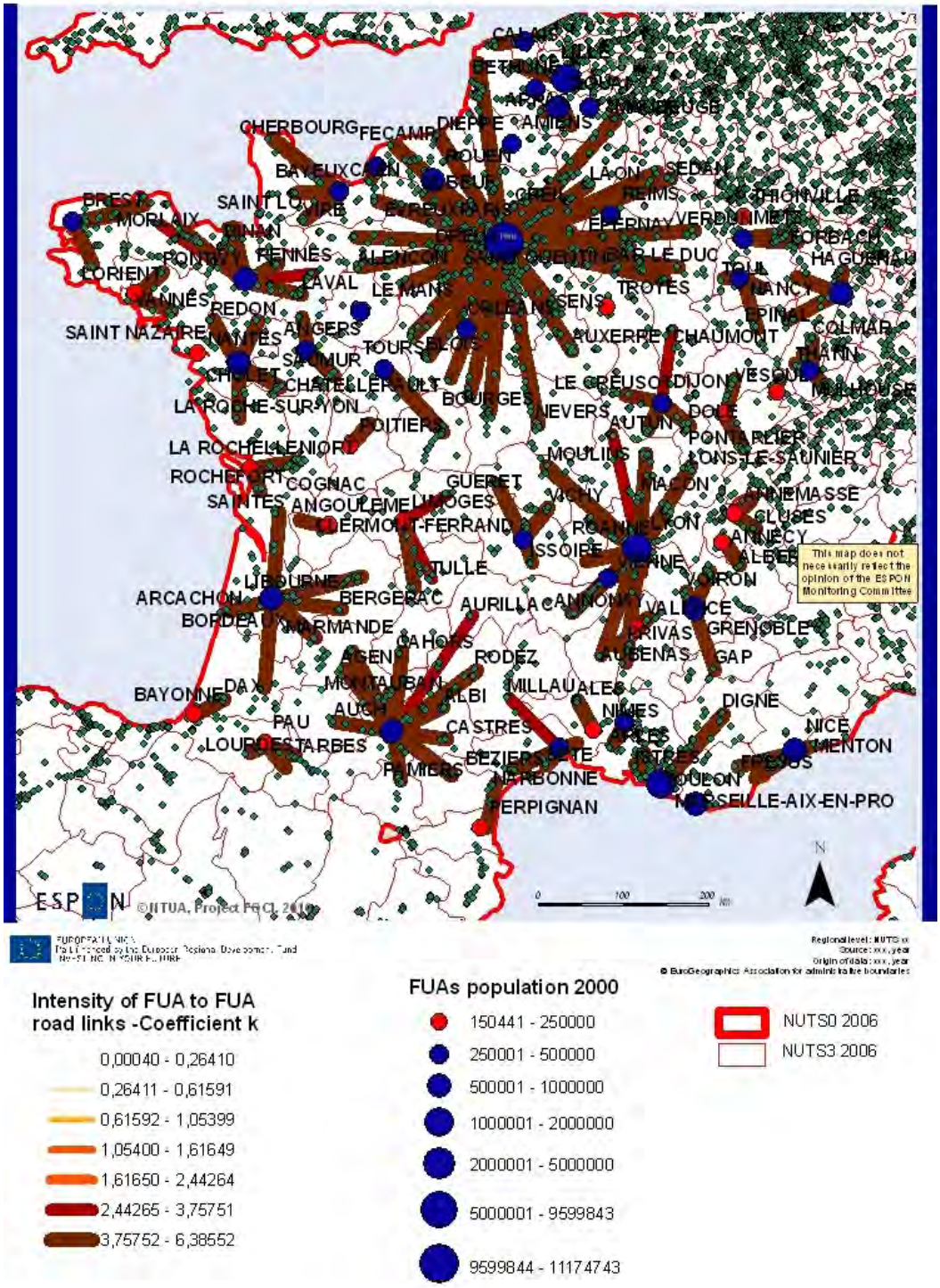


Figure 6. France: FUAs road links intensity from regional centres to lower level centres: Coefficient k

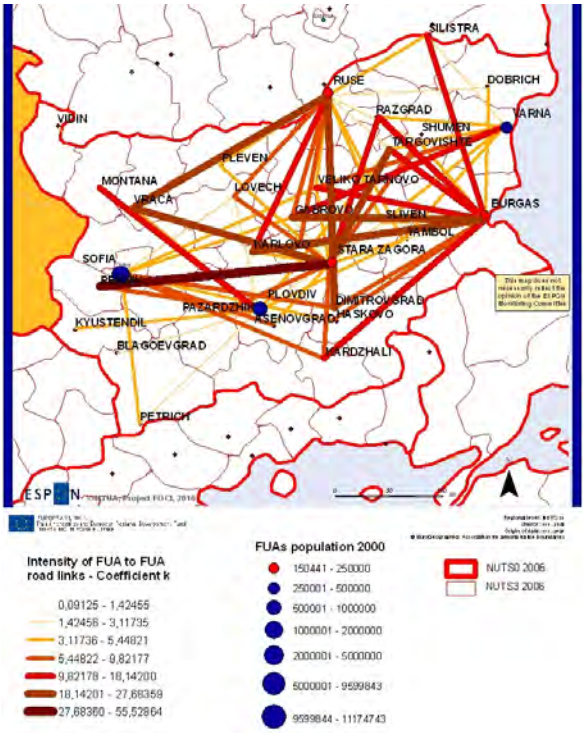


Figure 7a. Bulgaria FUAs road links intensity from regional centres to lower level centres – Coefficient k

Figure 7b. Romania FUAs road links intensity from "regional" centres to lower level centres – Coefficient k

(a3) Further improvement of the method of comparison and selection of links among the regional and secondary FUAs **using the average density traffic**

Each secondary city is attributed to the regional city the link with which has the highest rate (of average density traffic) and appropriate other criteria have been taken into account:

Max distance among FUAs with exception for cities with < 50 Km distance from the supposed "regional" centres (the provincial centre is attributed obligatorily to the nearest "regional" centre).

This method gave the more satisfactory results taking into account our purpose.

We present below the case of France.

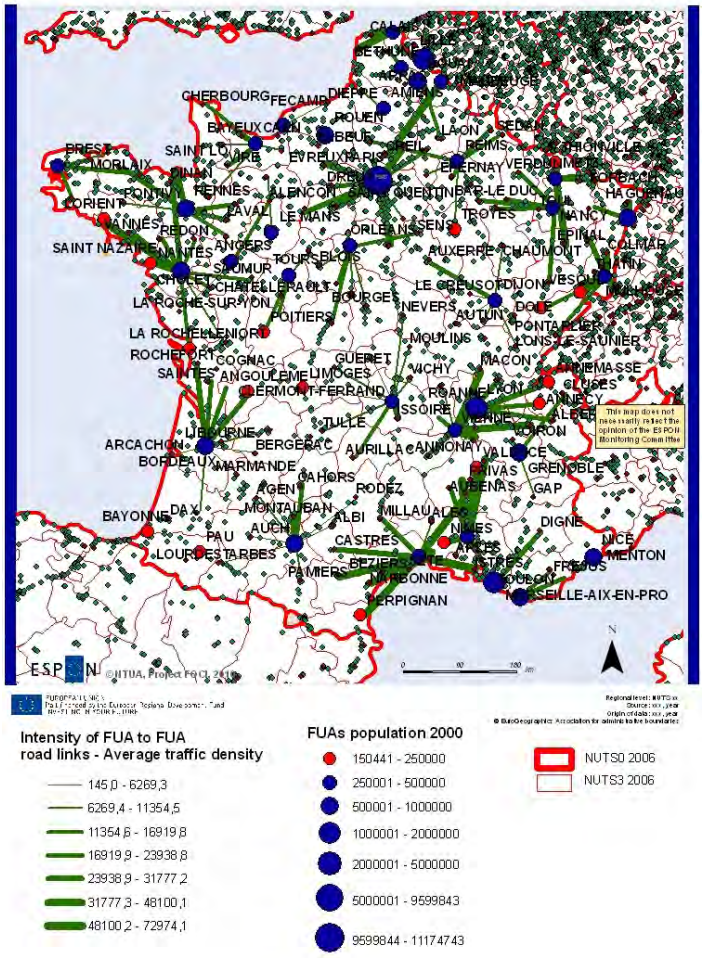


Figure 8. France: FUAs road links intensity from "regional" to lower level centres: Average density traffic max distance = 160 Km (exception for cities with < 50 Km distance)

We applied the same method for Bulgaria and Romania.

Conclusions / Selection of "regional" urban networks / territories for the case of Eastern Balkans

Because the work on Eastern Balkans was exploratory, we selected the above third method and improved the results taking additionally into account the rail traffic among cities and the administrative structures of the three respective countries. The final result is presented in the chapter 3 of the Part 2 of the Report / Eastern Balkans.

Conclusions for the ESPON space

We concluded that the third method presented above could be used as starting point for all the ESPON space countries in condition that the daily traffic data is complemented for all these countries.

However, it needs some improvements:

For instance, *the maximum distance from the First FUA to the other FUAs depends on the country characteristics.*

Also, as we already mentioned, we also need take into account:

(a) The air and rail transport links, the intra-firms and research links and so on.

(b) The administrative system of each country etc.

However, in our opinion, taking into account that the road traffic is far more important indication of the "total flows" among cities, the final result will not be essentially different from the above (using the intensity of road traffic as flows / networking parameters).

The results of this exploratory / innovative work will be presented in more detail in a specific publication.

8. Data used and analyses applied for the Metropolitan Areas and the regional urban systems

8.1. The Metropolitan Areas

Research here has concentrated in evaluating:

(a) Higher Level links (relationships) between Metropolitan Areas or "regional" territories (which often have population above 500.000 inh.) containing at least one large city (the population of which is greater than 250.000 inh.).

(b) The performance and the degree of existing complementarities and networking and the lack of linkages by infrastructures among the sub-centres and the sub-units of each one Metropolitan Area.

We have used for this purpose both "attribute" and networking / flows data.

8.2. The regional urban systems

Here we refer to the Higher Level functions and links inside "Regional" cities and territories (as they are defined in the previous section).

Their size allowed us to approximate them with NUTS3 areas.

In general terms:

Research here has concentrated in evaluating the degree of existing **economic performance** -see in **section 9.2**-, **firms and research networking** -**Chapter 10**- , transport links –Chapter 11- and **complementarities -Chapter 12-** [53].

On this basis we have evaluated the overall polycentric potentials of the regional urban systems and territories. In other words, we have approximated a degree of "actual" **functional polycentricity** of these urban systems using specific data and analyses:

(a) We have first used attribute data and indicators corresponding to each node (constituent city) of the regional urban system in order to compare their sizes, functions and economic profiles as well as their economic performance. This analysis regards the First cities and the other nodes as well as the entire urban systems.

We have specifically examined (in section 9.2):

(a) GDP weighted by population as a first indication of economic performance.

(b) The composition of the economy by sectors using data on the employment (Eurostat) and the number of subsidiaries of major international firms (ORBIS data –see in next). We have also put emphasis on other crucial aspects of the actual and potential integration of the ESPON space urban systems: the firms' potential with focus on the potential of Advanced producer Services (APS) and HT (High Technology) activities using the ORBIS database data (see in 8.3).

Then, we have examined the intensity of links among the nodes of the urban systems using network data on the firms' links and research links from the First to the other FUAs of the territory. We specifically examined the firms' links inside FUAs and from FUA to FUA both inside the urban systems and among urban systems as well as at the ESPON space level (Chapter 10).

Afterwards, we examined the intensity of the transport links among FUAs at different territorial levels in order to evaluate the lack of linkages among cities inside each "regional" territory as well as from / to the outside of it (Chapter 11).

Finally, we have specifically examined the degree of complementarity of the economic pattern of each city to the others (see in Chapter 12).

These analyses have been done for the entire ESPON space and in more detail for the case study of the trans-national region of Eastern Balkans countries and the four case studies at regional level: Randstad, Munich urban system, Piedmont and Athens urban system.

[53] Social disparities in relation to the provision of services will not be analysed

We should stress here that the analyses mentioned present two very important difficulties:

First, as we have already pointed out, the territorial levels of the urban systems (their functions and their in / out links) differ considerably not only per country but also per region! This is due to the fact that the respective levels of activities and links have been produced historically as successive in time super-posed “layers”. Each new layer does not fully replace the previous and so on. Implementation of policies has often normalised this structure by layers but not the same way in all regions. Thus if it is appropriate to discern three levels in one region it is necessary to discern five levels in another.

The second difficulty, already mentioned, is the approximation of data on FUAs with the respective NUTS3 data which distorts considerably the results.

In our opinion, this difficulty reduces considerably the explanatory power of models pretending to explain the overall urban systems’ structure on the base of a super-composite indicator or a “global” statistical analysis. This is really an “impossible quest”. On the contrary, specific analyses of the correlation among two aspects of the above structure appropriately embedded in a sound framework of forces driving the urban systems have a higher explanatory power. We will apply in next this second methodological approach.

Evidently, the use of data corresponding fully to the FUAs configurations is very helpful. This is the case of the use of the ORBIS data which correspond to the configurations of FUAs as it is described below.

8.3 The data of the ORBIS database on firms

We used data of the ORBIS Database which includes 600.000 subsidiaries of the 3.000 greater companies worldwide. ORBIS contains data on the location of each subsidiary and the respective numbers of subsidiaries and turnover for the recent years (2006 to 2010, according to the case). It also informs on the link among the subsidiary and the “mother” company; in more detail it refers to the city in which each subsidiary is located and the city where are located the headquarters of the “mother” companies (shareholders, “actionnaires”).

These data have been given to us in the frame of the FOCI project. C. Rosenblat has done a first elaboration of these data. The NTUA team proceeded to an additional elaboration in order to associate the names of the “cities” where are located numerous subsidiaries in case these names were not fully the same with the names of FUAs. We also used information that M. Lennert (IGEAT) gave to us for the postal codes corresponding to Urban Audit Large Urban Zones (LUZ).

The ORBIS firms’ database includes two datasets:

(a) A dataset on 600.000 subsidiaries of firms worldwide (dataset” “entities”), containing the following fields: subsidiary code, name of the company, address of the company, postal code, city, country, name, branch per NACE 2 classification, amount of employees and turnover and dates of record of these two last.

(b) For each subsidiary, the code of the subsidiary and the codes of the firms’ shareholders (“actionnaires”) (dataset: “links”). This dataset has been used in Chapter 10.

In our analysis, we extracted from the first dataset only the information referred to subsidiaries located in the FUAs of the ESPON space.

9. Economic profiles and performance of the Metropolitan Areas and the regional urban systems

9.1. The European cities and metropolitan areas

We will examine here the inequalities regarding the economic profiles and the performance, among the cities (FUAs) according to the major divisions of Europe (ESPON space): Western / Northern / Southern / Eastern and EU-15 / New 12 countries, as well as the difference among the Metropolitan areas (assimilated to ESPON 1.1.1 MEGAs) and the other cities situated in the above major divisions of Europe.

The GDP as an indication of performance

Regarding the economic **performance of the cities,** we have examined the **GDP** PPS per capita of the European cities (FUAs) for the period 2001-2007 as a first indicator of reference. Evidently, such use of GDP presents many problems as several researchers have already pointed out.

The differences that exist among the different types of cities are very high. First, the cities of the Western and Northern Europe (ESPON space) had much higher GDP in average in 2007 compared to the Southern European cities –Graph 9.2.1 in Annex. The cities of the Eastern Europe had clearly lower GDP.

As it was expected, the difference among the cities of EU-27 and those of the 12 New member countries are also very high[54].

Even more important is the fact that the average GDP of **MEGAs** in 2007 (39.000) was much higher than that of the transnational and the regional cities (as they were classified by the ESPON 2006 1.1.1. project) (22.900 and 26.400, respectively).

As for the **GDP change rate 2001-2007 %**, the changes which regard cities are associated to a considerable extent to the respective changes at national level. However, as we will see, differences among MEGAs, transnational and regional cities of the same European mega-territory are important.

GDP change rate 2001-2007 is much more important in average in the Eastern European cities than the average of ESPON space cities. Change rate in North-European cities is merely higher than the ESPON space average, while the rates of the Western and Southern European cities are lower than the average.

The change rate average of East-European MEGAs is clearly higher than the average for the trans-national cities while the change rate for the regional cities is even lower.

In Western and Northern Europe differences among the change rates of MEGAs, transnational and regional cities are not significant while in Southern Europe the MEGAs change rate is quite higher than the two lower levels cities.

[54] GDP of the ESPON countries which do not belong to the EU: Norway and Switzerland amount roughly to the Western Europe cities average.

The change rate average of East-European MEGAs is clearly higher than the respective averages for the Western, Northern and Southern European cities.

Economic profiles and performance of cities

We have first examined several aspects of the **economic profiles** of cities (FUAs).

A first interesting aspect of the economic profiles of the cities (FUAs) is **the distribution of their economy per groups of branches.** We have examined this distribution according (a) to Eurostat data on the employment in 2001 (b) to the numbers of firms' subsidiaries of the ORBIS database. In both cases, FUAs are approximated with NUTS3 units.

Economic profiles of European cities according to the employment division in six groups of branches[55] in 2001 (Eurostat data) are very different.

West-European cities percentage in financial and business activities is very high while it is very low for the East-European ones –see in Table 9.2.1; cities of W. and N. Europe have higher percentages in public administration and social services than the South-European and East-European ones; inversely, East-European cities are more specialised in industry and even more in agriculture; Southern-European cities are relatively more specialised in Construction.

As for the profiles of MEGAs / Transnational / Regional FUAs, the literature review's results presented in the Chapter 1 are confirmed: MEGAs are much higher specialized in financial and business activities and also prevail in trade. Further on, West-European MEGAs have a clearly higher percentage in financial and business activities as well as in public administration and social services than the East-European ones and so on.

[55] The respective NACE groups of branches are: (1) Agriculture, hunting, forestry and fishing, (2) Mining and quarrying; electricity, gas and water supply, (3) Construction, (4) Wholesale and retail trade, repair of motor vehicles, motorcycles & personal & household goods, (5) Financial intermediation; real estate, renting and business activities, (6) Public administration and defence, compulsory social security; education; health & social work. FUAs are approximated with NUTS3 units; this is evidently a gross approximation.

	Agriculture, hunting, forestry and fishing	Mining and quarrying; electricity, gas and water supply	Construction	Wholesale and retail trade, repair of motor vehicles, motorcycles & personal & household goods;	Financial intermediation; real estate, renting and business activities	Public administration and defence, compulsory social security; education; health & social work;
	A_B %	C_E %	F	G_H_I %	J_K %	L_TO_P %
Western Europe	3	19	6	24	15	32
Northern	4	20	6	24	12	34
Southern	5	23	9	25	12	26
Eastern Europe	19	26	6	22	6	21
MEGAs	2	17	7	28	18	29
Transnational	8	23	7	24	11	27
Regional FUAs	8	21	7	24	12	29
ESPON space	7	22	7	24	12	28

Table 1. Distribution of the employment 2001 per groups of branches: W / N / S / E European cities (FUAs)

Source of data: Eurostat, analysis of data: NTUA team

A second element of the economic profiles of cities which however has even more strategic importance is how much the activities of cities are internationalized and which relations of interdependence (interconnection) they present.

As we have already stressed previously, we can approach approximately this issue with the use of the data on the subsidiaries of firms included in the ORBIS database. We stress here that the firms included in the ORBIS database constitute a small portion of the economic potential of the ESPON space, however very important as it is the more modernized and internationalised part of the economy.

As for the distribution of the economy per groups of branches according to the respective numbers of the ORBIS firms; subsidiaries, there is a more important specialisation in financial and business activities in the West-European FUAs than in the East-European ones; West-European MEGAs are much more specialised in the latter activities than the East-European ones. Results as for the other groups of branches are less valuable because the number of firms in this cases are much smaller.

As for the degree of internationalisation of the economy of European cities, relevant indicators are the number of the ORBIS firms' subsidiaries per city and particularly *the number of the firms' subsidiaries weighted by the FUA population*. The values of this last indicator differ considerably throughout the ESPON space. The cities (FUAs) of the Western Europe (including the extended Pentagon area) prevail by far with 952 subs./ millions of inh. The Northern Europe follows at a considerable distance (444) while the Southern Europe and Eastern Europe cities follow with much smaller amounts (314 and 136, respectively) – *see in Table 2.*

Cities (FUAs)	Number of subsidiaries / 1.000.000 inh.	Nr sub. APS - Weighted by population (1.000.000 inh.)	Nr sub. HT - Weighted by population (1.000.000 inh.)	Nr sub. APS+HT - Weighted by population (1.000.000 inh.)	AP % Total sub.	High Tech % Total sub.	(APS + High Tech) % Total sub.
Western Europe	952	282	33	315	30	3	33
Northern Europe	444	76	19	95	17	4	21
Southern Europe	314	47	15	62	15	5	20
Eastern Europe	136	20	7	27	15	5	20
ESPON space	595	156	23	178	26	4	30
MEGAs	1174	339	34	373	29	3	32
Transnational FUAs	376	75	20	95	20	5	25
Regional FUAs	137	19	12	31	14	9	23
ESPON space	595	156	23	178	26	4	30
EU-15	699	188	26	214	27	4	31
EU-12 (New countries)	135	20	7	27	15	5	20
Outside EU*	666	108	39	147	16	6	22
ESPON space	595	156	23	178	26	4	30

Table 2. Numbers of ORBIS firms' subsidiaries located in cities (FUAs) weighted by population per major division of the European territory and types of cities

* Norway and Switzerland,
Source of data: ORBIS database, data analysis: NTUA team

Differences among the EU-15 FUAs and the 12 New member countries ones are also enormous.

MEGAs and other big cities present clearly higher values (1174 in average) than transnational (376) and regional (137) cities, primary cities in morphologically monocentric urban systems are prevailing in most of the cases -*see in Table 9.2.2.*

Even more important indicators of economic performance of cities are **the numbers of Advanced Producer Services / APS, High Technology / HT activities' subsidiaries as well as the numbers of APS +HT subsidiaries** weighted by population as well as the **shares of the APS, HT and APS+HT subsidiaries** in the total subsidiaries, as they reflect the specialisation of cities in branches with strategic importance for their development.

Table 2 and Fig. 9, 10, 11 show clearly the big respective differences among the FUAs of Western Europe (including the extended Pentagon area) and Northern Europe compared to the Southern and Eastern Europe cities, among the MEGAS and the transnational and regional cities as well as between the centres and the

rest of the urban systems (for the latter one could compare for instance these maps with the maps and the analyses for PIAs).

The differences in ORBIS subsidiaries are much greater than in GDP as well as in population and labour force potentials.

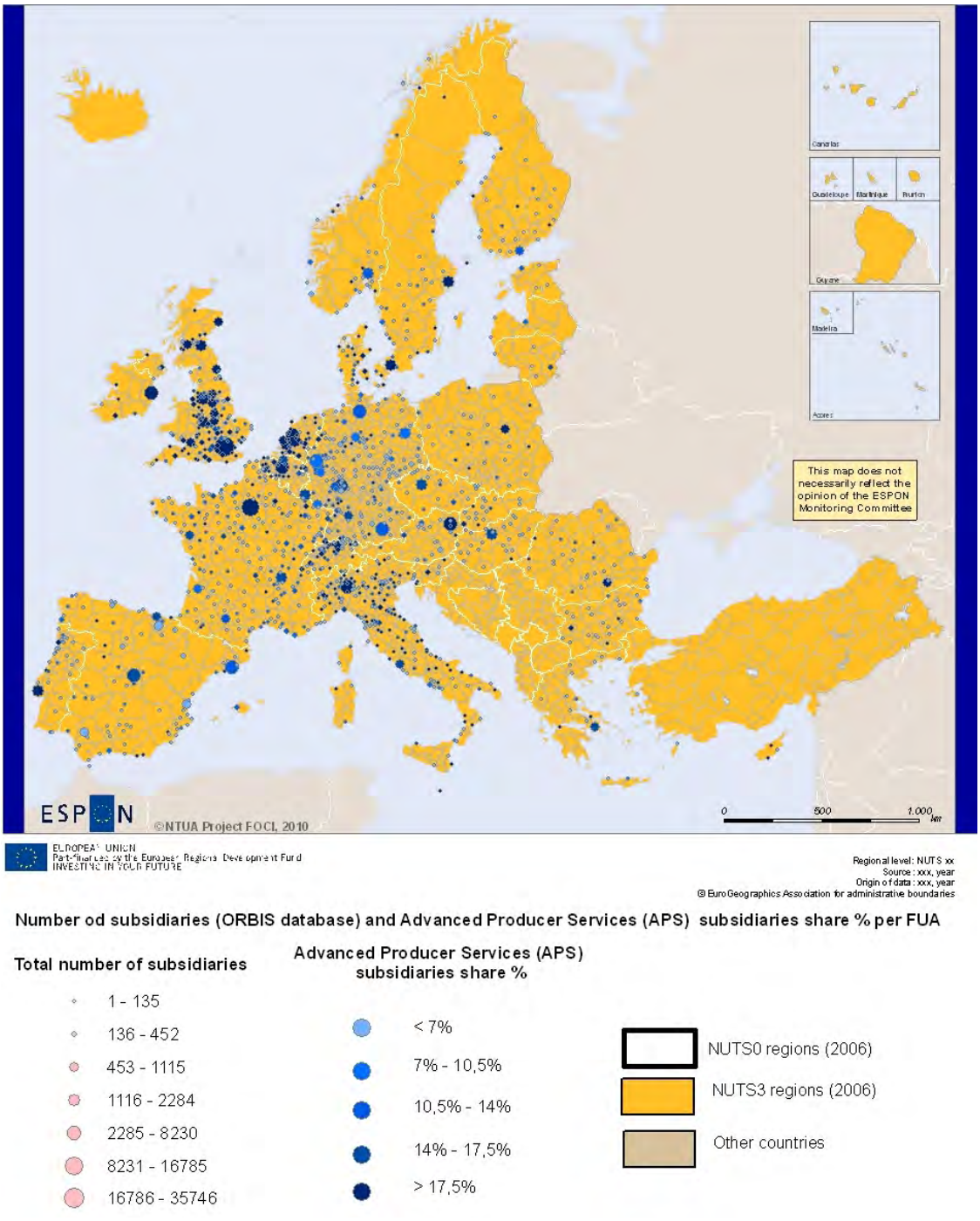


Figure 9. Number of subsidiaries (ORBIS database) and Advanced Producer Services (APS) subsidiaries share % per FUA

Source of data: ORBIS database (see in detail in Section 8.3), analysis of data: NTUA team

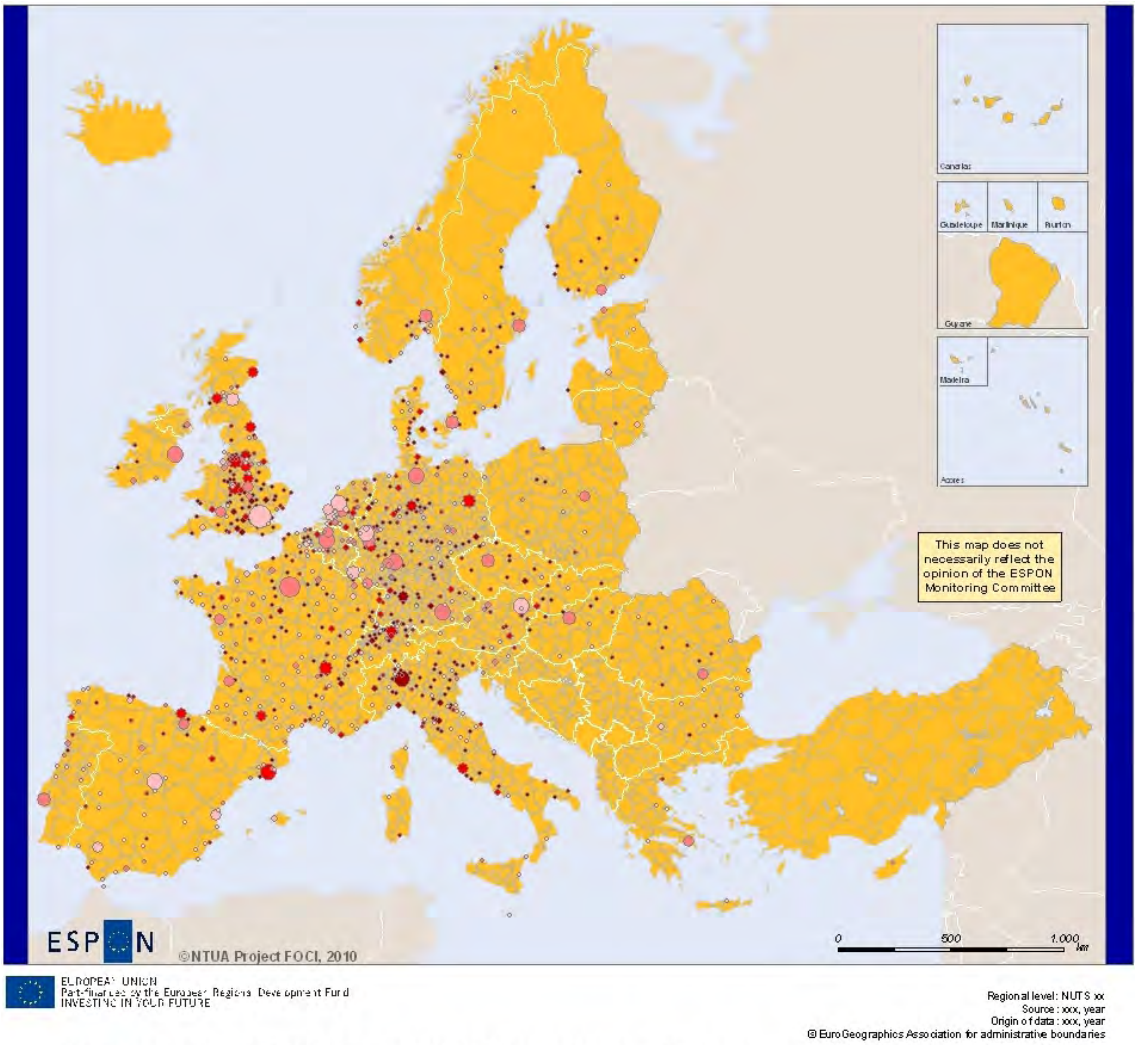


Figure 10. Number of subsidiaries (ORBIS database) and High Technology subsidiaries share % per FUA

Source of data: ORBIS database (see in detail in Section 8.3), analysis of data: NTUA team

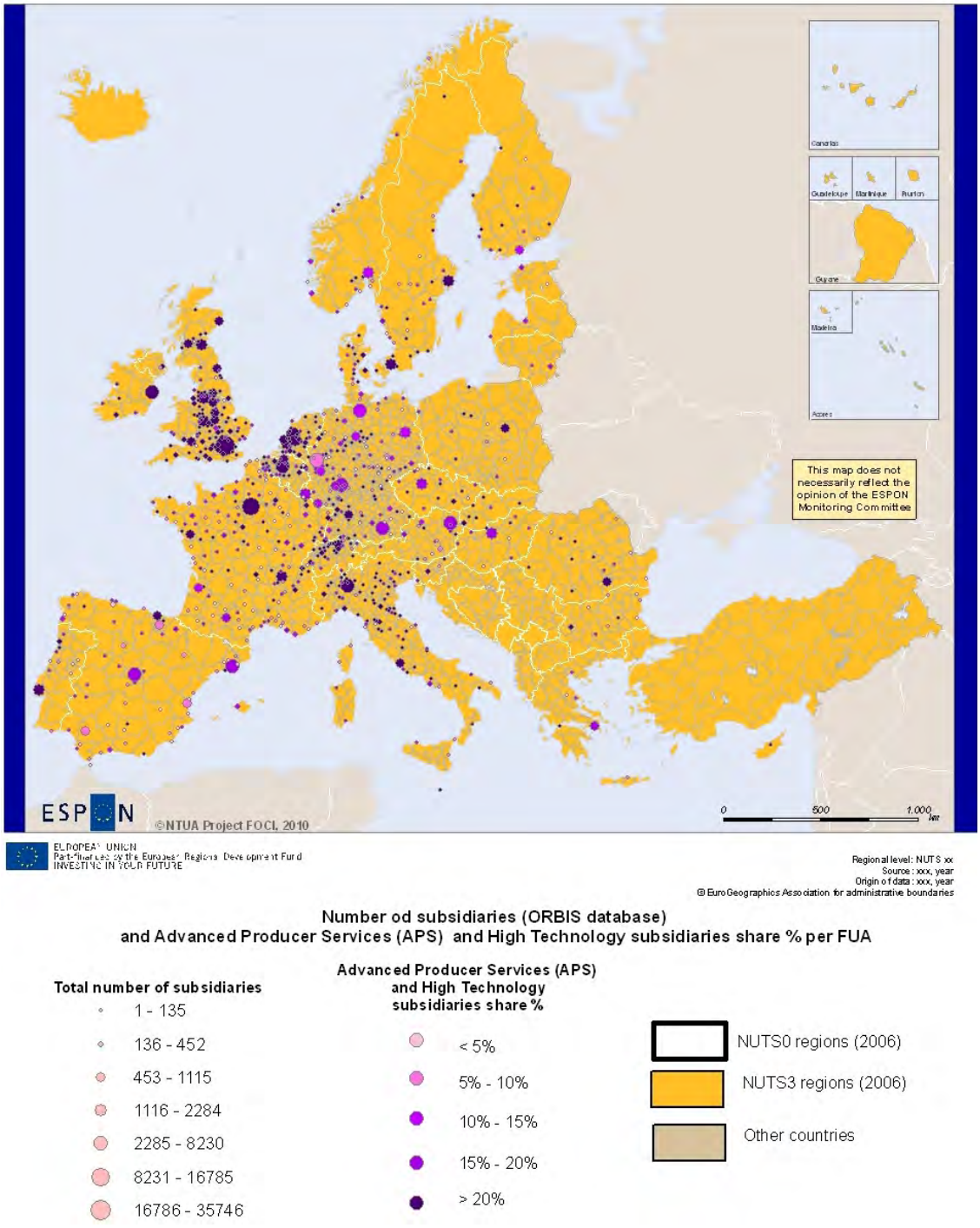


Figure 11. Number of subsidiaries (ORBIS database) and Advanced Producer Services (APS) and High Technology subsidiaries share % per FUA

Source of data: ORBIS database (see in detail in Section 8.3), analysis of data: NTUA team

While average GDP 2007 in Western Europe cities is greater by **2,2** compared to the Eastern Europe, the respective index for the **number of subsidiaries** weighted by population amounts to 7,0; even more, the index for the **numbers of APS +HT subsidiaries** weighted by population amounts to **11,7.**

The correlation of the GDP with several aspects of the economic profiles of cities

The performance of cities measured with the GDP PPS per capita 2007[56] **depends on the** previous defined «density » of subsidiaries -**number of subsidiaries weighted by population**-; the value of the Pearson correlation coefficient is satisfactory: 0,42.

The Pearson coefficient values as for the **correlation among GDP PPS per capita** (2007) and the **numbers of APS, HT and APs + HT subsidiaries weighted by population** are **lower**; respectively: 0,42, 0,26 and 0,36. We could hypothesise here that the different national statistical organisations do not apply with exactly the same way the association of the economic units to NACE sub-divisions.

A very high correlation exists among the Total GDP PPS (in millions PPS) 2007 and the Total Number of subsidiaries per FUA; the value of the respective Pearson coefficient amounts to **0,75.**

Obviously, the results of these simple statistical approaches on the basis of gross approximations allow creating only “advanced hypotheses” on the issue. However, a wide literature on the effects of the division of labour of multinational firms on national / regional inequalities in Europe provided similar results.

Evidently, the previous analysis of the performance and economic profiles is not enough to evaluate the overall “sustainability” of cities which, at the end, should be taken into account in order to provide sound results which could appropriately feed the building of territorial strategies exploiting polycentric potentials. The social and environmental dimensions have not been taken into account. These dimensions have been examined in other Workpackages of FOCI but it is obviously very difficult to cross-check the respective results.

However, in our opinion, developing more complex statistical analyses on the economic performance of all the European cities (FUAs) taking into account the situation of the data needed as well as the methodological difficulties is less fruitful than the improvement of “core” analyses of the driving forces creating economic dependence relationships among European cities and territories through the differentiation of the forms of territorial integration. Furthermore, the main objective of the polycentric integration goal of the EU territorial priorities is to strengthen territorial cohesion through the change of the actual dependence pattern reproducing the inequalities.

[56] The FUAs are assimilated to the respective NUTS3 units, so we use a gross approximation

9.2. The entire regional urban systems

We used for this analysis the regional urban systems and respective territories which were defined as *not overlapping "service areas" the boundaries of which are not distant more than 90 minutes of cities with more than 250.000 inhabitants* – see in more detail in the section 6.2.

There are 256 such urban systems and territories in total in the ESPON space.

We repeat here that there are some problems regarding the use of these urban systems and territories – see in more detail in the Chapter 12.

As for the case of the cities (FUAs), there are very considerable differences as for the average **GDP** PPS per capita in 2007 among the urban systems located in Western Europe and Northern Europe compared to the Southern and Eastern Europe, as well as among those located in EU-27 compared to the 12 New member countries – see in the Map 12. The average GDP of the Western Europe urban systems is 2,0 times greater than that of the Eastern Europe.

Also, the urban systems containing a MEGA have a much higher GDP in 2007 compared to the other urban systems (33915 and 25222, respectively).

The differences as for the total number of subsidiaries weighted by population are even more important: the index for the Western Europe is 6,5 times higher than that for the Eastern Europe. The index for urban systems containing a MEGA is 3,4 times higher than that for the other urban systems.

The differences as for the other indicators examined for the case of cities are quite similar.

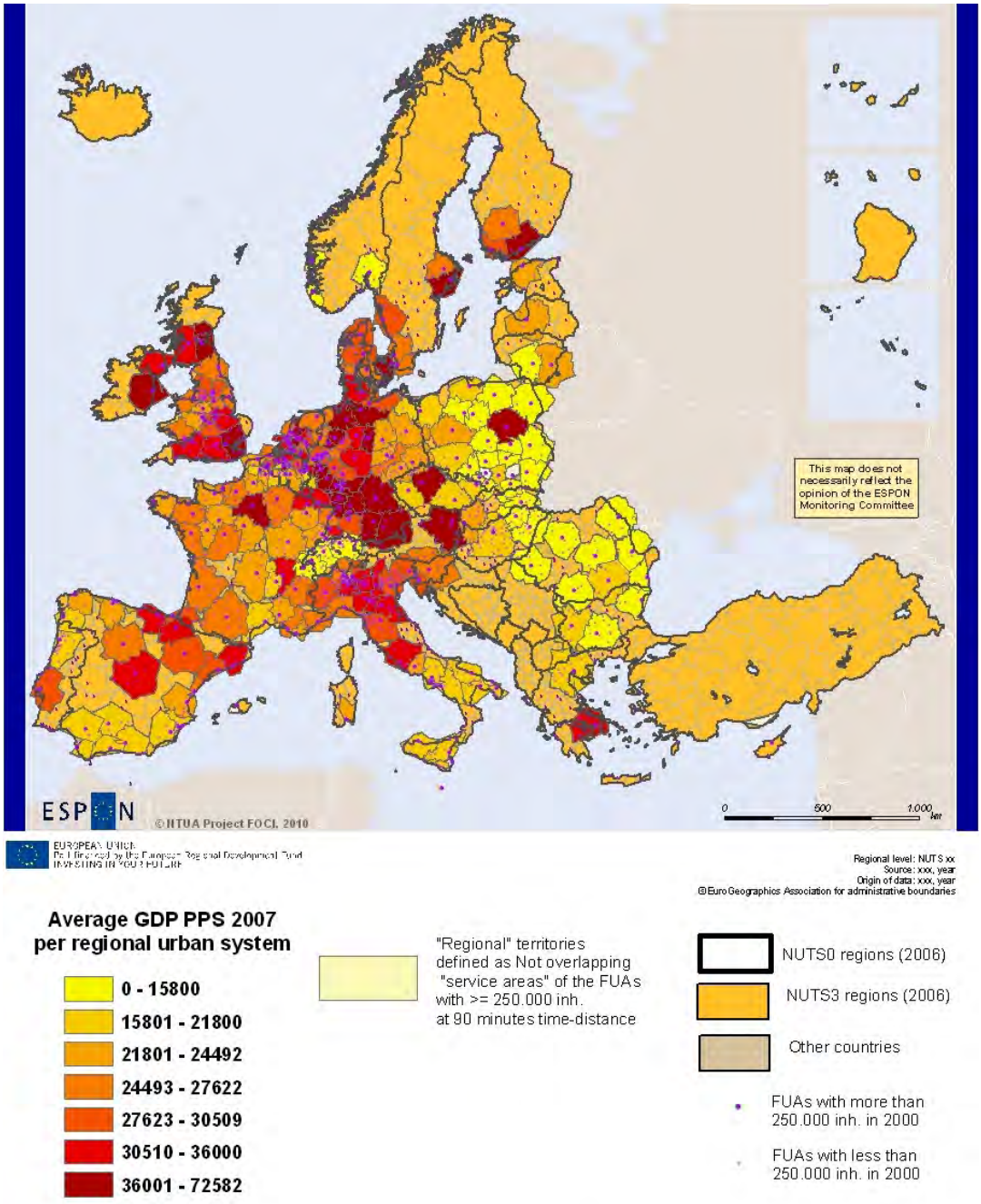


Figure 12. Average GDP PPS 2007 per regional urban system

The "regional urban systems" are included in respective "regional territories" which are defined as following: We have created "service areas" of the FUAs with more than 250.000 inhabitants at 90 minutes time-distance from the centroid of the FUA (the boundary of the service area corresponds to the 90 minutes isochrone from the FUA). We have taken the option that the "service areas" to be not overlapping in cases two FUAs are distant less than 180 minutes (the common edge of the two respective service areas is equidistant from the two FUAs)

Cities (FUAs) are approximated with respective NUTS3 units

Source of data: Eurostat, analysis of data: NTUA team

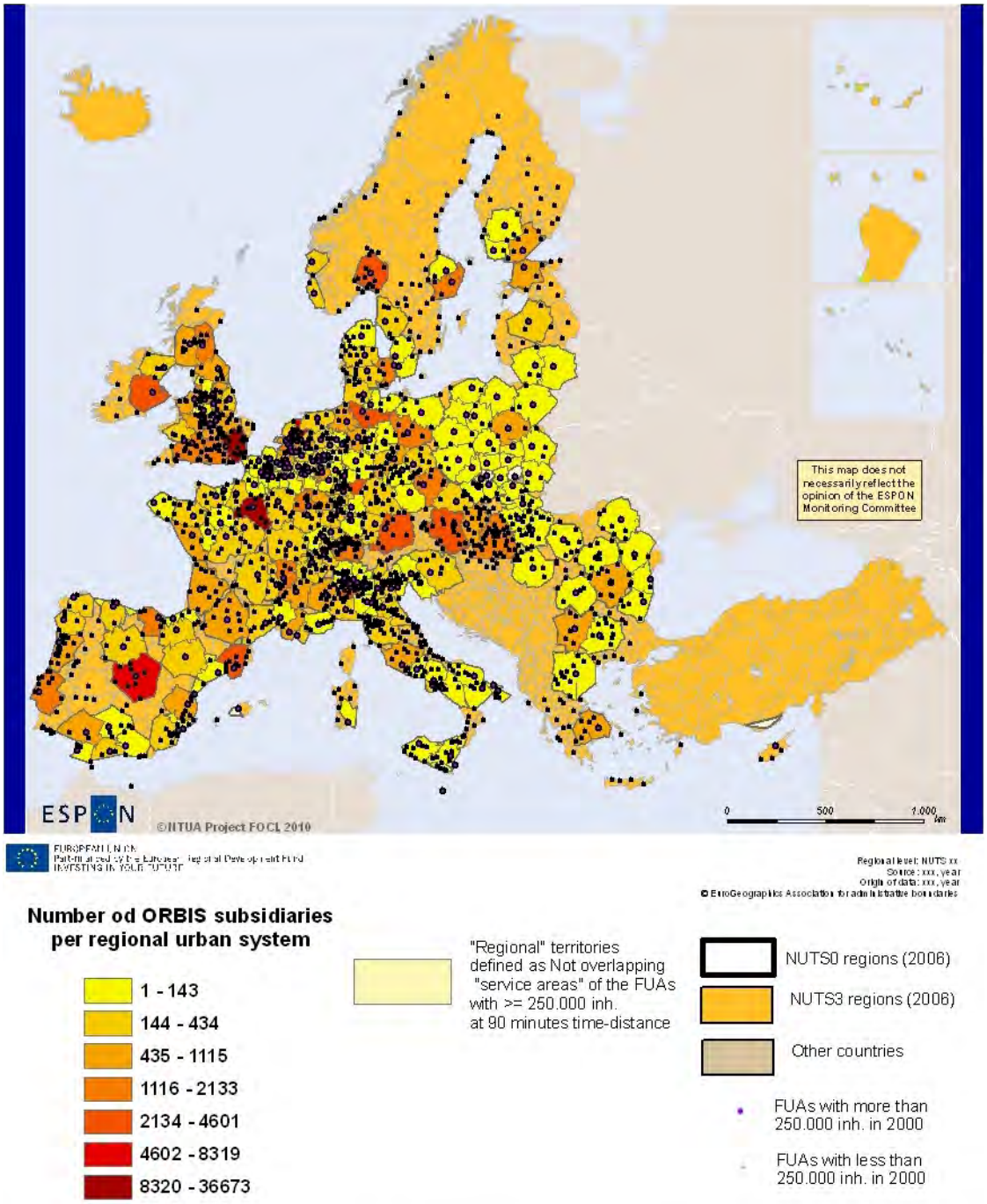


Figure 13. Number of subsidiaries of firms included in ORBIS database per regional urban system*

*Included in not overlapping "service areas" of the FUAs with more 250.000 inhabitants at 90 minutes time-distance. In cases two FUAs are distant less than 180 minutes the common edge of the two respective service areas is equidistant from the two FUAs

Source of data: ORBIS database (see in detail in Section 8.3), analysis of data: NTUA team

10. Cities networking through firms' links and research links

In next we present the results of the work on measuring the *intensity of linkages among cities in "regional" territories using flows / links data.* We mention where it is needed the additional categories of data used.

10.1. Cities networking through firms links

10.1.1. Analysis of the GaWC Study Group data

Our workgroup used the GaWC (Globalisation and World Cities) Study Group data on the intra-firms networking for 50 European cities (the large majority of which are MEGAs). We have used the respective analysis for the polycentricity at European – transnational level: relationships among MEGAs etc.

In this frame, we produced the Figure 22-see in Annex- for the *ESPON space* where we present the intensity of links among the firms' offices located at different cities, the potential (number) of offices per city and the respective population.

We also present in the Annex the Figure 23 for *the case of Western Europe.*

We further analysed the orientation of links from the head office to the other offices,

As we also analysed the similar but much wider ORBIS dataset on firms' subsidiaries –see in next- we do not further present the results of the analysis of the GaWC Study Group data

10.1.2. Cities networking through firms links: analysis of the ORBIS database data

The data on the subsidiaries of firms included in the ORBIS Database allow do a wide range of analyses on polycentricity. We present here the results only of some of these analyses[57] [58].
We have analysed the ORBIS firms' links in more general terms for the entire ESPON space (more detail results with be presented in a publication) and in more detail in the project case studies -see in the Parts 2 and 3 of the Report.

The intensity of firms' links to and from FUAs -*see in the Map 14*- reflects to an important extent the actual degree of clustering of activities at different territorial levels.

[57] Our team received the data of the ORBIS firms' database on April 2010. Thus it was feasible to finalise for the Final Report only a part of the analyses that we had planned to do (see in previous reports of the project).
[58] We will also use the recent results of the WP2 work on firms networking

The ratio of the number of subsidiaries links starting from an FUA (the FUA is "Origin") to the number of links which are oriented towards the same FUA (the FUA is "destination") reflects to some extent the orientation of the clustering / integration of activities.

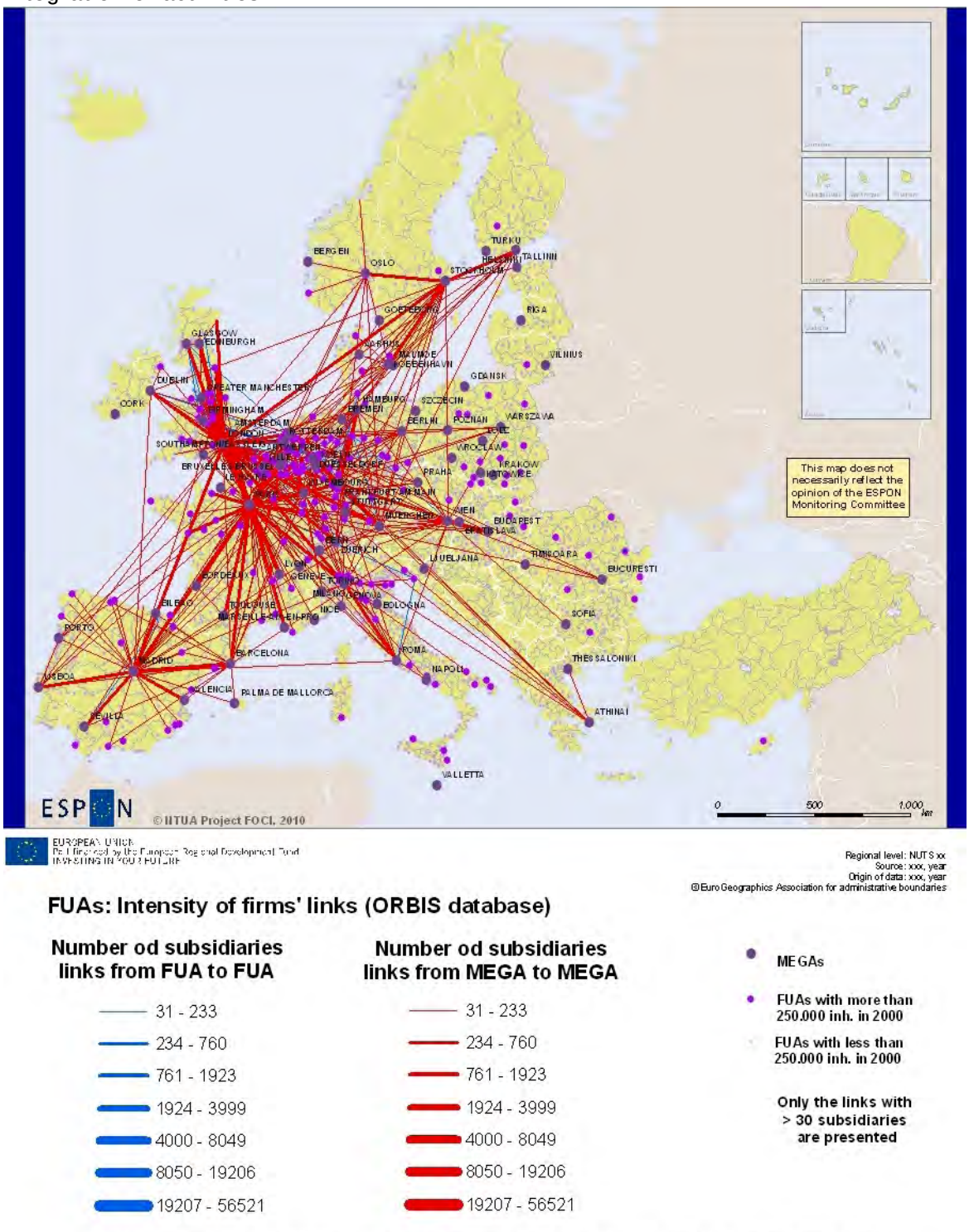


Figure 14. Intensity of ORBIS database firms' links from MEGA to MEGA and from FUA to FUA with more than 250.000 inhabitants of the ESPON space

Note: links of more than 30 subsidiaries
Source of data: ORBIS database (see in detail in Section 8.3), analysis of data: NTUA team

This ratio is mostly greater than 1 in Pentagon bigger FUAs (much greater in the most important ones) and less than or much less than 1 in the Southern and Eastern European cities, even the capitals.

At urban system level, this ratio reflects also the polycentricity degree of the clustering / integration: in some cases we have strong orientation from the centre to the other nodes of the system while in others we have more equal relationships among the nodes. More balanced relationships are found more often in the extended Pentagon area.

	Sum of the subsidiaries located in FUAs which are "Origin' of the links	Sum of the subsidiaries located in FUAs which are "Destination" of the links	Number of subs. which are "ORIGIN / Number of subs. which are DESTINATION" per FUA	Nb. Of subsidiaries /1.000.00 inh.
West Europe	85405	76507	1,12	964
North Europe	8355	7540	1,11	440
South Europe	17441	20214	0,86	318
East Europe	727	5684	0,13	137
Total ESPON space	111928	109945	1,02	603
MEGAs	66833	56116	1,19	1310
Other FUAs	45095	53829	0,84	327
Total ESPON space	111928	109945	1,02	603

Table 3. Orientation of the ORBIS firms' subsidiaries from FUA to FUA

10.1.3. Analysis at the level of regional urban systems and territories

As it obviously results from the following Map 15, the intensity of links inside the urban systems is much lower outside the Pentagon. In the latter area, the primary city has more often a primary role in the system of links.

We should remark here that the pace of the ORBIS database firms links is closely related to the intensity of the air transport links which are examined in next section.

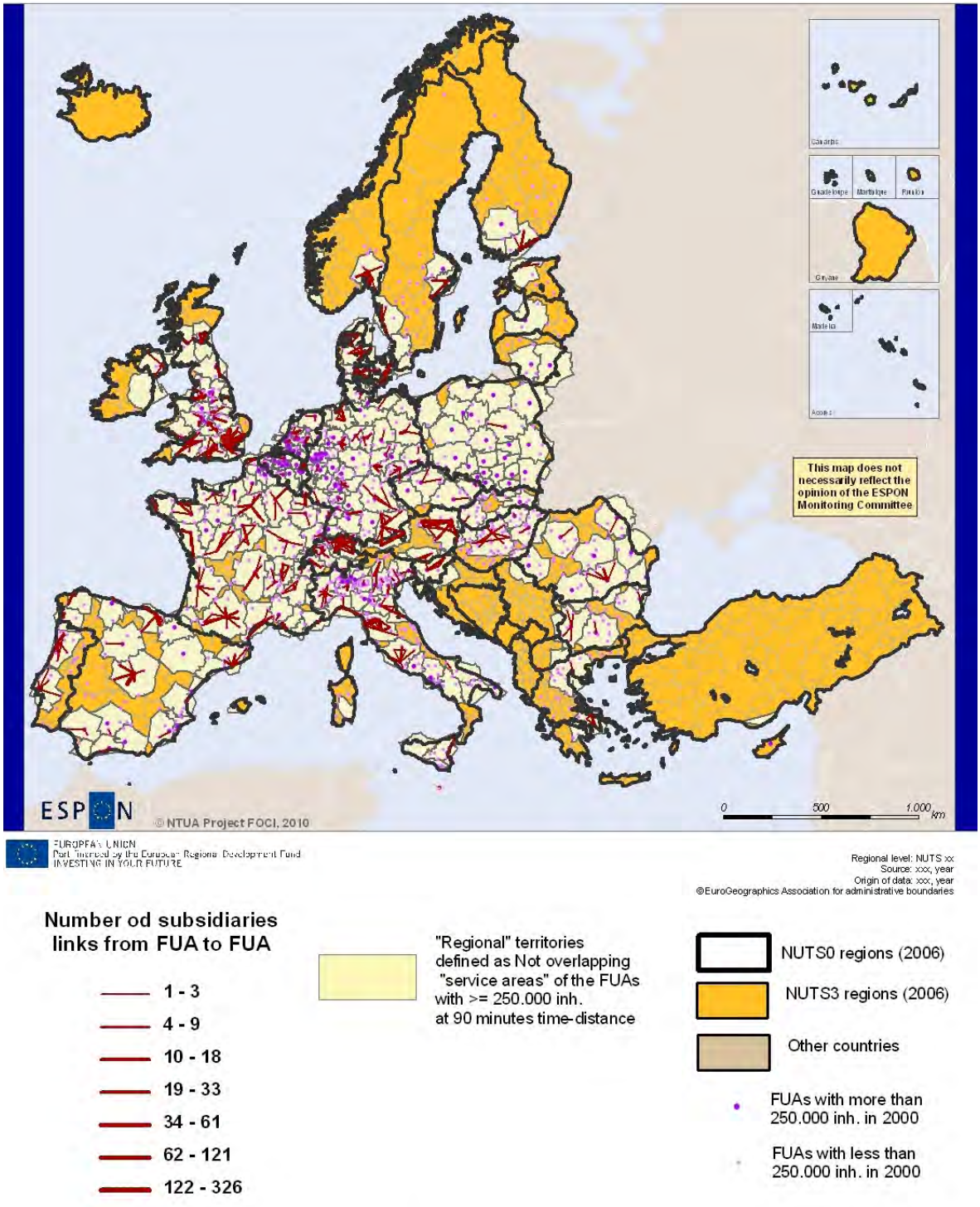


Figure 15. Intensity of ORBIS database firms' links from FUA to FUA inside regional territories defined as not overlapping "service areas" of the FUAs with >= 250.000 inhabitants at 90 minutes time-distance (ESPON space)
Source of data: ORBIS database (see in detail in Section 8.3), analysis of data: NTUA team

10.2. Cities networking through research links: analysis of the CORDIS database data

The Géographie-cités – IGUL team of FOCI project has examined the position of European cities in research networks in four branches of converging technologies (see in Chapter 6 of the Pre-final Report). They specifically studied different types of centralities corresponding to the cooperations in EU funded research (data included in CORDIS database) among different research groups located in European cities (FUAs).

Several results of this research converge with those of the analysis of the potential and the links among the ORBIS database firms' subsidiaries –see previously. It seems that the degree of concentration according to the respective numbers of research cooperations, in the European global cities and in cities located in the Pentagon is lower compared to the respective degree for the firms' subsidiaries. Evidently, the EU frame of selection of the cooperations to be funded has impacted in the territorial distribution of the participant teams.

Specifically, the higher "densities" of cooperations (numbers of cooperations weighted by population) correspond to the "Pentagon" cities as well as to MEGAs. The numbers of cooperations are lower in cities of Southern Europe and even lower in East-European cities. In the latter territories, only MEGAs and a limited number of lower level cities have participated in research cooperations.

Since it was necessary to use results on the cooperation in research links among European cities in previous stages of the project, we have tested the use of the data of the CORDIS research projects (funded by the EU) database (2009) through the pilot case study on E. Balkans conducted in the frame of the Work-package on "Opportunities through polycentric cooperation. Specifically, we have extracted from CORDIS database the respective data for the three countries of the Eastern Balkans area (Greece, Bulgaria and Romania). Then we defined the network linkages among FUAs (of the Eastern Balkans area) and we presented the intensity of linkages among the participants in EU projects (located in the three countries). See for details in the section 5 of the Part 2 / Eastern Balkans case study.

11. Cities networking through transport networks

Air transport

We started by using the database of the JRC Transtools package of projects (2009)[59] including, among other the intensity of the connections among the European airports (matrix of (all airports) x (all airports)), associated to the respective geo-referenced links.

We have used the indicator "Annual number of air flights from airport to airport" – *see in the Map 16-* in order to evaluate the intensity air transport links among the ESPON space cities (FUAs) and specifically the links: (a) Between MEGAs, (b) Between MEGAs and "Regional" FUAs (c) Between "Regional" and "Secondary" FUAs.

[59] See in detail for the JRC Transtools 2009 in the section 7 of the Report.

This analysis is first particularly useful in order to evaluate the intensity of networking regarding the Polycentricity Potentials level based on the potential of MEGAs, trans-national cities and "Regional" cities (FUAs) and on the links among them.

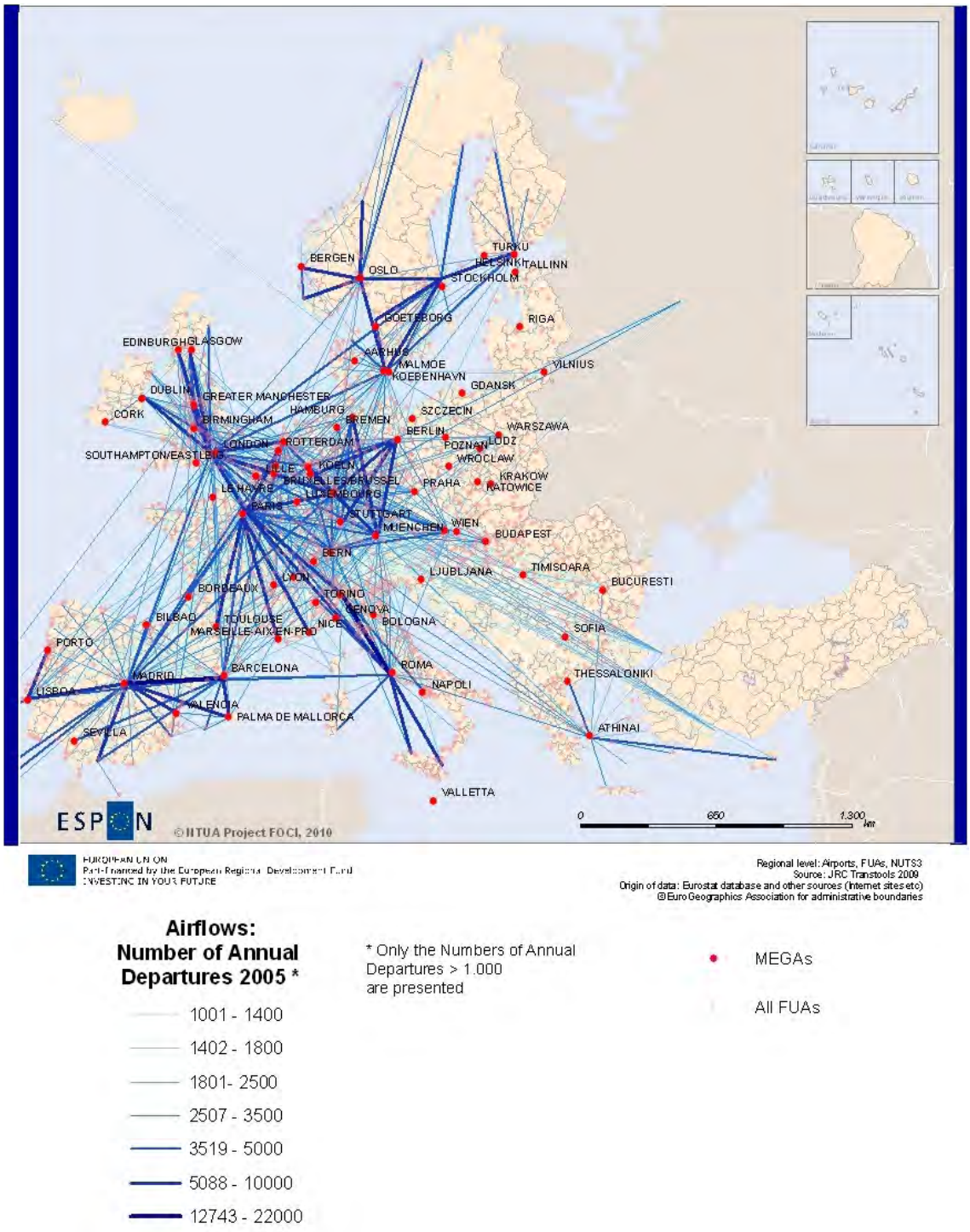


Figure 16. Polycentric cooperation potentials analysis at European level: Air-travel flows from / to MEGAs and other FUAs in 2005

Source of data: JRC Transtools 2009 (see in section 7.2), analysis of data: NTUA team

It is obvious that the intensity of the actual air links favours the integration, at this territorial level, of the "mega-regions" of the "Pentagon" area as well as of other sub-territories of Western, Northern and South-Western Europe while this kind of integration is lower in Eastern and South-Eastern Europe. Further on, integration in a number of "regional territories" in the respective "mega-regions" is also strengthened. Evidently, information on the division of the numbers of passengers according to the goal of their travel could contribute to go in depth on functional integration at this level.

Also, the results of the work of the team of the University Paris – Est LVMT (2009) on the connectivity of cities by a combination of rail and air travels gives very useful information on the capacity of the existing air and rail transport infrastructure to serve the movements of the higher level workforce of firms per "mega-region" and region.

Rail transport

It is difficult to evaluate the actual intensity of trips inside and outside the regional urban systems and territories.

We have advanced in this type of analysis only in the Eastern Balkans area case study – see in the part 2 of this Report[60]. We have specifically calculated the *total numbers of passengers from FUA to FUA* as an indication of the intensity of the rail transport links.

Road transport

The intensity of the road transport links inside the regional urban systems is more important comparatively to the two other modes of transport as road transport represents the majority of the movements.

A first exploratory work at European level that our team has done in the frame of this project, using the respective data of the JRC Transtools package of projects (2009), has not given enough reliable results.

A gross but plausible method in the frame of the objectives of this project is to measure the capacity of the road network per regional urban system (and territory) weighted by the population of the urban system. Our team has done a respective exploratory work.

However, it is quite obvious that there are enormous differences as for this indication among the regional urban systems of the "Pentagon" –and even more its North-Western part- and those of the Eastern Europe, Spain, Portugal and Greece.

Conclusions

A wide range of research on accessibility and connectivity of the European regions have been done in the frame of ESPON 2006 an ESPON 2013 as well as outside

[60] We used data from our own recording from the sites of the National Railway Organizations of these countries on the daily number of trips from FUA to FUA - We used data of the Greek Railway Organization on the number of passengers from railway station to railway station

ESPON. Research on the accessibility and connectivity of the European cities is comparatively less developed. Some of the latter results are useful in the frame of the analysis of polycentric potentials; for instance, the results of the study on "GDP per capita versus potential multi-modal accessibility 2006" at NUTS3 level (ESPON CU –in the First ESPON 2013 Synthesis Report, 2013).

The results of this research converge to a considerable extent with the informed observations that we have done previously.

Multi-modal accessibility and connectivity (among other relevant indicators) is relatively higher in the "Pentagon" area and in MEGAs of the Western, Northern and Eastern Europe compared to the MEGAs of Eastern Europe and so on. We could conclude that regarding accessibility and connectivity inside and outside the regional urban systems, there are enormous differences among the systems included in the "Pentagon" and the rest Europe and so on.

Also, there are strong indications that the capacity of (multi-modal) transport infrastructure inside the urban systems (linking the respective cities) weighted by population (a kind of "density" of internal to the urban systems transport infrastructure) is much higher in the Pentagon MEGAs and regional urban systems and even more in specific areas of the Pentagon; it is lower in descending order in the respective entities of Northern, Southern and Eastern Europe.

12. Use of the correspondence analysis to measure complementarity in urban systems[61], empirical results

12.1. Starting point: the use of the correspondence analysis by E.J. Meijers

One of the most interesting methods to measure complementarity in PP urban networks through the evaluation of the differentiation in the economic roles of cities (see in section 1.2) is the use of the correspondence analysis. We will apply the respective methodology developed by D. Meijers (see in Meijers 2008 and Meijers 2009). We will adapt his method whenever it is necessary.

"Correspondence analysis is a technique to analyse the association between rows and columns of a table or matrix by representing the rows and columns as points in a low-dimensional Euclidean space (in practice, often a two-dimensional plot)[62]. Categories with similar distributions will be represented as points that are close in space, and categories that have very dissimilar distributions will be positioned far apart. Although often used as a tool to enable graphic interpretation of complex data, ***correspondence analysis also provides a single statistic that describes the extent of differentiation in the economic profiles of a group of cities.*** This statistic is called the ***total inertia.*** *Total inertia is a measure of the extent to which the profile points are spread around a centroid, representing the average profile.*

> *The larger the distance of the category points to the centroid, the higher the inertia. The highest attainable inertia is equal to the dimensionality of the*

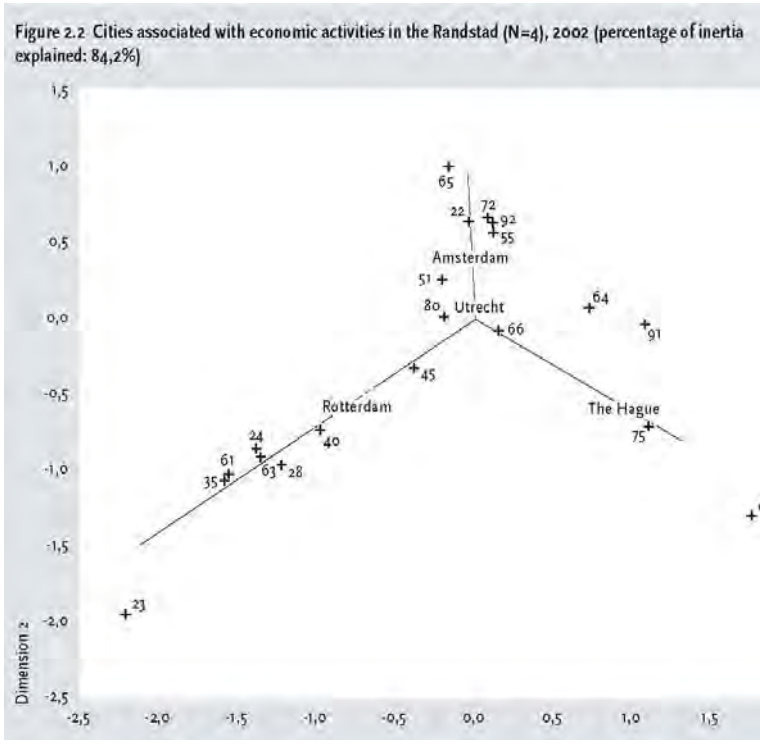
[61] Specifically: in Polycentric potential urban systems

[62] We summarize here the description of the method by Meijers.

problem (in our case, the number of cities – 1). This maximum would be reached if all the cities have completely different economic profiles, whereas zero inertia is attained when they all have exactly the same economic profiles. In reality, values will be far from the maximum… Correspondence analysis corrects for such activities in the sense that they do not, or hardly, contribute to the total inertia statistic. In order to enable a comparison of the inertia between polycentric urban regions, a ***complementarity ratio*** is defined for which ***the total inertia is normalised by dividing it by the maximum total inertia possible and multiplying this by 100, resulting in a value between 0 and 100".*** See in detail the analysis of the case of Randstadt for the years 1996 and 2002 in Meijers 2009. Meijers concludes that the economic profiles of cities within the Randstad are becoming less differentiated.

One of the main advantages of correspondence analysis is that it graphically displays associations, thus enabling an easier interpretation of complex contingency tables. Here, we are interested in associating cities with economic activities (see Figure 2.2 of Meijers 2009). The two dimensions displayed represent a reasonable 84.2 % of the total inertia. The two axes together indicate the origin (0.0), which resembles the average profile of the four cities. This plot requires careful interpretation. If two cities lie close together, then their economic profiles are more or less similar. The same condition applies to the economic activities. Economic activities lying close together are more or less similarly distributed between the cities. The distances between cities and economic activities are more complicated, since these are not defined as chi-square distances. All cities influence the location of an economic activity and, the other way around, all economic activities contribute to the location of a city. In general, cities and activities will be close to each other when the observed value for this pair of points in the table is larger than expected, and the distance will be large when the observed value is less than the expected value".

Meijers used for the analysis a dataset containing the 1996 and 2002 data on the number of jobs classified according to two-digit NACE Rev. 1 classification of economic activities for the municipalities of Amsterdam, Rotterdam, The Hague and Utrecht.



01	Agriculture, hunting and related service activities	63	Supporting and auxiliary transport activities travel agencies
22	Publishing, printing and reproduction of recorded media	64	Post and telecommunications
23	Manufacture of coke, refined petroleum products and nuclear fuel	65	Financial intermediation, except insurance pension funding
24	Manufacture of chemicals and chemical products	66	Insurance and pension funding
28	Manufacture of fabricated metal products	72	Computer and related activities
35	Manufacture of other transport equipment	75	Public administration and defence: compulsory social security
40	Electricity, gas, steam and hot water supply	80	Education
45	Constructions	91	Activities of membership organisations n.e.
51	Wholesale trade and commission trade	92	Recreational, cultural and sporting activities.
55	Hotels and restaurants		
61	Water transport		

Figure 17. Cities associated with economic activities in the Randstad
Source: Meijers 2009

See for the conclusions of this analysis in Meijers 2009.

12.2. The use of the method in several configurations of regional urban systems and territories

The use of the method in the ESPON 1.1.1 PIAs on the basis of employment in FUAs assimilated to NUTS3 units

We used the correspondence analysis method in ***the two kinds of PP Urban networks defined in Chapter 6:*** (a) The ESPON 1.1.1 PIAs (b) The ESPON space PP urban networks defined on the basis of 90' isochrones starting from the FUAs with more than 250.000 inh.

We first applied this method to the 249 *PIAs of the ESPON 1.1.1 project.*

We approximated each FUA with the correspondent NUTS3 region as we did not have detailed data on the economic profiles of FUAs at LAU level.

We used for the definition of the economic profiles of cities Eurostat data for the year 2001 on the following six groups of branches of the NACE classification*:

- Agriculture, hunting, forestry and fishing (code: A_B).
- Mining and quarrying; industry, electricity, gas and water supply (C_E).
- Construction (F).
- Wholesale and retail trade, repair of motor vehicles, motorcycles and personal and household goods; hotels and restaurants; transport, storage and communication (G_H_I).
- Financial intermediation; real estate, renting and business activities (J_K)
- Public administration and defence, compulsory social security; education; health and social work; other community, social and personal service activities; private households with employed persons (L_to_P).

*The NACE codes are taken from the respective Eurostat Table

We elaborated the % rates of each group of branches which have been used as input in the analysis.

We should remark the following:

- There are not values of Total inertia for the cases of urban networks the cities of which are located in the same NUTS3 unit.

- The results for the cases where two or more cities are located in the same NUTS3 unit are less valuable.

- An important number of PIAs are constituted by only two cities. Therefore the respective results are also less valuable.

In summary, *only for about 150 urban networks we have valuable results.*

It is possible that in some of these cases the result is not statistically acceptable. We further examine this issue.

We then ordered in the respective Table the values of Total Inertia (TI) observed by decreasing order.

Empirical results

- The higher Total Inertia values, reflecting *a high degree of functional differentiation (complementarity) are observed:*

(a) In PP Urban Networks (UN) of the Eastern and Southern Europe countries, mainly in the PPUN dominated by capital cities.

(b) In PPUN of the Western Europe the one or more, bigger cities are highly specialized in financial services.

Attempts to improve the application of the method

We have used FUAs defined on the basis of LAU units and the respective data of SIRE database for three groups of branches: agriculture, industry, services. The results were not significant because the number of groups is very small.

We have used data from the ORBIS database on firms per FUA and group of branches. Evidently, the respective results differ considerably from the above, as the public sector, the small enterprises and the main part of the agricultural sector are much lower represented in the dataset of ORBIS subsidiaries –see in next.

This kind of analysis could produce more useful results if we compare data for two distant years; however actually Eurostat do provide data for six groups of branches only for the year 2001.

The use of the method in the urban systems defined on the basis of 90' "service areas" starting from the FUAs with more than 250.000 inhabitants

We have described the method of definition of these urban systems and respective territories in the section 6.2.

Same as for the PIAs, we approximated each FUA with the correspondent NUTS3 units and we used for the definition of the economic profiles of cities Eurostat data for the year 2001 on six NACE groups of branches. Next, we elaborated the % rates of each group of branches which have been used as input in the analysis.

Similar problems emerged:

- There are not values of Total inertia for the cases of urban networks the FUAs of which are located in the same NUTS3 unit.

- The results for the cases where two or more cities are located in the same NUTS3 unit are less valuable.

- An important number of PP urban systems are constituted by only two cities. Therefore the respective results are also less valuable. However, the number of PPUNs with only two cities is less than in the case of PIAs.

In summary, *only for about 120 urban networks we have valuable results.*

We then ordered in the respective Table the values of Total Inertia observed by decreasing order.

Empirical results

Same as for the case of PIAs – *see in the Map 18.*

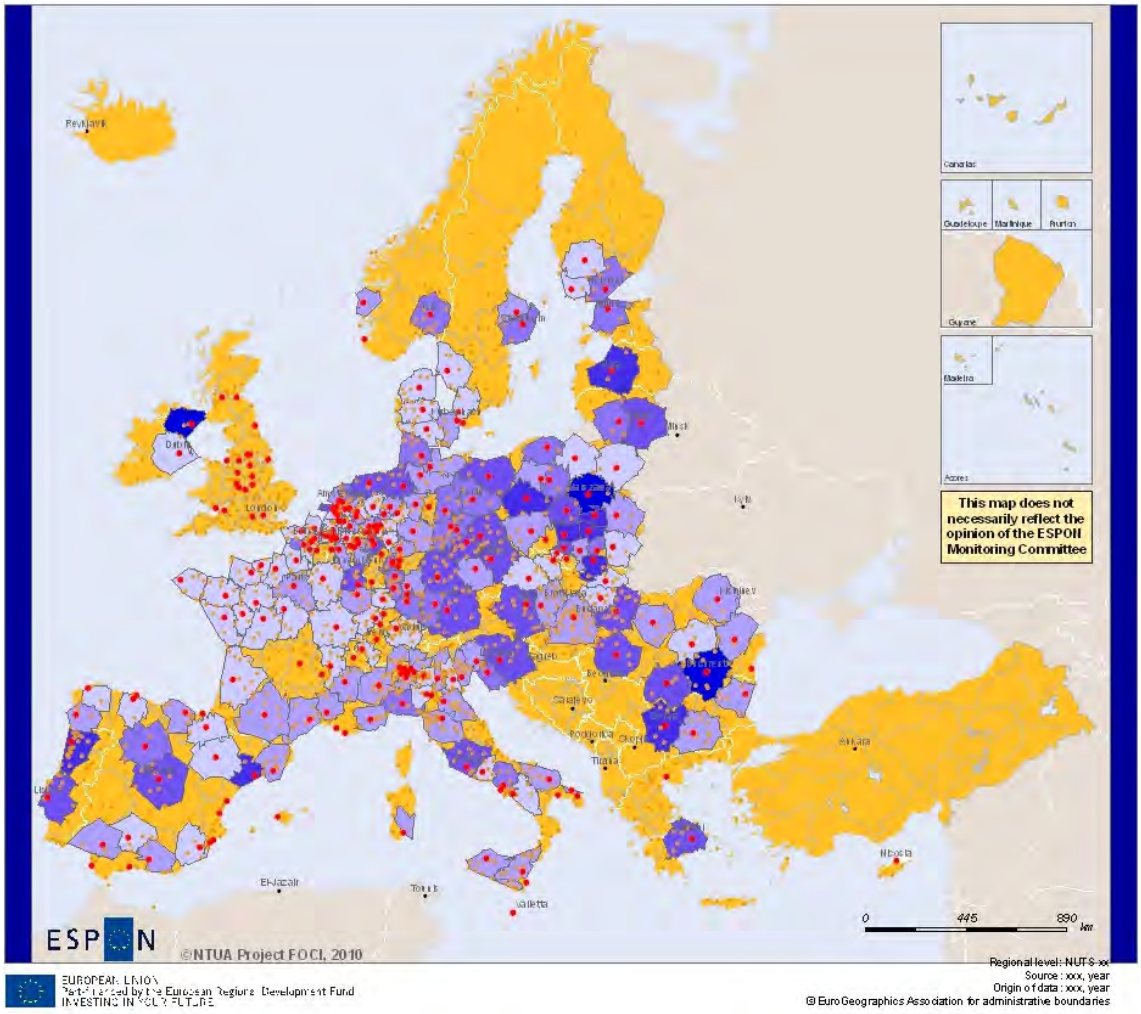


Figure 18. The degree of complementarity (correspondence analysis: total inertia) in PP urban systems in the ESPON territory
Source of data: JRC Transtools 2009 for the transport data (see in section 7.2), analysis of data: NTUA team

- The higher Total Inertia values, reflecting *a high degree of functional differentiation (complementarity) are observed:*

(a) In PP Urban Networks (UN) of the Eastern and Southern Europe countries, mainly in the PPUN dominated by capital cities.

(b) In PPUN of the Western Europe the one or more, bigger cities are highly specialized in financial services.

Further improvement of the application of the method

As it is described in section 6.2, we have replaced the "empty" zones of the European space with "service areas" at a distance of 90 minutes from "First cities*" with 100.000-250.000 inh.* Further on, in cases where the potential time distance of provision of regional level services is obviously much lower than 90 minutes we have unified the areas of the respective regional urban systems and territories.
These "new" configuration of the urban systems and territories contains: (a) much less cases where only 1 or 2 FUAs are included in the respective regional territory (b) much more cases where comparatively (to the initial configuration) much more FUAs are included in the respective regional territory. Thus, technically, the results of the Total Inertia exercise could be valuable for a much larger number of territories.

The use of the method in the previous urban systems on the basis of the employment in ORBIS subsidiaries per FUA

As we have already pointed out, a main disadvantage of the two latter analyses is that they refer to employment data for NUTS3 units with which the respective FUAs are assimilate. In order to face this inconvenience, we used data on the number of the subsidiaries included in the **ORBIS database on firms** per FUA.

See the description of the data of the ORBIS database in the previous section 8.3.
However, the results were interesting only for a limited number of urban systems including enough subsidiaries in 4-5 groups of branches; on the contrary, the results were less valuable in a great number of urban systems, the FUAs of which include subsidiaries belonging only in 1 or 2 branches.

13. Commuting and the Lower level links among cities

The study of the daily commuting areas of the cities (FUAs) allows us to correlate the profiles of the economic activities of the regional urban system as well as the Metropolitan areas with the spatial distribution of the workforce.

We remind here that the relationships (links) among cities regarding daily commuting are included in a wider set of lower level relationships. This concerns all types of Polycentric Potential territories: Metropolitan Areas (A), "regional" (B) and "provincial" (C) territories[63]. On the contrary, the higher level firms' links are included in a set of "higher level" relationships.

While (total) commuting correspond to the daily movements of the workforce, the "regional" / higher level links correspond to the daily movements of the higher level workforce, to a great part of exchanges of products and information among firms. The transport infrastructures used and the necessary time-space for the movements in the first case (commuting) are often not the same as in the second case.

Here again there is not only one "layer" corresponding to higher level (regional) relationships and one layer corresponding to lower level relationships (commuting of the total workforce) but there are also other intermediate layers corresponding to specific functions of firms, to intermediate level of facilities providing services according to the country etc.

In order to analyse commuting among cities we have used data of the Eurostat *SIRE Database* for the year *2001.* The latter data have been further elaborated by IGEAT (D. Peeters) which gave us[64] a respective database[65] which includes, among others, for each city (FUA) the numbers of the commuters (incoming and out goers) from / to the other European cities.

On the base of these data we have created *Figures 19-20.*

As it was impossible to examine all the territorial aspects of daily commuting (using the latter data) in the context of this project, we have analysed only some simpler aspects of commuting which are more closely related with the definition of the extend of Labour Market Areas of cities. The results of the analysis of the specific data on commuting in the case studies' areas are presented in Part 3.

The comparison of the intensities of commuting among the FUAs shows clearly that the Labour Market Areas (LMAs) of the MEGAs and other big cities of the "Pentagon" area are clearly more extended and more "dense" than the respective LMAs in the rest of Europe. The LMAs of the MEGAs and other big cities of a more restrained area located at the North-Western area of the "Pentagon" are even more extended and "dense". The bigger cities of this last territory profit more from a labour force living at a comparatively higher distance compared to the rest European territory. In other words, the degree of unification of LMAs around a great number of cities situated at the more "dense' area of the Pentagon as well as to the rest of the Pentagon (at a lower degree) is actually much higher than in the other parts of the European territory.

---

[63] We remind that (C) cities / territories are "Provincial" FUAs with population 100,000–250,000 inhabitants, associated to territories ("provincial" Polycentric Potentials, "provinces") with less than 500.000 inhabitants (the population of the Polycentric Potentials' area is lower than 500.000 inhab.).

[64] On may 2010.

[65] We are grateful for this to D. Peeters and M. Lennert.

Each of these unified LMAs includes several cities (FUAs); thus these LMAs constitute important components of the formation of "poly-FUAs" (see in the first chapters of the Report) or other monocentric urban networks.

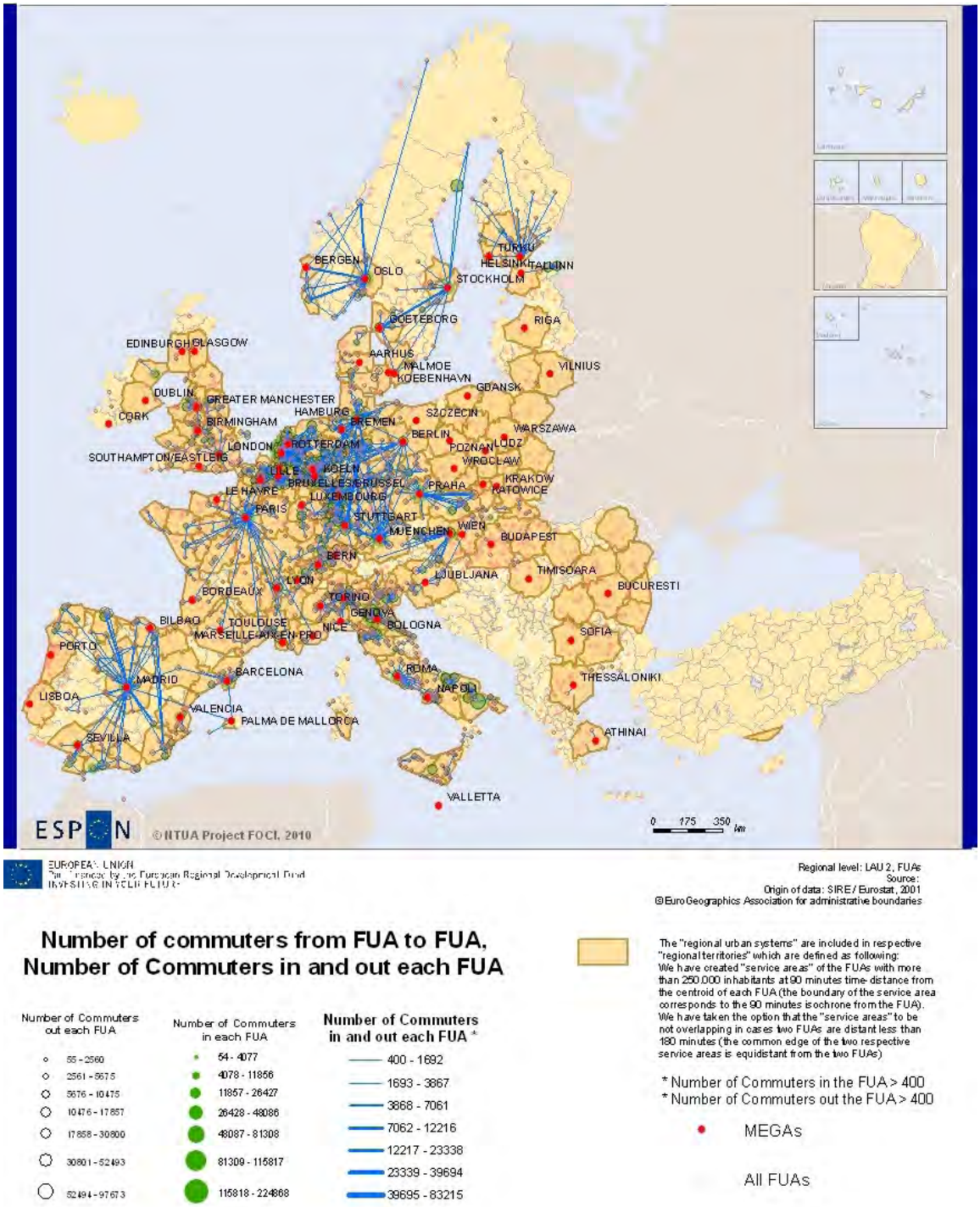


Figure 19. Number of commuters from FUA to FUA, Number of Commuters in and out each FUA

First elaboration of SIRE data: D. Peeters (IGEAT), analysis of data: NTUA team

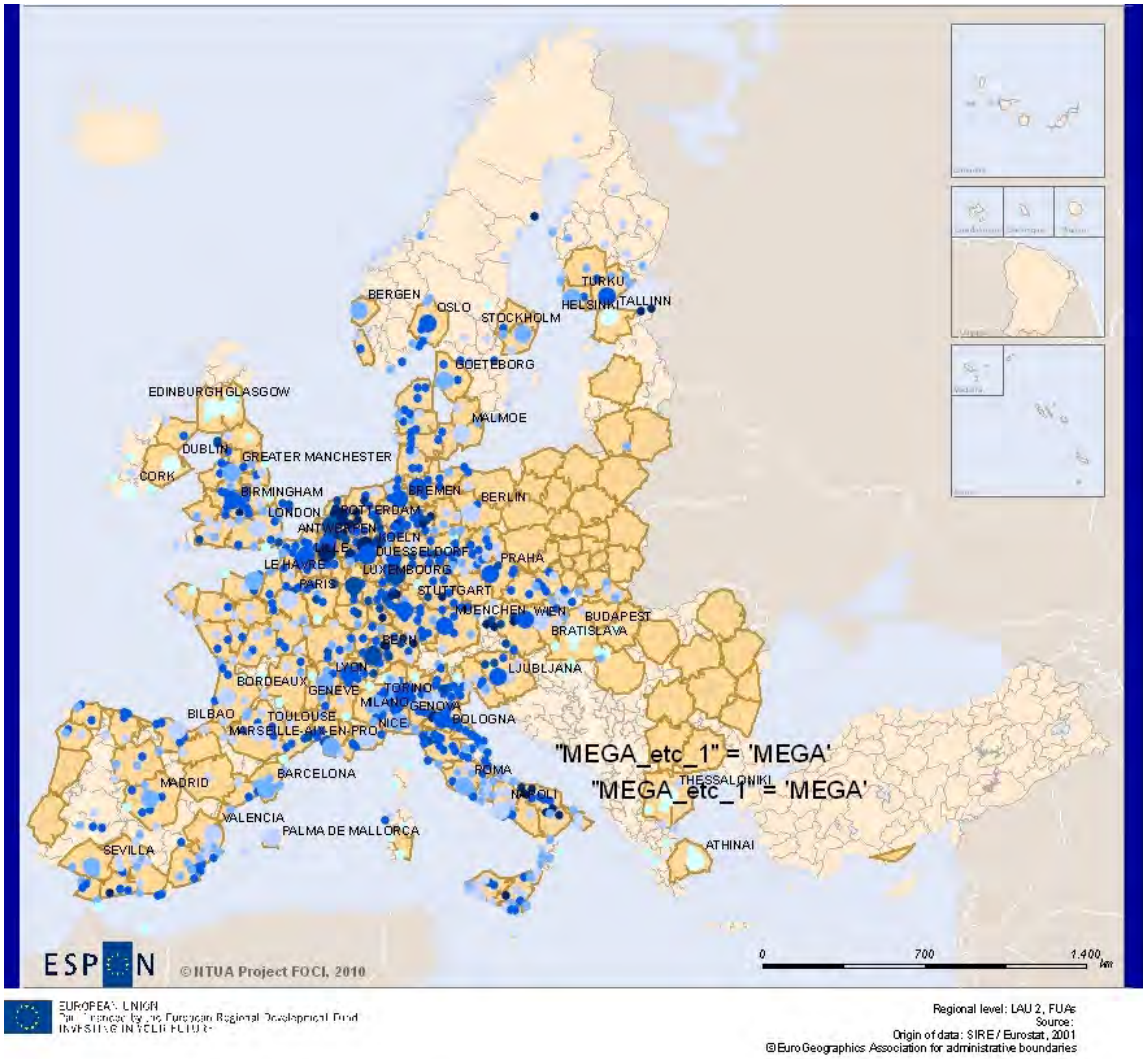


Figure 20. Rate % of incoming commuters 2001 to the total population of the FUA 2000

First elaboration of SIRE data: D. Peeters (IGEAT), analysis of data: NTUA team

14. Conclusions: polycentric integration in Europe[66]

Inevitably we should synthesise the results of the previous analyses on territorial development patterns, clustering and complementarity of activities as well as the configuration of the Labour Market Areas as components of territorial integration, regardless of whether these analyses are enough mature or not, in order to arrive to a policy development paradigm useful for planners and policy makers.

Conclusions should be in line with their possible use for policy development. Polycentric development policy options could be used as a kind of guidelines for territorial development strategies at different territorial levels. The creation of specific proposals for these strategies could be undertaken by the respective authorities. So it is not useful to be more specific than needed.

Patterns of territorial development trends

(1) Enhanced clustering and complementarity of activities together with a strong sector of « dynamic activities » explain at a great extent the higher performance and integration of specific urban systems –see in next. Thus the enhancement of these three aspects should constitute a strategic orientation of the polycentricity policy in urban systems.

Strong APS and HT sectors together with high level of clustering of activities correspond to the extended Pentagon while in Southern Europe and even more in Eastern Europe APS, HT and clustering are weak. As here the majority of clusters of activities, mainly the APS and HT ones, are progressively integrated in European level clusters integration at national or regional level is encumbered.

On the other hand, a high degree of complementarity often corresponds in Southern and Eastern Europe to cases where the Primary cities have a strong role in administration and higher level services and the rest nodes of the urban network are specialised in the agricultural sector and in industry; in the extended Pentagon area it is often related in cases where primary cities have a strong specialisation in higher level services (mainly) and in the rest cities lower level services and industry prevail.

In all cases the contribution of complementarity in integration and performance of the urban systems should be evaluated in close relation with clustering of activities and the development of the «dynamic activities»

The specific role of polycentric integration

The typology of the territorial layers of the urban systems at the regional level (between the local and the national level) in Europe (ESPON space) is very complicated; territories of higher level relationships, Labour Market Areas (LMAs) and, further on, living areas (“espaces de vie” –dense urban tissues) are combined differently according to several parameters: clustering of activities, territorial differentiation (indication of complementarity) of activities, “density” of transport and other infrastructures, structure by levels of the provision of services and the governing / administration system as to mention only some of these parameters.

[66] At the ESPON space

However, we could clearly discern different territorial development patterns in Europe in relation to the intensity of territorial integration inside the regional urban systems.

Some of these patterns are highly correlated to a higher development performance of the respective territories; shortly, this regards the Pentagon area and the MEGAs; thus the authorities responsible for the lower performance territories (of the rest Europe, regarding specifically the Southern and Eastern Europe regional territories[67]) should try to improve the key components related to higher performance.

Some of these components depend much to the national level policies, as the improvement of APS and HT activities together with the diversification of the economic profiles of the less developed urban systems from that of the more developed ones in order to better exploit endogenous development potentials and so on.

This evidently should be in line with the available funds (resources) in the underdeveloped urban systems and the possible funding of EU during the next program period 2013-2020. Evidently without enough EU support for the improvement of the development pattern of the latter urban systems and territories, this pattern would not be improved enough.

Territorial integration produces a kind of surplus value for the respective territories (as, in more general, spatial planning does). Thus the less developed urban systems (see previously) need more territorial integration; therefore, works and actions improving integration should be funded by priority by the EU.

Territorial cooperation is an important component of territorial integration. Its improvement needs in general “soft” interventions and low funding. Thus it should be supported everywhere in Europe but more in the less developed urban systems and territories.

According to the existing degree of polycentric integration, Europe is divided in three major parts corresponding to different overall patterns of territorial development trends and polycentric integration:

(a) Specific parts of the Pentagon area, roughly: in Belgium, the Netherlands, South- Eastern UK and parts of Germany.

In these cases:

- The population density together with the degree of urbanisation is very high

- The capacity of the transport infrastructures weighted by population (the “density” of transport infrastructures if we could use this term) is much higher allowing the provision of higher level services in clearly smaller time distances.

- The Labour Market Areas (LMAs) of the MEGAs and other big cities are clearly more extended and more “dense” than the respective LMAs in the rest of Europe.

They overlap at a high degree with regional urban systems and territories.

The overall territorial development pattern profits not only from more developed dynamic activities but also from wide and dense Labour Market areas and higher

[67] Evidently the development and integration issues of the metropolitan areas should be taken into account.

level and density infrastructures and services. They profit, in addition, from a more intense polycentric integration. Not only the latter conditions favour integration but the tradition in territorial cooperation has contributed in more intense cooperation (as we have seen in the cases studies).

(b) The rest of the Pentagon area and the linear extensions of this last.

In the respective urban systems:

- The population density and urbanisation, the “density” of transport infrastructures and the extent and density of LMAs are high but lower than in the previous case.

- Integration is high but relatively lower.

Here the MEGAs distinguish as for almost all the previous parameters, presenting higher values, including integration in widening metropolitan areas.

(c) The rest of Europe, with clear distinction among the Northern, Southern and Eastern European urban systems (the sequence corresponds to descending values).

The extents of the regional urban systems differ highly to very highly from that of the LMAs. So ESPON 1.1.1 PIAs has sense only for MEGAs and even for these to a lower degree.

Therefore the extend of the regional territories and much higher while the intensity of integration inside them are much lower than in the Pentagon. Effort to strengthen integration here is more necessary while the territorial pattern of the integration (levels and content of activities, infrastructures and so on) should differ clearly from this of the Pentagon area.

15. Territorial governance and cooperation in relation to the polycentric urban systems policies

Territorial cooperation becomes more efficient when the definition of the cooperation area is related to Potential Integration areas; that happens in cases interested stakeholders exploit identified "Polycentric Potentials" by improving complementarities in their common territory (by combining appropriate infrastructures and services -see previously). Obviously, the spatial extent of the territorial cooperation depends also on the political will of the interested authorities.
Previous relevant researches identified existing cooperation among cities and urban networks mainly on the basis of the cooperation initiatives developed under the transborder, transnational and interregional parts of INTERREG (see indicatively, in INTERACT and METREX documents).
They more precisely evaluated both the approaches of polycentricity used in different situations and the possible impacts of the respective projects on polycentric development.
Further research is needed on the evaluation of the strategies of territorial cooperation programs (including the 2007-2013 period's ones) from the scope of the "regional polycentricity" approach developed previously.
As this work should take into account the different territorial contexts throughout the ESPON space, it was included in the scope of the case studies.

16. Case studies

The case studies on "polycentricity and cooperation" aim to improve the knowledge acquired from the analyses on the development and interactions concerning all the European Functional Urban Areas (FUAs).

Different types of case studies will provide complementary insights of the European regional polycentricity. Case studies should also reflect the very important disparities in "Polycentric Potentials" areas among North-Western Europe and Southern and Eastern Europe. Their selection has been made partly on the basis of the statistical results for the entire ESPON space – see in Part 3 of the Report.

In light of the extreme scale dependence of the notion of polycentricity and the need to understand the interaction between scales, but also the national governance and planning structures, we used a multi-scalar approach to case studies.

- We selected at first a large transnational area: Eastern Balkans (Greece, Bulgaria and Romania) across different scales and thus across the different types of interactions identified above. This specific case study will also address the relationships among the transnational, the national and the regional level –see details for the characteristics of this case in the Part 2 of the Report – Eastern Balkans area case study.

- Four other case studies have addressed the "regional polycentricity" level. They were selected taking into account, among others, the results of the previously presented statistical analyses. The cases of this type are: the Randstadt (Netherlands), the urban system of Torino (in the Piedmont region, Italy), the urban system of Munich and the urban system of Athens –see details for the

characteristics of these cases in the Part 3 of the Report: “The regional urban systems’ case studies”.

The case studies have assessed the performance, networking complementarities and cooperation mainly at the higher level of territorial relationships previously distinguished.

Specifically, these case studies have examined in more depth two issues: (a) the interactions among the cities of specific urban networks focusing on the intra and inter-firms flows and the transport flows (b) the initiatives of territorial cooperation developed by the cities nodes of each urban system either among them or with external territorial authorities.

Research questions

The main research questions for the case studies are the following:

Which development opportunities for cooperation exist between the cities of the case study urban system? Which links between cities are already there?

Which functionalities of these cities represent comparative advantages to explore?

Which complementarities are to be developed in order to reinforce competitiveness and cohesion and with which territorial entities?

Which specific cooperation arrangements could have positive impacts to the urban system itself as well as to the wider national and transnational urban networks in which it is embedded?

The work on case studies

The elaboration of the first case study on Eastern Balkans was taken over by the NTUA team. The respective results are presented in the Part 2 of the Report.

The elaboration of the four other cases has started on August 2010. The work on two of these case studies was appointed to experts: OTB (Netherlands) for the Randstadt case and EU-polis for the case of Piedmont while the cases of the Athens and Munich urban systems were studied by the NTUA team. This work is coordinated by the NTUA team which also provided specific analyses for each case study on the basis of the work for the entire ESPON space which has been made in the framework of the WP on “polycentricity and cooperation” of the project. These specific analyses concern mainly the numbers of firms and the firms’ links as well as the commuting among FUAs.

On the basis of the findings of the case studies as well as the analyses provided from the NTUA team we present in Part 3 a comparative analysis of the four case studies.

References – sources

EU cohesion and territorial policies

ESDP (1999), *European Spatial Development Perspective: Towards balanced and sustainable development of the territory of the EU*, CEC, Luxembourg.

European Commission [1], 2008, *Green Paper on Territorial Cohesion; Turning territorial diversity into strength*, COMMUNICATION FROM THE COMMISSION TO THE COUNCIL, THE EUROPEAN PARLIAMENT, THE COMMITTEE OF THE REGIONS AND THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE, {SEC(2008) 2550}, COM(2008) 616 final, European Commission, Brussels

European Commission, 2008, *COMMISSION STAFF WORKING DOCUMENT a*ccompanying the Green Paper on Territorial Cohesion Turning territorial diversity into strength {COM(2008) 616 final, SEC(2008), European Commission, Brussels.

EU / Regional Policy, 2007, *Growing Regions, growing Europe: Fourth report on economic and social cohesion*, Communication from the Commission, Office for Official Public. of the EC,Luxembourg.

ESPON 2006 projects, ESPON publications

ESPON TPG, 2004, *project 1.1.1: Potentials for polycentric development in Europe*, Nordregio, Stockholm.

ESPON TPG, 2005, *project 1.1.2: Urban-rural relations in Europe*, Helsinki University of Technology - Centre for Urban and Regional Studies, Helsinki.

ESPON TPG, 2005, *project 1.1.3: Enlargement of the European Union and the wider European Perspective as regards its polycentric spatial structure*, KTH, Stockholm.

ESPON TPG, 2006, *project 1.4.1: The role of small and medium sized towns (SMESTO)*, ÖIR, Wien.

ESPON TPG, 2007, *project 1.4.3 Study on Urban Functions*, Free University of Brussels – IGEAT, Brussels.

ESPON TPG, 2007, *project 1.4.4: Study on Feasibility on Flows Analysis,* Spiekermann & Wegener, Dortmund.

ESPON TPG, 2005, *project 2.1.1: Territorial impact of EU transport and TEN policies*, Christian Albrecht University of Kiel, Institute of Regional Research, Kiel.

ESPON TPG, 2006, *project 3.4.2: EU economic policies and location of economic activities*, Université Libre de Bruxelles, Brussels.

ESPON TPG, 2007, *project 3.2, Spatial scenarios and orientations in relation to the ESDP and Cohesion Policy,* IGEAT, Brussels.

ESPON, 2010, *New evidence on Smart, Sustainable and Inclusive territories*, First ESPON 2013 Synthesis Report – ESPON Results by summer 2010.

Polycentricity: analytical and policy aspects, service provision, transport, territorial complementarities

Baudelle G. - Castagnède B., 2002, *Le polycentrisme en Europe*, Editions de l'aube, DATAR, Paris.

Castells M. (1996), *The Information Age: Economy, society and culture: Volume 1 – The rise of the network society*, Blackwell Publishers, Massachusetts - Oxford

CEMAT, 2006, *13 Final RESOLUTION N° 1 on Polycentric development: promoting competitiveness, enhancing cohesion*. .

Clausen, S-E., 1998, *Applied correspondence analysis: an introduction,* Sage University Papers Series on Quantitative Applications in the Social Sciences, 07-121. Thousand Oaks: Sage.

Davoudi. S., 2003, *Polycentricity in European Spatial Planning: From an analytical tool to a normative agenda*, European Planning Studies, Vol. 11(8), pp. 979-999.

Dijkstra L. – Poelman H., 2008, *Remore rural regions: how proximity to a city influences the performance of rural regions,* Regional Focus No 01/2008, EU / Regional Policy, Brussels.

Eskelinen Heikki & Matti Fritsch, 2007, *Polycentricity in the northeastern periphery of the EU territory,* Paper prepared for the Regional Studies Association Conference “Regions in Focus" Lisbon.

ESPON, 2005, *In search of territorial potentials*, Midtern results by spring 2005.

Faludi A., 2005, *Polycentric territorial cohesion policy,* Town Planning Review, 76 (1), pp. 107–118.

Gabi Simone –A. Thierstein –Chr. Kruse –L. Glanzmann, 2005, *Sustainable Management of the polycentric European Metropolitan Region of Northern Switzerland*, Raumentwicklun.

Glanzmann L., Grillon N., Kruse Chr., Thierstein A., 2004, *Polycentricity and metropolitan governance. A Swiss case study,* ERSA.

Goebel Viktor, Alain Thierstein, Stefan Lüthi, 2007, *Functional polycentricity in the Mega-City Region of Munich*, Technical University of Munich.

Greenacre, M.J., 1993, *Correspondence analysis in practice*, London, Academic Press Limited.

Hague, C., and K. Kirk, 2003, *Polycentricity Scoping Study,* London, Office of the Deputy Prime

Halbert, L., Convery, F., Thierstein, A., 2006, *Reflections on the Polycentric Metropolis* in Built Environment, vol. 32, pp 110-113.

Minister.Halbert Lud., Kathy Pain, Alain Thierstein, 2008, *European Polycentricity and emerging Mega-City-Regions - “one sizes fits all” policy?*, Built Environment, 32 (2), pp. 206-218.

Hall P. - Pain K., 2006, *The Polycentric Metropolis - Learning from Mega-City Regions in Europe*, Earthscan Publications Ltd, London.

Hall, Peter, 2003, *In a lather about polycentricity,* Town and Country Planning.

Lacour Cl. –Puissant S., 2000, *La Metropolisation croissance diversite fractures*, Anthropos.

Nordregio, 2004, Mountain Areas in Europe: Analysis of mountain areas in EU member states, acceding and other European countries, Final report / January 2004, European Commission.

Mathian - Pumain - Rosenblat (GDR LIBERGEO – Equipe PARIS) in Study Programme on European Spatial Planning (SPESP) Chapter 2 p. 25, 2000.

Meijers E., 2009, *Synergy in Polycentric urban Regions: complementarity, organising capacity and critical mass (Ph. D. Thesis)*, Delft Centre for Sustainable Urban Areas, Delft.

Meijers E. - Sandberg K., 2008, *Reducing Regional Disparities by Means of Polycentric Development: Panacea or Placebo?*, FrancoAngeli.

Meijers E., 2008, *Summing Small Cities Does Not Make a Large City: Polycentric Urban Regions and the Provision of Cultural, Leisure and Sports Amenities,* in Urban Studies, Vol. 45, No. 11, 2323-2342 (2008)

Meijers E.J., B. Waterhout and W.A.M. Zonneveld, 2007, *Closing the Gap: Territorial Cohesion through Polycentric Development*, European Journal of Spatial Development, 24.

Meijers E. – K. Sandberg, 2006, *Polycentric Development to Combat Regional Disparities? the Relation Between Polycentricity and Regional Disparities in European Countries*, ERSA.

Meijers E., 2006a, *The notion of complementarity in urban networks: definition, value, measurement and development,* paper presented at the 10th UNECE Conference on Urban and Regional Research, May 22-23 2006, Bratislava.

Meijers E., 2006b, *Polycentric Urban Regions and the Quest for Synergy: Is a Network of Cities More than the Sum of the Parts?* In Urban Studies, Vol. 42, No. 4, 765-781 (2005)

Rheinisch-Westfδlisches Institut fὸr Wirtschaft sforschung, German Institute of Urban Affairs – DIFU, NEA Transport research and training, Policy Research & Consultancy –PRAC, 2010, *Urban Audit Analysis II, Final Report, Second Draft (Preliminary Version),* March 2010, Research Project for the European Commission, DG Regional Policy

Rich J., Bröcker J., Hansen C.O., Korchenewych A., Nielsen O.A., Vuk G. (2009): *Report on Scenario, Traffic Forecast and Analysis of Traffic on the TEN-T, taking into Consideration the External Dimension of the Union – TRANS-TOOLS version 2; Model and Data Improvements*, Funded by DG TREN, Copenhagen, Denmark.

Sandberg K. – E. Meijers, 2006, *Polycentric development: panacea for regional disparities in European countries?*, paper presented at the 10th UNECE Conference on Urban and Regional Research.

Sassen S., 2002, *Global networks, linked cities*, Routledge, New York - London.

Shaw D. - Sykes O., 2004, *The concept of polycentricity in European spatial planning: reflections on its interpretation and application in the practice of spatial planning,* International Planning Studies, 9 (4).

Turok Ivan, 2005, *Polycentric Development: the key to regional competitiveness and cohesion?*, Town and Country Planning.

Vandermotten, Christian et al, 2008, *European Planning and the Polycentric Consensus: Wishful Thinking,* Regional Studies, Vol. 42.8, pp. 1205-1217.

Waterhout, Bas., 2002, *Polycentric development: what is behind it?*, in Faludi, A. (ed.) European Spatial Planning, Cambridge, MA: Lincoln Institute of Land Policy, pp. 83–103.

Waterhout Bas, Wil Zonneveld and Evert Meijers, 2005, *Polycentric Development Policies in Europe: Overview and Debate*, in Built Environment, 31 (2), pp. 163-173.

Zonneveld W. et al (Guest Editors), 2005, *Polycentric development policies across Europe*, Revue Built Environment- Volume 31, Number 2 (Special issue), Alexandrine Press Editors: P. Hall- D. Bannister, London

Polycentricity: mainly analytical aspect (firms / activities networks, urban networks etc)

Aguilera A., 2005, *Growth in commuting distances in French polycentric metropolitan areas: Paris, Lyon and Marseille*, Taylor Francis, Routledge.

Amiel, M., Mélançon G., Rozenblat C., 2005, *Réseaux multi-niveaux: l'exemple des échanges aériens mondiaux de passagers*, http://mappemonde.mgm.fr/

Castells M., 1999, *The Information Age: Economy, Society & Culture, Vol I, The Rise of the Network Society*, Blackwell Publishers.

Chevalier J., 1999, *Réseau urbain et réseau de villes dans l'Ouest de la France*, Anthropos.

Green N*., Functional Polycentricity: A Formal Definition in Terms of Social Network Analysis*, Urban Studies, 44 (11), pp. 2077-2103.

Institut de l'économie urbaine (IEU) / nexialis coref, 1992, *L'internationalité des villes françaises,* IEU.

Offner J.-M. & Pumain D., 1996, *Réseaux et territoires: significations croisées,* Editions de l'aube, Paris.

Rozenblat C., 2009, *European urban polycentrism: a multi-scale typology*, Geographica Helvetica.

Rozenblat C. & Pumain D., 2007, *Firm linkages, innovation and the evolution of urban systems* in Taylor et al. (eds), *Cities in Globalization: Practices, policies and theories*, Routdledge, pp.130-156.

Rozenblat C. & Pumain D., 2004, *Articulated modes of integration: the structuring of the european urban system* in M. Pacione: *Changing cities: international perspectives*, IGU Urban Commission and Strathclyde University Publishing, pp.91-105.

Simmie J. (ed.), 2001, *Innovative Cities,* Spon Press, London & New York.

Taylor, P. J., 2003, *European Cities in the World Network,* in Dijk, H. van (ed) T*he European Metropolis 1920–2000*, Rotterdam: Erasmus Universiteit.

Future of polycentric urban systems

Ascher F., 1995, *Métapolis - ou l'avenir des villes,* Odile Jacob.

Hall P. - Pfeiffer U., 2000, *Urban Future 21: A global agenda for twenty-first century cities,* E & FN Spon London.

Layard A. -Davoudi S. -Batty S., 2001, *Planning for a sustainable future,* Spon Press, London.

Leclerc R. - Wachter S., 1996, *Les régions au futur,* Editions de l'aube, Paris.

PwC Big Cities Network, 2005, *Cities of the future: global competition, local leadership,* Pricewaterhouse Coopers.

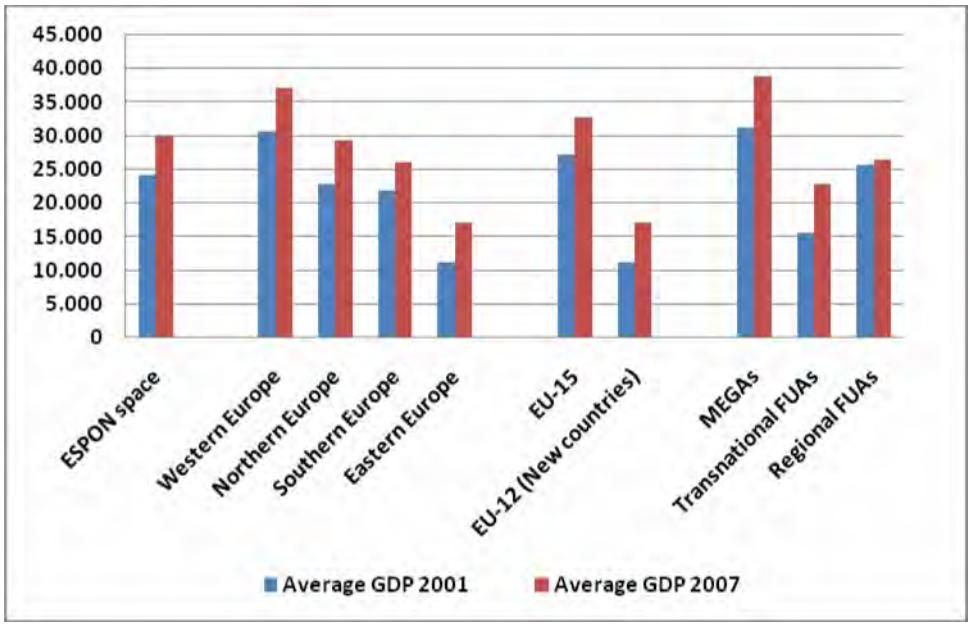
Reginster I. - Rounsevell M., 2006, *Scenarios of future urban land use in Europe,* Environment and Planning B, 33 (4), pp. 619 – 636.

Polycentrism: territorial governance and

Transnational and inter-regional cooperation

See in the Part 3 of the section of the ESPON FOCI Scientific report on "Opportunities through polycentric cooperation".

Annex



* ESPON space
Source of data: Eurostat, FUAs GDP approximated by NUTS3 units

Figure 21. Average GDP per capita 2001 and 2007 of the European* cities (FUAs) according to the division in major parts of Europe, EU-15 / new m. countries, MEGAs / transnational / regional cities (FUAs)

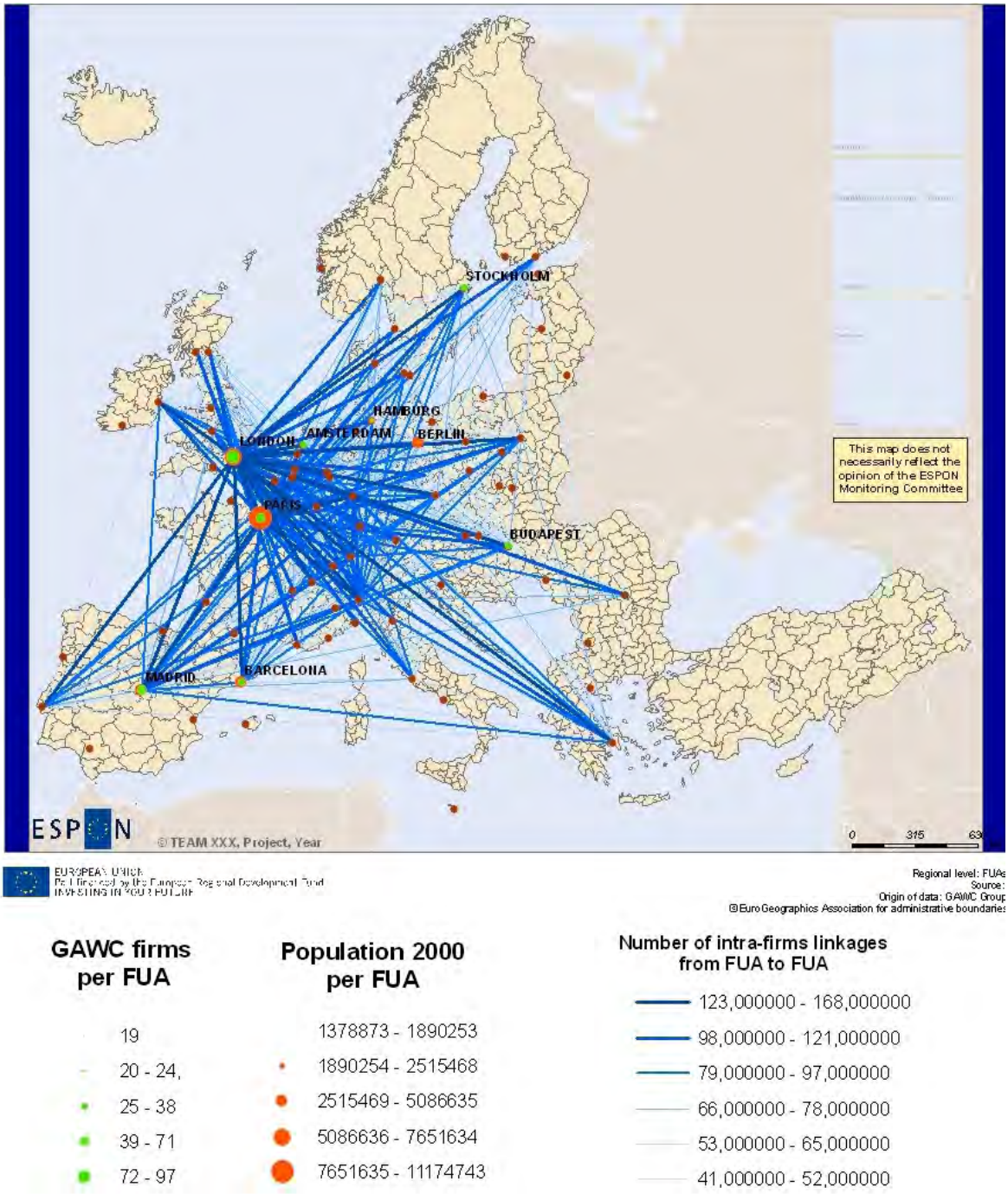


Figure 22. GAWC companies: Intra-firm linkages from FUA to FUA / ESPON space
Source of data: GAWC, analysis of data: NTUA team

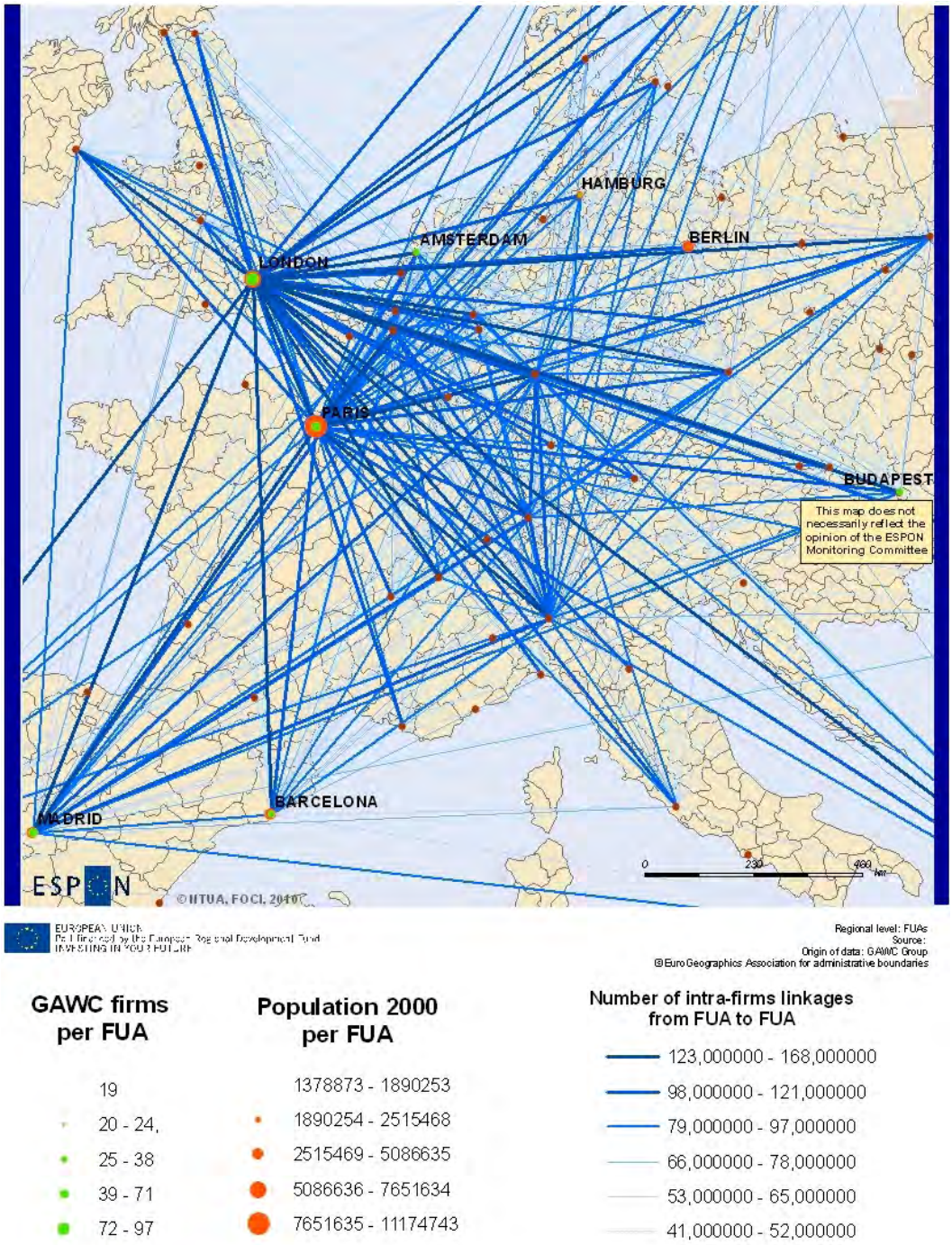


Figure 23. (in Annex) GAWC companies: Intra-firm linkages from FUA to FUA / West Europe
Source of data: GAWC, analysis of data: NTUA team

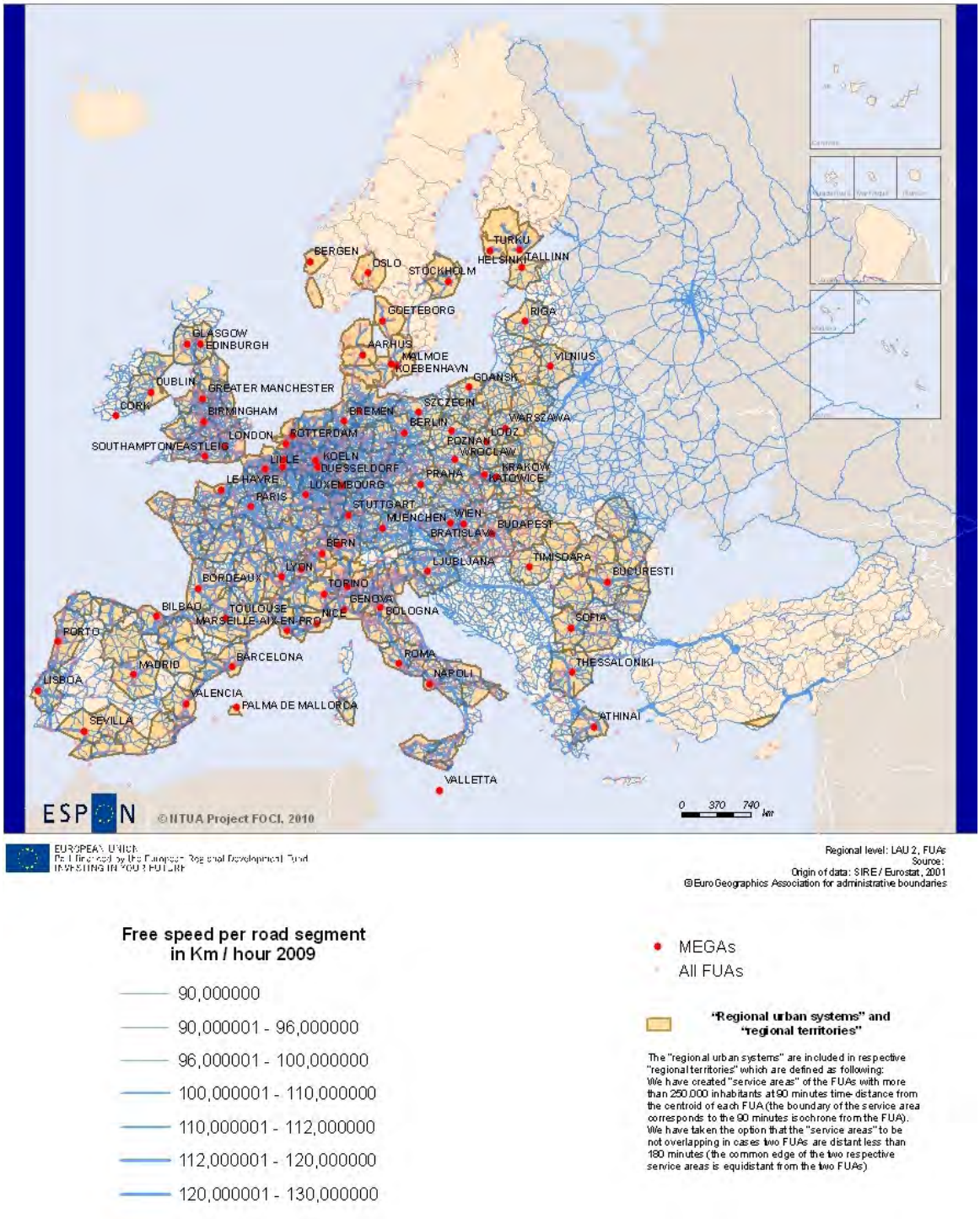


Figure 24. (in Annex) Capacity of the road networks per regional urban systems and regional territories in Europe*

* ESPON space

Part B. The Eastern Balkans area case study

1. Initial methodological remarks, specific characteristics of the approach of the EB area

A multi-level case study

According to the methodological approach that we have presented previously we decided to work on case studies selected according to the three types (or levels) of polycentric relationship presented above.

Case studies should also refer to *different spatial development contexts.* The *Eastern Balkans (EB) area*, including *Greece, Bulgaria and Romania*, constitute a distinguishable spatial development context.

According to our general approach (see in the Interim report and its Annex / WP4 – polycentric potentials), *in the frame of the same spatial development context, different spatial levels case studies should be examined.* Therefore, we decided to examine the two following case studies included in the Eastern Balkans area:

- The entire Eastern Balkans area, where we mainly examine the higher level polycentric relationships focusing on the transnational ones. In the frame of this case study we further go in depth in the national / regional polycentric relationships in the case of Greece / Athens.

- The case of the trans-border region Greece - Bulgaria, where we examine the specific polycentric relationships created in trans-border areas.

The approach of the Eastern Balkans area

According to our system of hypotheses, *the EB urban system will be approached as an accelerator of polycentric territorial integration in the Eastern Balkans.*

The region of Eastern Balkans, which includes ***Greece, Bulgaria and Romania***, is transformed considerably since the end of '80s due to the transition of the two last countries to the free market economy, the pre-accession procedure that they followed and their accession to the EU on 2007.

This development process transformed not only the internal structure of the urban systems of the two recently accessed countries but, even more, their networking with the urban systems of the neighbouring EU countries, especially with the Greek urban system.

(a) Taking into consideration that the urban systems consist the main component of the transnational territorial integration, it is of great importance to examine precisely the *change* of the urban systems of Eastern Balkans from this scope. In other words, *we will first study the urban / territorial integration in the Eastern Balkan area as a case of transnational territorial integration of the European mega-*

regions through the integration of the urban system. The geographical position and the former historical evolution permit the formulation of the hypothesis that *the Eastern Balkans area is a trans-national mega- region with strong potential of integration.*

(b) We have also examined the *higher level "regional" polycentric relationships in the three countries of the Eastern Balkans area.*

The Eastern Balkans in the European Space: the issue of "context"

In the European space we can clearly distinguish different socio-economic and territorial contexts: the one of the areas included in the 'pentagon" or outside it, the one of the regions in the North and the ones in the South, that of the regions in the more developed Central-Western Europe, in Southern Europe (included mainly in the EU-15 "Cohesion countries") and the regions of the new member states of Eastern and South-Eastern Europe.

The South-Eastern Balkans area represents the regions outside the "pentagon", the regions of Southern Europe, as well as the regions of the new member states of Eastern and Southern- Eastern Europe.

2. The development framework in the three countries

The consequences of Bulgaria's and Romania's transition to the free market economy have become more intense since they have become accession countries and, even more, since they became full EU members.

2.1 Population

Population at national level

During the decade 1991-2001 while the population of Greece grown considerably (6,8%), the population of Bulgaria and Romania diminished (-8,3 % and -3,3% respectively).

In the period 2001-2007 while the population of Greece continued to grow (2,2%), the population of Bulgaria continued to diminish with a slower rate (-3,2%) and the population of Romania diminished a bit more than in the previous period.

Population density at NUTS3 level - as an indication of the polycentricity degree at national level

From the analysis of the population density in 2006 (inh. / Km2, source: Eurostat) per NUTS3 regions of EB –*Figure 1*- we concluded that:

- *In Greece population is mostly concentrated in the two MAs: Athens and Thessalonica*, in the NUTS3 regions which are located along the development axis Patras- Athens – Thessalonica – Kavala as well as in the coastal areas (NUTS3).

- In Bulgaria, *the population is more equitably distributed,* with higher densities in the NUTS3 regions of Sofia, Plovdiv and Varna.

- In Romania, population is even more equitably distributed per NUTS3 regions, with high population density in 6 big cities, strongly indicating increased polycentricity.

Population change

We have chosen to examine the population change per NUTS3 regions of the EB in relatively extended period that starts from 1991, almost at the beginning of the period of transition of the economies of Bulgaria and Romania to the market economy accompanied by a impressive raise of immigration from the East European countries to Greece –and lasts to 2006 – see in Figure 2.

We concluded that:

- In Greece population increased considerably in all NUTS3 regions that were already most developed and were most densely populated: in the two MAs, in the regions of the axis Patras- Athens – Thessalonica – Kavala and in the coastal zones.

- In Bulgaria and Romania, as we have already noted, the total population per country decreased in the period 1991-2006. In more detail:

(a) In Bulgaria, population decrease is less in the NUTS3 regions that include big cities while we observe a substantial raise of the population in Sofia, a small raise in Varna and no change in the regions of Burgas and Pazardzik.

(b) In Romania, we have a considerable population increase in Bucuresti, lower increases in 4 NUTS3 areas (including Iasi), no change in a considerable number of regions and population decrease in several others, mainly in the Western part of the country.

Figure 1. Population density per NUTS3 regions and population of FUAs in 2000 in the EB countries

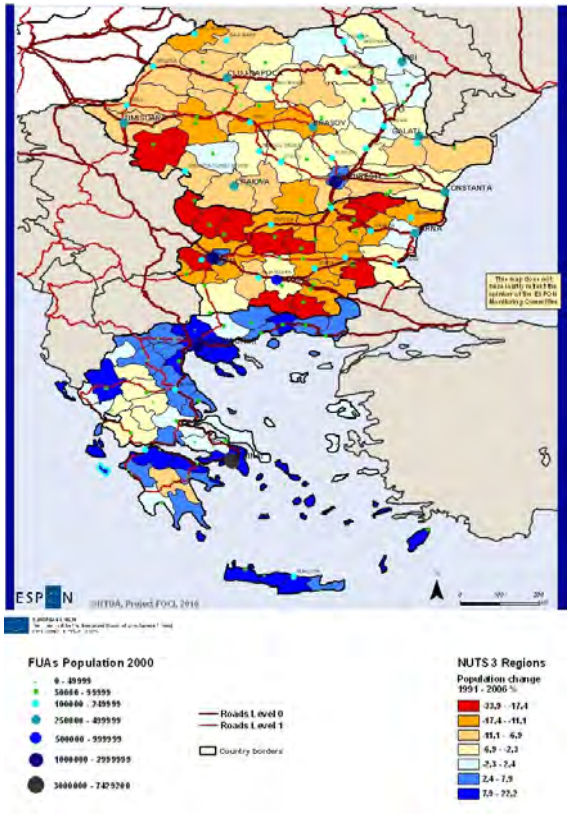


Figure 2. Population change %1991-2006 per NUTS3 regions and population of FUAs in 2000 in the EB countries

2.2 Economic changes and migration movements

GDP at national level

The GDP per capita (Euros per capita – in current market prices, source: Eurostat) for the year 2006 was for Bulgaria 3.300, for Greece 19.100 and for Romania 4.500. *During the decade 1996-2006 (for Romania 1998-2006) it has increased in all three countries.* Especially in Greece the increase was up to 101,1%, in Bulgaria 175% and in Romania 164,7%.

GDP per NUTS3 regions in 2003

- As we have already noted, GDP per capita in Greece is much higher than that of Bulgaria and Romania. Therefore, it is expected that almost all the NUTS3 regions of Greece have higher GDP than all the respective regions of Bulgaria and Romania.

- In Greece, the higher GDP values are observed in the Metropolitan Area of Athens and in its neighbouring NUTS3 regions as well as in the touristic area of Cyclades –see in *Figure 3,* followed by the areas of the axis Athens - Thessalonica and the rest touristic island areas.

- In Bulgaria, the NUTS3 regions of Sofia and the other big cities: Varna, Burgas and Stara Zagora clearly distinguish from the rest of the country.

- In Romania, the NUTS3 regions of Bucuresti and some of the other big cities: Timisoara, Cluj Napoca, Brasov and Konstanta clearly distinguish from the rest of the country.

Greek DI in Bulgaria and Romania

From 1989, and with a speeding rate, until today, Foreign Direct Investments (FDI) in Bulgaria and Romania are increasing. Greek DI in these countries has increased significantly, contributing to the territorial integration in the EB area.

Greek DI are primarily concentrated in the capital cities of Bulgaria and Romania and secondly: (a) to the rest big cities of Bulgaria and Romania (b) to the Bulgaria border region neighbouring to Greece.

See in more detail in section 5 - Firms and research potential and links at different territorial levels..

Other spatial economic relationships and immigration

Commercial exchanges between Greece and the two other countries, tourist flows (particularly from Greece to Bulgaria and Romania) and Greek private investments in real estate in the two other countries were increased substantially[68].
It should be emphasized that *immigration* of Bulgarian and Romanian workers to Greece as well as the level of wages paid to them are not very controlled. These workers are often employed in the "informal economy" sector.
Some aspects of the above interactions, particularly the shift of industries from Greece to Bulgaria and Romania and the presence of Bulgarian and Romanian workers with low

[68] It is illustrative from this scope that mainly during the last six years, the number of residents of the Greek border region (to Bulgaria) who go to the opposite side in order to be supplied with commercial products and services in lower prices has increased

wages in Greece have created tensions which are representative of tensions that are presented generally in EU in the current period immediately after the enlargement with the twelve new countries.

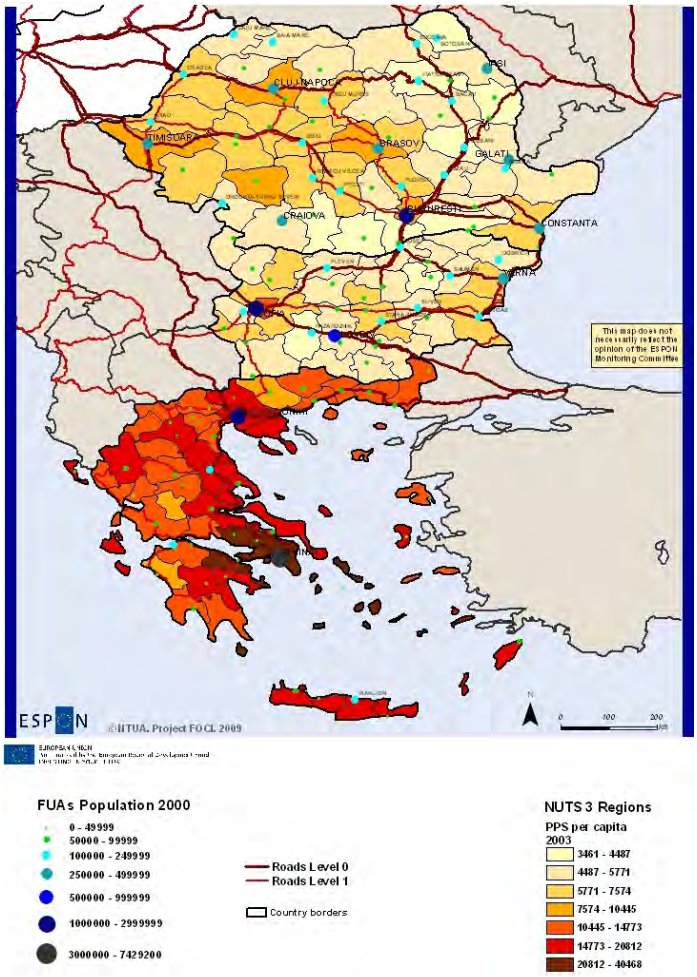


Figure 3. GDP PPS per capita 2003 per NUTS3 regions of the EB countries

3. The Eastern Balkans cities and urban systems: definitions and research priorities

3.1 Typology of cities (FUAs) – The Eastern Balkans cities

The ESPON 2006 1.1.1 project constructed a typology of FUAs which is based on the average scores of seven features and functions of the FUAs, population, transport, tourism, industry, knowledge, decision- making and administration (see in detail in this project).

Three concepts are used for the typology, (1) Metropolitan European Growth Areas (MEGAs), (2) Transnational / national FUAs and (3) Regional / Local FUAs.

The total number of functionally significant urban areas in Europe is 1595. 76 of these are MEGAs, 219 are transnational / national FUAs and 1312 are regional/local FUAs.

According to the ESPON 1.1.1 project, Greece has 45 FUAs, Bulgaria has 31 FUAs while Romania has 59 FUAs.

3.2 Identification and delimitation of the Metropolitan Areas, links to be studied

MEGAs of the three Eastern Balkans countries have a particular importance.

The MEGA analysis seeks to identify those urban areas that may be seen as "counterweights" to the Pentagon in the future. There are four building blocks here, namely (1) mass criterion, (2) competitiveness, (3) connectivity and (4) knowledge basis. Each of these building blocks consists of two variables or indicators. The typology of the MEGAs is based on indices of these four building blocks (cf. ESPON 1.1.1).

According to ESPON 1.1.1 project, there are 5 categories of MEGAs ordered by significance:

Global nodes, Category 1 MEGAs, Category 2 MEGAs, Category 3 MEGAs and Category 4 MEGAs.

In more detail: (a) *Global nodes:* Two, London and Paris, are considered to be Europe's global nodes: the largest and most competitive urban systems with high connectivity levels. (b) *Category 1 MEGAs:* There are often large, highly competitive, and possess strong human capital and good accessibility. Most of these FUAs are located within the Pentagon, though a few are located outside. These FUAs play a key role in building a more polycentric economic growth pattern in Europe. (c) *Category 2 MEGAs:* Category 2 MEGAs comprise cities that are relatively large, competitive and often possess strong human capital. *(d) Category 3 MEGAs:* These MEGAs are smaller, have lower competitiveness are more peripheral and often have weaker human capital than Category 2 MEGAs. *(e) Category 4 MEGAs:* These MEGAs are often smaller, less competitive, more peripheral, and have lower human capital figures than Category 3 MEGAs.

In the entire Eastern Balkans area there is only **one FUA** belonging to the **MEGAs -2** category –**Athens**- and **3 FUAs**: **Bucuresti, Sofia and Thessalonica** included in the **MEGAs -4** category.

As it was stressed in ESPON 1.1.1, the MEGA analysis identified some strong poles outside the Pentagon, however it found that no individual MEGA outside the Pentagon demonstrates a sufficient capacity to concentrate functions and mass in order to form a **Global Integration Zone** which could be an alternative to the "Pentagon". They pointed out that "such a potential may however arise by looking at groups of MEGAs". We will try to see if the MEGAs and, eventually, other big cities of the EB area present such a potential.

For this purpose we examine in next both the respective "attribute values" and the networking among the bigger EB FUAs.

3.3 Identification and analysis of "regional" territories in the three countries

This work concerning the Eastern Balkans area is presented in the Chapter 1.
We finally discerned the urban networks, corresponding to "regional territories" in the three countries. See Figure 4 for the case of Romania (the primary cities are marked in bold) and in Annex the list of cities included in each "regional" urban system / territory.
We made analyses of these regional urban systems / territories both by attribute and networking data and evaluated the degree of their complementarity using employment per sectors data (at LAU1 level for Greece and Romania).

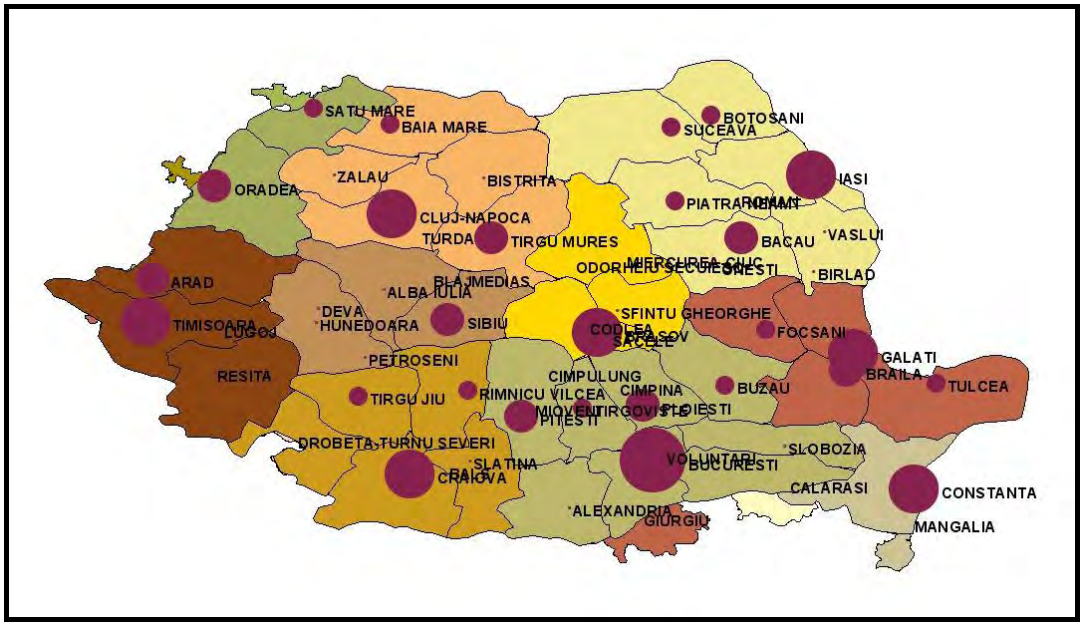


Figure 4. The "regional" polycentric potential urban systems and the "regional territories" in Romania

4. Analysis of the national urban systems by "attribute" values

Here we are going to *emphasize on the population, knowledge, decision-making and administrative functions*, as they are analysed in ESPON 1.1.1 project. For the rest functions, see in detail in the above project.

Greece

The average FUA population in Greece amounts (2000) in 154.312 inh. 65% of the inhabitants of the country live in FUAs. Almost all FUAs are growing, with the smallest growing relatively faster.
Greece is dominated by the metropolitan regions of Athens / Attiki and has Thessaloniki as its second-city. These two metropolitan regions had 3.761.810 and 1.084.000 inh, respectively in 2001. There are not other large cities (with population over 500.000 inh.) and the other cities are medium sized and small functioning mainly as local centres. The most important FUAs are included in the main developmental axis of the country Patras – Athens – Thessaloniki - Kavala which has an S form. Iraklion is clearly the main centre in the island of Kriti.
As for the *Knowledge* function, both Athens and Thessaloniki have universities of European significance. Seven other FUAs have large universities. The total number of FUAs with higher education institutes is 23. The university system is making Greece more polycentric.

Concerning *Decision-making,* Greece has no FUA with a second order role as a business decision-making centre on the European level –see in Chapter 1. The headquarters of top-500 companies are located in Athens and in Thessaloniki. Komotini and Larisa are two other FUAs that boast regional significance.
Administrative function: Athens is the capital city (European significance in administration). The administrative role of some FUAs is strengthening their position in the national urban network, as compared to their position in accordance with mass criterion. 35 FUAs have regional significance in administration.

From the above, we could make the following preliminary estimates:
- Athens and Thessalonica constitute very strong centers of urban networks at supra-regional and regional levels.
- In the majority of the rest regional urban networks, the primary city has a very prominent role: rather monocentric urban networks. There are few cases of morphologically and functionally polycentric urban systems as for example Karditsa-Trikkala- Larisa- Volos in Thessaly and Serrai - Kavala – Komotini – Xanthi - Alexandroupolis in Thraki. The respective FUAs, which are mainly small and medium sized, have today medium intensity inter-links but they could very probably form Potential Integration Areas (see also in next section) as this is although suggested by the Greek planning authorities.

Bulgaria

The average FUA population in Bulgaria amounts (2000) to 155.291 inh. 63% of the inhabitants of the country live in FUAs. All FUAs are declining, with the smallest FUAs

losing most of their population from 1991 until 2000 (ESPON 1.1.1 2005 and ESPON 1.4.3 2006).
Bulgaria is rather monocentric. As in some other former socialist countries, the urban network of Bulgaria is characterised by the strong primacy of the capital Sofia (1.174.000 inh. in 2000 according to ESPON 1.1.1) and for the rest by a quite equilibrated pattern of second-level cities, corresponding to the willingness of the former planned economy to disperse industry on the whole country, following the administrative hierarchy.
Plovdiv (722.000), Varna (320.000) and Burgas (209.000) are clearly the most important cities after Sofia. The remaining FUAs have less than 200 000 inhabitants.
As for the *Knowledge* function, Sofia has more than 50 000 students in higher education institutes, which gives the city the status of being a significant knowledge node on the European level. Four other FUAs have large universities. The total number of FUAs with higher education institutes is 11. Three of these 11 FUAs have less than 100 000 inhabitants.
Concerning *Decision-making,* Bulgaria has no FUA with a significant role as a business decision-making centre on the European level. Sofia is a national decision-making centre. Seven other FUAs have 2 to 10 percent of top-500 companies, and 22 FUAs have at least one, but less than 10, top-500 companies.
Administrative function: Sofia is the capital city (European significance in administration). The network of regional capitals is rather dense. There are 26 regional capitals, and only four FUAs do not have a significant role in administration.

From the above, we could make the following preliminary estimates:
- Sofia constitutes a very strong center of urban networks at supra-regional and regional levels.
- In the majority of the rest regional urban networks, the primary city has a medium intensity role: rather polycentric urban networks.

Romania

The average FUA population in Romania amounts (2000) to 144.052 inh. Only 38% of the inhabitants of the country live in FUAs. All but two FUAs were losing population from 1991 until 2000 (ESPON 1.1.1 2005 and ESPON 1.4.3 2006).
Romania is dominated by Bucuresti, and has seven FUAs with 280.000 to 320.000 inhabitants. These last design a *quite equilibrated urban pattern*, inherited from the communist period, when the planned economy wanted to disperse industry onto the country, following the hierarchy of the administrative pattern. At the third and the lower levels of the hierarchy, the urban pattern remains weak.
The *knowledge* system is very polycentric. In addition to the capital, eleven FUAs have major universities, distributed over all parts of country. The total number of FUAs with higher education institutes is 29. The knowledge system makes the national urban system more polycentric.
Concerning *Decision-making,* Romania has no FUA with a significant role as a business decision-making centre on the European level. Bucuresti is the most important node in national decision - making and also in the private sector. Five other FUAs have regional significance in decision-making, while the top-500 companies are scattered across 32 other smaller FUAs.

Administrative function: Bucuresti is the capital city (European significance in administration). 40 FUAs have regional administration functions. The network of regional capitals is rather dense.

From the above, we could make the following preliminary estimates:
- Bucuresti constitutes a very strong center of urban networks at supra-regional and regional levels.
- In the majority of the rest regional urban networks, the primary city has a medium intensity role: rather polycentric urban networks.

The above estimates on polycentricity in urban networks served as hypotheses tested in the next section on networking among cities.

5. Firms and research potential and links at different territorial levels

We will examine here the firms and research potential as well as the networking through firms and research links at different territorial levels: the level of the Eastern Balkans "mega-region" and the national / regional level. In chapter 6 we will examine the transport potential and links.

5.1. The ORBIS database firms' subsidiaries: division per branches

In the following we use the ORBIS database data on firms' subsidiaries. We have presented the content of the two respective datasets on the subsidiaries themselves and the links among them in the section 8 of the Part 1 of the Report. We should repeat here that these data should be used under certain conditions -see in Part 1.

We used the first dataset of ORBIS, specifically its data on the numbers of subsidiaries per NACE 2 classification branches and cities (FUAs) of Greece, Bulgaria and Romania. We grouped the NACE 2 branches in 6 appropriate groups –see in Part 1 of the Report.

From this analysis, it results that the number of subsidiaries located in Greek cities (FUAs) (1.256) is by far higher than that corresponding to the cities of the two other Eastern Balkans countries. From the same respect, Romania (713) prevails to Bulgaria (663).

Athens dominates the Greek urban system. It holds 87% of the total number of subs. corresponding to the Greek cities (FUAs) (1.096 subs. from 1.256). Thessaloniki has the 2nd rank with only 65 subs. and four other cities are following with much less subsidiaries: Heraklion in Crete: 22, Volos : 8 subs. and Patra and Larisa: 7 subs. each
From the total number of subsidiaries in Greek cities (FUAs) 46% correspond to the group of branches Trade - Transportation - Information and communication - Accommodation and food service (G-J) followed by branches Mining - Manufacturing - Electricity etc (B-E) : 22% and Financial - Real estate - Professional, scientific and technical activities (K-M) with 21%.

The dominance of Athens in the **Greek urban system** become even higher as for the third of the latter three groups, that included the more dynamic groups both from the scope of innovation and the scientific and technical activities. Thessaloniki is following in

importance of this last group but the total of the respective number of subsidiaries is very low.

Trade - Transportation - Information and communication - Accommodation and food service (G-J) prevails even more in the total employment of Bulgarian FUAs: 37%, followed by Manufacturing and associated branches (B-E): 26,7% and Financial - Real estate - Professional, scientific and technical activities (K-M): –24,3%.

The distribution per groups of branches per cities is close to Bulgaria and Greece.

Sofia dominates in the national urban system (less than Athens in Greece) with 441 subs. ollowed by Varna (72), Plovdiv (32) and Ruse (13).

In almost all Bulgarian cities except Sofia the large majority of subsidiaries belong to Manufacturing and associated branches (B-E).

In the total of Romanian cities, Trade etc (G-J) is in the first place with 40% of the total, followed by Manufacturing etc (B-E) with 27% of the total, followed by 33% and Financial activities etc (K-M) with 23%.

Bucuresti preponderates compared to other Romanian cities (485 subs), followed by far by three other cities: Timisoara (24), Cluj-Napoca (23) and Sibiu (22).

5.2 The firms links

In the following, we will examine both the intra-firm links: the links among the subsidiaries of a firm with the headquarters of the firm and inter-firms links: the links of a firm with its shareholders ("actionnaires") by FUA where are located the subsidiaries, the headquarters of the firms or the headquarters of the shareholder. We will also examine the number of subsidiaries of firms per groups of branches which could also contribute to the evaluation of the potential of integration of the urban systems.

We used successively three datasets: (a) the firms' dataset of the GaWC (Globalisation and World Cities) Study Group, (b) data on the major Greek companies operating in Eastern Balkans and (c) data on firms of the ORBIS Database.

The results of the 2nd (b) analysis are not presented here in detail [69] as the ORBIS data are much richer.

We have also examined the firms' links per FUA on the basis of GAWC data in the Part 1 of this report, concerning the entire ESPON space. The specific results of this analysis are very similar with those of the analysis on the basis of the ORBIS data. Therefore we do not refer to the GaWC data analysis for the Eastern Balkans as the ORBIS data are much richer.

We note that the results of the analysis of the GaWC data on firms by IGEAT (FOCI Interim Report, source of data: GaWC, data analysis and Maps design: IGEAT), seen from the scope of the Eastern Balkans region give only some elements of the situation as

[69] The results of this analysis were presented in the 1st Pre-final Report (April 2010) as follows: "As the number of GAWC companies which have branch offices in EB countries is small, we proceeded to an analysis of the *major Greek companies' networking in Eastern Balkans* (the number of Bulgarian and Romanian companies operating in Greece are very small). That means we examined the locations of the branch offices of these companies in the cities of Bulgaria and Romania. We also made a similar analysis for Greece. We concluded that the presence of these companies is much more important in Sofia and Bucuresti; however they have branch offices in an important number of regional capitals of Bulgaria and Romania".

the significant presence of Athens (Headquarters and Offices) as well as of Sofia and Bucuresti (Offices).

In next we will analyse the firms' links on the basis of the ORBIS database –see details on the *extraction of an appropriate subset of ORBIS data from the initial ORBIS dataset in section 5.1.*

The Eastern Balkans and the rest of the ESPON space

Evidently, the "flows" starting from FUAs of the more developed parts of West, Central and North Europe (mainly the "Pentagon") and oriented towards FUAs of the Eastern Balkans are much more intensive than the inverse flows. In other words, the number of subsidiaries located in the EB FUAS and controlled by firms located in the more developed Europe is much higher than that of subsidiaries located in this last and controlled by firms of the Eastern Balkans. The links of the Eastern Balkans FUAs with the rest Southern and Eastern Europe are clearly less intensive.

In Greece there are 893 affiliated subsidiaries controlled from FUAs of the rest ESPON space; the higher dependence links are from Paris (188 subsidiaries) and London (116) – *see Figure 14 in Part A of the report.*

The intensity of flows concerning Bulgaria and Romania is lower while their territorial orientation differs from that towards Greece. In Bulgarian FUAs there are 244 subsidiaries controlled from the rest Europe, the most important dependence links being originated from Wien (46), Paris (29) and Amsterdam (25),

In Romanian FUAs there are 633 subsidiaries controlled by the rest Europe, the most important dependence links starting from Wien (102), Paris (99), Amsterdam (88), Brussels (29) and London (26); 28 links start from the rest E. Balkans including 24 from Athens, 2 from the rest Greece and only 2 from Sofia.

Thus, the index of the firms' dependence degree of the FUAs of these two countries from Athens is high even if it is 6th in the total ranking. *It is also obvious that there is an even higher dependence of the firms located in the cities of the two countries from the neighbouring Austria mainly through Wien.*

Inversely: Companies' headquarters located in Eastern Balkans FUAs that control subsidiaries in the rest of the ESPON space are much less. Greek FUAs control in total 298 subsidiaries from which 199 are located inside the country, 44 in the Eastern Balkans and 99 in the rest ESPON space. The main "flows" are oriented towards London (23), followed by Luxemburg (9) and Amsterdam (11). Bulgarian FUAs control only 4 subsidiaries: 1 located in London, 1 in Amsterdam, 2 elsewhere. Romanian FUAs control 7 subsidiaries in the rest ESPON space: 2 of them are located in Brussels and 2 to London.

Concluding: Athens at first and a few other Greek cities (much less) have much more intensive links with the rest Europe than the Bulgarian and Romanian FUAs (with Sofia and Bucuresti in the first places). In all countries these links reflect a strong dependence from the most important economic centres and the rest developed part of the EU space.

Links inside the entire Eastern Balkans area

As we have noted, the flows originated from Greek FUAs and oriented towards the Eastern Balkans FUAs are important. Companies' headquarters located in Greece have *44 subsidiaries in E. Balkans:* the more important flows are oriented towards Bucuresti (25) and Sofia (19) – see Figure 5.

In Bulgaria: 20 subs. are controlled by Eastern Balkans FUAs, the large majority of headquarters of which (18) are located in Athens, 1 in another Greek FUA and only 1 in Romania (Bucuresti). Athens holds the 4th rank as for the numbers of installations of headquarters of the ESPON space companies that work in Bulgaria.
The numbers of subsidiaries located in Bulgarian and Romanian FUAS or in the rest ESPON space that are controlled from Bulgaria and Romania are insignificant[70].
Concluding: Athens has an important influence to the urban systems of the two other countries, which are even more dependent from the neighbouring Austria. Also, in all three countries the numbers of FUAs' subsidiaries controlled from the rest Europe are greater than the numbers of subsidiaries controlled from national FUAs. As the subsidiaries included in the ORBIS database constitute the more modernized part of the economy of the 3 countries (the rest of the economic activities correspond to small and very small enterprises), this last remark means that the EB subs. participating in dynamic clusters, they participate in clusters integrated at European level and dependent from urban centres outside the EB.

Links Inside each one of the three countries

Athens controls the rest of the Greek FUAs in a much greater degree than expected taking into account the relative weights of the respective populations -see Figure 5.
Companies' headquarters located in Athens control 113 subsidiaries located in other Greek FUAs and 655 located inside the Athens metropolitan area (85% of the total).
Athens is by far followed by Thessaloniki, which controls only 18 companies in other Greek FUAs and inside its area; it is followed by Heraklion.

In Bulgaria, the capital dominates, but markedly less than Athens in Greece. Sofia controls 76 subsidiaries in other cities in Bulgaria and 258 inside its area (77% of the total). Varna follows: it controls 17 subsidiaries in other Bulgarian cities and 48 inside its area.

A similar situation is found in Romania. Bucuresti controls 31 companies in other cities in Romania and 93 inside its area (75% of the total). Cluj-Napoca follows, controlling 17 subsidiaries in other Romanian cities and seven inside its area. Bucuresti controls also a very small number of subsidiaries located in the Eastern Balkans (2: 1 in Athens and 1 in Sofia).

[70] Companies headquarters located in Sofia control only 2 subs. located in the Eastern Balkans area (in Bucuresti). The number of Eastern Balkans subs. controlled by Romanian FUAs (Bucuresti) is slightly bigger: 2 (1 to Sofia, 1 to Athens). Bulgaria controls also very few subsidiaries in the rest ESPON space: 5 subs. are controlled from Sofia (2 are located in Bucuresti and 3 in the rest Europe) and 1 from Varna.

Figure 5. Intensity of firms' links (ORBIS database) inside the Eastern Balkans

Concluding, the three capitals dominate strongly the units of the "companies sector" (that is examined here –according to the ORBIS database) which are located inside their territories. This result becomes more meaningful if we take into account that this part of the economy is the more modernized and competitive. This analysis demonstrates that the innovative branches' units installed in the national territories are also strongly dominated by the three capitals. Therefore, it seems that cities outside the capitals do not profit enough from the positive effects of clustering (by specific groups of branches) of enterprises at national and regional level.

5.3. Participation of cities in research networks

(a) Some results for the Eastern Balkans area could be derived from the work of the FOCI respective team (D. Pumain-C. Rosenblat) on the participation of ESPON space cities in research networks (extracted from the NBIC- Euro database) -see the relevant Maps of the FOCI IR.

(b) Our workgroup used the CORDIS Research projects database to find data for the *cooperation in research among the Eastern Balkans regions and cities.*
We recorded the research projects:
(a) Which refer to two fields of high technology: "Information processing, information systems" and "Biotechnology".
(b) The coordinator of which is located in Greece, Bulgaria or Romania and with participants from Greece, Bulgaria or Romania.
We elaborated the respective data per NUTS2 / NUTS3 levels and per FUA - *see Figure 6.*

We made the following conclusions:

(a) Concerning the trans-national level linkages:

We elaborated in total 655 projects. Most of coordinators -634- are located in Greece, 15 of them are located in Bulgaria and only their 6 of them are located in Romania.

Only 16 projects (2,4% of the total number of projects) refer to cooperation of cities in Greece with cities in Bulgaria, 32 (4,9%) to cooperation between Greek and Romanian cities and 8 (1,2%) to cooperation between Bulgarian and Romanian cities.

Mostly the capital cities participate in the collaborations in all three countries.

Attiki / Athens take the leading role (in number of projects compared to Sofia and Romania).

But the percentages of the participants from Romania (Bucuresti) and Bulgaria (Sofia) in projects the coordinator of which are located in Attiki are very low (4% and 2,1%, respectively)

Therefore, only the three capitals and Thessaloniki have a trans-national role in research networking in EB. This kind of networking is growing. It was not spread until recently but this spread is now growing.

(b) Concerning the national / regional level linkages:

It occurred that, in the three countries, most of the participant bodies are located in the capital city. Specifically:

- In Greece:

51% of the projects the coordinators of which are located in *Attiki / Athens* (424 projects) include other participants from Attiki. The percentage of the participants from the rest of Greece is smaller, with the significant presence of Kentriki Makedonia (5%).

Most of the 79 projects with coordinator located in *Thessaloniki* have participants from Attiki (23%). Significant is also the presence of participants from Thessaloniki (15%), too.

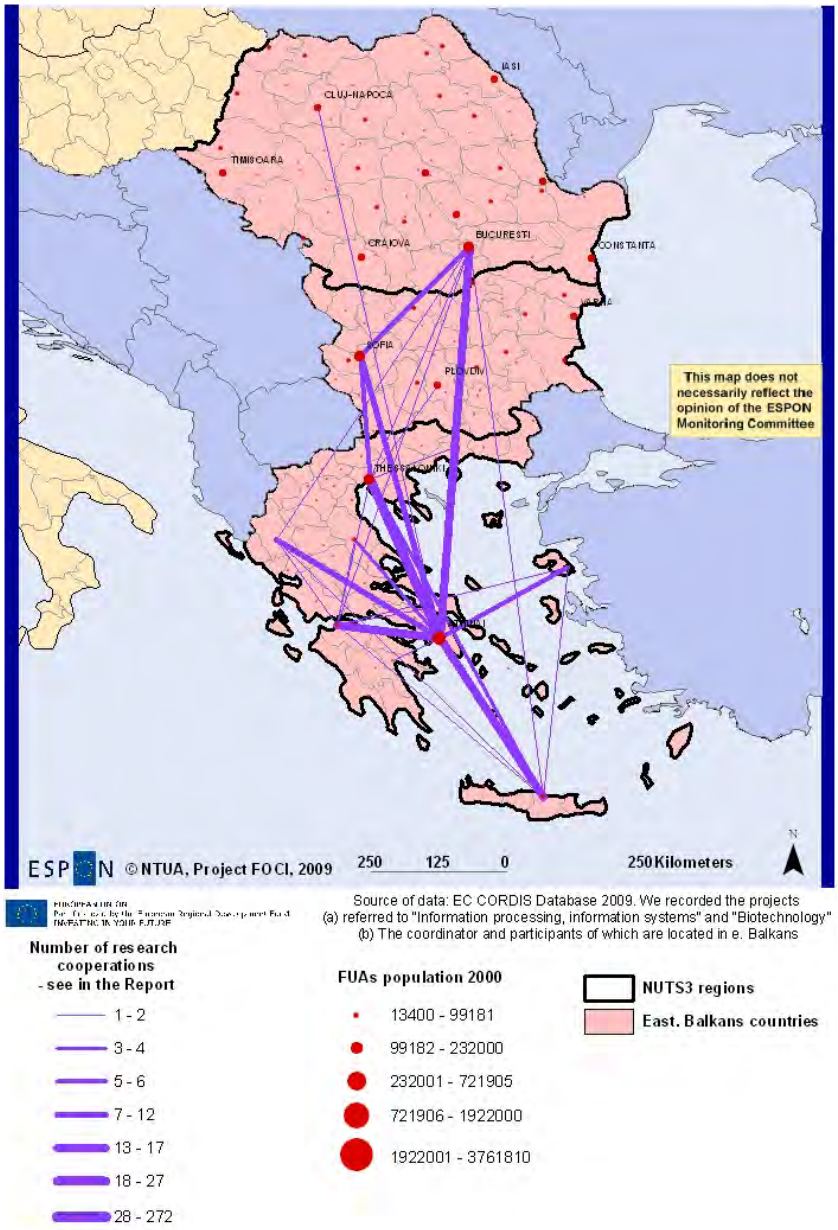


Figure 6. Polycentric cooperation analysis at transnational / national levels: *selected CORDIS research projects cooperation in Eastern Balkans*

- In Bulgaria:

The coordinators of the majority of the projects (13 out of 15 projects, 87%) are located in the capital city, Sofia. In these projects the participants are mainly from other cities of Bulgaria (for example Stara Zagora)

- In Romania:

The coordinators of most of the projects are located in Bucuresti (4 projects out of 6, 66%).

Therefore, the role of Eastern Balkans Metropolitan Areas in research networking at national level is much more important than their participation in other sectors of activities. The role of regional capitals at national level as well as their role in regional urban networks / territories was until recently very small; however, it seems that it is gradually growing.

6. Transport links at different territorial levels

The basic characteristics of the transport system of Eastern Balkans

The transport system of the area is rather weak. It is gradually reinforced through finance from CSFs and TEN- Transport.

Air transport

Flows per country

In the period 2006-2007 the total number of passengers raised very considerably in Romania -41%- while it raised moderately in Bulgaria -12%- and in Greece: 8,5%. The respective increase rates in the two first countries exceeded the EU-27 average; the raise for Greece was smaller than this average.

The air transport traffic between Greece and Romania was in 2007 much higher -275.000 passengers- compared to those between Greece and Bulgaria -118.000 passengers- as well as between Bulgaria and Romania: 31.000 passengers.

Flows per airport /city

The number of *Greek* cities having an airport -38- is much higher than in the two other EB countries –*Figure 7*- because in Greece there are many islands where air transport is very convenient. Most important airports are those of Athens and Thessalonica while 7 others are important.

There are 15 *Bulgarian* cities having an airport. However, only 5 airports: Sofia, Varna, Plovdiv, Burgas and Gorna oryachovitsa, are really important.

There are 17 airports in *Romania*, located respectively in: Bucuresti (2 airports), Timisoara, Cluj Napoca, Sibiu, Iasi, Arad, Bacau, Constantza, Targu Mures and Baia Mare.

The airports of Romania and Bulgaria present very important raise of the traffic of passengers in the interval 2006-2007 (source: Air Passenger Transport in Europe 2007-Eurostat) , the respective raise for the airports of Greece was smaller. Specifically, the passengers traffic raises in 3 Romanian airports were of the most important among the EU-27 airports ones: namely, the airports of Cluj-Napoca: roughly 70% raise –first place considering the increase rate, the Baneasa airport in Bucuresti: 45% raise -7th ranking and Otopeni in Bucuresti (40%).

Rail transport

The rail lines network in Romania and Bulgaria is much more developed than in Greece concerning the total length of the ;lines and the number of stations compared to Greece since these two countries had accorded much higher priority to the development of the rail transport than to the road transport during the socialist period.

Cities networking through the transport system

Air transport

(a) A first set of data were gathered from the Transtools package of projects geo-database (2009). We used as main indicator for the air transport of passengers, the *annual number of flights from airport to airport.*
(b) We, also, used *data resulted from our own research* in order to check the validity of the Transtools respective data and expand them to cover some additional airports.
We proceeded in two steps:
- First, we recorded through specific Web software that we have created, the travel schedules of flights from the "expedia.com" site. The recording of the results was done for a specific day (9/9/2009) and includes all flights, direct and no direct. Then we calculated the daily numbers of flights and estimated the respective annual numbers of flights.

From the relevant data we concluded the following:
(a) Linkages between the EB area and the rest of Europe
Significant is the flow between Athens and the rest of Europe: to London (3185 ann. departures), to Rome (2.581 ann. depart.) and to Paris (2.565 ann. depart).
The communication between Athens and other European countries is mainly realized through the airport of Athens and in a much smaller extent through the other airports (for example, Athens- Vienna 698 ann. depart. while Thessaloniki- Vienna 434 ann. depart.).
(b) Linkages inside the EB area
- There is strong air transport linkage between the airports of Athens and, much less, of Thessaloniki and those of Sofia and Bucuresti *–see Figure 7.*
According to additional data, the number of the relevant annual flights has increased significantly during the last years.
The communication with the rest of the EB area is realized mainly through Athens: the most important flow is to Bucuresti OTP (1800 ann. depart, according to our own calculations) while the flow to Sofia is less important (799 ann. dep). The linkages with other cities of Romania and Bulgaria are realized, mainly, with intermediate stops.
Concerning the linkages between Athens and other cities of Romania, there are data resulting from our research: Athens-Timisoara: 11 non direct flights per day and Athens-Iasi: 5 non direct flights per day.
There are, also, flights, mainly with intermediate sops, to some of the largest cities of Bulgaria and Romania. It should be noted that the recently constructed airport of Athens consists the most important air transport node in the Balkan region.
(c) Linkages inside each one of the three EB countries (national / regional level)
- In Bulgaria
The flows from Sofia to other airports of Bulgaria appear limited, for example from and to Varna only 1flight per day.
- In Romania
The flows from Bucuresti to other airports of Romania are more extended: for example from and to Timisoara 4 flights per day, from and to Iasi 4 flights per day.
- In Greece

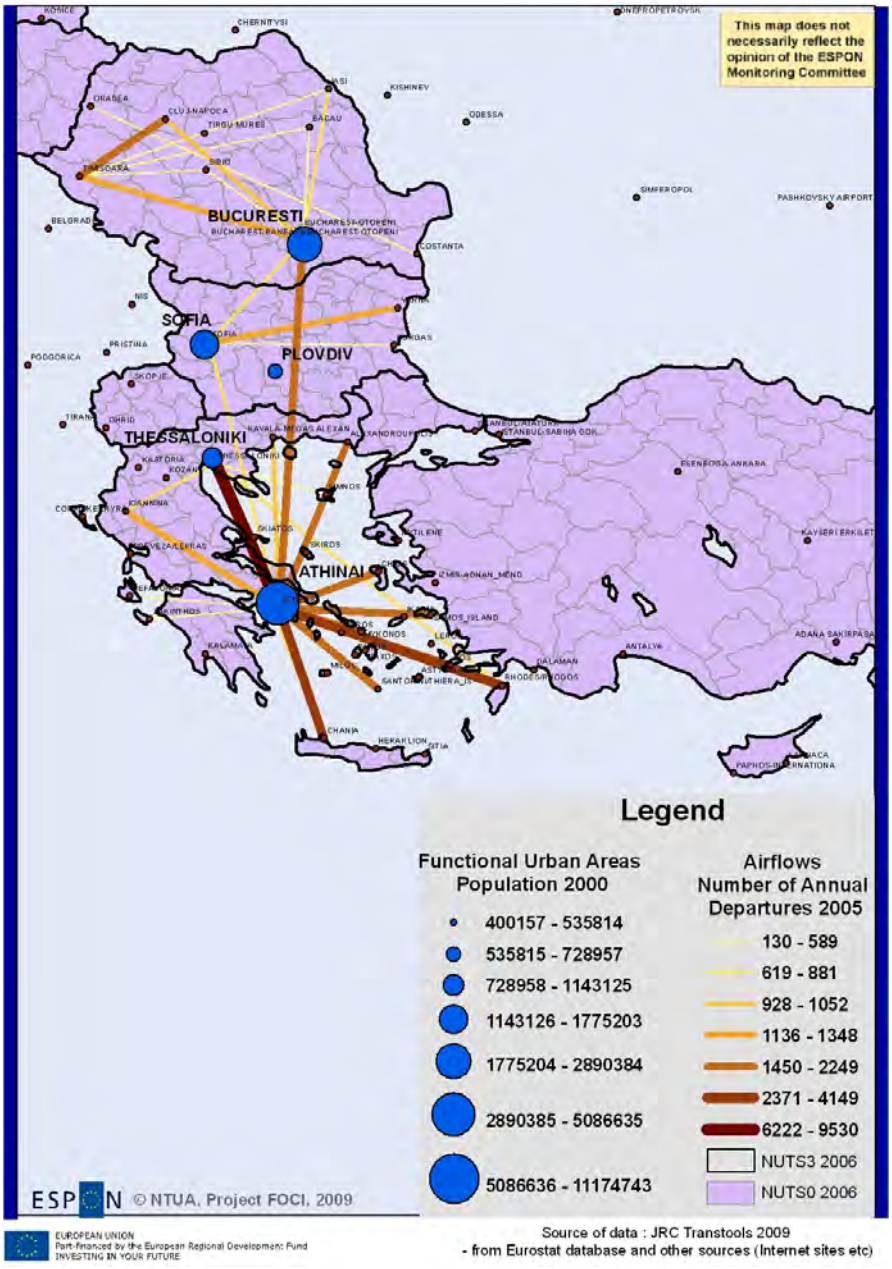


Figure 7. Air travel flows in the EB area: Numbers of Annual departures 2005

According to our research, the strongest linkages are between Athens and the rest of Greece and, mainly, from Athens to Thessaloniki (19 direct flights per day), to Kriti (Herakleion 14 flights, Chania 9 flights), to Dodekanisos (Rhodos 11 flights) and to Kyklades (Santorini 7 flights)

Rail transport

We recorded the data on the daily numbers of rail trips among the main Bulgarian and Romanian cities from the official sites of rail transport of these two countries.
A similar work was done for Greece using data of the Rail transport Organisation of Grrece – see in detail in the Chapter 3 on Greece / Athens.
This work is used in the definition of the “regional territories” of the 3 EB countries.

7. Conclusions for the polycentric integration in the Eastern Balkans at trans-national and national / regional levels

Our goal was to examine the higher level polycentric relationships in the Eastern Balkans focusing on the trans-national ones. Further on, we made the hypothesis that the Eastern Balkans urban system acts as an accelerator of polycentric territorial integration in the entire Eastern Balkans area.

We could conclude, based on the "attribute data" analysis and even more on the economic networking through the cities one, the following:

- The economic networking has progressed very fast from the beginning of '90s and it is accelerated before and even more after the accession of Bulgaria and Romania in the EU (2007).

- The economic networking among cities has most progressed in the case of the three capitals: Athens, Sofia and Bucuresti: the headquarters of the majority of Greek companies that have invested in the 2 other countries have been installed in the capitals, the research networking concerns mainly the capitals and air transport flows are much higher among the three capitals.

- During the decade of 2000, economic relationships among the second order cities have been intensified. This concerns: (a) the expansion of Greek banking and commerce units in second order cities (regional capitals) of Bulgaria and Romania (and even –in as smaller extent- in third order cities). This movement is going partly through the headquarters of the respective companies installed in Sofia and Bucuresti (b) the intensification of the research relationships among second order cities (mainly regional capitals) of the three countries [to be further checked].

- In more general, the fast growing territorial integration in the EB area is guided mainly by the intensification of the networking among the three capitals and secondly (and more recently) by the intensification of the relationships among the respective regional capitals. The urban network of the three capital cities of the respective countries is functionally "more mono-centric" as the power centre of the respective "trans-national" companies remains in Greece; however as, according to the relevant documentation, the "local" Bulgarian and Romanian branches of Greek companies are expended and acquire a certain degree of autonomy.

Bibliography- Sources

See in the Part 1 of the section of the ESPON FOCI Scientific report on "Opportunities through polycentric cooperation".

Annex

List of cities included in each "regional" urban system / territory of Bulgaria, Romania and Greece.

In Bulgaria:
Burgas territory*:* **Burgas**, Sliven
Plovdiv territory: Plovdiv, Karlovo, Pazardzhik, Asenovgrad
Ruse territory: Razgrad, **Ruse**, Veliko Tarnovo
Sofia territory: Blagoevgrad, Kyustendil, Lovech, Montana, Pernik, Petrich, Pleven, **Sofia,** Vidin,Vraca.
Stara Zagora territory*:* **Stara Zagora,** Dimitrovgrad, Gabrovo, Kazanlak, Kardzhali, Haskovo, Yambol
Varna territory*:* Shumen, Silistra, Dobrich, **Varna,** Targovishte, Vraca

In Romania:
Bacau territory: Bacau, Onesti, Piatra, Neamt
Brasov territory: **Brasov,** Codlea, Miercurea-Ciuc,Odorheiu Secuiesc, Sacele, Sfintu Gheorghe
Bucuresti territory: Bucuresti, Buzau, Calarasi, Cimpina, Ploiesti, Slobozia, Tirgoviste, Alexandria,Giurgiu,Voluntari
Cluj Napoca territory: Baia Mare, Bistrita, **Cluj-Napoca,** Tirgu Mures, Turda, Zalau
Constanta territory: Tulcea, **Constanta,** Mangalia
Craiova territory: Bals, **Craiova,** Slatina, Tirgu Jiu, Drobeta-Turnu Severi
Galati territory: Braila, Focsani, **Galati**
Iasi territory: Birlad, Botosani, **Iasi,** Roman, Suceava, Vaslui
Oradea territory: Oradea, Satu Mare
Pitesti territory: Cimpulung, **Pitesti,** Rimnicu Vilcea, Mioveni
Sibiu territory: Alba Iulia, Blaj, Deva, Hunedoara
Medias, Petroseni, **Sibiu**
Timisoara territory: Arad, Lugoj, Resita, **Timisoara**

In Greece:
Achaia territory: Agrinio, Aigio, Amaliada, Kalamata, **Patras,** Pirgos,
Attiki territory: Argos, **Athens,** Khalkis, Korinthos, Lamia, Levadia, Thiva, Tripolis.
Ioannina territory: Arta, Corfu and Ioannina
Irakleio territory: Ierapetra, Chania, Irakleio and Rethymno. Irakleio is the primary city.
Kavala territory: Alexandroupolis, Drama, Kavala, Komotini, Orestiada, Serres and Xanthi.
Larisa territory: Karditsa, Larisa, Trikala and Volos with
Thessaloniki territory: Edhessa, Giannitsa, Katerini, Kilkis, Kozani, Naousa, Ptolemaida, Thessaloniki and Veroia.

Part C. The regional urban systems' case studies

NTUA team: Coordination, synthesis of the results of the case studies, case studies of Munich and Athens urban systems

EU-polis team: Case study of Piedmont, participation in the synthesis of the results

OTB team: Case study of Randstad, participation in the synthesis of the results

Abbreviations

AIT (Italy): Area of Territorial Integration
PIA: Potential Integration Area
APS: Advanced Producer Services
PTI: Programmes of Territorial Integration
FUA: Functional Urban Area
US: Urban System
GDP: Gross Domestic Product
HT: High Technology

1. Introduction and methodological issues

The case studies on "polycentricity and cooperation" aim to improve the knowledge acquired from the analyses on the development and interactions concerning all the European Functional Urban Areas (FUAs)[71].
In the ESPON FOCI project, different types of case studies will provide complementary insights of the European regional polycentricity. Case studies should also reflect the very important disparities in "Polycentric Potentials" areas among North-Western Europe and Southern and Eastern Europe.

In light of the extreme scale dependence of the notion of polycentricity and the need to understand the interaction between scales, but also the national governance and planning structures, we used a multi-scalar approach to case studies.
- We selected at first a large transnational area: Eastern Balkans[72]
- Four other case studies will address the **"regional polycentricity" level**. Their selection has been made on the basis of the results for the entire ESPON space –see in section 2 in next. The cases of this type are: the Randstad (Netherlands), the Piedmont urban system (Italy), the urban system of Munich (Germany) and the urban system of Athens (Greece).

The case studies should address cooperation and complementarities both at the higher level and the lower level of territorial relationships[73].
Specifically, these case studies examine **in more depth two issues**:

[71] See in the section of the FOCI Scientific Report: "Opportunities through "polycentric" cooperation"– Part 1
[72] See details for the characteristics of this case in the section of the FOCI Scientific Report: "Opportunities through "polycentric" cooperation"– Part2: Eastern Balkans area case study.
[73] See in previously mentioned Report – Part 1.

(a) The interactions among the cities of specific urban networks focusing on the intra and inter-firms flows and the transport - communication flows
(b) The initiatives of territorial cooperation developed by the cities nodes of each urban system either among them or with external territorial authorities.

We present in next the results of the comparison among the four case studies.
This report has been created on the basis of the respective working papers prepared by the OTB team (case of Randstad), EU-polis (case of Piedmont) and NTUA team (cases of Athens and Munich). In some parts we used the wording of the respective papers.

The **main research questions** for the case studies are the following:

- Which development opportunities for cooperation exist between the cities of the case study urban system? Which links between cities are already there?

- Which functionalities of these cities represent comparative advantages to explore?

- Which complementarities are to be developed in order to reinforce competitiveness and cohesion and with which territorial entities?

- Which specific cooperation arrangements could have positive impacts to the urban system itself as well as to the wider national and transnational urban networks in which it is embedded?

It is important to stress here that a considerable insufficiency of the majority of the territorial cooperation initiatives developed at different European contexts is that they do not correspond enough to the opportunities resulting from the specific territorial development trends which take place in each context.

Thus here we insist, in the first sections of the report, in the analysis of the territorial development trends in order to be able to evaluate the success of the cooperation initiatives on the base of the degree of their concordance with the respective development trends.

In the last sections of the report, dealing with territorial cooperation, we will try to evaluate the degree of success of these cooperations in order to provide conclusions useful for policy recommendations. As the definition of the criteria of evaluation is both the most crucial and the most difficult methodological issue we will discuss it in section 8.1

2. Selection of the case studies

The number of types of the European space[74] urban systems approached from the scope of polycentricity is high. However, the number of case studies in the frame of the project could not be great taking into account the available resources. Therefore, for the selection of case studies we did not use a statistical method of selection of a sample of urban systems. We selected four cases that represent different contexts of development as well as different types of morphological and functional polycentricity.

We selected the urban system of the region of **Randstad** (Netherlands) and the urban systems of the **Piedmont** region (Italy), **Munich** (Germany) and **Athens** (Greece).

[74] The ESPON FOCI project refers to the “ESPON space” including the territory of the EU-27 member countries plus Norway, Switzerland, Iceland and Lichtenstain.

Regarding their development context, the three of them -Randstad, Munich urban system, Piedmont urban system- are located in or close to the "Pentagon", the most developed part of Europe[75]. Randstad and Munich urban system present higher competitiveness based, at a great extent, on the services sector. The Piedmont urban system presents a little less competitiveness and includes a strong industrial sector. Athens urban system, finally, constitutes part of the European "South" (in distinction with the "North" where Randstad and Munich belong).

Concerning morphological polycentricity, Athens and Munich urban systems are clearly mono-centric, while the Piedmont urban system presents relatively smaller degree of mono-centricity and Randstad is highly polycentric.

3. The four Urban Systems

The case studies' Urban Systems (US) include the following ESPON FUAs –*see Figures 1 to 4 for each urban system and in the synthetic Figure 25 in Annex*.

[75] It is delimited by: London, Paris, Milan, Munich and Hamburg.

- **Randstad**: Amsterdam, Rotterdam, Den Haag, Utrecht, Almere, Lelystad and Hoorn

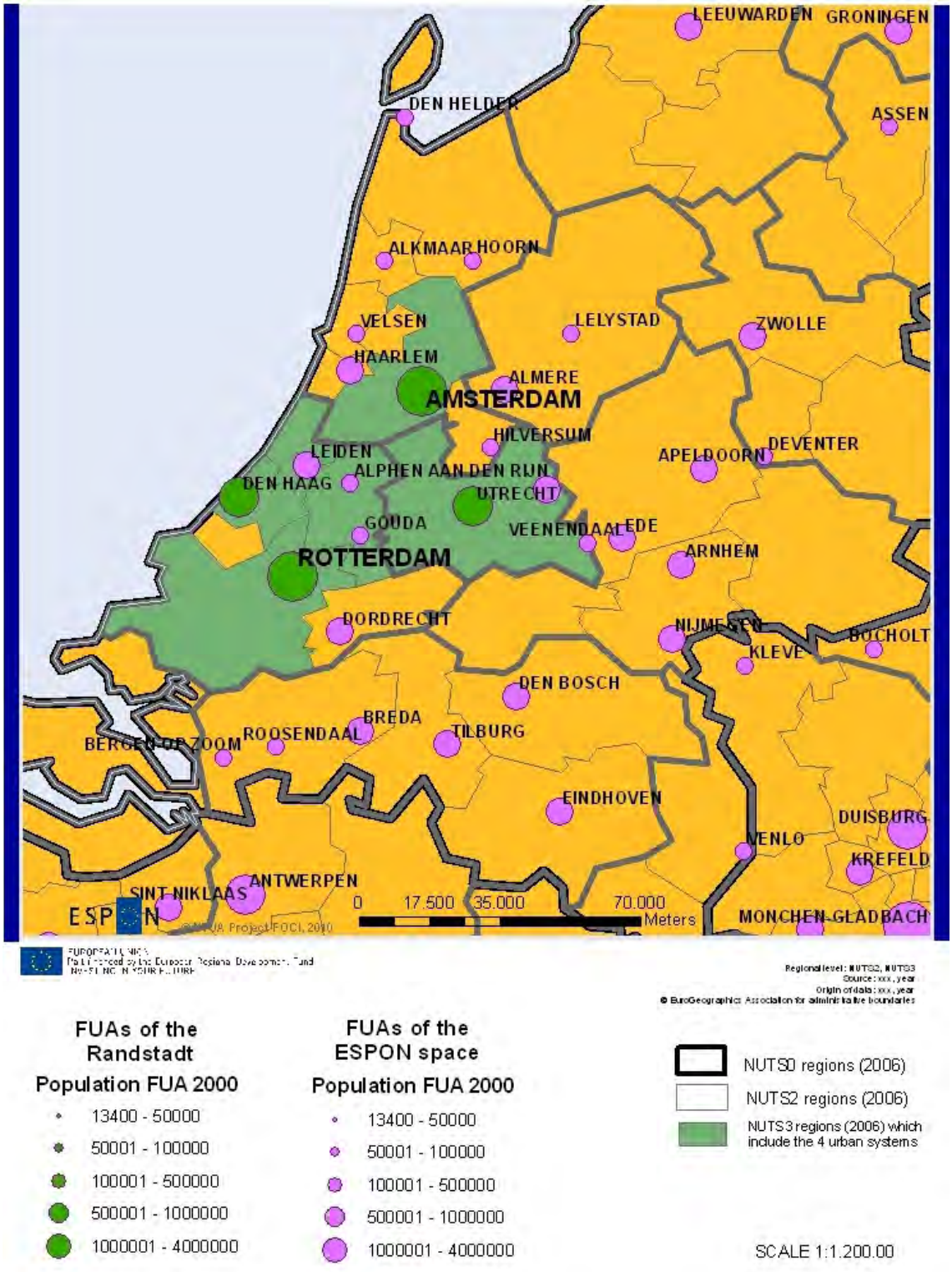


Figure 1. NUTS2 and NUTS3 units of the Randstad

- **Munich US:** Munich, Ingolstadt, Rosenheim, Freising, Garmisch- Partenkirch, Landshut and Deggendorf[76].

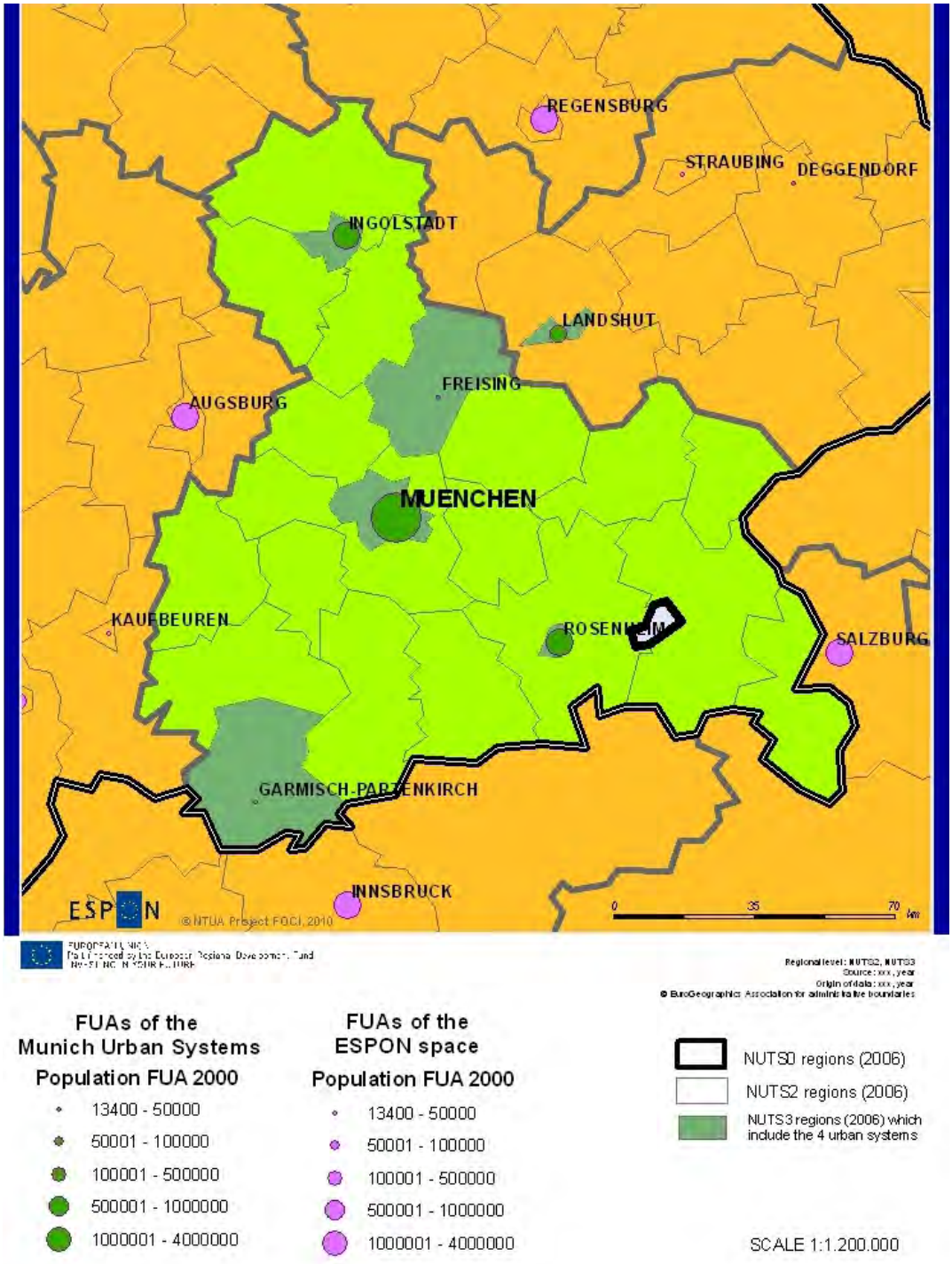


Figure 2. NUTS2 and NUTS3 units of the Munich urban systems

[76] Goebel et al (2007) have included in the "Mega-City Region of Munich" also the FUAs of Regebsburg, Augsburg and Kaufbeuren; however, the definition of "Mega-City Regions" differs from that of "regional urban systems" that we have used here –see in the Part 1 of the section of the ESPON FOCI Scientific report on "Opportunities through polycentric cooperation". In some parts in next we also took into account Regebsburg, Augsburg and Kaufbeuren

- **Piedmont US**: Torino, Carmagnola, Pinerolo, Chieri, Avigliana, Cirie, Ivrea, Cuneo, Fossano, Asti, Casale Monferato and Aosta.

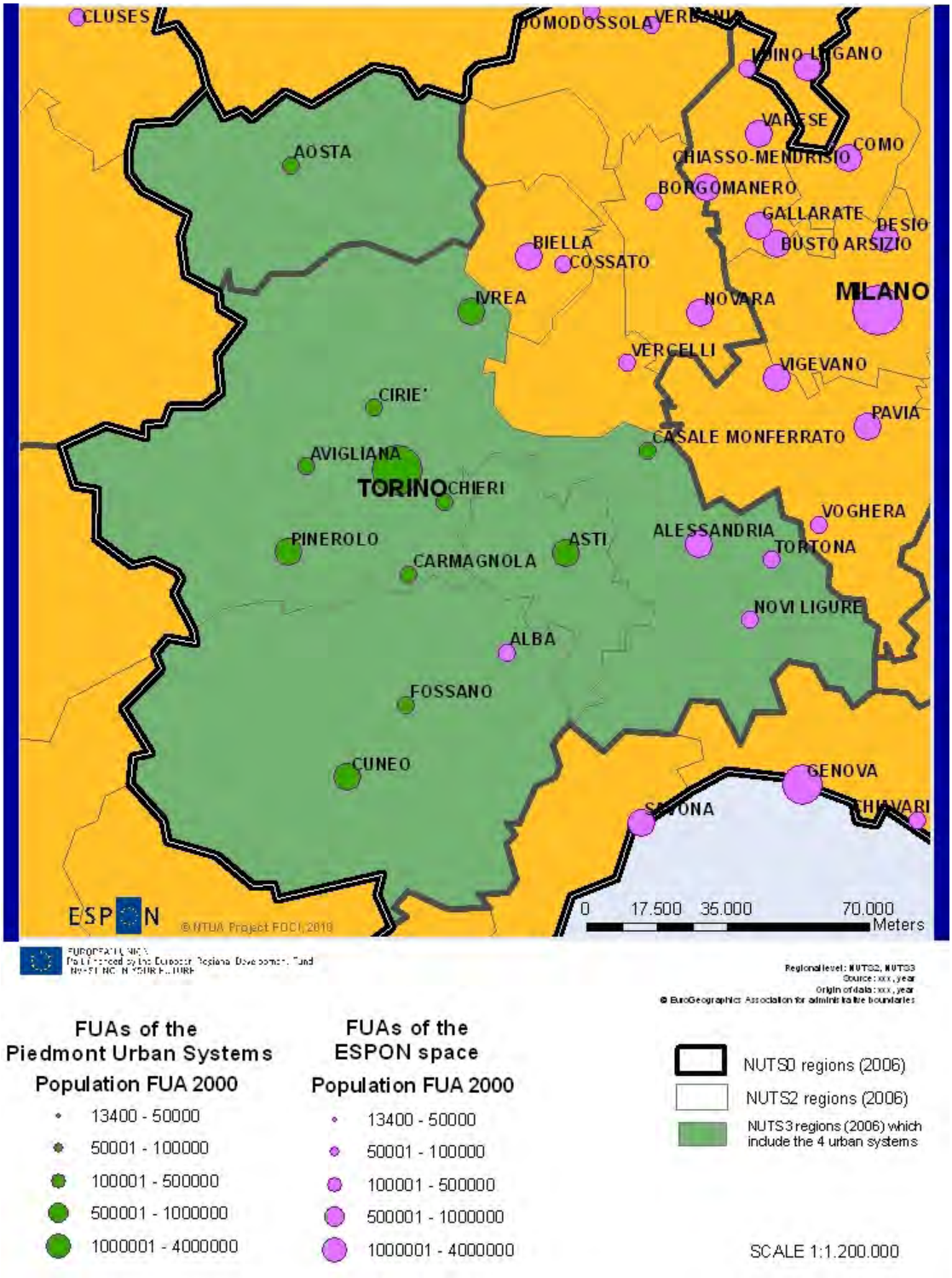


Figure 3. NUTS2 and NUTS3 units of the Piedmont urban systems

- **Athens US:** Athens, Thiva, Levadhia, Khalkis, Lamia, Argos, Tripolis and Korinthos.

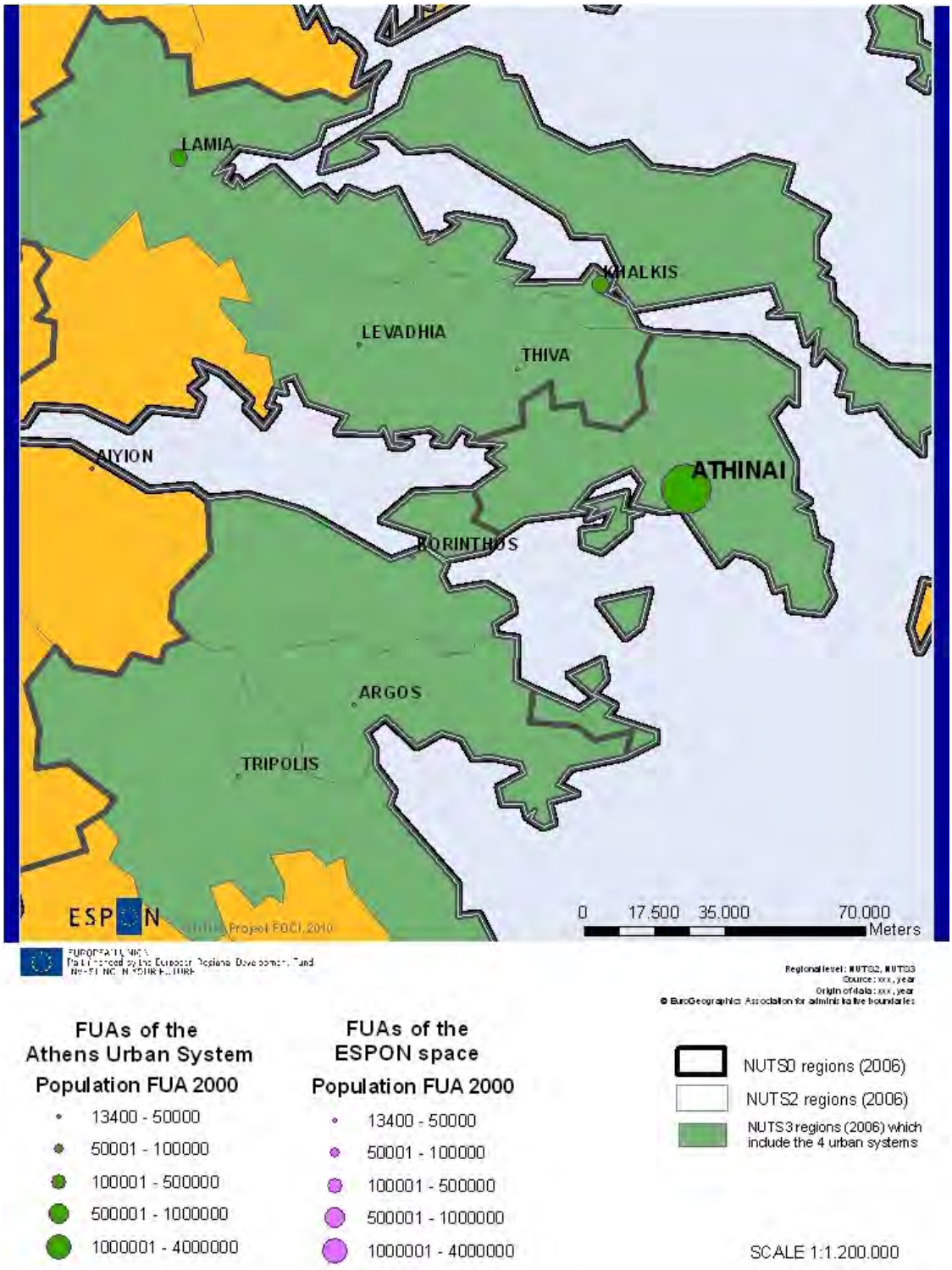


Figure 4. NUTS2 and NUTS3 units of the Athens urban systems

4. Population potential and morphological polycentricity

First we should mention that the population of the FUAs of the entire urban systems ranges (in 2000) from 4,2 and 4,0 millions for the cases of Randstad and Athens to 2,7 an 2,3 millions for Piedmont and Munich.

The share of the population of the first city (FUA) in the total population of the urban system (the total of the FUAs belonging to this last) is a first indication of the degree of polycentricity of these systems.
We used for the calculation, data on the population 2000 of the respective FUAs (from the ESPON 1.1.1 FUAs database).

In **Randstad**, only **32%** of the urban system population (1.378.900 out of 4.239.800 persons) belongs to the first city: Amsterdam –Graphs 4.1 and 4.2.

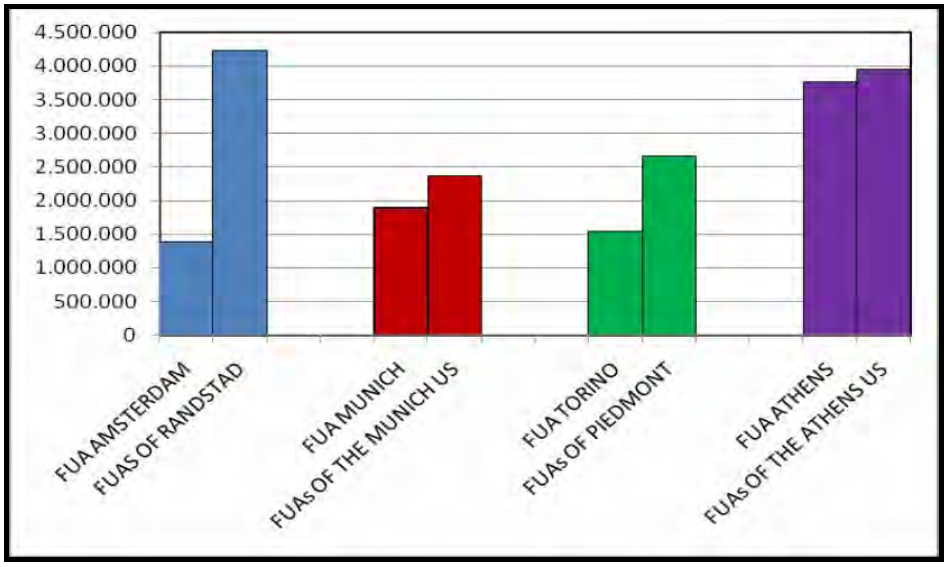


Figure 5. Population 2000 of the primary FUAs and the total FUAs of each urban system

Source of data: ESPON 1.1.1.Population 2000 FUAs

In **Munich urban system**, the city (FUA) of Munich[77], has 1.893.700 persons population, the **80%** of the system's total population (2.337.900).

In **Piedmont,** the first city: Torino concentrates **58 %** (1.545.200 pers.) of the total population of the urban system (2.660.300 inhabitants).

In **Athens urban system**: Athens[78] (Attiki), the first city of the urban system, concentrates the **95%** (3.761.800) of the total population of the system (3.955.500).

The degrees of morphological polycentricity differ substantially.

The shares of the first city's population to the total population range from 95% for Athens and 80% for Munich (very low degree of polycentricity) to 58% for Piedmont (intermediate case) and only 32% for Amsterdam (very high degree of morphological polycentricity).

[77] "Muenchen» in the ESPON 1.1.1 FUAs database
[78] «Athinai» in the ESPON 1.1.1 FUAs database

Further on, as for the *variation index* of the populations of the FUAs, Randstad presents the lower value: 2,95[79]; the value for Piedmont is merely higher: 2,98; the respective one for Munich US is higher: 4,7 and the value for Athens US is much higher: 19,9.

Also, the standard deviation from the average population is clearly lower in Randstad than Piedmont and the Munich US and even more from the Athens US – see in Fig.7.

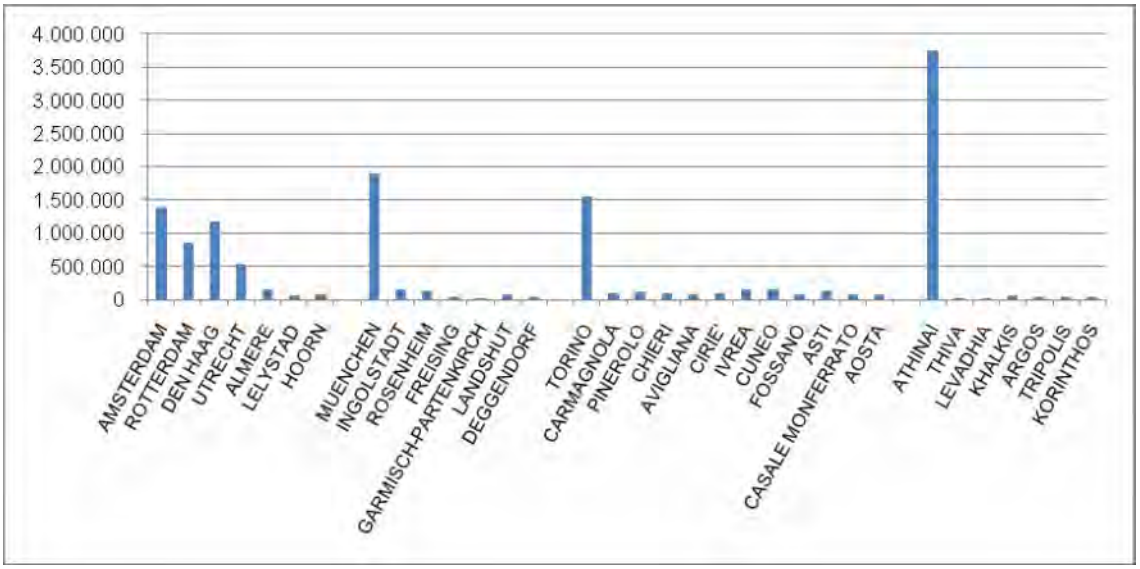


Figure 6. Population 2000 of the all FUAs of the urban systems

Source of data: ESPON 1.1.1.Population 2000 FUAs, analysis of data: NTUA team

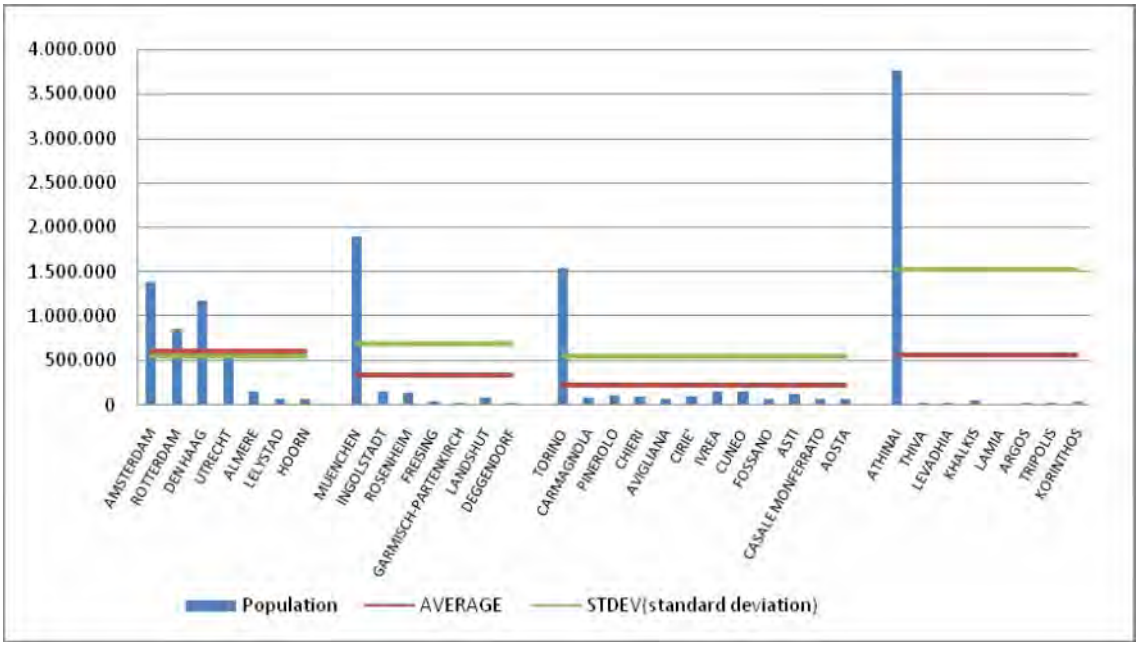


Figure 7. Average population of the FUAs and standard deviation per urban system

Source of data: Eurostat, analysis of data: NTUA team

[79] X 10^{11}

The population of the territory in which each urban system belongs is obviously greater than the total population of the cities (FUAs) of the urban system, as population of small cities and the countryside is also included.

The population of the 4 territories, on the basis of the populations of the respective NUTS3 units, differed in 2007 very substantially: it amounted in 5,3 millions for Randstad, 1,9 for the Munich US, 3,6 for Piedmont and 4,9 for Athens US – Graph CS 4.4.

During the *recent period* **2000-2007**, the population of the city (FUA) of Munich increased faster than the other primary cities: by 6,8% (4,4% for Torino, 3,9% for Amsterdam and 3,8% for Athens).

The population change rate of the primary city is greater than that of the respective territory in the cases of Munich US, Piedmont and Athens US and lower in the case of Randstad.

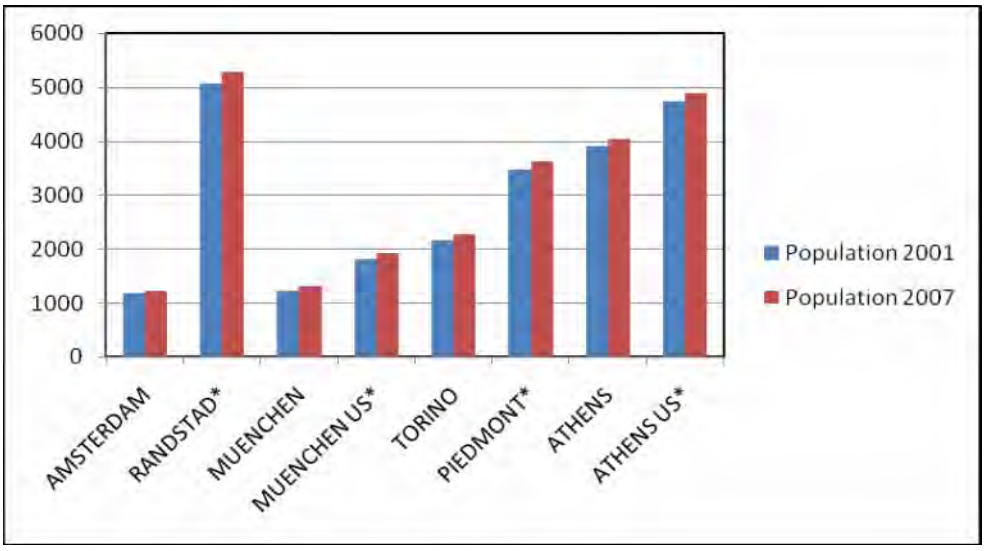


Figure 8. Population 2001 and 2007 of the first cities and the urban systems – on the basis of NUTS3 units

- Population of the NUTS3 units in which each FUA and each urban system belong

Source of data: Eurostat

5. Economic performance and economic profiles

We refer in the following in some basic components of the driving forces of the territorial development in the four urban systems.

We use GDP as basic reference of performance and we give emphasis on the economic profiles of the four systems and even more on the structure and the networking of the more dynamic activities from the urban system to the European territorial levels.

5.1. GDP as indication of performance

Regarding ***GDP per inhabitant*** (in PPS) in 2007, as a first indication of performance, the cities[80] of Amsterdam and Munich (on the basis of the respective NUTS3 units[81]) stand out with 49.900 and 55.100, respectively –Graph 5.1- while Athens and Torino[82] have considerably lower GDP / inh.: 31.900 and 28.500, respectively.

Munich possesses double GDP/ inhabitant compared to the national average while the GDP / inhabitant of Amsterdam exceeds the national average by 50%.

In the **Munich urban system**, one city (Ingolstadt) exceeds in 2007 the GDP / inhabitant of Munich while the rest cities have clearly lower GDP/Inh.

In **Randstad**, all the other cities (including Rotterdam, Den Haag and Utrecht) have clearly lower GDP / inhabitant compared to Amsterdam.

In **Piedmon**t, Torino is part of a NUTS3 unit which includes six other cities. This NUTS3 unit possesses GDP / inhabitant slightly higher than the national average (28.500 against 25.800). The rest NUTS 3 units which include FUAs of Piedmont have GDP / inhabitant that are similar to the one of Torino.

In the **Athens urban system**, Athens (NUTS3 unit: Attiki) has GDP / inhabitant which clearly exceeds the national average (31.900 against 23.100). The rest NUTS3 units which include FUAs have clearly lower per capita GDP compared to Athens.

During the period **2001-2007**, *Athens (Attica) presented a very high GDP/inh. rate change:* 45%, much greater than both the rest NUTS3 units of the US and the national average.

Amsterdam presents a lower rate (27%) which does not differ substantially from that of the rest Randstad and the country.

Munich has an even lower rate (18%) which is lower than the national average (25%). Ingolstadt (44%) as well as three other cities of the Munich US present much higher increase rate.

Torino[83] present a very law increase rate: 6,3% which is much lower than both the EU27 (26%) and the national average (11%). NUTS3 units of Cuneo – Fossano, Asti and Casale monferrato have higher rates than Torino.

[80] In the following, where we mention the "cities" of the specific urban systems we refer to the respective FUAs.
[81] We take into account GDP/inh. of the NUTS3 unit in which each FUA belong
[82] In the NUTS3 unit in which Torino FUA belong, are also included the FUAs of Carmagnola, Pinerolo, Chieri, Avigliana, Cirie' and Ivrea.
[83] On the basis of the respective NUTS3 unit

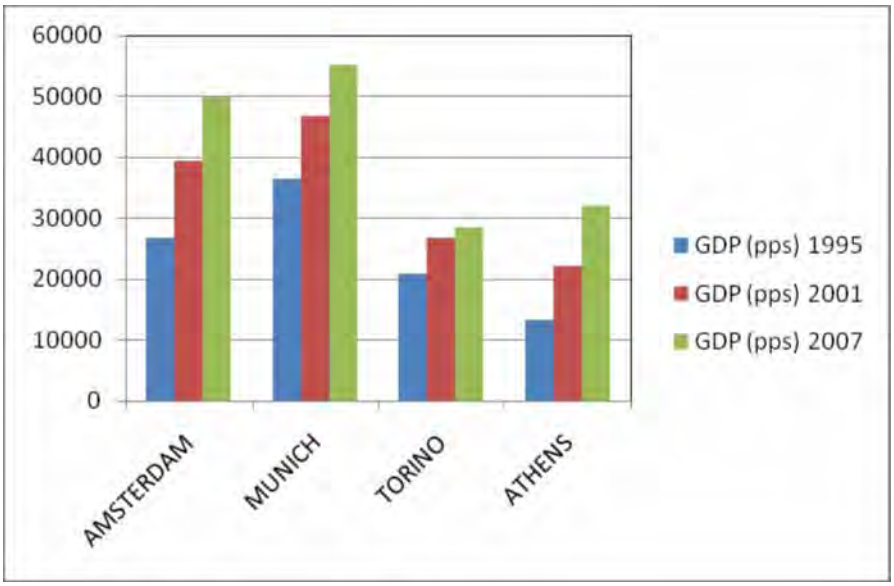


Figure 9. GDP PPS* 1995-2007 per inhabitant of the territories of the four urban systems at NUTS3 level*

* GDP/inh. of the NUTS3 unit in which each of the 4 cities belong

	AMSTERDAM	MUNICH	TORINO	ATHENS
1995	26700	36400	20900	13300
2001	39400	46700	26800	22000
2007	**49900**	**55100**	**28500**	**31900**

*at current market prices
Source of data: Eurostat / Statistics database / General and regional statistics 2010

5.2. Economic profiles as indications of performance and functional integration of the urban system

In this section we have first used the relevant literature and the four respective working papers.
We have further exploited data of Eurostat on the employment (2001) per groups of economic branches and the ORBIS database of subsidiaries of international firms in order to further put the comparison under a common denominator. See in detail for the description of these datasets in the respective report for the entire ESPON space.

> In brief: data of the ORBIS Database which includes 600.000 subsidiaries of the 3.000 greater companies worldwide. ORBIS contains data on the location of each subsidiary and the respective numbers of subsidiaries and turnover for the recent years (2006 to 2010, according to the case). It also informs on the link among the subsidiary and the "mother" company; in more detail it refers to the city in which each subsidiary is located and the city where are located the headquarters of the "mother" companies (shareholders, "actionnaires"). See in more detail in the in Part 1 of the section of the ESPON FOCI Scientific report on "Opportunities through polycentric cooperation".

The broad picture of the economic profiles of the four urban systems in relation with their competitiveness is as following:

Randstad and Munich urban system present very high competitiveness based, at a great extent, on high internationalised services sectors.

Specifically, in **Randstad** as for the sectoral specialisations of cities in just service sector activities in 2002 (Meijers, Romein, Zonneveld, 2010):

The three largest Randstad cities -Amsterdam, Rotterdam and The Hague- had relatively distinct profiles in commercial and public services. Utrecht had a more general and average profile. The Hague, which is the seat of the Dutch government, is very much associated with public administration and relatively more extra-territorial organizations and bodies are present there. Given the fact that Rotterdam's harbour is one of the largest in the world, the city holds a strong position in water transport and supporting and auxiliary transport activities. Other specializations include sewage and refuse disposal, and construction. Amsterdam has a relatively dominant position in the commercial services sector, in particular in financial intermediation, computers and related activities, and publishing and printing. Moreover, leisure seems to be more important for Amsterdam given the strong presence of the hotels and restaurants and recreation, culture and sports sectors. Utrecht's profile in service activities resembles Amsterdam's the most. Moreover, trade and business activities as well as education are activities strongly present in this city. In general, it seems that the three largest cities in the Randstad have different roles in providing services to companies and citizens, each of them specializing in either commercial services (Amsterdam), transportation (Rotterdam), or public administration (The Hague) (Meijers, 2007).

Munich has the strongest economy of any German city. It is considered a global city and holds the headquarters of many of the top worldwide companies. It is also a centre for biotechnology, software and other service industries. It has significance as a financial centre specifically as home of insurance companies.

According to Goebel et al (2007), "it seems that Munich plays the role of the international knowledge hub whereas the other functional urban areas of the Mega-City Region of Munich (a little more extended than the US of Munich as it is defined here –see in section 3) are contributing in various ways to the distinctive character the Mega-City Region".

The most interesting aspect of the division of labour in the urban system of Munich is the difference of the location pattern of the Advanced Producer Services firms from this of the High Technology (HT) ones. According to Goebel et al (2007), the dominance of the FUA of Munich in the entire Knowledge based economy (APS, HP and Research) is obvious -see in Figure 5.2.1. "The APS-Sector is quite strong in Munich (23,1%) and Freising (31 %), while the minimum percentage occurs in Landshut (10 %). High-tech branches have a relative high proportion in Ingolstadt (31%), Regensburg (26%) and Augsburg (21%), not so much in Munich (14%) or Freising (11%)".

We will return to this issue in next.

Piedmont presents a relatively lower competitiveness. It includes a strong industrial sector which is restructured during the last decades. Its service sector is growing and it partly replaces losses in labour force of the industrial sector.

Regarding specifically the changes in the performance and the sectoral profile of Piedmont region during the recent recession phase:

The performance change of Piedmont region is negative, with a higher decrease of wealth production and productivity, closely related to the crisis of automotive and textile industry. This decrease has been accompanied by shrinkage in employment in the manufacturing sectors, especially in the automotive one and in some industrial districts, notably in the textile sector, which continue to represent the cornerstones of the regional economy. This reduction has been compensated by a rise in services employment, particularly in services for business; however, this positive dynamics didn't manage to balance the whole increase of unemployment (+1,3% in 2009).

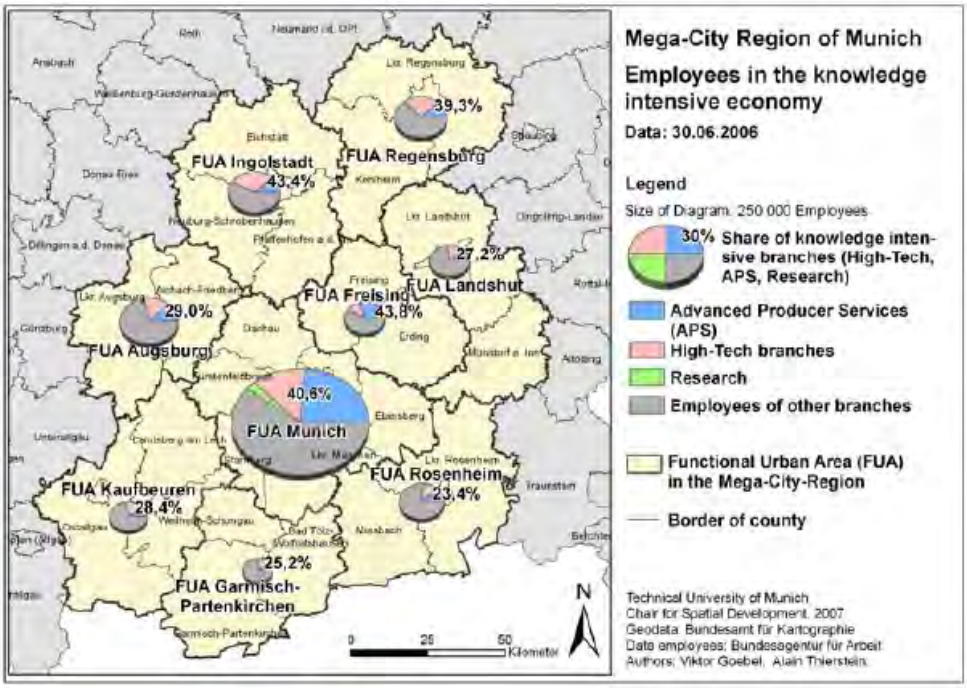


Figure 10. Employees of the knowledge based economy in the Mega-City Region of Munich

Source: Goebel et al (2007), Source of Data: German Federal Agency of Employment

Beyond these general features, the industrial crisis is not equally occurring throughout the whole Piedmont region. While some areas have been strongly affected by the crisis, some others continue to keep their economic dynamism, the decrease in growth rates notwithstanding. For instance the south-western province of Cuneo has benefitted of relevant economic development trends over the last two decades, thanks to the reinforcing of SMEs systems specialised in the agro-industrial and textile activities and the exceptional success in touristic services.

The **Athens** urban system presents a growing service sector in a comparatively low internationalised economy.

Specifically for the spatial division of labour in the urban system of Athens: the industry of the Athens basin has shrunk strongly during the three last decades; numerous middle and small industries have been moved to the eastern part of Attiki, while the industry of the three neighbour FUAs of Thivai, Korinthos and Khalkis is decreasing too. Inversely, services are growing in Athens as well as in all the cities of the Athens urban system.

The majority of the headquarters of the bigger companies are today located in the Athens basin where are also located the most important universities and research centres of the country.

The analysis of the distribution of the economy per groups of branches through Eurostat data for 2001 on the employment confirm to a considerable extent the above – see in the Graph 5.2.2 and the Table 2 in Annex. See also in Annex the List CS5.1.3 of the classification per groups of branches used in this section.

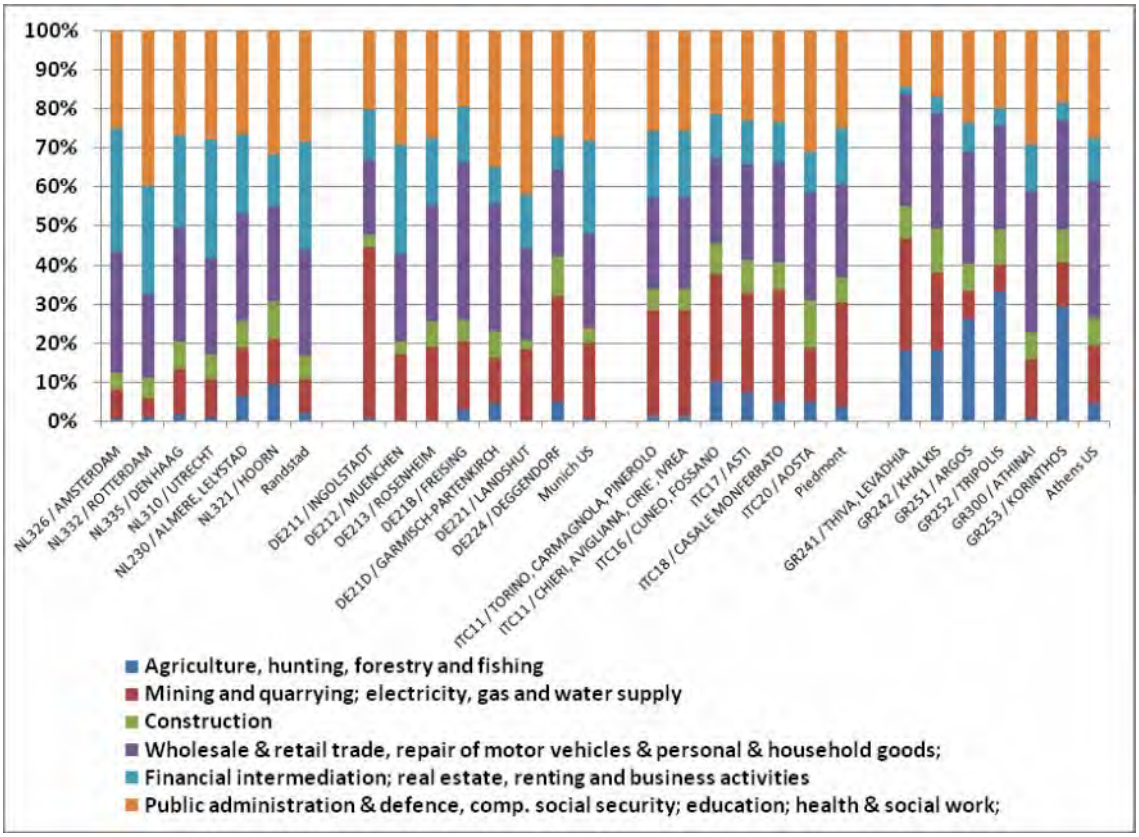


Figure 11. Employment by groups of branches, NUTS3 units and FUAs 2001 in the four US

Source of data: Eurostat, analysis of data: NTUA team

It is more interesting to examine the performance and the distribution of the economy per groups of branches per urban system according to the *number of subsidiaries in the ORBIS database.* These subsidiaries do not correspond to the entire economy of the respective four territories. However, it is obvious that these subsidiaries belong in the more modernized and more internationalised part of the economy.

The total number of ORBIS subsidiaries is much more important in Randstad –*see in Graph 5.2.3*- and in the Munich US than in Athens US and in Piedmont.

However, the performance for this criterion is even higher for Munich US and Randstad and much smaller for Piedmont and Athens, if we take into account the numbers of ORBIS subsidiaries weighted by the population 2000 of the urban systems[84].

Regarding the respective total numbers of subsidiaries and even more the per population weights for the single four primary cities (FUAs), Munich prevails; Amsterdam follows while the indexes of Torino and Athens are much smaller.

Amsterdam and Munich as well as Rotterdam and Utrecht in Randstad and Ingolstadt in Munich US present very high scores; on the contrary, other cities of Munich US and all the cities of Piedmont and Athens US present relatively very low scores.

[84] The Population in 2000 of the FUAs of each urban system as it is reported in ESPON project 1.1.1.

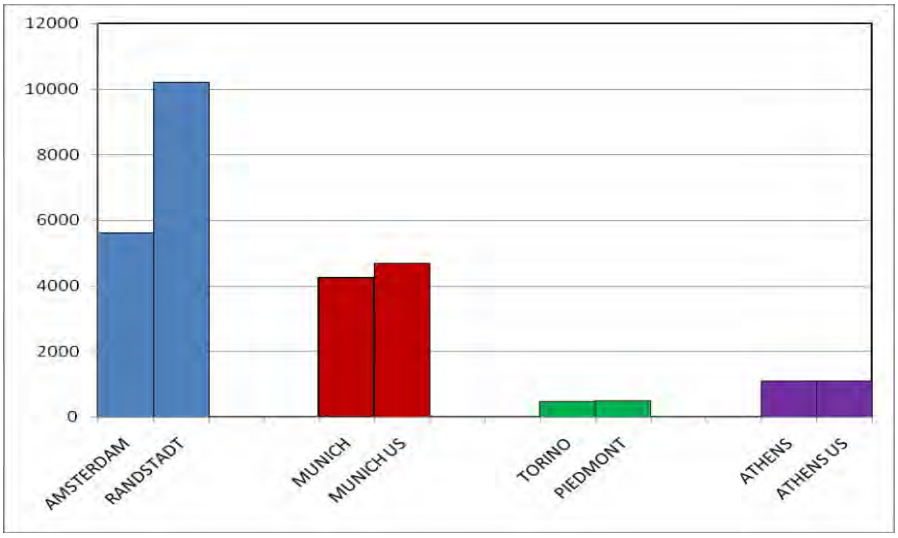


Figure 12. Number of ORBIS subsidiaries located in the first cities and the urban systems
Source of data: ORBIS database, analysis of data: NTUA team

The distribution per groups of branches as for the ORBIS subsidiaries differs substantially among the four cases.

Regarding the *Munich urban system*, in the city of Munich the group of branches of "manufacturing"[85] prevails, followed by the group of "financial / scientific / technical activities"[86]. The group of public, social and personal services has also a significant presence as well as the group of Trade-transportation[87].

Ingolstadt, Kufbeuren, Landshut and Regensburg present very important shares in manufacturing. All other cities present clearly smaller shares in public etc services than the city of Munich.

Regarding *Randstad*, the employment is distributed more equally per groups of branches: manufacturing also prevails, comparatively less than in the case of Munich US. It is followed by financial / scientific / technical activities while the share of Trade – Transportation is also considerable. Even more important is the share of the public, social and personal services.

Amsterdam has a lower participation in manufacturing and a more important presence in financial / scientific services and public, social and personal services. In these last, its share surpasses all the other cities of the urban system.

Rotterdam has much more important presence in Information – communication and financial etc and Utrecht in financial / scientific / technical activities.

The *urban system of Piedmont* presents by far higher concentration in manufacturing, followed by financial / scientific / technical activities.

While the majority of cities present the same distribution as Torino, in two cities: Cirie and Fossano, Trade - Transportation is prevailing.

Finally, in the *urban system of Athens*, manufacturing prevails, followed by financial / scientific / technical activities. The shares of Trade - Transportation and Information and communication activities are also important.

In the other cities of the urban system are present only some branches: manufacturing and financial / scientific / technical activities.

[85] Including, in detail, the NACE branches of mining, quarrying, manufacturing and Energy supply
[86] Which includes, in detail, the NACE branches of financial and insurance, real estate and professional, scientific and technical activities.
[87] In detail: Trade, Transportation and Storage.

The shares of more dynamic activities in the economy of the four urban systems explain to a considerable extent the inequalities of their competitiveness. We consider here as more dynamic activities both **the Advanced Producer Services (APS) and the High Technology (HT) branches**[88].
The fact that APS and HT branches have an important share in the economy of Randstad and the Munich US is crucial for the performance of their economies –see in more detail in next. On the contrary, these shares are clearly lower in the cases of Piedmont and the Athens urban system.

Regarding the *shares of the Advanced Producer Services (APS) in the total number of ORBIS subsidiaries*, *the four basic urban nodes of Randstad prevail by far*, *while the shares of the primary cities of the three other urban systems are clearly smaller but considerable; the shares of the rest nodes of these urban systems are very low.*

As for the shares of *High Technology branches* in the total *number of ORBIS subsidiaries*, the city of Munich is in the first place; Torino presents a high share and the shares of the four Randstad cities and Athens are low.

The shares of the total of APS and HT activities are very high for the entire urban systems of Randstad and Munich as well as for Amsterdam, Rotterdam, Munich and some other cities of the Munich US. They are comparatively low for Piedmont and even lower for the Athens US.

Concluding: In Randstad and in the Munich urban system, the services sector has a much higher participation compared to the other two urban systems (both in the total employment in 2001 and in the total number of the ORBIS subsidiaries).

Even more important is the share of the more dynamic branches (APS and HT) in Randstad and Munich (regarding numbers of ORBIS subsidiaries)

The shares of services as well as of the dynamic branches in Piedmont are comparatively (to the former urban systems) smaller and in the Athens urban system they are even smaller [to check for a second time].

The shapes of functional integration in the four urban systems differ considerably according to the results of the analysis of the per branches *spatial distribution inside the urban systems*.
The shares of services and, even more, the shares of the more dynamic branches located in two of the "first cities", Athens and Munich, are much higher than the shares in the other FUAs of the respective urban systems.
In Piedmont there is a lower degree of differentiation, while in Randstad the degree of differentiation of the economic profiles (defined on the base of the distribution of the employment in 2001 and the numbers of ORBIS subsidiaries per groups of branches) is smaller: Amsterdam distinguishes, Rotterdam and Utrecht present a quite similar profile (distribution per branches) while the economic profile of Den Haag is very different (from that of the three others).

[88] See, among other, in Theirstein et al 2008. See in the Annex the NACE Codes of the Advanced-Producer-Services (APS) and High-Tech (HT) branches which are considered in the following analysis.

6. Firms links and clustering, transport links, communting and territorial complementarities in the urban systems

6.1. Firms links and clustering

It is very important to examine if the activities of each urban system have a dominant or a dominated role in the ESPON space as (among other consequences) in the first case it is more probable that the clustering of activities is endogenous than in the second case.

Concerning ***networking and clustering inside the urban systems and from / to outside the urban systems*** of the case studies:

In the following Figures we mention the FUA where the shareholder of the subsidiary is located as "Origin" and the FUA where the subsidiary is located as "Destination"*. See also in Table in Annex.*

In Figure 17 we present the total Intensity of the firms' links (total number of links among the ORBIS subsidiaries) among FUAs in the case study areas.

FUAs of Randstad and the Munich and Piedmont **urban systems** control much more subsidiaries located outside (in other parts of the ESPON space) compared to the subsidiaries that are located in them and controlled from outside. The respective rates amount to 1,9, 1,4 and 1,4.

In the Athens urban system, the situation is opposite to what was observed in the other urban systems. There are many subsidiaries which are located in Athens and controlled from FUAs of the rest ESPON space and very few are located abroad and are controlled by Athens. The rate is very low: 0,3.

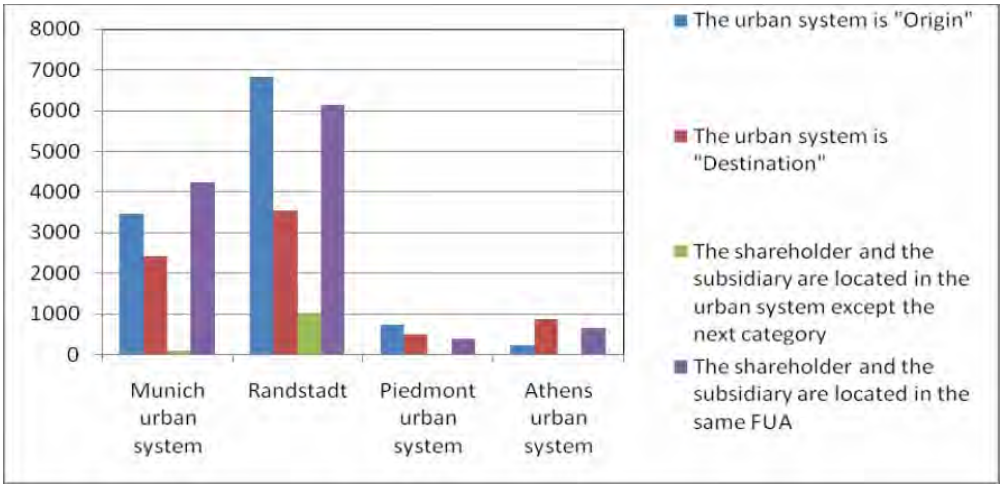


Figure 13. Number of subsidiaries corresponding to the urban systems per type of link

Source of data: ORBIS database, analysis of data: NTUA team

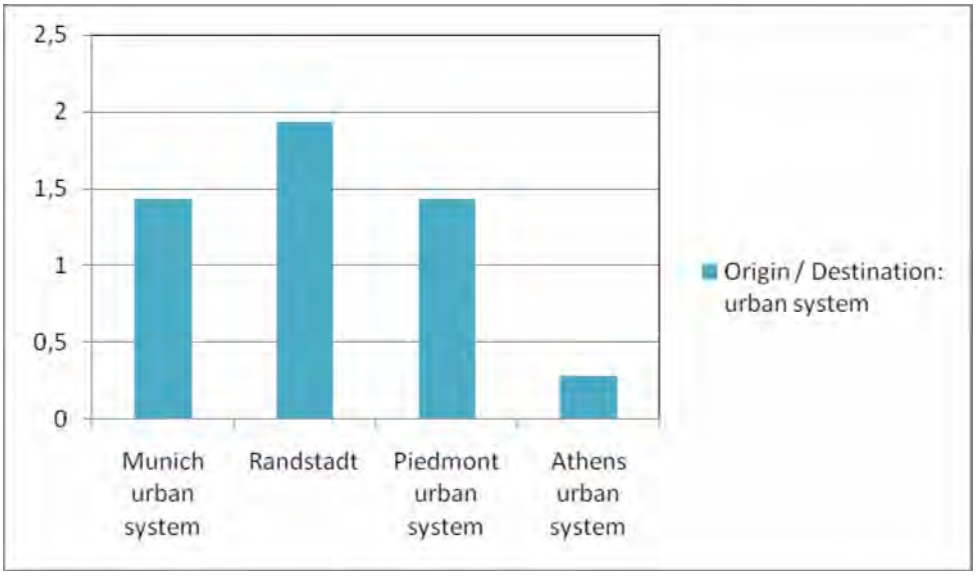


Figure 14. Rate of subsidiaries for the urban systems: Subsidiaries having the US as origin / Subsidiaries having the US as destination
Source of data: ORBIS database, analysis of data: NTUA team

The results for the **primary cities of the urban systems** are quite similar to those for the respective urban systems with the exception of Piedmont where Torino presents a lower rate of "dominance" than the respective urban system - *-see in Annex.*

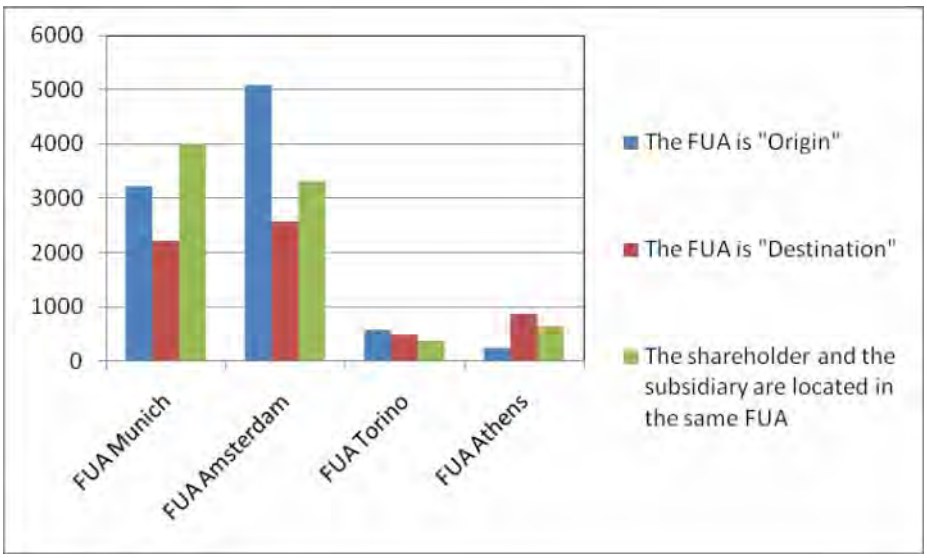


Figure 15. Number of subsidiaries corresponding to primary cities of the urban systems per type of link

Source of data: ORBIS database, analysis of data: NTUA team

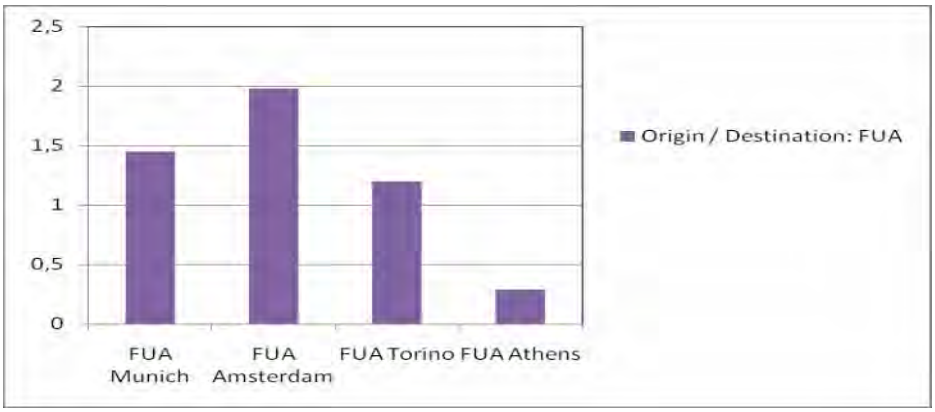


Figure 16. Rate of subsidiaries for the primary cities: Subsidiaries having the city as origin / Subsidiaries having the city as destination

Source of data: ORBIS database, analysis of data: NTUA team

As it is shown in Figure 1 on the (total) intensity of the firms' links inside the urban systems, these links are more intense in Randstad and Munich US than in Piedmont and Athens US. In Munich US, Piedmont and Athens US the links from / to the primary city are more intense while in Randstad there is a more polycentric pattern.

Taking into account both the profiles resulting from the division of the number of subsidiaries per groups of branches in the part of activities recorded from ORBIS[89] and the "dominant / dominated" relationships examined, we could preliminarily estimate that in Randstad and Munich US there is strong clustering in the dynamic branches. In Torino / Piedmont, clustering is less strong in the dynamic branches and stronger in industry, which, however, is declining. In the case of Athens, clustering is weak, taking into account that a large part of the subsidiaries is controlled from abroad. The subsidiaries in Athens are included in clusters, which are (as the previous ones) integrated at European or international level.

Clustering at the level of each urban system seems important in the three first cases while there is no significant clustering inside the Athens urban system.

[89] See in Section 5

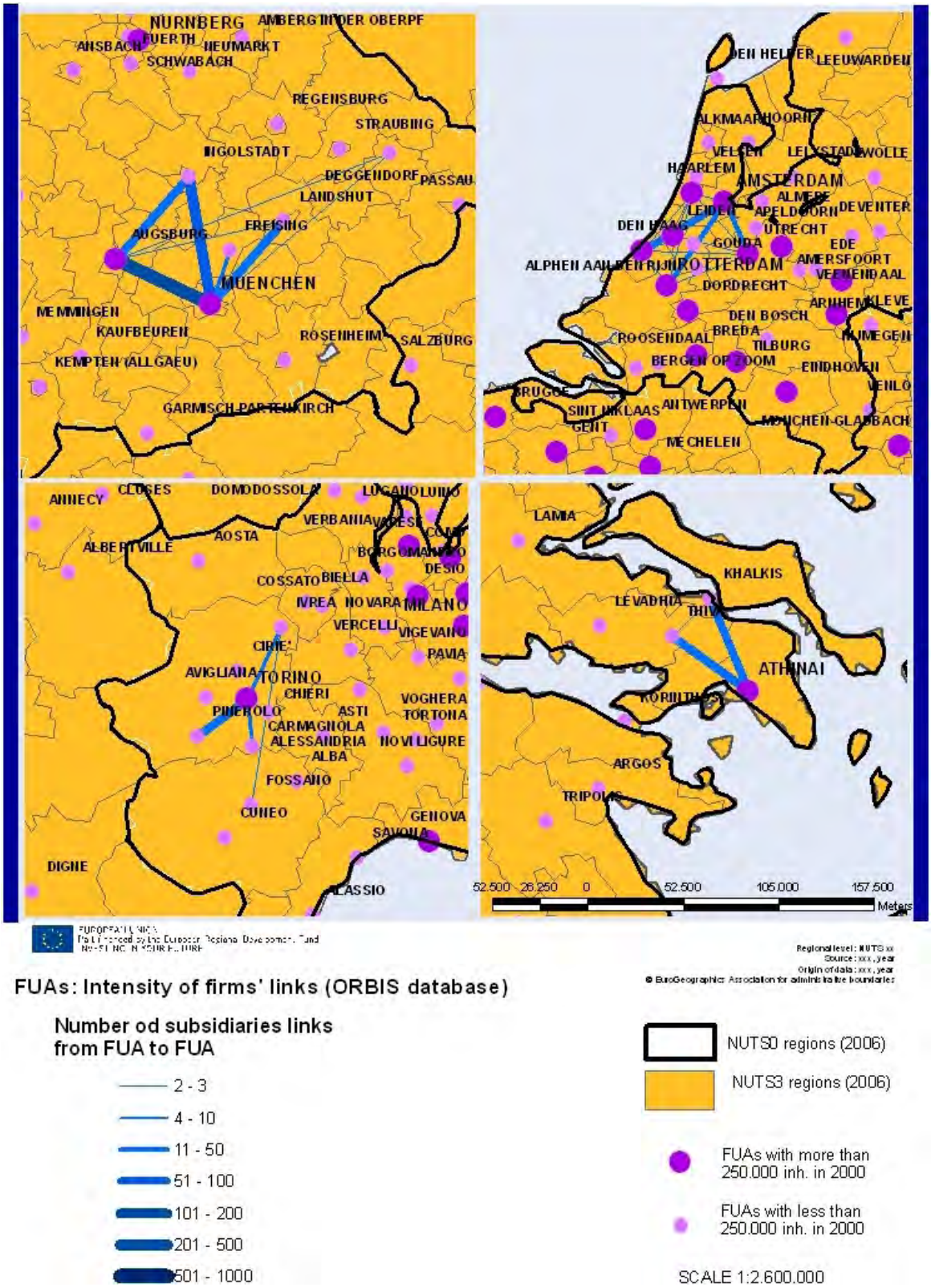


Figure 17. Intensity of the firms' links among FUAs in the case study areas
Source of data: ORBIS database, Elaboration of data, map creation: NTUA team / M. Angelidis

6.2. Transport links

Munich and Amsterdam constitute top air transport nodes at international and European levels. Munich is also a very important node at national level. Torino and Athens have a considerable role at European level and constitute important nodes at national level -see in Annex.

As for the rail transport systems, Munich and Randstad have a very high connectivity at European level; Munich has also a very important role at national level.

In addition, internal connections through rail and road transport inside the latter urban systems are highly developed.

Torino has a considerable role in air transport both at European and national level. Piedmont has good accessibility through rail and road transport at European and national level and satisfactory connectivity inside the urban system.

Athens has important but lower than Amsterdam and Munich air travel daily traffic to / from other European cities; this traffic is clearly higher than Torino. Athens has also a prominent role as for the rail but also the sea and the road transport systems. Connectivity inside the Athens urban system is very high taking into account the situation in other regions of the country.

City / FUA	Number of other cities (airports) linked to the city / FUA	Total Annual Departures
AMSTERDAM	111	138020
MUNICH	45	55736
ATHENS	47	56985
ROTTERDAM	4	1127
TORINO		estrimation (23400)

Table 1. Total Annual Departures from the airports of the four urban systems

Source of data: Transtools 2009, analysis of data: NTUA team

6.3. Territorial complementarities in the urban systems

Territorial complementarities are a very important component of territorial integration in urban systems.

In brief[90]: In order to measure complementarity in urban networks we used a correspondence analysis method developed by Meijers (2008 and 2009). Although often used as a tool to enable graphic interpretation of complex data, correspondence analysis also provides a single statistic that describes the extent of differentiation in the economic profiles of a group of cities. This statistic, called Total inertia, is a measure of the extent to which the profile points are spread around a centroid, representing the average profile. The highest attainable inertia is equal to the number of cities -1 and it is reached if all the cities have completely different economic profiles, whereas zero inertia is attained when they all have exactly the same economic profiles.

[90] See in detail for this issue in the Part 1 of the section of the FOCI Scientific Report on "Opportunities through polycentric cooperation" and in the working paper for Randstad (2010)

It is difficult to compare complementarities through the measure of Total inertia among the four urban systems as we should use comparable configurations of the urban systems and have for all the cases data at an appropriate low territorial level. Such a measure has been done in the frame of the FOCI analysis for the entire European space, on the basis of the respective to the four systems Potential Integration Areas / PIAs (of the ESPON 1.1.1 project 2006) and data on the employment approximated at NUTS3 level. This analysis has concluded that the values of Total inertia for the Amsterdam and Munich PIAs are relatively high, while for the Athens PIA is relatively low. The result for Piedmont is not usable as the approximation of FUAs to NUTS3 is not appropriate in this case.

6.4. Commuting areas

As we have stressed in Part 1 of the section of the ESPON FOCI Scientific report on "Opportunities through polycentric cooperation", the study of the daily commuting areas of the cities (FUAs) allows us to correlate the profiles of the economic activities of the regional urban systems (as well as the Metropolitan areas) with the spatial distribution of the workforce.

We should point out here that the relationships (links) among cities regarding commuting correspond to lower level territorial levels (layers) while the firms' links are higher level relationships.

While (total) commuting correspond to the daily movements of the workforce, the "regional" / higher level links correspond to the daily movements of the higher level workforce, to a great part of exchanges of products and information among firms etc. The transport infrastructures used and the necessary time-space for the movements in the first case (commuting) are often not the same as in the second case ("regional" relationships).

Here again there is not only one "layer" corresponding to higher level (regional) relationships and one layer corresponding to lower level relationships (total commuting) but there are also other intermediate layers corresponding to specific functions of firms etc.

In order to analyse commuting among FUAs we used both the four working papers based on literature review and data of the Eurostat *SIRE Database* for the year *2001* allowing us to put the comparison under a common denominator.

The latter data have been further elaborated by IGEAT (D. Peeters) which gave us a database which includes for each FUA the number of the commuters (in and out) to the rest FUAs.

On the basis of these data we have created layouts for each of the four urban systems examined. These layouts are presented at the same scale in order to facilitate the comparison.

The comparison of the commuting intensity shows clearly that the labour market area, including all the cities of **Randstad,** is more intensively unified compared to the other 3 cases. The shares of the persons commuting in the FUA of Amsterdam in the total of the population of the FUA (in 2000) amounts to 16% while it is even higher for Utrecht (17%) and lower in Rotterdam and Den Haag (10% and 8%, respectively).

According to Meijers - Romein - Zonneveld 2010, "we should further examine commuting in Randstad by layers. The Randstad is a complex layered structure of different although partly overlapping commuter sheds rather than one single labour market for all workers. The commuting patterns in the Randstad reflect a system of rather separated labour markets of daily Urban Systems (DUSs) that are each still largely hierarchical in shape, i.e. particularly directed at their respective central cities.

See also for the case of Randstad in the Map.

The labour markets of the separate DUSs are only loosely interconnected, mainly consisting of flows between their central cities. The only significant indications of complementarity concern the economic sector of advanced business services, a sector that is mostly concentrated in the Amsterdam area". On the whole, the Randstad consists of separate labour markets with low levels of integration".

This does not mean that there is not a lot of commuting between the cities. In relative terms this may not be so large, but in absolute terms it is.

The intensity of commuting inside the **Munich urban system** is lower than in Randstad but higher than in the other two cases.

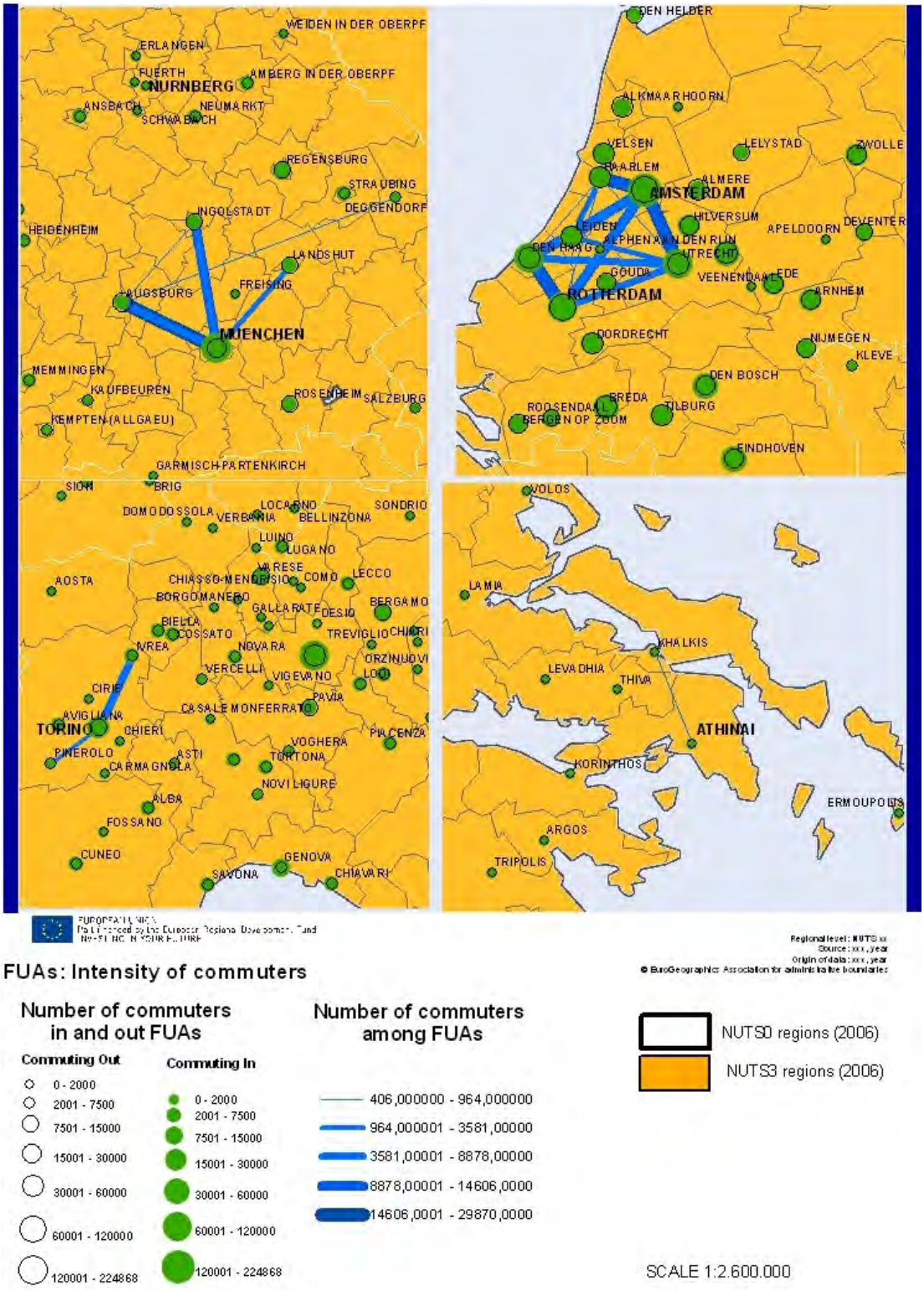


Figure 18. Intensity of commuting among FUAs in the case study areas
Source of data: Eurostat SIRE / IGEAT (D. Peeters),
Elaboration of data, map creation: NTUA team / M. Angelidis

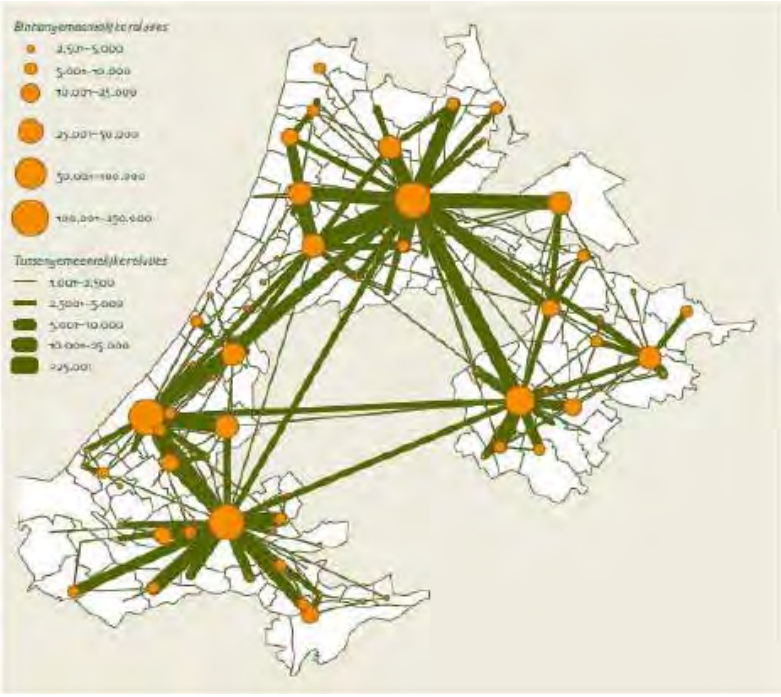


Figure 19. Commuting relationships in the Randstad, 2002.

Source: Meijers - Romein - Zonneveld 2010 – from Ritsema van Eck et al. (2006)

The flows from and to Munich are by far prevailing. The shares of the persons commuting in Munich amount to 4,3% of the population of the FUA of Munich (81.300 commuters) while they are lower in the other nodes of the urban system (in the exception of the small FUA of Deggendorf -31.000 inhabitants- where it amounts to 5,9%).

The commuting in the **Piedmont** urban system seems to be comparatively weaker. The share of the persons commuting in Torino amounts only to 1,3% of the population of the FUA of Torino. However, we should further examine the issue of administrative divisions that have been taken into account in the calculation

In the **Athens urban system** the commuting seems to be comparatively less important (only 600 persons). However, the elaboration of the respective data was done in such a way that could not lead to results comparable to those for the rest examined urban systems.

We should further examine the issue of administrative divisions that have been taken into account. In more general, what produces the difficulty of comparison is that the entire Athens area (Attica) was considered as one FUA. However, in reality the Athens Basin is separated by the other two areas of Attica: the areas of the (former) prefectures of Western and Eastern Attica, by low mountains -see in detail in Angelidis et al 2010 (Athens case study). The time-distance among these three areas is yet considerable.

Thus the most important aspect of the commuting inside Attica is the commuting among the Athens Basin and the rest of Attica. Other analyses (see in respective Greek studies on the transport in Attica) have demonstrated that this last commuting is very important. However, it cannot be calculated on the basis of the method used for the elaboration of the relevant data from the SIRE database.

Conclusions

The comparison among the four urban systems depends strongly on the definition of the urban systems and the definition of FUAs in relation to administrative divisions.

Inside each urban system, some layers present, as we saw, a higher level of integration of the working environment than others.

However, the layer including the entire Randstad seems to be relatively more integrated than the layers of the other US presenting higher “density” of commuting inside the respective urban systems.

In the Munich US the layer including Munich, Ingolstad, Augsburg and Landshaut present clearly higher level of integration regarding commuting than the rest of the urban system. This more “dense” in commuting territory represents roughly the half of the entire Munich US territory.

In Piedmont the layer including roughly Torino, Ivrea and Pinerolo is the more “dense” regarding commuting. It represents less than the half of the Piedmont regional territory as it is defined here.

The case of the Athens urban system, the core of which (the Athens basin) includes a huge part of the total population of the regional territory, presents relatively lower level of integration as for the commuting.

In the cases of Munich US, Piedmont and Athens US the layers presenting a relatively higher level of integration of the working environment include less than the half of the respective regional territories.

7. Territorial development trends in the four urban systems: contrasting features

A first feature which refers to all the four urban systems[91] is that their economic links (networking) at international / European / transnational level are growing. This is a comparatively more important strength for Randstad and the Munich US; it is a weakness for Piedmont and a more important weakness for Athens US. Similarly the high specialisation of the two first urban systems in APS and HT activities and their "central" position in the system of links of these activities represent a further strength for them.

It seems that both strengths explain to a large part their higher performance in comparison to Piedmont and even more to the Athens US.

This ascertainment should be translated into the objectives of the territorial cooperation necessary in the four cases. Randstad and Munich US should further develop these strengths through cooperation while Piedmont and even more Athens should even more prioritise the improvement of their position in this networking system through cooperation.

As for the polycentric integration inside and at the level of the given urban systems there are obviously contrasting features. Even Randstad present higher morphological polycentricity than Munich, the difference as for the functional polycentricity is lower. If the city of Munich prevails very much as for the most dynamic activities in the frame of the Munich US, Amsterdam also prevails clearly in the frame of Randstad in this field. Thus in both cases (morphological polycentrism versus morphological monocentrism) the specialisation of the first city in both the more dynamic activities and a leading position in international networks seems to be a considerable component of the high performance of both the urban systems. Also, integration of the working environments is high in the entire Randstad; it is lower in the Munich US at the level of the entire US but not so much lower if we consider the restrained layer of the cities more neighbouring to the city of Munich. In both cases the widening of the critical mass through integration in order to raise the performance seems to be necessary; the difference resides more to the fact that this is comparatively more difficult in the case of Munich where this should be happen in a more wide area to include a considerable potential of cities.

This is even more difficult in the cases of Piedmont and the Athens US. In the latter intense effort to improve territorial integration would very probably allow to make their development pattern more performing though the exploitation of potentials of development in potentially dynamic activities as the tourism / cultural activities.

Therefore, if the comparison of the territorial development trends among the four urban systems did not allow to specify which are the more relevant indicators as for the territorial extent of the polycentric integration through cooperation, the above conclusions could serve as a frame for the evaluation of the content of the cooperations which will be examined in depth in the following.

[91] As it results from both the data analyses done and the literature review

8. Territorial cooperation and governance

8.1. Introduction and methodological issues

ESPON 2006 projects 1.1.1 (2005) and 1.1.3 (2005), ESPON INTERACT (2007) as well as some of the INTERREG projects identified existing cooperations among cities and other territorial levels' authorities (Regions, provinces etc) mainly on the basis of the cooperation initiatives developed under the trans-border, transnational and interregional parts of INTERREG. Then they more precisely evaluated both the approaches of polycentricity used in different situations and the possible impacts of the respective projects on polycentric development. The linkage of the implementation of the INTERREG projects or other cooperation initiatives to the territorial governance at different spatial levels was less analysed. ESPON 2006 project 2.3.2 (2006) further investigated territorial cooperation initiatives in different European contexts and territorial levels. Several types of these cooperations were examined and an assessment was made on the degree to which government of territorial entities in different countries has adopted new more open forms of multi-level cooperation which constitute territorial governance (in distinction with government). This approach has been further discussed by a wide recent literature (see, indicatively, in Otgaar et al 2008). The more specific aspect of the relationships of the territorial cooperation to polycentric potentials was also discussed in the majority of the above documents. The more or less common thesis of this literature is that *multi-level cooperation which is adapted to new forms of economic territorial networking among cities as well as other territorial entities allows exploiting existing polycentric potentials at different levels.*

From this scope, the **main research question** in this section is the following:

Which specific cooperation arrangements could have positive impacts to the urban system itself as well as to the wider national and transnational urban networks in which it is embedded?

In this section we discuss the types of cooperation among cities and other entities in the *Introduction -sub-section 8.1-* and we then present shortly, *in 8.2,* the *institutional framework of government* in the four case studies regarding both the legally powerful entities as regions, provinces, municipalities etc and cooperations with a "soft" legal framework as for example inter-municipal cooperations and other informal cooperations.

Then we examine the *forms of cooperation and the issues of the cooperation* (planning, infrastructures, other) *inside the urban system –in 8.3-* and *at the level of the entire urban system –in 8.4-* as well as the *cooperation of the cities of the urban system at national and international level –in 8.5-.*

Next, *in 8.6*, we evaluate the *success of the cooperations* on the basis of the expertise of the authors of the respective working papers on the four case studies and respective literature and we try to evaluate the impact of different factors favouring cooperation (as for example: identification of reasonable objectives those are attractive for all partners, identification of objectives that are attractive for all partners, small distance or a common history or tradition) in *sub-section 8.7* or hindering cooperation (as for example: competition between partners of similar weight, mistrust of small versus bigger partners etc) in 8.8. Finally, in *8.9*, we try to evaluate the *correspondence of existing or proposed cooperation with territorial development trends inside and outside the four urban systems.*

According to Wassenhoven et al 2010 (building on the ESPON 2.3.2 project on Governance 2006), the range of the cooperation forms developed in the European countries is very extended, from the more advanced and daring to the more conventional and ostensible. In many cases, we should be cautious regarding the seriousness of the cooperations mentioned in relevant reports.

The **types of cooperation** cover forms of systematic, regular and institutionally guaranteed cooperation between territorial units, with tangible results of works and programs but also cooperations between public actors/institutions, which do not consist anything more than participation of their representatives to councils and committees. The cooperations cover from pacts, contracts and conventions which associate national, regional and local authorities into integrated sets of policies, to simple cooperations among local self-government authorities for the implementation of ordinary urban planning. Most of these examples of cooperations, and the rather most interesting, are those referring to cities. Among these we can find experimental innovative regulations, at the level of neighborhood, city or urban region. They, also, include all kinds of cooperation schemes i.e. agreements or contracts, but also simpler processes, which are aiming at economic development or regeneration of urban areas.

Here we focus on cooperations which are relatively more important in extent and duration and adopt a wider approach of territorial development (in other words, we neglect occasional cooperations focusing on very specific issues).

The role of each country's experience in the use of cooperation forms is decisive. Three of the countries in which are included respective case studies, the Netherlands, Germany and Italy have important experience in such cooperations (ESPON project 2.3.2) while Greece has a smaller experience.

We should insist here on the issue of **different levels of territorial cooperation** in relation to the levels of territorial development. It is often pointed out that below the national level we could take into account two levels: the "regional" level and the "local" level; of course we should add to these the "level" of the metropolitan areas.

However, a more careful analysis concludes that in the case of most EU countries there are more than two levels below the national level. This is true, as we will see later on, in the four cases studies examined here.

Meijers et al (2010) used for the case of Randstad the term of **"layered system".** We could further use this term for the majority of the EU member countries. This situation makes more difficult for the "legal" territorial authorities, such as the Regions, the provinces (or prefectures) and the municipalities, to focus their activity on a clear territorial level (or "territorial object"). Evidently, appropriate cooperation initiatives could cover the "layers" which are not appropriately covered by the "legal" territorial authorities.

On the other hand, it is more difficult to analyse territorial cooperation in systems with a great number of layers. In next, we will try to take into account this remark in order to avoid inappropriate comparisons of the four case studies.

Is it possible to compare effectively the specific initiatives developed in the frame of the four urban systems?

Despite the fact that similar evaluations have already been done, very often the main criterion of evaluation, the correspondence of the options and the results of initiatives to "real" territorial trends is not further specified into more detailed concepts and indicators.

The recent evaluation of cooperation initiatives financed through EU territorial cooperation programs INTERREG 2000-2006 (Panteia 2010) stressed that a major weakness of the latter was that "they paid insufficient attention to content-related policy issues of strategic relevance for territorial cooperation" e.g. how to achieve territorial

integration?. In addition, *the programme monitoring systems were weak, especially at the level of impact indicators.*

Furthermore, Panteia 2010 underlines that there are not until now convincing methods of definition of socio-economic "functional co-operation areas".

In the respective sections 8.9 and 9 the comparison will focus on the content-related policy issues of strategic relevance for territorial cooperation but we will not develop specific impact indicators for this issue.

8.2. Short presentation of the framework of government in the four case study areas

We will discuss here **the role of both the legally powerful entities**, for example regions, provinces and municipalities **and the cooperation with a "soft" legal framework** for example inter-municipal cooperation, informal cooperation.

The institutional frameworks of government of the four urban systems in question differ substantially. In order to give a first idea of the extent (the area) of the respective territorial units (in which the urban systems are included) we present the map of the respective NUTS2 and NUTS3 units.

While the territories corresponding to the urban systems of Randstad, Piedmont and Athens include NUTS3 units of comparable average areas, the territory of the Munich US includes some small in area NUTS 3 units.

The territory of Randstad covers 4 NUTS2 units (provinces[92]), the one of Piedmont 2 and the one of Athens 3 NUTS2 units. The major part of Munich US is included in one NUTS2 unit

Especially in Netherlands there are **12 NUTS2 units** corresponding to **provinces** and **40 NUTS3 units** corresponding to **"COROP regio's"** (Wikipedia 2010). These regions are used for analytical purposes by, among others, Statistics Netherlands[93].
In Italy there are 21 **NUTS2 units** corresponding **to Regions** (Regioni) and **107 NUTS3 units** corresponding to **Provinces** (Province).
In Germany there are **16 States** (Bundesländer) corresponding to **NUTS1 level**, **39 NUTS2 units**. (Government regions / Regierungsbezirke) and 429 **NUTS 3 units** corresponding to Districts (Kreise).
Finally, in Greece, after the recent reform of the administrative system (June 2010), there are 13 **NUTS2 units** corresponding to **self-governed Regions** and 52 NUTS3 units corresponding to sub-divisions of the self-governed Regions (former prefectures).
See in more detail in next.

8.2.1 Randstad

Randstad is embedded in the structure of government in the Netherlands which is a "**decentralized unitary state"** according to Meijers et al (2010) as well as according to ESPON project 2.3.2 on "Governance" (2006). The underlying principle is of **self government of provinces and municipalities.** Now officially the Netherlands have a three level government system.

[92] Noord-Holland, Zuid-Holland, Utrecht and Flevoland (in which Almere is located)
[93] The Dutch abbreviation stands for Coördinatie Commissie Regionaal Onderzoeks Programma, literally the Coordination Commission Regional Research Programme".

Municipalities and provinces have the most important competences concerning regional and local development in Randstad as in Netherlands. However,the Randstad is considered of such a special importance for the country as a whole that the national government claims that its development is a challenge for the national level also.

Several times over the years the legislator returned to an improvement of the possibilities **for municipal cooperation**. In 1994 a law created a **special status for seven urban regions** amongst them the more important Randstad regions of Amsterdam, Rotterdam, The Hague and Utrecht. These regions were expected to become so called **"city provinces"**. The general feeling in Netherlands was that regional instead of municipal governance would sit uneasily with local identity. A second attempt to improve **municipal cooperation** was realised in 2007. A new law came into force which created **8 regions where municipalities have additional possibilities for cooperation especially in the field of urban development and transport**, the so called **WGR Plus[94] regions** –see ***Figure.***

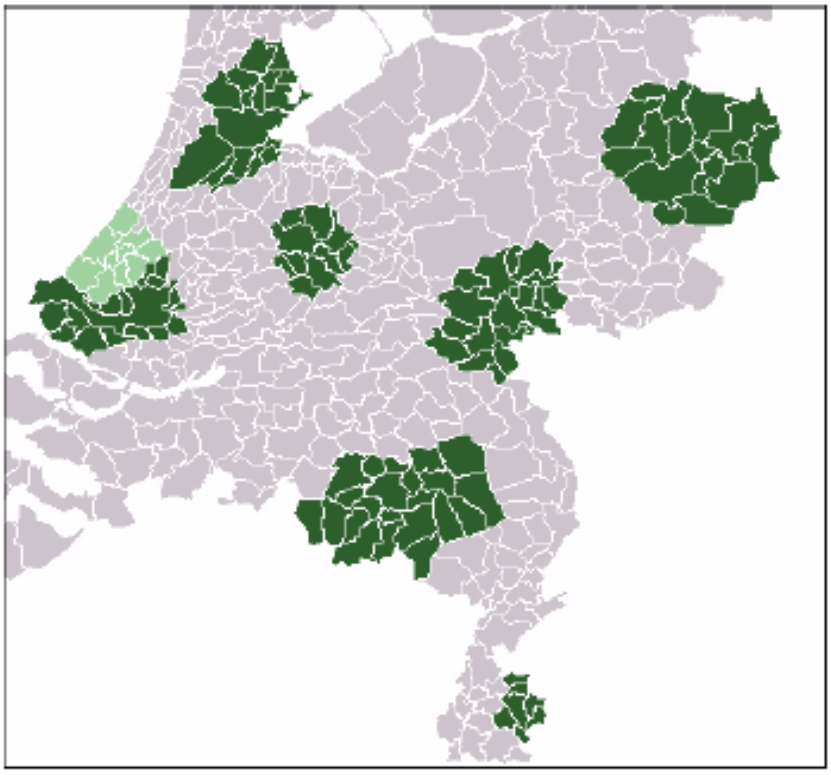


Figure 20. The eight "WGR+ areas"
Source: Wikipedia –used in E. Meijers, A.Romein, W. Zonneveld, 2010

A very important effort to put territorial cooperation in line with actual territorial integration at a high spatial level regarded specifically the Randstad which includes a respective powerful, highly integrated and polycentric urban system. In this case, the legislator attempted to attribute considerable competences to this polycentric region. This attempt was combined with the development of cooperation initiatives in the frame of the cooperation scheme "Delta metropolis". However, Randstad was not attributed the expected important political support because the authorities of other levels have reacted negatively.

[94] "WGR is the acronym of the law on municipal cooperation. "Plus" stands for a number of explicitly defined competences which "normal" WGR-bodies cannot have" (Meijers – Romein – Zonneveld 2010).

In more detail: According to Meijers, Romein, Zonneveld, 2010, in a 1st phase, in September 2002 the 4 Randstad provinces, the 4 main urban regions (WGR) plus their core municipalities established **Regio Randstad as a negotiation and cooperation platform.**
Regio Randstad together with the government participated in the Administrative Randstad Committee, created in 1997 originally to renew the covenants between national government, provinces, urban regions and municipalities **on housing allocation and production but later on getting a much wider task**. The **Deltametropolis Association** -a civil society initiative started to function as think tank and a platform for open, conceptual discussions about Randstad and key areas within Randstad. The momentum created by the Deltametropolis even lead to (renewed) calls for a Randstad authority.
In a 2nd phase, on the first of January 2008, the Regio Randstad was dissolved …., because the four participating cities as well as the central government lost interest in Randstad cooperation –see in section 8.1
Randstad cooperation has not ended entirely though. The four Randstad provinces still cooperate to promote their interests on the European level. The Deltametropolis Association is still active although it is suffering from the absence of the parallel political trajectory.

All the latter visions developed in Netherlands aiming to attribute more legal power to "new" territorial cooperation entities in order to put territorial governance in line with respective approaches of the recent territorial development changes, had a limited success, less than the respective high expectations. See in more detail in section 8.1

8.2.2 Munich US

The Munich US is embedded in the government structure of Germany which is characterized as **"federal"** by the ESPON 2.3.2 project (op. cit.).

Specifically, the administrative structure of Germany is made up of sixteen **states** (Länder) 3 of which are "city-states" while the remaining 13, including Bavaria, are "area states". The state of Bavaria corresponds to a NUTS2 unit – ***see Map***. The states are parliamentary republics and the relationship between their legislative and executive branches mirrors that of the federal system. They have important competencies in a large range of issues.

Bavaria is divided into 7 **administrative regions** –**Regierungsbezirke**- which are only administrative divisions and not self-governing entities. Munich is included in the administrative region of Upper Bavaria (Oberbayern).

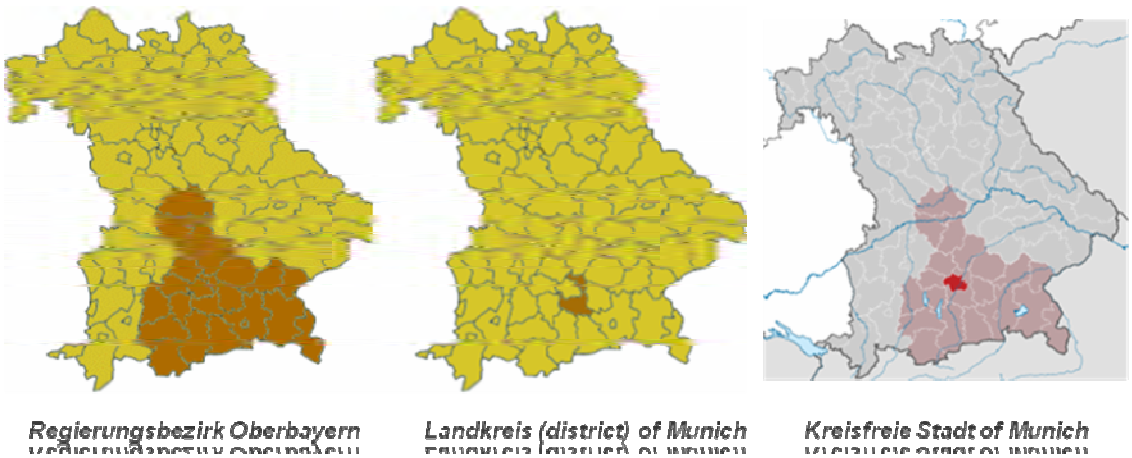


Figure 21. Regierungsbezirk Oberbayern, Landkreis (district) of Munich and Kreisfreie Stadt of Munich

"Districts" (**Bezirke**) are another communal layer in Bavaria. **The Bezirke in Bavaria are territorially identical with the Regierungsbezirke** (e.g. Regierung von Oberbayern), but they are a different form of administration: they have their own parliaments etc.

The administrative regions of Bavaria consist of 71 **administrative districts** (called **Landkreise**, singular Landkreis) and 25 **independent cities** (district-free towns, kreisfreie Städte, singular kreisfreie Stadt).

Upper Bavaria has 20 Landkreise (districts), including the **Landkreis (district) of Munich** and 3 Kreisfreie Städte including the **kreisfreie Stadt of Munich**. Landkreis (district) of Munich surrounds the kreisfreie Stadt (district-free city) of Munich itself, which is the district seat. Kreisfreie Stadt (district-free city) of Munich is in effect a municipality independent of Landkreis administrations[95].

Kreisfreie Stadt of Munich is divided into 25 boroughs or Stadtbezirke.

In this relatively complicated government structure, the municipality of Munich and Landkreis or municipalities corresponding to the rest nodes of the Munich urban system have most competencies at local level while Regierungsbezirke of Upper Bavaria and the state of Bavaria have competencies at the higher levels.

8.2.3 Piedmont US

The Piedmont US is embedded in the structure of government in Italy which is characterized by Salone - Cotella (2010) as **decentralized unitary"** and as **"regionalized towards federal"** by the ESPON 2.3.2 project (op. cit.).

Specifically, **Italy** is subdivided into 20 **regions** (regioni) corresponding to **NUTS2 units**. It is further divided into 110 **provinces** (province) -corresponding to **NUTS3 units**- and 8,100 **municipalities** (comuni).

[95] The 71 administrative districts of Bavaria are at the lowest level divided into 2031 **municipalities** (called Gemeinden, singular Gemeinde). Together with the 25 independent cities (which are in effect municipalities independent of Landkreis administrations), there are a total of **2056 municipalities** in Bavaria.

The **Piedmont urban system** is included in the **regions of Piedmont and Aosta valley** (the latter has a special autonomous status that enables it to enact legislation on some of its local matters). Specifically, the Piedmont urban system is included in 4 provinces of the Piedmont region and the province (and region) of the Aosta valley.

In the Italian structure of government, Regions, provinces and municipalities have important competencies in territorial development issues. *Regions* have legislative authority especially on a *spatial planning, industrial development, education and health*, provinces have regulatory tasks mainly for what concerns employment, education, and natural resources and municipalities have important competencies on local level issues (Borrelli - Santangelo 2004).

In the territory of the Piedmont urban system, different forms of horizontal cooperation, inter-municipal and other, as well as vertical cooperation, have been developed which improve multi-level governance. One interesting example from this scope is the constitution of *Areas of Territorial Integration (AITs)* (Ambiti di Integrazione Territoriale), units used for the construction of the proposal for the new Regional Territorial Plan of the Piedmont Region (Piano Territoriale Regionale della Regione Piedmont) *–see Map.*

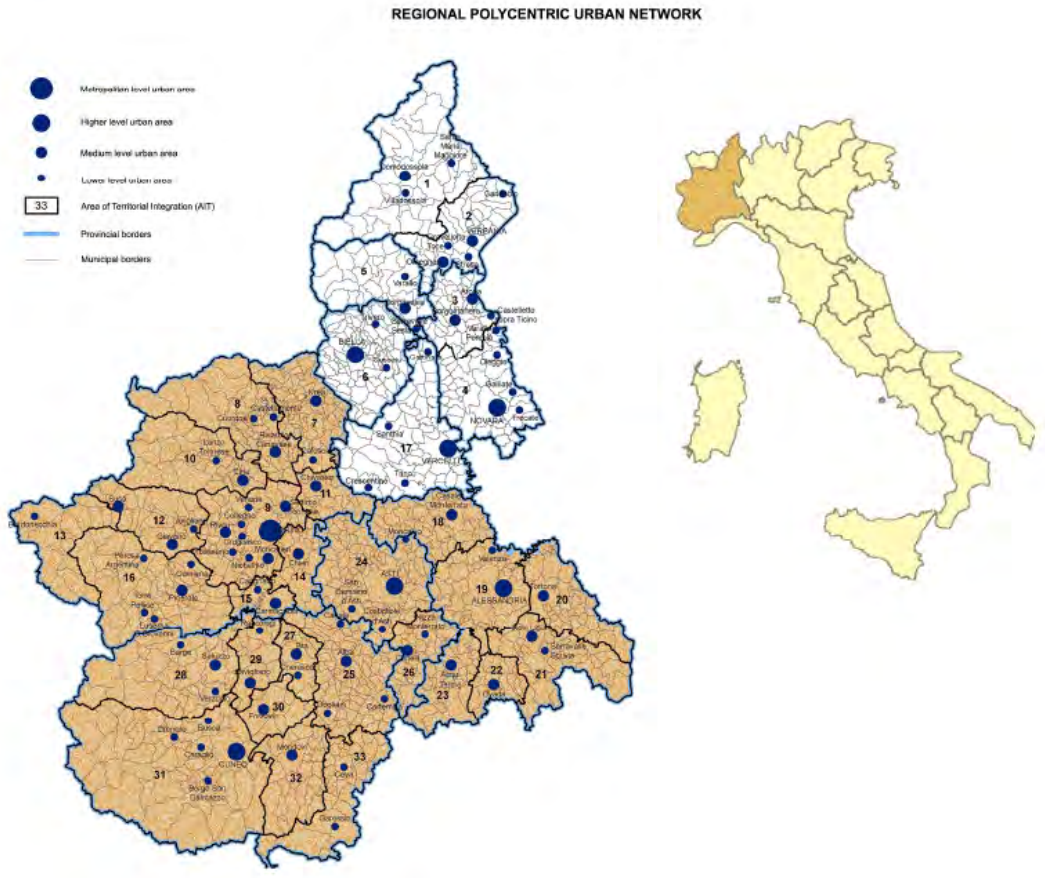


Figure 22. Territorial Integrations Areas according to the Regional Territorial Plan of Piedmont

AITs reflect appropriately *local systems'* model, intended *as collective actors of territorial development (*Salone – Cotella 2010) and they should used as a basis for voluntary aggregations of actors for participation in regional development programmes.

In general terms, cooperation with a "soft" legal framework both horizontal and vertical are well developed in the Piedmont urban system area. See for the specific forms and issues of these cooperations in next sections.

8.2.4 Athens urban system

The Athens US is embedded in the structure of government in Greece which was characterized by the ESPON 2.3.2 project (op. cit.) in 2006 as **"centralized unitary"** but is transformed recently rather to "**decentralized unitary"** -see in detail in next.

The administrative system of **Greece** has been restructured very recently, since June 2010[96]. Thus we will refer in both the previous and the actual administrative systems.

The former Greek administrative system was decentralised a bit less than those of the three previous countries. Now, as we mentioned, it changes to a fully decentralized system.

The former system was based on 13 administrative Regions (corresponding to NUTS2 units), 52 prefectures (corresponding to NUTS3 units) and more than 1.000 municipalities and communes (LAU1 units).

Each Region was governed by a head ("perifereiarhis") designated by the central government and a Regional Council; some members of the Council were designated by the central government while the other were designated by the elected prefectural authorities.

Prefectural and municipal authorities were elected and had considerable competencies.

The **NUTS2 unit of Attica** which roughly corresponds to the **"real" metropolitan region of Athens** had before June 2010 a particular government system. First, its entire territory was included in the administrative Region of Attica (see previously). Second, it was divided into: (a) the self-governed "super-prefecture of Athens - Piraeus including the prefectures of Athens and Piraeus (b) two other prefectures, those of West and East Attica –*see Map.*

The **new system of government**, adopted in June 2010 **includes three levels of government**:

(a) The **central government** and seven **"administrative regions"**, the authorities of which are designated by the central government.

(b) The level of **self-governed regions**. There are 13 regions which correspond to NUTS2 level. Their authorities are elected and they have, according to the new Law, important competencies. They are governed by the head of the Region ("perifereiarhis") and the Council of the Region.

The former prefectures (NUTS3 Level) are now administrative sub-divisions of the Regions. The new Law previews that the members of the Council are elected on the territorial basis of the former prefectures.

(c) The level of **municipalities** which is also a self-government level. The former more than 1.000 municipalities (and communes) were merged into 336 **"new" more powerful municipalities** which have a wide range of competencies at local level.

The **new self-governed Region of Attica** includes the entire territory of the former Region of Attica (NUTS2) and it is sub-divided into 7 administrative units. All the decision

[96] The respective Law (included in the so called "Plan Kallikratis" will fully enter into force on 1.1.2011 but on November 2010 regional and municipal authorities were elected according to the provision of the new Law.

powers belong to the head ("perifereiarhis") and the Council of the Region see in more detail in the working paper on Athens US.

The **Athens urban system** is now included in 3 self-governed regions (NUTS2), the more important of which is Attica. As we have already mentioned, the most of the competencies at regional level belong to the respective elected authorities while the most of responsibilities at local level belong to the elected municipal authorities.

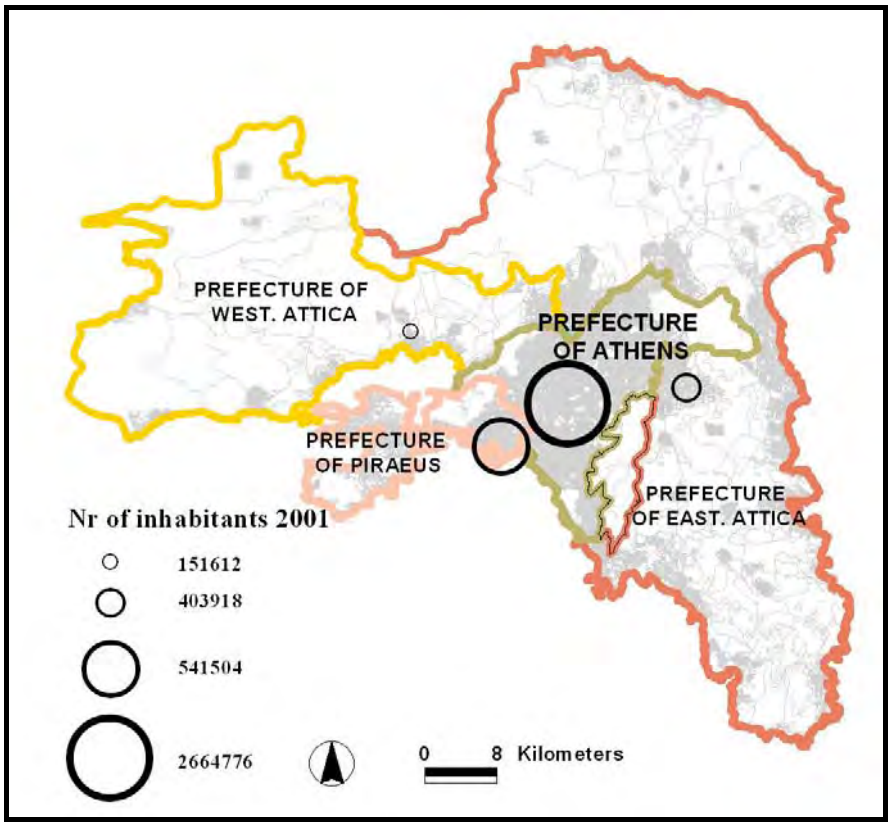


Figure 23. The former administrative division of Attiki
Super-prefecture of Athens - Piraeus (including the prefectures of Athens and Piraeus), Prefecture of Western Attica, Prefecture of Eastern Attica
Athens Basin = Continental part of the "Super-prefecture"

In the context of the former government structure of the Athens urban system the most interesting form of territorial cooperation with a "soft" legal framework was that of inter-municipal cooperation. Several such cooperations were developed mainly among municipalities of the Athens basin.

These cooperations were permanent or had a relatively limited duration. Permanent cooperations were often restricted to territorial planning issues while the more limited in time ones were referring to the creation of common infrastructures or to specific local issues -see in more detail in section 8.4.

It should be noted that the relevant new law (June 2010) favours the development of inter-municipal cooperations as well as the development of territorial cooperation as a means to promote appropriate multi-level governance in line with recent territorial development trends.

Comparison / Conclusions

The four case studies refer to different approaches of government systems: from "federal" in Germany to "decentralized unitary" in Netherlands and Italy and to "centralized unitary towards decentralized unitary" for Greece. The German system presents more independence of the "states", as Bavaria, from the central government. In the systems of Germany, Italy and Netherlands Regions, "provinces" (or prefectures) and municipalities have considerable competences for the respective territorial levels. In Greece, after the recent reform, only two levels: Regions and municipalities, have governmental competencies.

In the three first cases, important initiatives of cooperation with a "soft" legal framework have been developed, either inter-municipal (in the three cases) or inter-provinces (mainly in Netherlands) or multi-level: among municipalities and/or provinces and / or Regions and / or the central government. In Greece similar initiatives have been undertaken under the former government system; the law on the new government structure favours such collaborations. Very interesting from this respect are the attempts to institutionalise permanent collaborations in Netherlands: the WGR regions at lower level and Regio Randstad. We will discuss in next the degree of success of these initiatives.

8.3. Cooperation inside the urban system

Here we will discuss in more detail the cooperations inside the US of each case study; in other words, cooperations among some of the entities of the US. Cooperation at the level of the entire US of each case will be discussed in next section.
We will specifically examine the forms of cooperation and the issues of the cooperation: planning, infrastructures, other issues.
The analysis is based on the four working papers as well as to an analysis of the **INTERREG IIIC and IVC** projects. In these last only two cooperations (one in the frame of INTERREG IIIC and the other in the frame of INTERREG IVC) are included referring specifically to the urban system of Piedmont –see in next.

8.3.1 Randstad

Cooperation between groups of local authorities in the Randstad is formally made possible by the law on common arrangements (WGR in Dutch) which gives municipalities in 4 regions in the Randstad (centred on its main anchors: Amsterdam, Rotterdam, The Hague and Utrecht) additional possibilities for cooperation especially in the field of urban development and transport. For instance, public transportation for the whole region is contracted jointly to transit companies.

According to Meijers, Romein, Zonneveld, 2010, cooperation within the so called Amsterdam Metropolitan Region, entirely focussing on spatial planning issues, is quite successful. This does perhaps hold less for the region of Rotterdam-The Hague and the area of Utrecht and its (wider) surroundings. However, new initiatives have emerged in the Randstad's South Wing, where Rotterdam and The Hague try to form a single Metropolitan Area. Both cities have recently been connected by metro, and another manifestation of their willingness to seriously join forces is the renaming of the Rotterdam airport into "Rotterdam-The Hague airport". Both cities are currently discussing a programme to develop the bi-centric area further.

Next to the formal platform of the WGR, numerous cooperative efforts can be found in the Randstad region between smaller municipalities.

8.3.2 Munich

The city of Munich has a long tradition of **city-cooperation** on a partnership basis (Miosga 2005). Actually, the city of Munich participates to a significant number of informal and formal cooperations with other cities of the Munich urban system. Small distance and traditional economic links facilitate these cooperations.

The first and more important city-network was the initially informal city-network MAI: Munich - Augsburg – Ingolstadt which was founded in 1992 and then developed into a formal organisation in 1995. In this case the aim of the city of Munich was to concentrate on the most interesting economic potentials in the Bavarian capital and to share the growth with the subordinated cities (Miosga 2005). However, it seems that there is neither a sufficient cooperation network nor actual initiatives to build up governance structures at the level of the Functional Region of Munich In comparison with other European Metropolitan Regions (Miosga 2005, see also in Otgaar A. et al 2008 and Thierstein et al 2008).

8.3.3 Piedmont

Since in the Piedmont urban system territory, the delimitation of administrative regions and provinces does not comply to some extent with the actual organization of the territory, we will refer to the cooperation initiatives developed inside the *Areas of Territorial Integration (AITs)* –see for their definition in section 2- which are included in the urban system of Piedmont. We remind that AITs do not constitute either legal levels of government or areas of permanent cooperation of municipalities.
The initiatives developed inside each AIT mainly concern the most important issues in each AIT:
- Transportation- railway system in Chieri, Chivasso and Savigliano
- Environment in Asti
- Culture and historical heritage in Chivasso, Carmagnola, Bra, Casale Monferrato and Asti
- Economy in Cuneo and Alba
- Education and research in Cuneo and Asti
- Tourism in Ciriè.

Especially for *Torino,* the centre of the respective urban system, the cooperation initiatives developed concern a wide range of objectives and have positive impacts on the neighbouring municipalities, as it is resulted from the two Strategic Plans developed by the municipalities of Torino aiming at the coordination of the activities of the interested municipalities.

Another interesting example is that of the city of *Cuneo*, aiming at the exploitation of two important projects of Strategic Plan Cuneo 2020, PASS (Agro-food development services node), and TecnoGranda park, promoted and strengthened the cooperation between the existing organizations.

Also, the city of *Asti* cooperates with other municipalities for the completion of the Asti-Cuneo highway and the conversion of the railway linking Asti to Alba, Nizza Monferrato, Canelli, Chivasso, Casale Monferrato etc.

More recently, the **PTIs**, new programs of local development, have been designed and proposed by public-private coalitions and must be inter-municipal –*see Map.*

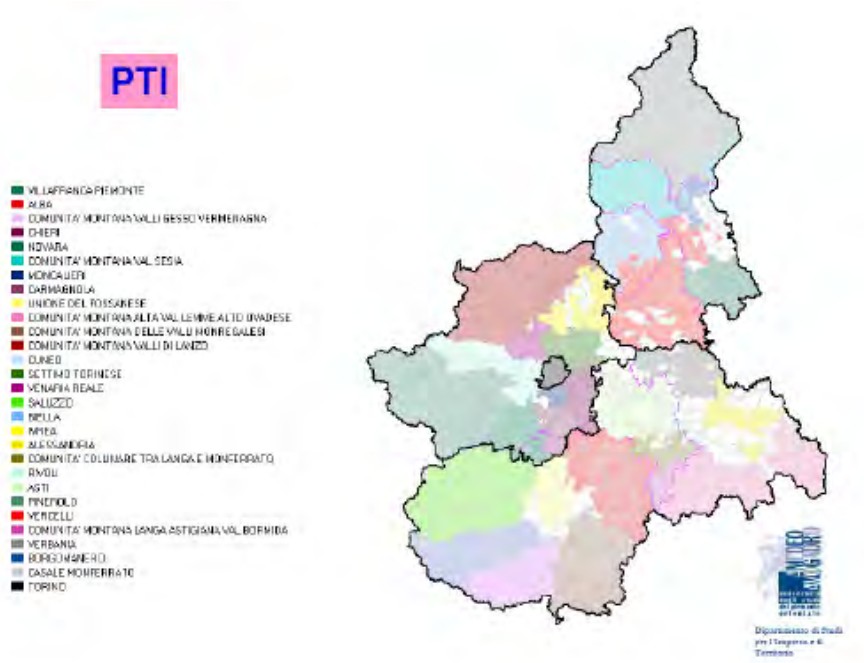


Figure 24. PTIs in Piedmont

Finally, we should also mention:

- One cooperation in the frame of INTERREG IIIC; in the respective project, Turin acts as leader and the Autonomous Region of Aosta Valley participates as partner.

- One cooperation in the frame of INTERREG IVC; in the respective project, the regional authority of Piedmont participates as leader and as partner; the city of Asti also participates in this project as partner.

8.3.4 Athens

As we have already mentioned in section 3.4, in the context of the former government structure of the Athens urban system the most interesting form of territorial cooperation with a "soft" legal framework was that of inter-municipal cooperation. However, a considerable number of multi-level cooperations, among municipalities, prefectures and the central government, have also been developed. Several such cooperations were developed mainly among municipalities of the Athens basin.

These cooperations were permanent or had a relatively limited duration.

(a) Relatively more permanent cooperations had often prioritised development and planning issues. Examples of such cooperations: Cooperation of the municipalities of the Northern part of Athens, Developmental Association of Western Athens, Developmental Company of municipalities of the Piraeus region etc.

(b) Cooperations often more limited in time were referring to the creation or management of common infrastructures or to specific local issues as:

- Environmental protection of the mountains or hills (Penteli, Parnitha, "Attikon alsos") or rivers (Kifissos -with the participation of prefectures- etc),

- Management of waste and of networks of water supply etc.

An interesting example is the one of the Developmental Company of municipalities of the Piraeus region which after one decade of activity was dissolved because the constituent municipalities estimated that its activity could limit their decision powers -see also in section 8.9.

Comparison / Conclusions

The "density" of cooperations (number of cooperations per population concerned), the functional form of the cooperations: "light" or "strong cooperation", their legal form, the issues concerned etc differ considerably among the different case studies' urban systems.

- In the case of Randstad it seems that cooperation (inside the urban system) in the frame of WGRs together with other more informal cooperations among municipalities and / or provinces is developed enough in a wide range of issues. While the WGR-law does not specify which issues should be jointly addressed, in practice these often concern regional aspects of economic development, tourism, recreation, housing, employment, traffic and transport, spatial development, nature and environmental affairs, welfare and social affairs. All the cities-nodes have developed such cooperations.

- In the case of Munich, cooperation inside the urban system is developed; in these cooperations the city of Munich has a determinant role.

- In Piedmont, where Torino is a powerful node, multi-level governance is satisfactory, because, among others, the majority of issues that interest specific municipalities are approached by these specific municipalities

- In the Region of Attica, inter-municipal as well as multi-level cooperations (among the municipalities, the prefectures, the administrative region and the central government) were developed strongly during the three last decades in a wide range of issues It seems that the high expectations of the period 1980-2000 were not fulfilled, thus the activity of the cooperation bodies was limited during the last decade. Territorial cooperation in the part of the urban system outside of Attica is in general terms less developed.

- In all case studies inter-municipal and multi-level governance have been developed during the last decades and contributed to the change of the entire structure of government to more flexible and adapted to the changes forms of governance. In general terms, the cooperations in the three first cases are more effective compared to the case of Athens. We will examine in section 9 the degree of success of these cooperations.

8.4. Cooperation at the level of the entire urban system

Here we are interested in the forms of cooperation and issues of the cooperation concerning the entire urban system of each case study.

8.4.1 Randstad

The most important cooperation *with a "soft" legal framework* at the level of the entire urban system examined here is that of the Regio Randstad as a negotiation and cooperation platform and of the Deltametropolis Association as a platform for conceptual discussions about Randstad –see also in section 3. This cooperation embraced a wide range of strategic territorial development issues and fully corresponds to the extent of the urban system examined. The question raised by interested stakeholders in Netherlands is if a strong cooperation at this level contributes to maximise the positive

effects from recent territorial changes for the entire Netherlands or not –see also in section 8.7.

Regio Randstad together with the government participated in the Administrative Randstad Committee ('Bestuurlijke Commissie Randstad'or BCR), created in 1997 originally to renew the covenants between national government, provinces, urban regions and municipalities on housing allocation and production but later on getting a much wider task. The Deltametropolis Association – a civil society initiative started to function as think tank and a platform for open, conceptual discussions about Randstad and key areas within Randstad. Two loosely coupled trajectories were created. One trajectory was heavily dominated by political negotiations, reaching consensus and decision-making. The other trajectory was dominated by research and design related discussions and various sorts of publications, partly web-based and supposed to inspire politicians and administrators working along the other trajectory: a network type of laboratory for research, design and discussion. A soft space in more than one respect: 1) nobody really bothered about the borders of the Deltametropolis as a spatial unit; 2) there is open access in terms of membership (quite literary as well: the Deltametropolis has personal memberships); 3) there is no direct link with operational decision-making (Meijers, Romein, Zonneveld, 2010).

The momentum created by the Deltametropolis even lead to (renewed) calls for a Randstad authority. In 2006 the mayors of Amsterdam, Rotterdam, The Hague and Utrecht, and the Crown's Commissioners of the four provinces united forces in what they called 'Holland 8', named after the Dutch rowing team which won a golden medal at the 1996 Olympics. More or less declaring that they would cooperate in a way nobody had seen before they also called for the creation of a Randstad 'authority' as the only viable long term solutions. Combined with the outcry by spokesman from trade and industry that administrative bustle ('bestuurlijke drukte') was seriously undermining all efforts to improve the competitive position of the Randstad national government established a advisory committee chaired by former prime minister Kok. In 2007 he and his commission came to the same conclusion as the 'Holland 8': in order to win the economic competition a far reaching administrative reform is necessary to put an end to the 'administrative crowdedness' that was held responsible for the agonizingly slow de-cision-making procedures that were seen as preventing the region from becoming more competitive (Lambregts et alia 2008: 51-52; (Meijers, Romein, Zonneveld, 2010).

National government did set aside this strongly formulated advice. Weary of governmental reform in general, support for this decision came from several research institutes. First the OECD. In a 2007 report this highly influential organization acknowledged that in certain ways the Randstad represented a relevant scale, it did not consider the introduction of a Randstad authority a necessity and instead favoured the strengthening of the governance capacity of city-regions (OECD 2007 as discussed by Lambregts et alia 2008: 52). However, the new Dutch government that came into being in the autumn of 2010 announced that it will consider the fusing of some or all of the Randstad provinces.

8.4.2 Munich US

Almost all the cities included in the Munich urban system, as it is defined in the present case study, are included in the state of Bavaria (NUTS2 region), thus territorial development issues at the level of the entire urban system are faced at the level of the Bavaria state the area of which is much wider of that of the Functional Region of Munich.

In addition, a number of cooperation initiatives of cities embracing cities-nodes of the Munich urban system are also developed. However, as we underlined in the previous section, city networking at the level of the Functional Region (FR) of Munich is insufficient

Therefore recent development in cities economic networking in the case of the entire Munich urban system corresponds to ineffective multi-level territorial governance, as cities cooperations are not enough developed at the FR level and the Bavarian state corresponds to a much wider territorial frame.

8.4.3 Piedmont US

As we have already mentioned, the Piedmont urban system, as it is defined in this case study, is included in a part of the region of Piedmont and in the Aosta valley region. Thus there is not a single government authority corresponding to the given urban system.
However, several cooperation initiatives are developed among the majority of cities of the given urban system; this means that recent developments in cities economic networking in the case of Piedmont correspond to a considerable degree to effective territorial governance.

8.4.4 Athens US

We should note from the beginning that in the case of the Athens urban system there are two levels of integration: the first includes Athens and its neighbouring cities of Athens, Thiva, Khalkis and Korinthos and the second includes also some more distant cities.

As we have already mentioned, the Athens urban system, as it is defined in this case study (corresponding to the 2nd of the versions mentioned above) and before the recent reform (June 2010), included under its existing structure of government the Attica administrative (non self-governed) Region and parts of its neighbouring administrative regions (see Map). The urban system of Athens in its narrow version mentioned above corresponds more or less with the metropolitan region of Athens if we take into account the intensity of economic links among the respective cities (Athens, Thiva, Khalkis and Korinthos). This narrow urban system corresponded to the administrative region of Attica but also to some small parts of the neighbouring to Attica administrative regions. In addition, Attica was administrated with a singular spatial- administrative system which included the Super-prefecture of Athens-Piraeus (which included the Prefectures[97] of Athens and Piraeus) and two more Prefectures (East and West Attica)[98].

Therefore the “old” government structure covering the territory of both the narrow and the extended versions of the Athens urban system did not correspond to the recent territorial dynamics of cities networking in this case.

[97] The 2010 reform removed the prefectures as self-governed units but the respective territorial units continue to correspond to NUTS 3 level.
[98] Each of these four prefectures included an important number of municipalities and communes.

Two new schemes of cooperation between Attica and the areas which include the rest of the Athens Urban System should, at least, be established and operate effectively: a first including Attica and the areas of influence of Thiva, Khalkis and Korinthos and a second including, in addition to the latter, the rest cities of the extended urban system of Athens.

Neither the new (after June 2010) government structure complies with the latter two wishful schemes. First, the "new" Attica self-governed region does not include the four closest to Athens cities. Second, there is not an official cooperation entity including the extended urban system of Athens. However, the functioning of the two scales of the Athens urban system (a. including: Athens and Thiva, Khalkis and Korinthos, b. including, in addition, other more distant cities) has been taken into account in the territorial plans of the respective Regions (NUTS2 units) as well as in the recent (2008) Spatial Plan of Greece.

We should also add that cooperation initiatives of the municipalities situated inside Attica with the rest of the cities of the urban system are rare.

Comparison / Conclusions

In all case studies there was an effort to take into account the new configurations of networking among cities; however the answers given were different.

In the case of Randstad, two platforms of cooperation with a more or less "soft" legal framework were used: the Regio Randstad and Deltametropolis Association. These cooperations referred to the entire urban system (as it is defined here); however the necessity to further improve the power of the Regio Randstad was contested by authorities of other territorial levels.

In the case of the Munich urban system, the necessity to improve territorial cooperation at the level of the urban system (as much as this correspond to the FR of Munich) was not faced appropriately by multi-level territorial governance as the city-cooperation component of this last was not developed enough.

In the Piedmont urban system, the recent developments in economic and social networking among cities at the level of the urban system (as it is defined here) was faced by "soft" multi-level cooperations, including, among other, cooperation in the definition of the planning objectives. As it was expected, these cooperations corresponded to territorial configurations either larger or narrower than the territory corresponding to the urban system.

Finally, in the case of Athens, the functioning of the two scales of the urban system has not been taken into account by the recent reform of the government structure but only in the objectives of the territorial plans.

8.5. Cooperation of the cities of the urban system at national and international level

Here we are interested in the forms of cooperation, the issues of the cooperation etc among cities (or groups of cities) of the case studies' urban systems at national and international level.

Cooperation at national level: We refer here to the cooperation of "strong" or "soft" legal framework among entities of the urban system with other entities situated in other parts of the national territory.

We have found few elements for this issue which are reported below together with those concerning the international level. In a following version of this report we will include the analysis of cooperation at national level in a separate section.

The number of **common programs or projects** that were implemented in each case study is a first useful indicator on this topic.
It is relatively easier to find data on the **international cooperations** of the respective cities. We used for this issue:
(a) The results of the 4 working papers and other literature.
(b) Data on the basis of a desktop research done by the NTUA team on the *twinning* of the respective cities with European or other cities outside Europe.
(3) Data from a desktop research done by the NTUA team on the participation of the case studies' cities in INTERREG IIIC and IVC projects.
The data of the two last datasets could provide a quantitative comparison of the cooperations corresponding to the four case studies.

We describe in next both the reported twinning and the cooperations developed in the frame of the EU programs **INTERREG IIIC** (promoting interregional cooperation[99] in the period 2000-2006) **and INTERREG IVC (“**innovation &environment: Regions of Europe sharing solutions", period 2007-2013) which regard the cities of each one of the four case studies[100]:

Regarding the two programs: INTERREG IIIC and IVC**,** *there are only one cooperation for each one (two in total) corresponding to cooperations inside the urban systems. Both correspond to the urban system of Piedmont (see also in section 8.3).* All the other are cooperations of the cities of the 4 urban systems at national and international levels.
We should note that the number of cooperations developed in the frame of the actual EU INTERREG IVC program is relatively small as they correspond only to a part of the considered period 2007-2013.

8.5.1 Randstad

The four Randstad provinces cooperate to promote their interests at the European level. A small group of provincial representatives works together on this issue, partly based in Brussels in the 'House of the Dutch Provinces' (see: www.regio-randstad.nl; www.nl-prov.eu). So, actually, policy cooperation on the Randstad level is externally, even internationally oriented.
As it results from the **twinning** data analysis, Amsterdam and Rotterdam are the most active in international cooperations while The Hague has not developed any such activity. As for the level of territorial influence, Rotterdam has developed mostly "European" relationships: its 9 twin cities are located inside EU, while Amsterdam twinnings are "more international": they regard 10 cities outside EU and only 2 cities of EU.

Regarding **INTERREG IIIC** in the Randstad, the city of Amsterdam prevails regarding the intensity of cooperation. The cities of Rotterdam, Utrecht and The Hague participate in a small number of cooperations (only 1 for the latter). Each one of the provinces of Utrecht and Flevoland participate in one cooperation. The social, sustainable development and issues of health concern mainly these cooperations.

[99] "Strengthen economic and social cohesion in the European Union (EU) by promoting interregional (strand C) co-operation"

[100] We only reported actors which belong to regional or local authorities (Regions, provinces, municipalities), not to private companies

Regarding **INTERREG IVC**, the entities of the urban system of Randstad participate in 4 cooperations; 3 of them correspond to the province of Flevoland and one to the Municipality of Almere.

Interesting to mention is also that recently Rotterdam and The Hague jointly participated as one of the actors in the METREX research group on polycentrism.

8.5.2 Munich US

In the case of Munich, cooperation at national and international level is very important as it is included in the city's strategy to improve the relationships of the firms installed in the city with partners throughout the world. The government of the Bavarian capital tends to improve the image of both the firms and the city as a dynamic economic centre at international level (Miosga 2005). It "emphasizes its economic success and announces with pride, that Munich ranks among the first in both European and national city rankings (Miosga 2005).

Only two years after the end of the Second World War, Munich as other German cities and especially the respective municipalities started to re-build international contacts. During the recent decades Munich developed strongly international cooperation in the form of town twinning. Actually (2010), the municipality of Munich is twinned with 9 cities[101]

Also, more recently, it participates in a considerable number of regional and national level city networks. It is also linked to a significant number of informal and formal cooperation projects at the national and regional level (Miosga 2005).

Specifically, the cities of Munich and Ingolstadt have comparatively more developed *twinning cooperation* with other cities (data from desktop research 2010). From a total of 33 such cooperations, 8 correspond to Munich, 8 to Ingolstadt and 17 in total correspond to the other cities of the US. The city of Munich is more active in this kind of networking with cities outside the EU and cities outside Europe (4 links). The twinnings of the other cities of the urban system are mostly European; only Rosenheim and Ingolstadt present twinning linkages with cities outside EU (2 and 1, respectively).

We should also add that Munich, in the frame of its marketing strategy (see previously) emphasises on a short of "diffused cooperation" as it host numerous economic (companies') cooperation organisations and organises a great number of economic, cultural and sports events.

Regarding **INTERREG IIIC**, it is evident that the city of Munich functions as an important cooperation node presenting the more active participation in projects. In the overall urban system, the city of Munich presents four collaborations. In one of them it collaborates with the city of Rotterdam. By the total of four collaborations that is developed, the two are reported mainly in the networking of enterprises and the other two in environmental issues.

Regarding **INTERREG IVC,** as for the previous program period, the city of Munich is the only node of the urban system that participates in cooperations (2). The respective projects regard mainly "entrepreneurship" and "knowledge network"

[101] (Dates of agreement shown in parentheses): Edinburgh, United Kingdom (1954), Verona, Italy (1960), Bordeaux, France (1964), Sapporo, Japan (1972), Monterrey, Mexico (2010),. Cincinnati, Ohio, United States (1989), Kiev, Ukraine (1989), Harare, Zimbabwe (1996), Hyderabad, India (2005).

8.5.3 Piedmont

Among the cities included in this urban network, only three of them develop cooperation initiatives at regional or international level: Torino, Cuneo and Alba.

In the first case, the cooperation initiatives concern: (a) the interconnection of Torino with the neighbouring French and Swiss regions in the frame of different programmes such as: "Diamante Alpino", COTRAO, CAFI, Euroregion MedAlp and (b) the participation of the municipalities, the county and the region of Torino in several EU networks and projects (Eurocities, Metropolis etc), the participation of its universities in educational and cultural European and world networks, the hosting in its ground of several international organisations (ILO, UNESCO etc) as well as the organization of different cultural and sports events[102].

In the second case, Cuneo is included in the strategically important areas of North Italy as pointed out by the program SISTEMA, which characterises Cuneo as cross-border gate between Piedmont, Luguria and French Nice.

Also, the public administration of some of the municipalities of the Cuneo AIT started to cooperate with their counterparts in the western Liguria towards the promotion of the development of Levaldigi airport towards the logistic sector, in order to transform the Cuneo area in a logistic gate of an integrated system Liguria-Piedmont.

In the case of Alba, the cooperation initiatives are devoted in the valorization of the particular economic structure of the area and its international links and mainly concern coordinated development of agriculture and eno-gastronomic tourism

As it results from the **twinning** data analysis, only Torino participates in twinning with both European cities (7 inside EU and 1 outside EU) and cities outside Europe (9)

Regarding **INTERREG IIIC**, as we have already mentioned, there is one cooperation inside the urban system –see in section 8.3[103]. All the other regards cooperations at national and international levels.

The authority of the region of Piedmont presents the higher activity (4 cooperations). Provinces of Asti and Turin participate in the most of cooperations developed inside the territory of the Piedmont urban system. While Aosta valley has a more autonomous status, both the municipality and the province have participated in such cooperations.
The city of Asti cooperates with other municipalities in 3 projects.
The different entities of Piedmont participate in 16 cooperations inside or outside of the Piedmont territory.
The themes of the projects are reported mainly in the sectors of regional - land planning and strategies, information society, industry-enterprises and in the confrontation of environmental issues.

Regarding **INTERREG IVC**, there is one cooperation project inside the Piedmont urban system[104], as we have mentioned.

The province of Turin had the most important activity in cooperations (4). The majority of the cities of Piedmont do not participate in INTERREG IVC cooperations.

Main sectors of interest of various projects are the sustainable change - competitiveness, the European Entrepreneurship Network and the knowledge economy.

[102] E.g. 2008 Turin World Design Capital, 2010 World Architects Congress etc.
[103] In the respective project, Turin acts as leader and the Autonomous Region of Aosta Valley participates as partner.
[104] In this project, the regional authority of Piedmont participates as leader and as partner; the city of Asti also participates in this project

8.5.4 Athens US

We should take into account that the region of Attiki includes numerous municipalities a great number of which have important population potential.

As it results from the **twinning** data analysis, even the small municipalities participate in "twinning" with foreign municipalities. The total of the cities included in the Athens urban system have developed 110 twinning with foreign municipalities (29% of the total twinning developed by Greek cities). 78 twinning (22% from the total for the country) correspond to the Attica municipalities while 32 (9%) correspond to the rest of the Athens US. From the total of 110 twinning the bigger share (70%) correspond to cities of the EU-27. However, twinning of Attica as well as of the rest urban system with cities outside EU is also strong.

The more important of these municipalities regarding the population potential have developed considerable cooperation relationships with other cities from abroad in the frame of programs financed by EU funds. The municipality of Athens (with population roughly 900.000 inhabitants) has the more developed activity on this matter.

Second, the four prefectures of Attiki (which will be removed after 31.12.2010) and even more the two more important, the ones of Athens and Piraeus have also developed a considerable activity in cooperations with European prefectures or regions in programs funded by the EU.

On the contrary, other cities nodes of the Athens urban system, much smaller in population participate in few cooperations with EU cities.

Both cities situated inside Attiki and outside Attiki participate in a small number of cooperations with other Greek cities.

Regarding **INTERREG IIIC** In the case of the Athens urban system, the prefecture of East Attica is very active in INTERREG IIIC cooperations (6); the municipality of Pallini participates in three of them. The neighbouring cities of Athens, Thiva, Khalkis and Korinthos don't represent any kind of cooperation.
The municipality of Athens is also highly active in cooperations (3). Only five of the municipalities of the rest of Attica[105] participate in cooperations. Finally, the authority of the region of Attica participates in one only cooperation.
In the urban system of Athens the cooperation deals with themes such as networking, communication between the enterprises, e-governance and environment.
Regarding **INTERREG IVC**, the issues dealt in the case of Attica, the only part of the **Athens US** that participates in projects, are the urban transport system, the ICT and the environment. Three collaborations are only developed by the total of municipalities of Attiki (municipalities of Zografou, Lavrion and Athens). The municipality of Elefsis which belongs to the prefecture of Western Attica participates in one project. In its entity the urban system of Athens presents low number of municipalities' participation in projects.

Comparison / Conclusions

Internationally, the Randstad region is represented in Brussels, but most of its major cities engage in international activities separately. However, one has to take into account that the Randstad forms such a large and dominant part of the Netherlands, that international activities of the country often bear a 'Randstad' mark as well.

[105] Elefsis, Avlona, Aghia Paraskevi, Aghios Stefanos and Zografou

The city of Munich has participated in a high number of cooperations at national and international level. Other cities–nodes of the urban system has also developed (less in comparison with Munich) this kind of cooperations.

In the case of Piedmont, it seems that only three from the 12 FUAs (Turin, Cuneo and Alba) participate actively in this kind of cooperations.

The municipalities and prefectures of the Attiki region have participated in an important number of cooperations at international level, while the respective cooperations at national level are few. The cities of the urban system located outside Attiki have a comparatively smaller participation in such kind of activities.

It seems that the cities of Munich and Piedmont urban systems have a very active participation (taking into account their population potentials) in cooperations with a "soft" legal framework with other European cities. International cooperations are also numerous in the case of the Athens US; however the density of cooperation links is much less important taking into account the population of the Athens US.

Regarding cooperations at national level, we can't compare the density of links, but it seems that in all three cases examined here national cooperations are comparatively smaller.

Regarding specifically the reported **twinning links** which enable a quantitative comparison of the cooperations corresponding to the four case studies:
- Athens has comparatively to the other 3 urban systems developed the most twinning with other cities both at European and international level.
- Regarding Randstad and the Munich urban system, the cities of Munich and Amsterdam have developed considerable in numbers linkages both inside and outside EU while Rotterdam presents more important networking with cities inside the EU.
- In Piedmont, only Torino has developed twining linkages with other cities at both European and international level.

Athens US and Piedmont are much more active in **INTERREG IIIC** cooperations (15 and 16, respectively) compared to the Randstad (6) and the Munich US (5).

Finally, regarding the implementation of **INTERREG IVC** until today, the most important activity was developed by the urban system of Piedmont (6 collaborations); it is followed by the urban system of Athens (4 collaborations), Randstad (4 collaborations) and finally the Munich urban system (2 collaborations).

Regarding specifically the **issues of the cooperations** developed through the programs **INTERREG III C**, promoting interregional cooperation in the period 2000-2006, and **INTERREG IV C** which prioritises cooperation on innovation and environment ("Regions of Europe sharing solutions") in the period 2007-2013:
In general terms, these two INTERREG programs aim to promote regional cooperation on development policy as well as to create synergies between "best practice" projects.
In next we take into account the division of the issues / activities of each program in categories.
In the projects in which actors of the Athens US and Piedmont participate, main issues of the cooperations are: regional - land planning and strategies, information society and knowledge economy, environmental issues, sustainable change – competitiveness and the European Entrepreneurship Network (regarding industry-enterprises).
In the cases of the Munich US and Randstad, the respective cooperation projects deal with a more restrain range of issues as networking of enterprises, environmental issues and health issues.

In all case studies' projects, a great attention is given in networking of enterprises and in information networks.

8.6. Evaluation of the success of the cooperation

We refer both to existing and proposed cooperations for each territorial level.

We took into account the opinion of the involved local authorities and the respective regional and national authorities (according to the relevant literature) as well as the opinion of the experts (authors of the respective papers) for each case study.

8.6.1 Randstad

According to Meijers, Romein, Zonneveld, 2010, the highest level of the entire Randstad is without any doubt the most unsuccessful level of cooperation.

After a first promising phase of functioning of the Regio Randstad as a negotiation and cooperation platform and of the Deltametropolis Association as a platform for conceptual discussions about Randstad, in a 2nd phase, the opinions changed. On 2008 the Regio Randstad was dissolved mainly because the four participating cities lost interest in Randstad cooperation, chiefly because it was difficult to reach agreement.

Also, Randstad as a policy concept was further undermined by central government based on a study of NISR, which argued against the usefulness of this cooperation for the entire development of Randstad. Also the functional rationality behind such co-operation was put into question, as suggestions were made that the Randstad cities were not strongly integrated.

Also, in this case the cooperation was to a large part unsuccessful because the participant actors of different territorial levels worried that their powers could be limited as well as they did not agreed to common objectives for territorial policy implementation.

On the contrary, it seems that WGRs work successfully. A wide range of supra-local issues are addressed at the scale of larger city-regions. New steps have been taken to strengthen cooperation between the Rotterdam and The Hague city-regions, but their success cannot yet be evaluated.

8.6.2 Munich US

Cooperation developed at international level is obviously successful. However, it concerns mainly the city of Munich and it seems that there is not an appropriate coordination among the cities-nodes of the US on this issue.
Coordination inside the urban system seems to be successful as for the participation of the cities in the territorial planning activities. However, cooperations with a "soft" legal framework on issues other than planning seem to have a moderate success –see also in section 8.9.

8.6.3. Piedmont US

It seems that the different horizontal and multi-level cooperation initiatives with a "soft" legal framework developed in the Piedmont US enriched the action of the respective legal territorial authorities (municipalities, provinces, regions) in order the entire multi-level governance scheme to be put in line with the recent territorial development of the Piedmont territory.

Specifically, a crucial role in stimulating the local cooperation has been played by the Regional Government, which offers many incentives to the aggregation of municipalities according to the main axis of the Regional Plan and the Regional Strategic Document for the 2007-2013 Cohesion policy. This interplay between the Region and the local systems seems to configure an original declension of the New Regionalism stream initiating in nineties, with a strong application of the multi-level governance recommended by the European Union (Salone, 2010).

8.6.4 Athens US

Regarding specifically territorial cooperation initiatives with "soft" legal form developed inside the Attica region *before the recent government reform*, both inter-municipal and multi-level cooperations, it seems that they were not successful. The main reason was that they added an additional layer of decisions and actions in a context where an excessive number of levels of territorial authorities existed (central government organisms, administrative Region, self-governed super-prefecture and other prefectures, municipalities) and there were overlapping competences among the different territorial levels.
On the contrary, since the recent reform constituted only three levels of territorial authorities having competencies that are enough clearly defined, it is expected that "soft" legal form cooperation initiatives will be more successful in comparison with the past.

Comparison / Conclusions

In the case of Randstad, the attempts to strengthen the cooperation at the highest level (of Randstad) was to a large part unsuccessful, while cooperation at the level of WGRs worked successfully.
In the Munich case, international cooperations are undoubtedly very successful, while horizontal cooperations with soft legal framework are less successful as they are viewed as less useful.
In the Piedmont case, the entire set of multi-level cooperations was successful to a large part.
In the case of the Athens urban system inter-municipal and multi-level cooperations under the former government regime were rather unsuccessful; it is expected that such "soft" legal form cooperation initiatives will be more successful under the new government structure.

Comparing the 4 case studies, In general terms:
- International cooperations are very successful in the cases of Munich and Randstad as they are seen as a crucial component of highly extrovert economies.
- Cooperation at the level of the entire urban system of Randstad was rather unsuccessful as the approach which argued against the usefulness of this cooperation for the entire development of Randstad prevailed. Also, cooperations at the entire urban system layer in the other cases were not seen as necessary – see also in section 8.8.
- Horizontal cooperations, mainly inter-municipal or inter-provincial ones, are more successful in Randstad and moderately successful in Munich and Piedmont; they were less successful in Athens.
- Overall multi-level cooperation seems to be relatively more successful in Piedmont, Randstad and Munich and clearly less successful in the case of Athens.
See in more detail for the reasons favouring or hindering cooperations and the correspondence of the entire multi-level governance in the 4 cases in the next sections 8.7-8.9.

8.7. Factors favouring cooperation

There are different factors favouring territorial cooperation that interests us here, as for example: identification of reasonable objectives that are attractive for all partners, small distance, a common history or tradition etc.

It is firstly obvious that the preparation and discussion of a plan of territorial development is a factor that favours cooperation among the interested authorities and other stakeholders of different territorial levels. This is true for Randstad (Structuurvisie Randstad 2040), Munich US ("PERSPECTIVE MUNICH") and Piedmont (Regional Territorial Plan of the Piedmont Region / Piano Territoriale Regionale della Regione Piedmont) and at a smaller degree for Athens US.

However, as it results for the 4 case studies, this is not enough; the agreement on the strategy and the several objectives of the plan matters more.

Specifically, it is obvious that the *identification of common development objectives in the new context* of growing global competitiveness together with growing connectivity and networking among cities is the most attractive for partners of territorial cooperations mostly for the higher levels cooperations in the four case studies.

In the case of Randstad this is true for a part of municipal and provincial authorities as well as planners which estimate that functional integration at the level of the urban system of Randstad would raise the performance of the urban system.

It is also true for the municipal, provincial and regional authorities and other stakeholders in the case of Piedmont regarding both the development of the entire territory of the Piedmont urban system and the territories of specific AITs.

> According to Salone – Cotella 2010: "The main strengths of the urban network economic system are represented by its consolidated entrepreneurial tradition, both various and open to the outside, by the availability of highly educated labour resulting in increasing technological capacity and by the historical and natural heritage characterizing the majority of the analysed Piedmont AIT.

It is also true for the cases of the Munich and the Athens urban systems.

Identification of common objectives regarding the improvement of quality of life has an important role in all case studies.

The *small distance* has undoubtedly an important role in all the cases; this role was comparatively higher in the case of Randstad and smaller in the other three cases.

In the cases of Randstad, Piedmont and Munich, important *tradition of cooperation* favoured recent initiatives while in the case of the Athens urban system respective tradition was very limited.

The finance of collaboration projects from EU funds constituted a factor which favoured considerably collaboration at regional and national and even at trans-national level, particularly in the case of the *Athens urban system*. In this case, often the collaboration between Municipalities or Municipalities and Prefectures in order to submit a proposal of construction of infrastructures or other works or development of activities to be financed by EU founds (as well as, afterwards, the implementation of this proposal) constituted undoubtedly a factor that favoured a more permanent cooperation among the interested bodies.

It appears that this factor was also important in the case of *Piedmont urban system*.

Summarising, in all case studies, the main factors favouring cooperation are: the identification of reasonable objectives that are attractive for all partners, concerning both development and improvement of the quality of life, the small distance, the common history or tradition and the finance of collaboration projects from EU funds.

The small distance and the important tradition of cooperation favoured mainly cooperations into the US of Randstad, Piedmont and Munich.

EU funding of the collaboration at regional and national and even more at trans-national level play a more important role in the case of Athens US and a comparatively less important one in Piedmont.

8.8. Factors hindering cooperation

Different factors could hinder cooperation as for example: *competition between partners of similar weight, mistrust of small versus bigger partners, mistrust of partners with "hard" legal status versus cooperations with "soft" legal status* etc.

Concerning the "soft" cooperation at the level of the entire urban system of **Randstad** under the form of Regio Randstad, major factor hindering cooperation is that in the absence of good trade-off mechanisms and instruments, it proved hard to set aside local interests for the greater regional good. A second factor, closely related to the first, is that different stakeholders argued against the usefulness of this cooperation for the entire development of Randstad based on a relevant study.

In the case of the **Munich** urban system, the most important reason hindering cooperation is very probably the absence of motivation taking into account that cities-nodes are enough dynamic by themselves. As Miosga 2005 underlines:"The municipalities in the Munich region are benefiting from the strength of the core cities without the need for collective action. Thus there is a lack of motivation to collaborate. This could become a serious obstacle for the Munich Metropolitan Region and its future competitiveness at the European level". The city of Munich prioritised the planning of its close wider area from the vision of its wider Functional Region. This is related to a mistrust of a big versus smaller partners.

In the case of **Piedmont** a factor which hinders the success of the inter-municipal cooperations with a "soft" framework is "the exclusion of Turin municipalities from the majority of development policies promoted by its neighbours in themes of cooperation…" due mainly to the change of the development objectives of the latter municipalities towards to a bottom-up development in order to respond to their historical dependence from Torino and the promotion of a more polycentric structure of the Turin metropolitan area.[106]. Paradoxically, however, the renewed capability to cooperate demonstrated by the local systems has recently tended to exclude the capital, historically dominant in a hierarchical urban system.

In the case of the **Athens US**, the existence of many levels of government / self – government in **Attiki** under the former (before June 2010) government system, made horizontal and vertical cooperation, among the different territorial units, more difficult. It is expected that the new government system of Attiki previewing only two levels with more clear division of responsibilities will allow the development of multi-level cooperation initiatives under a "soft" legal framework, complementing the action of the actors with strong legal framework: self-governed Region and municipalities.

[106] See in more detail in Salone C. - Cotella G. 2010, chapter 5.

Comparison / Conclusions

We could conclude that factors hindering cooperation refer both to the differentiation among the nodes of each urban system (population weight, economic profile and dynamics) and the specific forms and issues of cooperations.

As for the differentiation among the nodes: it seems that the existence of a very strong node (the share of the primary city is very high) in the urban system does not favour cooperations in a steady and permanent base. This is evident in the case of Athens and to a smaller degree in the case of Munich In this last, the strongest node, the respective authority did not trusted cooperation in a very wide scale.

On the other hand, in a contrary situation as this one of Randstad the existence of a morphologically polycentric structure i.e. the existence of multiple strong nodes inside the urban system hinders also cooperation: as we seen in this case institutionalised local actors as the provinces and municipalities worried that the creation of a strong basis for permanent cooperation at the level of Randstad would limit their competences.

In the intermediary situations from the respect of monocentricity / polycentricity as the case of Torino / Piedmont, mistrusts at different levels hinder cooperation: mistrust among the primary city and more distant areas, among groups of cities belonging to different territorial units as the AITs etc.

Finally, the political will of the central government to support decentralisation also matters. The new dutch government led by Rutte appears to favour decentralisation, thus giving more room for cooperation at the level of regional urban systems such as the Randstad. In another case, this one of Athens US, the unsufficient support by the central government of horizontal and multi-level cooperations (in the former government structure) hindered the development of these cooperations.

8.9. Evaluation of the correspondence of cooperation with territorial development trends

Here we will try to evaluate the correspondence of existing or proposed cooperation at different territorial levels with territorial development trends inside and outside the respective urban systems

At this stage some results of analyses of the territorial cooperation developed in the four cases are still incomplete, as for example cooperations of the urban systems with the respective national territories.

In general terms, the majority of cooperations developed in the four cases tried to take into account the recent territorial development trends in each urban system. However, we should evaluate specifically the degree of this correspondence on the base of the numbers of cooperations, their forms and their issues.

The most important cooperation *with a "soft" legal framework* at the level of the entire urban system examined here is that of the Regio **Randstad** and of the Deltametropolis Association. This cooperation embraced a wide range of strategic territorial development issues.
According to Meijers, Romein, Zonneveld, 2010: "The analysis of the case of Randstad has shown that there is high functional integration associated to morphological polycentricity. In this fact were based the initiatives taken to strengthen the cooperation at the level of Randstad in order to create the necessary critical mass for a more powerful development. The later initiatives proposed to enhance the power of Randstad as a distinct layer of governance through cooperation. In this context are included the cooperation initiatives implemented in the frame of "Delta metropolis". However, there were also opposing political initiatives which were based on the argument that it would

be more efficient to approach distinctively the development of ea strengthen the centre: Amsterdam".

In the case of **Munich US** emphasis which has been given to the international cooperations (of the city of Munich) is undoubtedly in line with the recent territorial development, specifically with growing economic and cities networking at this level.

Regarding the cooperations inside the US and at the level of the entire US it seems that the major concern of the city of Munich is to develop cooperation with its closest cities (Ingolstadt, Augsburg etc) in order to develop infrastructures that respond to the recent territorial development trends without however according enough importance to the territorial integration at the level of the entire urban system (see the evaluation of the "PERSPECTIVE MUNICH" as well as the accompanying guideline projects in Thierstein – Droß 2008[107]).

In the case of **Piedmont,** the recent and current experiences of cooperation on different territorial scales appear to be coherent with the development trends occurring within both the regional space and the interregional dimension in which the urban system of Piedmont region is inscribed. Specifically, the deep crisis occurred to the Piedmont industrial system has represented a powerful impulse to search for new conditions of collective actions.

Regarding the cooperations inside the US, the AITs, were conceived as coalitions of local authorities that transcends administrative and historical borders. More recently, the PTIs have been designed and proposed by public-private coalitions and must be inter-municipal.

The level of the entire urban system has been taken into account by the Regional Territorial Plan, which is strongly and explicitly coherent with the philosophy underlying the European Spatial Development Perspective (ESDP), in which the idea of polycentrism and definition of systems of urban nodes cooperating in various spheres of territorial action play a significant role. The Region's statement assumes that polycentric development must be developed on various scales, from the European to the urban one, taking into consideration the multi-polar structure of the Turin Metropolitan area.

However, the recently renewed capability to cooperate demonstrated by the Piedmont local systems has recently tended to exclude the capital, historically dominant in a hierarchical urban system.

Finally, the growing importance of networking at national and international levels is in line (a) with the initiatives aiming at the strategic coordination of public and private initiatives and projects at the level of North-Western Italy in which participates mainly the Turin metropolitan area (b) with the intensification of respective cooperation developed by municipalities and other stakeholders.

In the case of **Athens urban system,** the need to further reinforce urban networking at different levels through cooperation is in general terms in line with the intensification of cooperation initiatives and the recent government reform.

Specifically for the territory of Attica:

- The objectives of both the Development Plan of Attica 2007-2013 (2007) and the more recent proposal of Regulatory Plan (Spatial Development Plan) of Attica (2009) are in line with the ESDP objectives (plus the Territorial Agenda of the EU ones for the second) on polycentric development.

[107] "There is no doubt, that sustainable urban development strategies need a complementary approach by adequate strategies and governance capacities on the wider regional level. Fragmentation of power and planning capacity, different rhythms on decision making and philosophies between core cities and its wider mega-city-region are counterproductive and weaken the performance of the city and the region in the international competition" (Thierstein et al 2008).

- Inter-municipal as well as multi-level cooperations were developed strongly mainly during the period 1980-2000 in a wide range of issues; however an important number of these cooperations were abandoned during the last decade because the expected results were not fulfilled and the partners with “hard” legal status (municipalities etc) mistrusted the further consolidation of these cooperations.

The recent government reform previewing the support to inter-municipal and multi-level cooperations with “soft” legal framework in the frame of more appropriate two levels structure of government (self-governed region, municipalities) is undoubtedly in line with recent territorial development trends.

The intensification of cooperation with European cities and other partners undoubtedly comply with the need to further support networking of Attica with European partners. However, the results of the respective cooperations whether they were or not financed by European funds were clearly lower than expected.

The territorial development trends of the four urban systems are inscribed in the general trend of intensification of the networking among cities inside and outside the urban systems of the European territory. However, specific driving forces operate in each urban system:

In Randstad and Munich US the role of global players and major players at European level reinforce through the further development of APS and HT activities. Cooperation aims to further consolidate this role through giving emphasis to the international and European level cooperations. The initiatives to improve integration in the entire Randstad and at the level of a wider zone of the city of Munich are included in this option, which is translated to objectives such the improvement of relevant infrastructures and the promotion of the image of Randstadt and Munich.

In Piedmont, multi-level cooperation is seen as a means to promote polycentric integration which would support economic recovery of the industrial system through innovation policies, environmental protection, valorisation of historical sites and culture-based systems.

Finally, in the Athens US recent territorial development trends constitute a challenge which should be faced by the improvement of the role of the urban system at European and trans-national scale; this corresponds to the improvement of competitiveness through innovation in relation with the amelioration of the environment in order, among others, to raise the attractiveness of Attica for investments. While polycentric integration through cooperation is supposed (by the Regional and Spatial Development plans for the Region) to serve this goal, only the cooperations at European level (financed or not by EU funds) have often given priority to economic development issues; inter-municipal and multi-level cooperation inside Attica have usually prioritised issues of infrastructures at local and sub-regional level.

In all the cases the cooperation policy options emphasise very often polycentric integration; however the results do not correspond to this goal at the degree which was expected.

At the higher level: in Randstad the implementation of the respective objectives did not advance; the cooperation including only some urban nodes neighbouring the city of Munich do not correspond enough to polycentric integration of the given urban system; cooperation at the level of Piedmont seems to be promoted systematically; in Athens US the respective results are clearly lower than expected.

The effects of lower level inter-municipal and multi-level cooperations on polycentric integration differ from case to case. WGRs of Randstad and cooperations in the frame of AIT and PTIs in Piedmont contribute effectively to polycentric integration as they strengthen the nodes located outside the primary city; in Athens US while the respective effects are undoubtedly positive, their overall impact was very small.

9. General conclusions

Territorial development trends and cooperation

The case of **Randstad** confirms to a considerable extent the finding of the ESPON space level analysis that the pattern of morphological polycentricity (low share of the "primary city" in the population etc) associated to high level of functional integration (measured, among others, on the basis of the intensity of firms links at the urban system level), the high presence of APS and HT activities[108], the "core" place in the national and transnational firms' networking and a highly unified labour market is associated with high performance as measured by the GDP per capita.

The characteristics of the **Munich urban system** are similar except from the indexes of morphological polycentricity (very monocentric urban system) and functional integration at the level of the urban system (high but lower than in Randstad). We could not evaluate if the Randstad development pattern is more performing than that of Munich urban system, both presenting a very high GDP per capita. However, we can surely stress that these two territorial patterns are more performing than the two following.

The **Piedmont urban system** pattern presents intermediate values as for the presence of the ORBIS sector and specifically the APS and HT subsidiaries weighted by population. The weight of Torino in the entire urban system is higher than in the former two cases and the intensity of the internal to the urban system links is smaller. This territorial pattern of less dispersal (compared to Randstadt) of the clustering effects in Torino to a significant part of its territory is clearly less performing (at the level of the entire urban system).

Finally, in the case of **Athens** it seems that the extreme monocentricity both at the national level and the level of the urban system explains only a part of the much smaller performance of the urban system. In any case, the lower level of the intensity of firms links inside the urban system, the lower shares of the APS and HT activities and the orientation of the firms networking / clustering at the European space level "to the outside" (to the European space "core") explains a considerable part of the lower level performance. However, as we saw in the case of the Eastern Balkans area the position of the city in the ESPON space networking does not encumber a certain type of integration at the Eastern Balkans level profiting to Athens.

Regarding **territorial cooperation,** we should first underline, as it was, also, mentioned (in section 8.2), that the four case studies refer to *different approaches of government systems*: from "federal" in Germany to "decentralized unitary" in Netherlands and Italy and to "centralized unitary towards decentralized unitary" for Greece.

In all four cases several attempts were realised in order to complement the activity of the legal actors as Regions, provinces and municipalities, with cooperation initiatives with a "soft" legal framework covering intermediate territorial layers in order to **implement a more flexible and more appropriate to recent territorial development multi-level governance.**

Very interesting from this respect are the attempts to institutionalise permanent collaborations in Netherlands: the WGR regions at lower level and Regio Randstad.

[108] In the ORBIS database subsidiaries part of the economy.

In Greece similar cooperation initiatives have been undertaken under the former government system; the law on the new government structure favours such collaborations.
Also, in the cases of Munich US and Piedmont several initiatives in the same line have been developed as the cooperations initiated by the city of Munich and inter-city or multi-level initiatives developed in the case of Piedmont.

Concerning the cooperations which are relatively more important in extent and duration and adopt a wider approach of territorial development, the four urban systems have developed different types of cooperation initiatives **inside the urban systems:**

In Randstad we can argue that cooperation within the so called Amsterdam Metropolitan Region, which is a WGR-region, entirely focussing on spatial planning issues, is quite successful.

In the case of Munich US, the aim of the city of Munich to concentrate on the most interesting economic potentials in the Bavarian capital and to share the growth with the subordinated cities seems that there is neither a sufficient cooperation network nor actual initiatives to build up governance structures at the level of the Functional Region of Munich.

Although in the Piedmont urban system territory, the delimitation of administrative regions and provinces does not comply to some extent with the actual organization of the territory, a number of cooperations are developed between the nodes inside the U.S.

Finally, in the case of Athens U.S., the respective permanent cooperations were often restricted to territorial planning issues while the more limited in time ones were referring to the creation of common infrastructures or to specific local issues (see in more detail in section 8.4).

The cooperation **at the level of the entire urban system** in Randstad raised questions so not enough actions have been undertaken on this issue.

In the case of the entire Munich urban system (as it is defined here), cities cooperations are moderately developed at the US level; on the other hand, the Bavarian state corresponds to a much wider territorial frame.

In Piedmont recent developments in cities economic networking correspond to a considerable degree to effective territorial governance.

No cooperation inside the wide U.S of Athens is established until now.

Regarding the cooperation of the cities of the urban systems **at national and international level:**

Cooperation at national level is relatively less developed than expected. It is comparatively more developed in the cases of Piedmont, Munich US and Randstad and less in the case of Athens.

As for the international level, all first cities of the four urban systems have developed considerable in numbers linkages both inside and outside EU. The other cities of the urban systems participate less in such cooperations[109].

We should also take into account respective activities developed by the provinces in Randstad or multi-levels actors in the other three cases.

[109] Except from Rotterdam, which has developed twinning linkages with several cities at European level.

A first general conclusion on territorial cooperation is that regarding the level of international cooperation, a very intense activity has developed in all four cases, a fact that it is in line with recent territorial development trends. Cooperation at national level is comparatively less developed. Cooperation inside the urban systems and cooperation at the level of the entire urban systems present, in general terms, a moderate degree of progress (as we have already mentioned) as several initiatives have been developed with different characteristics and different degrees of success.

In more detail: A first criterion of success is the **degree of concordance of the cooperation results with the cooperation objectives.** Furthermore, it is important to evaluate if the cooperation objectives and results are in line with polycentric integration objectives fitting to development trends, regarding both the European context and the specific contexts of the four urban systems. The phrasing of the objectives of the cooperation initiatives is in general terms in line with the "real" (on the ground) development trends; this constitutes alone (per se) a progress.

However, it seems that the "real effects" of the cooperation initiatives from this scope are less than expected. The cooperation objectives often did not comply to each other, therefore the overall approach is rather fragmentary; often they did not focus on priorities which are in line with territorial integration; furthermore, the territorial extent of the desired territorial integration was not often clearly defined; we should here take into account that there is not a widely acceptable method of definition of the appropriate extent of territorial integration – see in section 8.1.

What it is important: they did not develop procedures of evaluation to what extent their results comply with recent territorial development trends and with the appropriate polycentric integration.

It seems that, in general terms, cooperations had longer duration and were more fruitful in the cases of Piedmont, Randstad and Munich US compared to the case of the Athens US. Specifically: cooperation at the level of the entire US was more effective in the case of Piedmont and less in Randstad and Munich US and even less in Athens US. At local level and at European level there are no major difference among Randstad, Piedmont and Munich US while in the case of Athens the respective cooperations were less effective. We should, however, underline that even in the three first cases, a part of the "real results" are to be expected.

It is more important to evaluate separately the cooperations financed by European funds: it seems that the ex post evaluation of the respective cooperations in the four case studies was limited to check the correspondence of the results to the objectives of the cooperations and did not evaluate appropriately the "real impacts" on polycentric integration. We furthermore remind here the opinion of Panteia 2010 that there are not until now convincing methods of definition of socio-economic "functional co-operation areas".

The above ascertainment for the four case studies is in line with the respective conclusion of the evaluation of INTERREG projects (this last being limited to the period 2000-2006) by Panteia (2010) –see in section 8.1.

The challenging regional urban systems level

As it results from the above comparison exercise, links and integration of the urban systems at "regional" level (beyond the metropolitan level for these specific case studies) becomes gradually more important both regarding territorial development trend and territorial cooperation.

Links at the level of Randstad are obviously already very strong; links among the city of Munich and its closer cities develop; similarly links among Torino and cities of Piedmont as well as among Athens (the Athens basin) and the rest of the Athens urban system) are growing.

Cooperation in all four cases gave priority to the development of the respective entire urban systems (and respective territories) with one way or another: aiming to improve the competitiveness of the entire territory (Randstad) or to ensure an appropriate widening of the primary city (Munich) or to face the crisis of the industry of the primary city (Torino) and other localities through the development of other activities (tourism, culture) in the entire territory (Piedmont) or, lastly, to ensure both the appropriate widening of the primary pole (Athens) with the development of new activities in the neighbouring cities.

In all cases the growing importance of this level in planning and wider cooperation necessitated a new balance among the territorial entities: the cities in Randstad, the primary city and smaller cities in the three other cases. The emergence of this new balance faced mistrusts and reactions from the respective established authorities and questioned older rivalries: among cities and provinces in Randstad, among the city of Munich and other cities, among Torino metropolitan area and other cities in Piedmont, among the Athens basin authorities and the rest in Athens.

It seems that the activity of a unique regional authority covering the entire regional urban system and territory (existing authority in Piedmont or recently created in Attica) with clear role at least for the planning in the entire regional territory is comparatively more successful regarding the alignment of policy objectives to the exploitation of polycentric integration potentials.

Apart from this, cooperation of interested established authorities or soft legal framework cooperations in the frame of regional objectives as in Piedmont (AITs, PTIs), Randstad and Munich US has also contributed to the alignment of policy objectives to the exploitation of polycentric integration potentials.

Policy options

It results from the above that there is a need to advance more in the field of polycentric integration though cooperation in the frame of a more general improvement of territorial cooperation in EU.

- EU policies and primarily Territorial cooperation programs should contribute to the improvement of the definition of priorities as well as to the implementation of cooperation initiatives developed by different level authorities of the member countries for the new programming period 2013-2020.

This option is mentioned in general terms in the proposals of "Europe 2020" (2010) and in the Fifth Cohesion Report (2010) for the new programming period 2013-2020.

It is specified more in Panteia 2010, the respective proposals of which we used to a considerable extent as for the EU level.

- European Commission should take the initiative in the development of a more appropriate overall approach for **monitoring and evaluating** through appropriate **indicators** future territorial co-operation.
- **EC but also national, regional and local authorities** should establish more intense and durable inter-regional (but also cross-border and transnational) co-operation processes **in order to achieve more concrete and tangible territorial development effects**. These processes should involve public and semi-public sector organisations located at various levels of government, but also actors from the private sector and the civil society.

Cooperations should appropriately combine aspects which are of strategic EU interest as the EU 2020 strategy and the (future) guidelines for the period 2007-2013 and aspects which are of strategic interest in their own territorial context.

Inter-regional (but also cross-border and transnational) cooperations whether they are financed by EU funds or not should seek to be self-sustaining i.e. securing on their own financial means for co-operation. This is particularly important for cooperation initiatives that address problems or development challenges requiring a continuing effort in order to be tackled effectively.

- Territorial cooperations strategies should include specific objectives for **strengthening polycentric integration through cooperation of cities in urban networks at different territorial levels.**

These specific objectives should be more appropriately included in the sustainable urban development cooperations which will be developed in the programming period 20013-2003 (in which the URBAN method will become mainstream method of promoting sustainable urban development).

- Research on methods of definition of “functional co-operation areas” taking into account the growing importance of the links among cities has already been developed mainly in ESPON. The results of FOCI project constitute a useful step on this issue. However, further research on this topic is needed; it should take more into account the results of the respective aspects of cooperation initiatives.

References and selected Bibliography

Angelidis et al, 2010, *ESPON Project FOCI- Athens Case study*

Angelidis et al, 2010, *ESPON Project FOCI- Munich Case study*

Central Union of municipalities & communities of Greece (KEDKE), 2010, *Twinning (among Greek and foreign municipalities).*

ESPON Transnational Project Group / TPG (Lead partner /LP: Univ. of Valencia), 2006, *ESPON project 2.3.2: Governance of territorial and urban policies from EU to local level,* Final Report, Univ. of Valencia www.espon.eu

ESPON TPG (LP: Nordregio), 2005, *Project 1.1.1: Potentials for polycentric development in Europe*, Nordregio, Stockholm www.espon.eu

ESPON TPG (LP: KTH), 2005, *Project 1.1.3: Enlargement of the European Union and the wider European Perspective as regards its polycentric spatial structure,* KTH, Stockholm www.espon.eu

ESPON INTERACT TPG, 2007, *Polycentric Urban Development and Rural - Urban Partnership – Thematic Study of INTERREG and ESPON activities FIR*, OTB Delft, the Netherlands

European Commission, 2010, *Fifth report on economic, social and territorial cohesion: Investing in Europe’s future (preliminary version),* Report from the Commission, November 2010.

European Commission, 2010, Communication from the Commission, *EUROPE 2020: A strategy for smart, sustainable and inclusive growth,* March 2010

Heins F. - Bucher H., 2010, ESPON DEMIFER case studies: *Euro standard in Muenchen and its region Oberbayern (DE21),* IRPPS-CNR, BBSR 2010

Informal Council of Ministers of Spatial Planning in Potsdam, 1999, *European Spatial Development Perspective (ESDP): Towards balanced and sustainable development of the territory of the EU*, CEC, Luxembourg.

INTERREG IIIC "Strengthen economic and social cohesion in the EU by promoting interregional (strand C) cooperation" Project's Database, 2010

INTERREG IVC "Innovation and environment: Regions of Europe sharing solutions" Project's Database, 2010.

Borelli N. – Santangelo M., 2004, *Turin: Where territorial governance and politics of scale become keystones for the city development strategy* in CITY FUTURES. An international conference on globalism and urban change 8-10 July 2004, Chicago

Borrelli N.. – Santangelo M., 2004, *Turin: Where territorial governance and politics of scale become keystones for the city development strategy* in CITY FUTURES. An international conference on globalism and urban change 8-10 July 2004, Chicago

Meijers, E, 2007, Clones or complements? The division of labour among the main cities of the Randstad, the Flemish Diamond and the RheinRuhr Area, Regional Studies, 2007, vol. 41 (7), pp.: 889-900.

Meijers E. - Romein A. - Zonneveld W, 2010, *The Randstad: a layered system of interactions and cooperation*, OTB Research Institute for the Built Environment, Delft University of Technology

Miosga M., 2005, *Munich's city-cooperations between image-building and learning processes* in *Competition between Cities in Central Europe: Opportunities and Risks of Cooperation* Ed: Rudolf Giffinger, 2005

Goebel V., Thierstein A., Lüthi S., 2007, *Functional polycentricity in the Mega-City Region of Munich,* Paper presented at the AESOP conference, July 2007, Napoli.

METREX documents

Otgaar A. - L. Van Den Ber - J. Van Der Meer, 2008, *Empowering metropolitan regions through new forms of cooperation,* Ashgate Publ.

Panteia, *INTERREG III Community Initiative (2000-2006) Ex-Post Evaluation (No. 2008.CE.16.0.AT.016) Executive Summary*, Zoetermeer, May 2010

Salone C. - Cotella G. 2010, ESPON Project FOCI- *Case study Italy - Piedmont Urban system*, EU-polis, Inter-university Department of Territorial Studies and Planning

Salone C., 2010, *Institutional arrangements and political mobilisation in the new Italian regionalism: the role of spatial policies in the Piedmont Region,* European Planning Studies, 2010, 18: 8, 1207 -1226

Thierstein A. - Droß M., 2008, *Airport Region of Munich – show-case for a lack of territorial governance* in AESOP Conference.

Wasenhoven L. et al, 2010, *Territorial Governance: Theory, European experience and the case of Greece,* Kritiki publications, Athens (in Greek)

Wikipedia, *Twin cities.*

Selected bibliography

For the majority of issues regarding polycentric development, see in the Part 1 of the section of the ESPON FOCI Scientific report on "Opportunities through polycentric cooperation".

Polycentrism: territorial governance

ESPON TPG, 2007, *project 2.3.2, .Governance of territorial and urban policies,* University of Valencia.

ESPON INTERACT Transnational Project Group, (2007) Polycentric Urban Development and Rural - Urban Partnership – Thematic Study of INTERREG and ESPON activities FIR, OTB Delft, the Netherlands

Relevant INTERREG III programmes

METREX documents

Transnational and inter-regional cooperation

TERSYN (France) in co-operation with EureConsult S.A. (Luxembourg) and ECOSYSTEMS (Belgium), 2007, *Ex-ante Evaluation of the Interregional Cooperation Programme (INTERREG IVC) Objective 3 European Territorial Cooperation 2007 – 2013,* Final Report,.

Regional Policy Inforegio, European Commission (http://ec.europa.eu/regional_policy/index_en.htm)

European Commission, *Regional Policy* - *Atlas* - *Transnational co-operation - Northern Periphery* , Cohesion Policy 2007 – 2013 (http://ec.europa.eu/regional_policy/atlas2007/transnational/northern_periphery_en.htm)

– *Baltic Sea*, Cohesion Policy 2007 – 2013

– *North West Europe* Cohesion Policy 2007 – 2013

– *North Sea*, Cohesion Policy 2007 – 2013

– *Atlantic Coast,* Cohesion Policy 2007 – 2013

– *Alpine Space,* Cohesion Policy 2007 – 2013

Annex

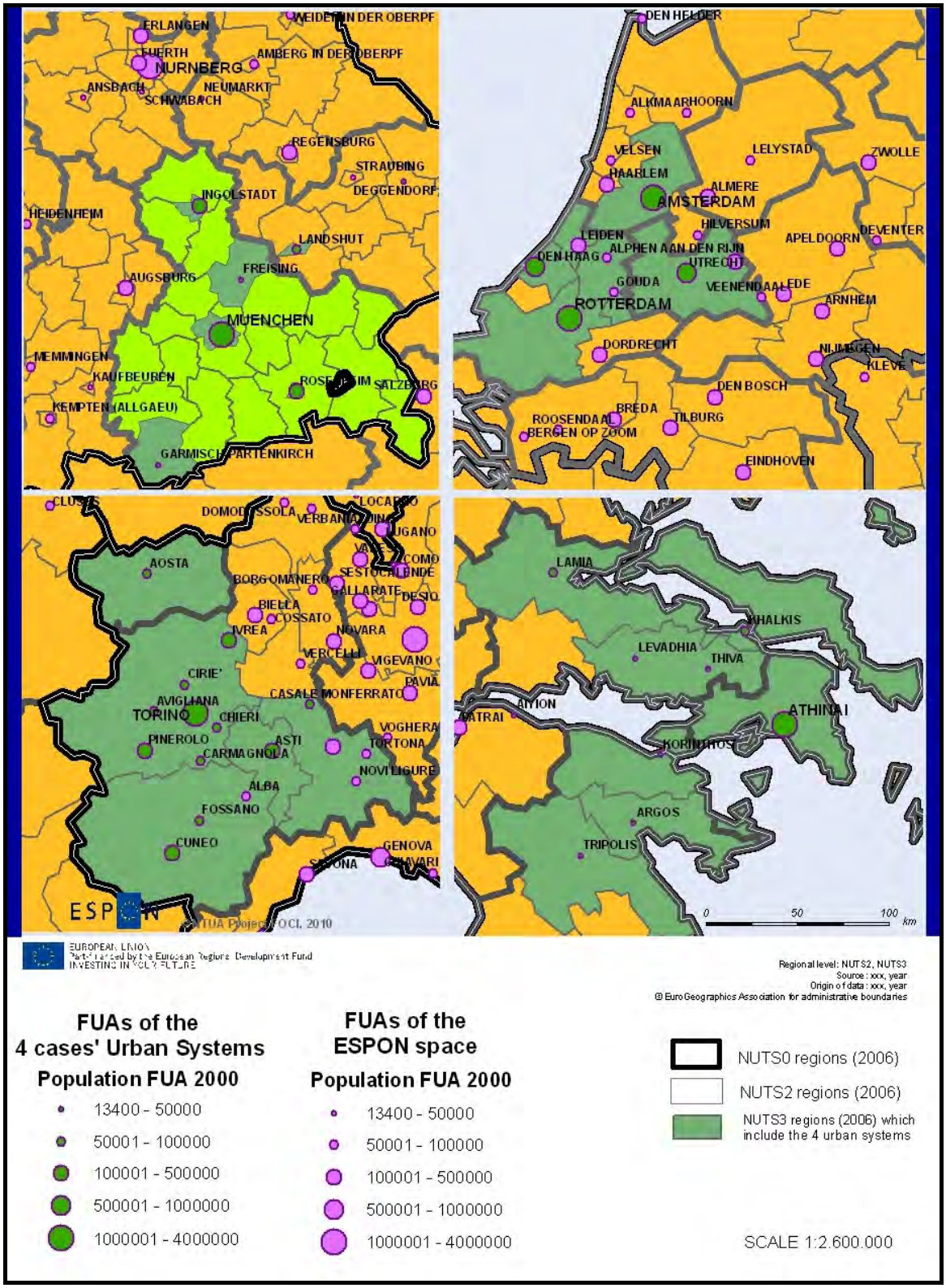


Figure 25. NUTS2 and NUTS3 units of the case studies' urban systems

Table 1. Considered Advanced-Producer-Services (APS) and High-Tech (HT) branches, NACE-Codes in parentheses

Advanced-Producer-Services (APS) branches	**High-Tech (HT) branches**
Finance (6411-6499)	Chemistry (partly), Manufacture of pharmaceuticals and bio-technology (2110-2120)
Management Consulting (7021-7022)	Manufacture of machinery (2811-2899)
Accountancy (6920)	Manufacture of electrical and optical equipment (2611-2680)
Insurance (6511-6530)	Manufacture of electrical machinery and apparatus (2711-2790)
Law (6910,8423)	Manufacture of medical, precision and optical instruments, watches and clocks (2651-2680)
Logistics (8211,8292,8299)	Manufacture of cars and car components (2912-2932)
Advertising & Media (7311-7320)	Manufacture of aircraft and spacecraft (3030)
Design (7410)	

Source of a first classification: Thierstein et al 2007.
We have updated the codes of branches according to NACE 2 classification

List CS5.1.3: Classification per groups of branches used in section 5.1

Group A: Agriculture, forestry and mining
Group B-E: Mining and quarrying - Manufacturing - Electricity, gas, steam and air conditioning supply - Water supply; sewerage, waste management and remediation activities
Group F: Construction
Group G-H: Wholesale and retail trade -Transportation and storage
Group I: Accommodation and food service activities
Group J: Information and communication
Group K-M: Financial and insurance activities-Real estate activities-Professional, scientific and technical activities
Group N-U: Administrative and support service activities - Public administration and defense; compulsory social security - Education-Human health and social work activities - Arts, entertainment and recreation -Other service activities - Activities of households as employers; u0ndifferentiated goods- and services-producing activities of households for own use -Activities of extraterritorial organisations and bodies

Table 2. Employment by groups of branches, NUTS3 units and FUAs 2001 in the four urban systems

NUTS3 units	NAME of the FUA included in the NUTS3 units	Agriculture, hunting, forestry and fishing	Mining and quarrying; electricity, gas and water supply	Construction	Wholesale and retail trade, repair of motor vehicles, motorcycles & personal & household goods;	Financial intermediation; real estate, renting and business activities	Public administration and defence, compulsory social security; education; health & social work;
		%	%	%	%	%	%
NL326	AMSTERDAM	1	7	4	31	32	25
NL332	ROTTERDAM	1	5	5	21	28	39
NL335	DEN HAAG	2	12	7	29	23	27
NL310	UTRECHT	1	9	7	24	31	28
NL230	ALMERE	7	12	7	27	20	26
	LELYSTAD						
NL321	HOORN	10	11	10	24	13	31
Randstad US		**2**	**9**	**6**	**27**	**27**	**29**
DE211	INGOLSTADT	1	44	3	19	13	20
DE212	**MUENCHEN**	0	17	3	23	28	29
DE213	ROSENHEIM	0	20	7	30	17	28
DE21B	FREISING	3	17	5	40	14	20
DE21D	GARMISCH-PARTENKIRCH	5	12	7	33	9	35
DE221	LANDSHUT	0	18	2	23	14	41
DE224	DEGGENDORF	5	27	10	22	8	27
Munich US		**1**	**19**	**4**	**24**	**24**	**28**
ITC11	CARMAGNOLA PINEROLO CHIERI **TORINO** AVIGLIANA CIRIE' IVREA	2	27	6	23	17	26
ITC16	CUNEO	10	28	8	22	11	22
	FOSSANO						
ITC17	ASTI	7	26	9	24	11	23
ITC18	CASALE MONFERRATO	5	29	7	26	10	23
ITC20	AOSTA	5	14	12	28	10	31
Piedmont		**4**	**27**	**6**	**24**	**15**	**25**

US							
GR241	THIVA LEVADHIA	18	29	8	29	2	14
GR242	KHALKIS	18	20	11	30	4	17
GR251	ARGOS	26	7	7	29	7	24
GR252	TRIPOLIS	33	7	9	27	4	20
GR300	ATHINAI	1	15	7	36	12	29
GR253	KORINTHOS	29	11	8	28	4	19
Athens US		**5**	**15**	**7**	**35**	**11**	**28**

Source of data: Eurostat, analysis of data: NTUA team

Table 3. Number of the ORBIS database subsidiaries by type of link

(a) Which are controlled by shareholders located in the FUA (b) which are controlled by shareholders outside the FUA (c) the subsidiary and the shareholder are located in the FUA

	The FUA is "Origin"	The FUA is "Destination"	The shareholder and the subsidiary are located in the same FUA	Origin / Destination: FUA	
FUA Munich	3217	2213	3999	1,45	
FUA Amsterdam	5082	2564	3305	1,98	
FUA Torino	593	494	389	1,20	
FUA Athens	250	876	655	0,29	
	The urban system is "Origin"	The urban system is "Destination"	The shareholder and the subsidiary are located in the urban system except the cases where the shareholder and the subsidiary are located in the same FUA	The shareholder and the subsidiary are located in the same FUA	Origin / Destination: urban system
Munich urban system	3461	2417	97	4239	1,43
Randstad	6823	3534	1032	6138	1,93
Piedmont urban system	743	520	24	408	1,43
Athens urban system	242	877	11	655	0,28

Source of data: ORBIS database, Elaboration of data: NTUA team

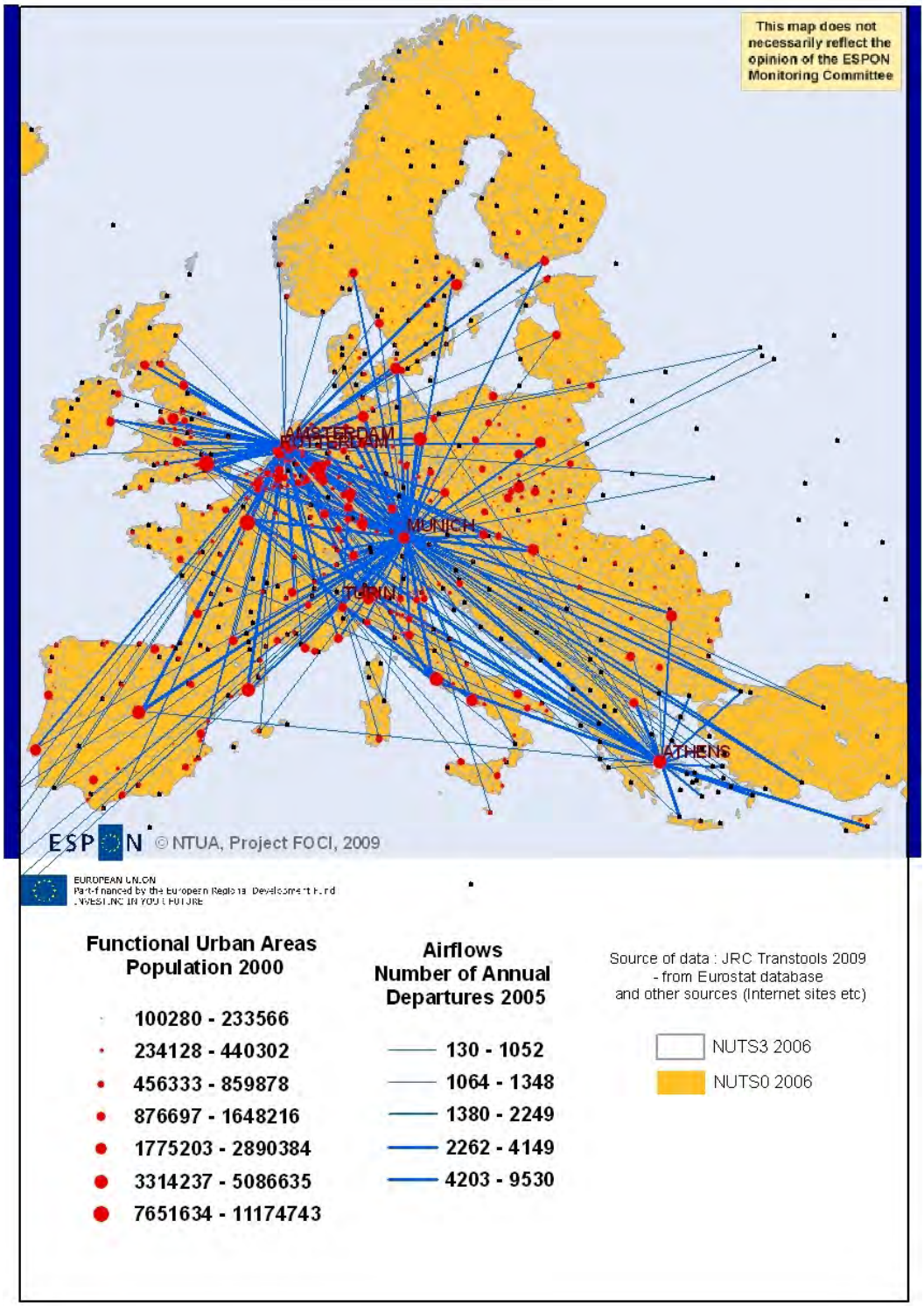


Figure 26. Air-travel flows: numbers of annual departures 2005 from / to the airports of Amsterdam, Rotterdam, Munich, Torino and Athens

Chapter 11 – Urban policies and governance with relation to polycentrism. Some results from case studies

Marcel Roelands and Pierre Marissal, IGEAT-ULB

Objectives

Starting from a limited number of case studies, we aim to understand intercity cooperation from a qualitative point of view and to analyze achievements and governance structures in terms of cooperation. We try to identify the strengths and weaknesses of cooperation partnerships on the basis of partners' experience, assertions by external experts as well as the existing literature, and then look for elements allowing us to objectivize our results.

Espon 1.1.1 report on polycentrism

The Espon 1.1.1 report is a reference work in terms of polycentrism, notably the part of it dedicated to governance. Yet if the material collected in the report did not enable us to answer the whole of our objectives, it offered a sound basis for exploration. It notably helped us select the case studies and elaborate our methodology and questionnaires.

The case studies

We have selected the following situations from the Espon 1.1.1 report as criteria for the case studies:
- a supposed functional complementary character;
- a pro-active policy aimed at having some urban entities cooperate ;
- lack of, or existence of urban cross-border cooperation ;
- lack of, or existence of governance structures recognised at the FUAs level;
- a variety of scales: either one large city surrounded by smaller ones, or several entities of the same weight (but, in one case, with active cooperation for the sharing of infrastructures; and in a second case with cooperation aimed at positioning themselves with regard to larger entities);
- a governance structure with decision-making power (sometimes), or with mere recommendation power (most of the time);
- finally, the taking into account of the field(s) aimed at: improving mobility; territorial planning; promotion of a more competitive economy; sharing of infrastructures or services to population or firms; etc.

Given the limited number of feasible case studies, neither a sample, nor even an example of each of those criteria could be obtained. They only helped us ensure the diversity of our examples and of the main issues identified in the Espon 1.1.1 report. We selected the following cases: the Flemish Diamond (Antwerp, Ghent, Brussels, Leuven); Copenhagen – Malmö & Øresund; Baltic Palette; Vienna – Bratislava – Gyor; Saar – Lorraine – Luxembourg; Liège – Aachen – Maastricht; and the Rhone-Alpes network (Lyon – Grenoble – Annecy – Chambéry – Roanne – Bourg-en-Bresse – Valence).

Methodology

Two questionnaires have been elaborated (see appendix). The first deals with the factors that can strengthen or limit the successes of inter-city cooperation partnerships (among which the governance factor is described in detail), the second aims at knowing them better and above all identifying the concrete results obtained with regard to the objectives. In addition, we collected as

far as possible information from firms allowing us to comprehend their relationships with customers and suppliers so as to examine if they privilege the cooperation area or not. We have sent those questionnaires to partnerships' actors as well as to external selected actors (academics, politicians, professional organizations, civil society representatives, etc.).

First results : THE DIFFICULTIES

Different factors may contribute to limit the success of urban partnerships: most of all the difficulties resulting from institutional frameworks which are most of the time partly inappropriate, and secondly the existence of often complex and ambiguous relationships between partners. Both problems, which can lead to a poor global transparency of the multiple initiatives undertaken in the different partnerships- varying in shape and time-, can contribute to limit the concrete results not only at the level of the partnerships taken separately but also as far as their global coherence is concerned.

1. Difficulties linked with the institutional framework

The existing institutional frameworks can represent different obstacles:

- The heterogeneity of competences

  Partnerships can group together partners with highly variable institutional competences. This is particularly true of cross-border partnerships, in which the actors integrate very different national institutional systems, more or less decentralized, according to their types of competences.

- The limits of competencies

  Some very concrete problems identified by partners can partly fall within the competence of a higher institutional level (e.g. tax systems within cross-border spaces), in terms of both decision-making and implementation. The implication can be very weak at this level and may contribute to increase the bureaucratisation of processes.

- Inadequacy of administrative boundaries in relation to the issues on the ground

  Some problems emerge in spaces lacking coherent correspondence with the divisions of the territorial organization of competences. This happens notably in some cities, be it at the level of the morphological agglomeration, the employment basin, or the hinterland. Such spaces can at the same time present a real coherence with regard to certain problems, while they do not correspond to any authority of the territorial organization having the necessary competences to deal with those issues. Similar problems can also appear when maintaining strategic views framed by national structures (e.g. in cross-border influence areas).

- The limitations in financial resources of the respective administrative levels of the partnership

  Those limits, in line with the institutional organization, can restrict the creation of partnerships, especially on the local scale, or keep them in a relative helplessness. They also can threaten their durability, while the establishment of trust relationships, often considered essential to success, obviously takes time. Those limits can also encourage partnerships following an opportunistic logic too much structured by concrete possibilities to obtain funding. Finally they can create relational problems – such as mistrust or dependence problems – when inequalities are too strong between partners' contributions.

2. Difficulties linked with the relationships between partners

Relationships between existing or potential partners can suffer more or less from mistrust or paralyzing competitions. On the whole, competition seems clearly dominant whenever markets and supply were already shared before the partnership was built, yet to various extents. We can for instance distinguish:

- Competition between partners of similar weight

  Some big cities may be concerned when they try to polarize the potential new facilities, or when they adopt a very competitive logic of reinforcement of their international attraction, even against their partners. Such competition can result in strategic stances in shape-varying partnerships, deprived of clear overall coherence and partly overlapping. Small partners can also position themselves above all as competitors, notably with regard to transport networks restructuration, the creation of new spaces of peri-urban firms, or the capture of urban deconcentration effects…

- The mistrust of small vs. bigger partners

  Mistrust can lead small- or medium-sized partners to join cooperation networks mainly determined by reasons of counterweight and relatively fragile in terms of coherence.

- Inadequacy between city links and firm links

  It seems that inter-firm relationships most of the time take place outside partnerships, due to the predominance of more local or more distant relationships. Developing inter-firm cooperation relationships on a pro-active basis appears very hard. The implication of firms often seems uneasy if we except very specific fields (e.g. tourism, links with universities,…). Given the limited possibilities in terms of direct aid to firms, and apart from cases such as technological poles around universities, the development of externalities remains the main mode of intervention. This raises the sensitive problem of mutual discrediting, due to generalisation, of the allowed investments and of the attraction instruments put in place.

3. Limits in relation to global regulations ?

The complex character of the different partnerships and cooperations tangled in one same area can make their harmonization difficult. The question of coherence is however present on higher scales too, since the concrete success of a partnership or of a regional partnership system can be achieved to the detriment of other regions, whenever devices to measure the impacts (and need it be re-orientate the objectives) are lacking on a more global scale. The strengthening, on the basis of a partnership, of the political negotiation power of a network of cities toward higher institutional authorities can also, as far as competition is concerned, lead to zero sum global gains since possible contradictions between the different partners' initiatives are not systematically examined.

FAVOURABLE FACTORS

A part of the favourable factors corresponds quite naturally to the mirror image of difficulties, notably the possibilities of stable and sufficient funding, the coherence of competences, or key

competences sufficiently autonomous in view of the objectives. The existence of combined bottom-up and top-down relationships is in line with this.

The following factors could thus be deemed favourable :

The identification of concrete and reasonable objectives that are attractive for all partners

A careful identification of common problems faced by all partners and likely to be dealt with concretely in the framework of the partnership would represent a major asset. Even if this can be achieved through assembling different objectives, it would seem most beneficial if each of the partners could precisely identify from the start which concrete measurable results it will be able to obtain as a member of the partnership. Vague or too ambitious objectives, for instance in relation to the necessary time or institutional means, could lead to demotivation. This consideration suggests that the overall rise of the European global “competitiveness” based upon a growing efficiency of regional structures and urban networks cannot be aimed as such and can only be reached through very concrete, and very variable, objectives on larger scales.

The identification of objectives requiring joint intervention of all partners

The existence of interdependency links binding together partners facing the identified problems would equally be a considerable asset. Some environmental issues such as the management of coastal areas or waste, or the promotion of a regional tourist image seem likely to combine partners’ awareness of individual responsibilities and the identification of expected benefits. On the whole, an active responsibilization of each of the partners, for example through autonomous responsible workgroups, seems to be an element of cohesion and consolidation of partnerships (provided communication is maintained between the different groups).

Cross-border networks

The inherited borders seem to result, more often than elsewhere, in regional structures suffering from incoherence in an open European space in terms of transport infrastructures (notably at local and regional level), the splitting in two of some infrastructures, harmonization problems (languages, statistical data, trainings…). Those problems could become dynamic bases allowing the building of partnerships based on achievable concrete objectives and the creation, on this basis, of a durable trust relation.

Others: Distance, existence of a common history or common tradition, average level of education

Let us however observe that a too great proximity or homogeneity can also be considered to some extent as a hindrance for some specific objectives, such as tourist objectives promoting complementary natural or cultural heritages.

Annexes

INSTRUCTIONS FOR INTERVIEWING PARTICIPANTS IN A COOPERATION PARTNERSHIP BETWEEN CITIES

The interview is made up of two parts :

- Part one consists in an open discussion beginning with a main question on the factors that can, in the interviewee's eyes, strengthen or limit the successes of cooperation partnerships between cities. It ends with the secondary question whether the responses to the first question can be applied to the partnership the interviewee is involved in.
- The second part is closely structured by a closed questionnaire related to the concrete results obtained by the partnership. A list of possible results is submitted to the interviewee. When a result is declared as aimed at/obtained, the interviewee is asked to give precisions and elements of objectivation during an open discussion.

Each of the two parts of the interview is described hereafter.

SELECTION OF THE INTERVIEWEE

The interviewee should have a good knowledge of the partnership. However no official representative mandate is requested.

SEQUENCE OF THE INTERVIEW

FIRST PART

TOPIC :
The first part of the interview deals with the factors that can, according to the interviewee, reinforce or limit the success of cooperation partnerships between cities.

AIM :
This first part aims at collecting the interviewee's opinions rather than objectivable facts.

FORM :
Open, guided, face to face discussion.

The interview will be largely open in order to allow the interviewee to express as freely as possible his/her convictions, hypotheses or doubts concerning the factors that, in his/her opinion, favour or limit the successes of cooperation partnerships between cities. The interviewer will strive to take into account the interviewee's nuances and hesitations as well.

The interview will also be guided since the interviewer will have to keep in mind the necessity to have the interviewee express himself/herself about a range of possible factors of failure or success, as listed hereafter (see structuring/sequence). The interviewer will however make sure the questions are meticulously and smoothly presented in a context of very free dialogues. He/she will thus avoid using a rigid structured questionnaire as well as inducing answers in any way.

The interview will take place face to face, except if a previous trust relationship between interviewer and interviewee allows an open and free phone conversation. Yet in this case the interviewer will question himself/herself as to the possible biases linked with this trust relationship.

STRUCTURING / SEQUENCE:

1. Brief presentation to the interviewee of the context in which the interview takes place. [to be clarified]
   - General context: Espon study on cooperation partnerships between cities.
   - More precisely: collection of different experiences within the framework of existing partnerships.
   - The interviewee's identity is strictly confidential.
   - Description of the sequence of the interview.

2. Main questioning submitted to the interviewee :
   'In Europe there are plenty of cooperation partnerships between cities. According to your experience or your own reflections, also outside the partnership you are involved in, could you tell us which factors, in your opinion, can contribute to their success or, inversely, hinder them? Can you give us your opinion about this question?"

   Note: this wording is only indicative and may vary if the interviewer wishes.

   Possible factors of success or hindrance to be smoothly submitted to the interviewee's appreciation:

   In the following table, the questions in brackets are formulated only as examples for the interviewer. Therefore they should not be asked as such.
   Some of them will simply not be asked if the interviewer has already spontaneously tackled the factors concerned.

As far as possible, the other questions will be introduced at the most appropriate moments during the interview and their wording will be adapted to the dialogue in progress.

General factors

- Types of objectives of the partnership
  → Do certain types of objectives offer better guarantees of success than others?
- Scale of the partnership and distance between partners
  → Do some scales of partnership (eg. between small cities; between medium cities; between big cities; etc.) or the distance between partners present more guarantees of success than others?
- Historical or cultural similarities (language…)
  → Does the existence of a common history or traditions, or the belonging of the partners to the same culture (language…) represent assets or not? Is the difference in languages an important obstacle?
- Location on the European scale
  → Do some types of location on the European scale represent assets or obstacles to the success of cooperative partnerships?
- Cooperation sectors
- → Do some cooperation sectors (or associations of cooperation sectors) allow easier successes than others?
- Types of players having initiated the partnership
  → Do the successes or difficulties of a partnership depend on the types of players that having initiated it (private, public, bottom-up, top-down…)
- The partners' problems having led to the creation of the partnership
  → Is the fact that the partnership was established to answer some kinds of problems faced by the future partners a driving force for the success of a partnership, or is it rather an obstacle?
- Other questions?

Factors linked with the types of governance

- Types of partnerships concerned
  → Does the presence (or absence) of some types of partnerships (private sector,

public authorities, unions, citizens' associations, independent experts…) or of some associations of different types of partners (eg. municipality + private sector; municipalities alone; private sector + unions, etc.) represent better guarantees of success or rather obstacles?
→ Can the number of partners involved, their homogeneity or diversity (in terms of size, economic weight, administrative level…) constitute assets? or obstacles?
→ Can the fixed or the progressive nature of the partnership be an asset or an obstacle?

- Types of autonomy and types of power held by the partnership or by the partners
  → Does the autonomy of management and/or of some types of power result in higher chance of success? Which types of powers are concerned (decision and/or executive power allowing the implementation of the partnership's aims)? In which fields precisely?
  → Can a confinement in non decision-making roles (development of studies and reports / exchange of information and knowledge / consultation roles / propositional roles / lobbying roles…) represent an asset or an obstacle?
- Institutional contexts
  → Do some types of institutional contexts represent obstacles or assets?
  - Types of state structures and types of distribution of powers among central and regional and local powers (organization into a hierarchy, complexity…)
  - Characteristics of regional or local powers (administrative boundaries, types of competences…)
- Relationships between partners
  Can some types of relationships between partners (rivalries, competition, opportunism) represent obstacles or assets for the success of a partnership?
  - Relationships between local (or regional) powers
  - Relationships between private partners…
- Decision-making modalities within the partnership
  → Do some types of decision-making modalities constitute assets or obstacles to the good functioning of the partnerships?
  - Decision-making modalities (unanimously, by a majority, with possible veto for some types of partners – public authorities for instance –, etc.)
  - Weight of the different partners in decision-making (equal weights, weight dependent on the type and/or the weight of partners…)
  - etc.
- Means and funding
  → Can the different types of funding sources (external or internal, hierarchical level…), the nature of the financed resources (facilities, human resources…), the level and regularity of financing, constitute obstacles or assets?
- Types of control and assessment
  → Do some types of control and assessment constitute an asset or an obstacle? Which ones?
- The temporality of the partnership
  → Can temporality (open-ended, long or short term…partnership) represent an obstacle or an asset?
- …

3. Open guided discussion based on this initial questioning

4. Secondary questioning submitted to the interviewee
   'Among all factors of success or failure you have mentioned during our discussion, do you see any which has relevance in the partnership you are involved in, or to the contrary, having no relevance at all?'

Note: this wording is only indicative and may vary if the interviewer wishes.

CAUTION:
Since our aim is to collect opinions rather than facts, the interviewer will see to it that he/she refrains from limiting the interviewee's answers in requesting proofs of his/her assertions. It is important here to establish a trust relationship and a good informal environment in which to discuss freely.

DELIVERABLES

The interview will be recorded and delivered as such. It will also be transcribed again in case it was not conducted in English, German, or French. Written precisions, referring to the recording, will be given about the possible elements of non verbal communication (meaningful smiles, pout, signs of embarrassment, significant funny faces…) when the interviewer considers them useful for a qualified interpretation of the interview.

SECOND PART

TOPIC:
Initial aims and concrete results obtained by the partnership.

AIMS:
The second part aims at collecting facts related to the initial aims of the partnership and to the concrete results obtained.

A particular attention should be paid to the objectivation of the results declared (precise description, elements of quantification…).

FORM:

a) Closed questionnaire in two parts concerning the initial aims of the partnership and the concrete results obtained.
b) Structured dialogue based on the answers to the second part of the closed questionnaire concerning to the concrete results obtained.

STRUCTURING / SEQUENCE:

1. Brief presentation to the interviewee of the context in which the interview takes place.
   - Objective = description of the aims and results of the partnership he/she is involved in.
   - First part: filling in of the two parts of the questionnaire.
   - Second part: dialogue based on the answers to the second part of the questionnaire.

2. The interviewee answers the two parts of the closed questionnaire

3. The interviewer checks the completeness of the answers
   It is imperative that every cell be effectively filled in for each of the questions.

4. Dialogue based on the second part of the closed questionnaire

   The dialogue concerns exclusively the results declared as at least partially reached in the second part of the questionnaire. The interviewer's role is here to obtain:
   - A precise description of the devices put in place
   - Elements allowing objectivation, if possible on quantitative bases

   Cf. Marcel [Sur la base du questionnaire en cours de réalisation]

5. If necessary : collection of information about the interviewee (see complementary form below)

DELIVERABLES

a) The filled in questionnaire.

b) The recording of the interview (second part of the questionnaire).

c) The following complementary form including the details collected at the end of the second part of the interview.

Complementary form

- Place of the interview
  - city
  - precise location (institution, …)
- Date of the interview
- Time of beginning and time of end of the interview
  Part 1 :
  Part 2 :
- Characteristics of the interviewee
  - Occupation
  - Age
  - Sex
  - Functions in the partnership
  - Seniority in the partnership
- Types of potential links between interviewee and interviewer
- Characteristics of the interviewer
  - Name
  - Age
  - Sex
  - Function in the institution in charge of the interview

Survey for externals at the interurban cooperation

	Appreciation of the concretely obtained results							Are the initial objectives answer to an important necessity ?					
	/	--	-	0	+	++	C	/	--	-	0	+	++
Objectives of the interurban co-operation													
1. Gain a critical mass… Please give concrete elements													
…of population as a market for the development of new market services of a higher hierarchical level to deserve this population better													
…of economic activities as a market for the development of new market services of a higher level aimed at enterprises													
…permitting stronger political negotiations… Please collect information about the obtained means or successes													
to obtain more financial means (EU, State, Regions…)													
to bear more upon the strategic decisions, the localization of infrastructures, the kind of regulations measures…													
other (please specify) : _____													
…permitting stronger economic negotiations…													
with suppliers													
with customers													
with competitors outside the zone of interurban cooperation													
other (please specify) : _____													
…for better social negotiations : labour unions, associations, etc.													
…for the promotion of an attractive regional identity : tourism, regional products… please give the turnover and sales about overnights…													
…for new equipments, infrastructures or services… Objectivations of the implementations permitting their impact evaluation [1]													
relating to new economy : access to the IT networks, to the training centres…													
economic : equipped zones, tourist areas…													
of leisure activities : sport, playgrounds, parks…													
of transport, communications, logistics…													
Social													
for training and education													
of health care													
for the forces of opposition													
environmental for the resources management, the wastes management, creation of protected areas…													
cultural : museums, exhibitions, festivals, trainings, workshops…													
creative : theatres, cultural events…													
other (please specify) : _____													
2. Increasing the economic integration within the interurban cooperation													
…support for the densification in the relationships between companies in the cooperation area (subcontracting…)													
Functional directory of the companies in the partnership areas Objectivation of its use													
Sectoral fairs Attendance + objectivation of established relationships born thanks this basis													
Support to cooperation : the know-how, technologies, prospection of new markets, equipment, resources… Please give a documented description about the concretely obtained results													
Creation and/or support of “technopole” (concentration of know-how in an economic sector)…													

Objectivation of their significance (??? or 'size' ??,) and their effective created links															
Other (please specify) :_____															
…Extension and/or diversification of the labour market in the cooperation area															
Relationship between supply and offer of labour forces in the area Implemented tools and obtained successes															
Implementation of business training in the interurban area Figures about the trainings, workers and companies															
Support to the spatial mobility of the labor forces Evaluation of the concretely obtained results															
Other (please specify): _____															
…Have new sectoral orientations or a new economic dynamic been obtained according to the initial decision? [2]															
…Other (please specify): _____															
3. Valorisation of the equipment, infrastructures or existing non-market services Leaded actions and impact measure of attendance, financial efficiency, needs satisfaction…															
Cultural Better access to equipments, to infrastructures or to existing non-market services															
Rationalisation of equipments, of infrastructures or of existing non-market services															
Leisure activities Better access……															
Rationalisation……															
Transport, communication, logistics Better access ……															
Rationalisation……															
Social Better access ……															
Rationalisation……															
Economic Better access ……															
Rationalisation……															
Schooling and education Better access ……															
Rationalisation……															
Health care Better access ……															
Rationalisation……															
Accommodation Better access ……															
Rationalisation……															
Forces of opposition Better access ……															
Rationalisation……															
Environment Better access ……															
Rationalisation……															
New economy Better access ……															
Rationalisation……															
Others (please specify): _____ Better access ……															
Rationalisation……															
4. Territorial planning															
Urbanisation Which tools do exist? Objectivation of new orientation															
Services poles Importance of the element in presence? Are they related? Beneficiaries number? Attendance? Objectivation of the dynamics in the interurban area															
Activities poles idem															
Environmental protection Measures and results: fall of nuisance on human beings or on nature															
Others (please specify): _____															
5. Regulations decisions adopted in the cooperation area (out of the land settlement) Which measures of regulation and objectivation of obtained results compared to targeted objectives?															
Tax system															
Land tax															

Labour force														
Markets														
Others (please specify) : _____														
Others (please specify) : _____														
6. Environment management and common resources management Adopted measures and et results objectivation : pressures decrease on the environment and on resources, etc.														
Environmental protection or improvement														
Water resources														
Energetical resources														
7. Transport improvement (roads, railway, water, air) and (tele)communication Measures and objectivation of obtained results: attendance, transported quantities, access improvement, nuisance limitation…														
8. Limitation of negatives agglomeration effects Adopted measures and proved results: modifications of time access, modified behaviours about landed matters, reduced exposure to pollutions														
Traffic jam (example: average access time…)														
Landed prices														
Level of suffered pollution														
Others (please specify) : _____														
9. Best practices exchange Description of those best exchanged practices and measure of the results														
10. Implementation of a framework permetting cooperation Description of these framework														

[1] Description of new equipments with elements permitting an impact measure (for example : type of concretely realised equipment, number of beneficiating and/or implicated people, figures about beneficiating and/or implicated companies and their size, cover rates within the partnership,…).

[2] Objectivation of those results at the level of the interurban cooperation area.

Survey for interns at the interurban cooperation	Appreciation of the concretely obtained results							Are the initial objectives still required ?					
	/	--	-	0	+	++	C	/	--	-	0	+	++
Objectives of the interurban co-operation													
1. Gain a critical mass… Please give concrete elements													
…of population as a market for the development of new market services of a higher hierarchical level to deserve this population better													
…of economic activities as a market for the development of new market services of a higher level aimed at enterprises													
…permitting stronger political negotiations… Please collect information about the obtained means or successes													
to obtain more financial means (EU, State, Regions…)													
to bear more upon the strategic decisions, the localization of infrastructures, the kind of regulations measures…													
other (please specify) : _____													
…permitting stronger economic negotiations…													
with suppliers													
with customers													
with competitors outside the zone of interurban cooperation													
other (please specify) : _____													
…for better social negotiations : labour unions, associations, etc.													
…for the promotion of an attractive regional identity : tourism, regional products… please give the turnover and sales about overnights…													
…for new equipments, infrastructures or services… Objectivations of the implementations permitting their impact evaluation [1]													
relating to new economy : access to the IT networks, to the training centres…													
economic : equipped zones, tourist areas…													
of leisure activities : sport, playgrounds, parks…													
of transport, communications, logistics…													
Social													
for training and education													
of health care													
for the forces of opposition													
environmental for the resources management, the wastes management, creation of protected areas…													
cultural : museums, exhibitions, festivals, trainings, workshops…													
creative : theatres, cultural events…													
other (please specify) : _____													
2. Increasing the economic integration within the interurban cooperation													
…support for the densification in the relationships between companies in the cooperation area (subcontracting…)													
Functional directory of the companies in the partnership areas Objectivation of its use													
Sectoral fairs Attendance + objectivation of established relationships born thanks this basis													
Support to cooperation : the know-how, technologies, prospection of new markets, equipment, resources… Please give a documented description about the concretely obtained results													
Creation and/or support of “technopole” (concentration of know-how in an economic sector)…													

Objectivation of their significance (??? or 'size' ??,) and their effective created links														
Other (please specify) :_____														
…Extension and/or diversification of the labour market in the cooperation area														
Relationship between supply and offer of labour forces in the area Implemented tools and obtained successes														
Implementation of business training in the interurban area Figures about the trainings, workers and companies														
Support to the spatial mobility of the labor forces Evaluation of the concretely obtained results														
Other (please specify): _____														
…Have new sectoral orientations or a new economic dynamic been obtained according to the initial decision? [2]														
…Other (please specify): _____														
3. Valorisation of the equipment, infrastructures or existing non-market services Leaded actions and impact measure of attendance, financial efficiency, needs satisfaction…														
Cultural	Better access to equipments, to infrastructures or to existing non-market services													
	Rationalisation of equipments, of infrastructures or of existing non-market services													
Leisure activities	Better access……													
	Rationalisation……													
Transport, communication, logistics	Better access ……													
	Rationalisation……													
Social	Better access ……													
	Rationalisation……													
Economic	Better access ……													
	Rationalisation……													
Schooling and education	Better access ……													
	Rationalisation……													
Health care	Better access ……													
	Rationalisation……													
Accommodation	Better access ……													
	Rationalisation……													
Forces of opposition	Better access ……													
	Rationalisation……													
Environment	Better access ……													
	Rationalisation……													
New economy	Better access ……													
	Rationalisation……													
Others (please specify): _____	Better access ……													
	Rationalisation……													
4. Territorial planning														
Urbanisation	Which tools do exist? Objectivation of new orientation													
Services poles	Importance of the element in presence? Are they related? Beneficiaries number? Attendance? Objectivation of the dynamics in the interurban area													
Activities poles	idem													
Environmental protection	Measures and results: fall of nuisance on human beings or on nature													
Others (please specify): _____														
5. Regulations decisions adopted in the cooperation area (out of the land settlement) Which measures of regulation and objectivation of obtained results compared to targeted objectives?														
Tax system														
Land tax														

Labour force														
Markets														
Others (please specify) : _____														
Others (please specify) : _____														
6. Environment management and common resources management Adopted measures and et results objectivation : pressures decrease on the environment and on resources, etc.														
Environmental protection or improvement														
Water resources														
Energetical resources														
7. Transport improvement (roads, railway, water, air) and (tele)communication Measures and objectivation of obtained results: attendance, transported quantities, access improvement, nuisance limitation…														
8. Limitation of negatives agglomeration effects Adopted measures and proved results: modifications of time access, modified behaviours about landed matters, reduced exposure to pollutions														
Traffic jam (example: average access time…)														
Landed prices														
Level of suffered pollution														
Others (please specify) : _____														
9. Best practices exchange Description of those best exchanged practices and measure of the results														
10. Implementation of a framework permetting cooperation Description of these framework														

[1] Description of new equipments with elements permitting an impact measure (for example : type of concretely realised equipment, number of beneficiating and/or implicated people, figures about beneficiating and/or implicated companies and their size, cover rates within the partnership,…).

[2] Objectivation of those results at the level of the interurban cooperation area.

Österreichisches Institut für Raumplanung

ESPON FOCI

Interview summary CENTROPE region

September 2010

Commissioned by:
Université Libre de Bruxelles

A-1010 Wien, Franz-Josefs-Kai 27
Telefon + 43 1 533 87 47 -0, Fax - 66 | www.oir.at
UID-Nr. ATU 47686703 | ZVR-Zahl 790276682

Bankverbindung
Erste Bank der österreichischen Sparkassen AG
BLZ 20111 | Kontonummer 31005200923
IBAN AT652011131005200923 | BIC GIBAATWW

From JORDES to CENTROPE

The commitment to build the CENTROPE region developed through the INTERREG funded projects JORDES and BAER (Building a European Region).
JORDES+ (Joint Regional Development Strategy for the Vienna-Bratislava-Györ Region 2002-2005) Project objective was the development of the regional development strategy for the Vienna-Bratislava-Györ Region in a three year process. The strategy was elaborated in cooperation with representatives from the regional administrations in Austria, Slovakia and Hungary. The activities focused on the creation and coordination of efficient and feasible development measures.
The Kittsee Declaration of September 2003 marked the launch of the CENTROPE initiative
Two CENTROPE projects followed. The actual cooperation CENTROPE CAPACITY project is funded under the EU programme CENTRAL EUROPE. It will last until 2012.

Information

www.centrope.com

Synthesis of the interviews with stakeholders from Vienna, Bratislava and Györ

CENTROPE is purely project based (funded with means of Interreg). So the CENTROPE cooperation stops each time the project is finished and starts with the approval of the successor project.
The project partners are engaged and put a lot of hope in the actual cooperation project. Still the main result of the actual cooperation project will be a development strategy and pilot projects (see website).
The cooperation seems to have not the same political support in all the participating regions. Especially the politicians of the smaller regions do not see enough concrete results. Competing each other is still more popular than cooperating. Politicians seem to have a horizon of the legislative period and within their own region only.
Mainly the cooperations are on bilateral level.
Vienna has a strange position in the region. It is the biggest city and the oldest EU member. Smaller partners looking skeptical to the “big brother”.
Decision making possibilities are varying from partner to partner. The Hungarian counties have other rights than the Austrian federal provinces.
The smaller the regional entities the more interest in concrete results.
None of the interview partners mentioned the common map: http://pgo.centropemap.org/
+ main mentioned factors supporting cooperation

- common history and tradition, same mentality of the people
- good education – people understand thoughts of cooperation
- cooperation is based on a top down as well as on an bottom up process
- cooperation potential: e.g. Biotech cluster, automotive cluster

- cooperation functions better, when the market share is not defined yet (common tourism network is easier to install than the cooperation of two existing harbors or airports)

– main mentioned factors hindering cooperation
  - four different languages (SK, CZ, HU, AT)
  - different interests
  - different governance structures (federal Austria, centralistic Hungary) regions have different competencies
  - different funding systems in AT, SK, HU (resulting from different accession dates). Cooperation projects have a longer tradition in AT than in other countries
  - concept of competition instead of cooperation
  - different markets and laws (especially labor law)
  - not enough political interest Though the commitment to cooperation is 15 years old.
  - Economic crisis

Location	Institution	Name	Function	Contact details	Interview annotations
1) Actors directly implicated in city cooperation structures					
Vienna (AT)	Europaforum Wien Center for Urban Dialogue and European Policy www.europaforum.or.at	Johannes Lutter Sex: male Age: 38 Seniority in the partnership: since the beginning (10 years)	Deputy Managing Director and consultant for cross-border cooperation, urban development and urban policy of Europaforum *Project coordinator on behalf of the concerned Austrian state governments* of the CENTROPE Coordination Office Responsibilities: thematic coordination and strategic development, communication management, overall technical-operative coordination, Centrope secretariat	Rahlgasse 3/2, AT-1060 Vienna Tel. +43 1 5858510-24 Fax. +43 1 5858510-30 lutter@europaforum.or.at office@centrope.info	Place of the interview: Vienna, Center for Urban Dialogue and European Policy, Rahlgasse 3 Date of the interview: Tuesday 31.08.2010 Time (part1):16:15-16:55 (part 2): 16:55-17:20 Interviewer: Barbara Bory, female, 36, project manager, no links to the interviewee Studies: Kittsee Declaration of September 2003 marked the launch of the CENTROPE initiative http://www.centrope.com/en/centrope-project/political-conferences/kittsee-2003 CENTROPE Vision 2115 (from 2006) http://www.centrope.com/en/centrope-project/vision-2015 Business and labour report (2007): http://www.centrope.com/en/centrope-project/pilot-projects/business-and-labour-report
Bratislava (SK)	CENTROPE Office Slovakia Slovenský Dom Centrope	Tatiana Mikušová Sex: female Age 54 Seniority in the partnership: since the beginning of the Slovakian	Head of Office Responsibilities: cooperation node and regional project management Slovakia, cross-regional responsibility for	Primacialne námestie 1, SK-814 99 Bratislava Tel: +421 2 53 635 281 Mobile: +421 903 826 125 domcentropy@gmail.com mikusova.tatiana@gmail.com	Place of the interview: Vienna, Bruno Kreisky Forum, Armbrustergasse 15 Date of the interview: Monday 30.08.2010 Time (part1): 17:30-18:00 (part 2): did not have time for the questionnaire, wanted to send the questionnaire it via e-mail, but can not be reached since then Interviewer: Barbara Bory, female, 36, project manager, no

		project (2003)	thematic development focus "Culture & Tourism"		links to the interviewee No studies
Györ (HU)	CENTROPE Office Hungary c/o CEURINA NKft, Central European Urban Research and Innovation Nonprofit Association	Örs Szokolay Sex: male Age 53 Seniority in the partnership: 10-12 months	Head of Office Responsibilities: cooperation node and regional project management Hungary, cross-regional responsibility for thematic development focus "Spatial Integration"	Szt István út 10/a, H-9021 Győr mob: +36 20 484 4960 szokolayors@invitel.hu	Telephone interview Brussel-Györ Date of the interview: Thursday 2.9.2010 Time (part1): 09:20-09:55 (part 2): 09:55-10:20 Interviewer: Barbara Bory, female, 36, project manager, no links to the interviewee Studies: in elaboration: CENTROPE ends up in the creation documents such as regional development reports. (WIFO+Györ+Brno+Bratislava private and academic institutions)

Location	Institution	Name	Function	Contact details	Interview annotations
2) Other actors, external to the cooperation structures (academics, employers, trade unions, opposition politicians, etc)					
Vienna (AT)	WIFO Austrian Institute of Economic Research www.wifo.ac.at	Peter Huber Sex: male Age 43 Seniority in the partnership: first contract for consultancy: 2004, actual contract from 2009	Research Area(s): Structural Change and Regional Development Regional labour markets (Author of FAMO)	Tel: +43 (1) 798 26 01-404 peter.huber@wifo.ac.at	Place of the interview: Vienna, WIFO, Arsenal, Monday 30.08.2010 Date of the interview: Monday 5.09.2010 Time (part1): 12:00-12:45 (part 2): 12:45-13:30 Interviewer: Barbara Bory, female, 36, project manager, no links to the interviewee Studies: Labourmarket Monitoring (LAMO) http://www.arbeitsmarktmonitoring.at/ Monitoring of Skilled Workers (FAMO): http://www.wifo.ac.at/wwa/jsp/index.jsp?fid=23923&id=37425&typeid=8&display_mode=2 www.lrsocialresearch.at/files/Trendanalyse_Berufe_EB_MA27_final.pdf "Überregionale Beschäftigungsstrategie" (interregional employment strategy) 2005 (http://www.lrsocialresearch.at/content.php?pg=archiv&submitsearch=1&id2thid=2&lng=de no download)
Györ (HU)	Hungarian Academy of Science Győr Institute MTA Regionális Kutatások Központja Nyugat-magyarországi Tudományos Intézet	Mr Mihály Lados Sex: male Age 49 Seniority in the partnership: jordes leader of hungarian side continuously involved in EU	Head of the Hungarian Academy of Science Győr Institute	H-9022 Győr, Liszt F. u. 10. Postacím: H-9002 Győr, Pf. 420. Tel.: +36/96/516570 Fax:+36/96/516579 ladosm@rkk.hu http://www.nyuti.rkk.hu	Telephone interview Thursday 11.9.2010 Time (part1): 13:05-13:35 (part 2):13:35-15:00 Interviewer: Barbara Bory, female, 36, project manager, no links to the interviewee Studies: UniRegio – University cooperations, result report reachable via http://w3.nyuti.rkk.hu/index_en.htm

		programming			

FOCI, ESPON

Case study:
Governance for polycentricism

Sabina Edelman

Division of Urban and Regional Studies
Royal Institute of Technology (KTH)
Stockholm

Summary of interviews in the northern Baltic Sea Region, part 1

Generally, commitment among politicians is needed for the implementation of good plans, a factor which is discussed in several interviews. A theory on the worries of commitment is political instability in the region causing fluctuations in previous projects.

Helsinki Tallinn represents a sub region which has developed further in the interurban cooperation than the rest of the Baltic Sea Region, similarly to Uppsala Stockholm. The sub regions are developing polycentric regions of their own in a nearer core area than the Basaar project, formally the Baltic Palette. The most important factors for this type of interurban cooperation seem to include relationship between regional and local partners as well as cooperation sectors.

General factors regarding the partnership

Location on the European scale
Different level on the European scale might have a positive effect, according to an Estonian official in Finland. Apparently Finland still acts as the helper to Estonia which Estonia gain on in several aspects of previous partnership.

According to a Finnish interviewee the successes of Norway and Sweden has distanced the countries from their Nordic neighbours. A comparison is made to the decay after World War II, when the Nordic patriotism was at its top.

Trust
Several projects have been carried out in the region, resulting in a good relationship between the partners which simplifies the Basaar project. The officials states that they know each other from before and they know some about the culture in the other countries, this is seen as an asset.

Types of objectives of the partnership:
It is found that common problems, which are realistic for all partners need to be found. Some examples are given to the countries surrounding the Baltic Sea, such as environmental problems. A worse objective is also exemplified to concern the educational system, which is found costly and hard to evaluate.

Historical differences
Any geographical or historical difference represents assets since the partnership can reach a maximum of foreign investors, according to some of the interviewees.

Scale of the partnership and distance between partners
The distances in between the countries in the northern Baltic Sea seem to be a problem when creating partnerships. Several of the interviewees express worries about travel costs. E-communication was tried out within Basaar but did not reach the quality demand for the meetings. Problems were reported to be disturbing noises and difficulties in hearing. This resulted in adjustments of the budget to cover up for increased travelling needs.

Contradictory, it is stated that value of distance depends on the objectives, e.g. to increase tourism, longer distances within a region could be seen as an asset because different geographical target groups can be attracted and kept within the region.

The partners' problems having led to the creation of the partnership
Generally the Basaar project was initiated to form a think tank on how Europe could deserve an important role in a future world when BRIC countries like China increase their power globally. It seems to be an obstacle in some ways to solve problems which do not exist, which lie in between all sciences invented. At the same time, it seems to unite the northern countries, despite economic differences etc, to face an outer power and unknown issues.

For the eastern partners former problems of the Soviet Union seem to be a driving force to exterminate any rest of it and modernize the country. The immigrant laws in Latvia for example are left since the dissolution of the Soviet Union as economic protection, it is needed for the cooperation to change them, and it is also needed to symbolize a new era of Latvia.

Factors linked with the types of governance

Types of partnerships concerned
It as experienced as difficult to involve private firms in the responsibilities of the public sector (to create a common environment), because of European funding rules, though it whould have been an asset.

Involving a homogenous group of partners, for example a business branch is not generally seen as an asset, even if such a possibility exists. The risk of skewing the market might be devastating, according to some of the interviewees.

Means and funding
The point is made during an interview that the regularity of funding might constitute an obstacle in earlier phases since research is hard to treasure. An example is given of interrupted statistical research made in Latvia for one of the work packages in Basaar.
Another interviewee states that there is an unnecessary strong will for big projects at an institutional level. The results are smaller institutions being non competitive and in over-sized projects with over-estimated resources.

Relationship between partners
Rivalries or competition between capital cities and surrounding regions represents obstacles in most of the surveys conducted. There is mistrust in partnerships resulting in rich capitals and poor surroundings. There has to be a change to understand that polycentric regions create less hinterland than monocentric regions. Especially in this kind of futuristic project it seems uncertain where the future resources are allocated. One of the interviewees suggests that the future might value the countryside in Latvia as the most valuable land due to a food crisis.

The temporality of the partnership
Basaar project aims at 2050. The long term partnership seems to create possibilities for any changes in status or structures within the partners that the future might hold. It offers some liability to the future.

Types of autonomy
The Basaar project consists of work packages handled by each partner. The shared responsibilities seem to create a lot of good-will.

Summary of the interviews in Oresund. Part 1

Objectives of the partnership and scale

Generally speaking the objectives of the partnership were stressed as a focal point to successful cooperation. A shared vision and a relevance to all partners are main factors of a successful partnership. The relevance is based on individual winning points which may differ. The points may lie in any spectrum and should be identified early on for each partner, according to an interviewee at a non-governmental organization.
The scale of the partnership was also mentioned but rather as something which had to be defined so that all resources will be given a value corresponding to the reality. Over dimensioned visions and scales of the partnership, results in failures of good intentions.

General factors regarding the partnership

Types of objectives of the partnership

To have specified objectives is stressed as a guarantee for success. Oresund is criticized for having too big ambitions; risking that nothing will be reached in the end. The consequence of, for example the Fehrman bridge investment, is claimed to cause uncertainty for existing projects such as the Oresund Bridge.
It seems as if the private sector experiences a lack of specified long term visions on a political level.

Other questions, Trust as an asset:

During the beginning of the partnership several years were prescribed to build up trust among private as well as governmental partners. Trust is a fundamental factor which enables a continued cooperation.

Historical or Cultural Similarities

A backbone of medical research and pharmaceutical companies on both sides of the water are considered to be a strong asset to the region. It is a natural concentration of global companies which has been able to attract foreign investments. The historical connection is mostly seen as an obstacle creating prejudices about national differences.

Similarities in the welfare systems of Denmark and Sweden have though caused a very simplified integration as soon as the migration started, according to one of the interviewees.

Location on the European scale

It seems as if the strong brand of Copenhagen represents a great asset, which smaller cities can count on if they choose to “belong” to Copenhagen.

Relationship between partners

Competition is considered to be both an obstacle and an asset. It has on one hand created positive values since the market has been shifted to the same competitors, according to one of the interviewees of a non governmental organization. It is stressed that the competition between local powers such as universities and private partners has to be focused on regional resources such as know-how. Aimed at the right target, competition is seen as an asset. Competing for market shares is hindering the development. On the other hand increased competition causes increased prices on land, labour and living and might be seen as an obstacle for FDI and the development of the region.

Factors linked with the type of Governance

Types of partnerships concerned
The presence of universities was repeatedly referred to as an asset during the interviews. The life-science cluster in the region is an example of a good type of partnership, consisting of firms in all size. By feeding each other with know-how and employees in one direction and spin-offs in the other direction the diversity within the network matters. At the same time the external network is equally important and the fact of having some sort of organization to brand the partnership internationally is stated as a prerequisite of a region to be profitable. The more contacts internationally with universities, venture capital funds and companies, the more likely is the partnership to succeed.

Decision-making modalities within the partnership
Autonomy of management and legislation is considered by some as a possible asset. The central government, especially the Swedish is criticized for prioritizing Stockholm region during the interviews. As it is today the national difference in taxation legislation causes a big hinder for the integration of the region. On the other hand, the point of view is raised that through democratic procedures the ever increasing amount of inhabitants in Oresund will slowly create differences. The critic is seen by some of the interviwees as political subjective truth to hoist an opinion.

Type of autonomy and types of power held by the partnership or by the partners
The fact of having a capital (Copenhagen) within the region is an asset since it creates some new possibilities for both decision making and non-decision making factors like branding and results in some higher chances of success. At the same time, it withholds the region from independency, which would simplify laws and policies.

Types of control and assessment
The different democratic directions of the countries, collectivism in Sweden vs. the Danish individualism, cause an obstacle for the individual and create incitements for tax evasions etc.
“It would have been easier to build a bridge between Germany and Sweden” says one of the interviewees.

Decision-making modalities within the partnership
“Democracy is an asset but in many ways an obstacle”, says one of the interviewees referring to the problem of bureaucratic.

Summary of the interviews in the Northern Baltic Region, part 2

- Gaining a critical mass

Of population as a market;

To market and brand the potential of having 12 million customers within a region is important. Turning to governmental organizations and authorities is the first step. A result of this is that of the region starting to be recognized within Europe. (CJE)

The original intention was to create an internet forum on ideas of a future population and the market they will form. The result was not really satisfying; of some reason all comments came from China. The comments were frank and very critical, but it is a serious problem that European officials do not have personal opinions on future issues. (JHJ)

After having gained a critical mass for the region, some interest can be gained for the individual region of Estonia for example. (IS)

Since the project is still going on, you cannot say that we have obtained something which we could measure. But it is important to work with. We are discussing the continuation, one way would be a project where we follow concrete measures. Another possibility is to keep the network going on if we cannot get more funds. As a network we could try to find concrete small projects which all partners would like to participate in. A meeting is planned to discuss what kind of projects this could be. (IC)

Of economic activities;

Reaching out to companies is the second step which has not been realized yet. (CJE)

The results are hard to measure today, but we are hoping that one day certain investment to certain areas will come, like Tallinn Tram Park, airport or the development of the port with Chineese direct investments. (IS)

Of stronger political negotiations;

Helsinki Tallinn has developed much further than the rest of the Baltic region. Helsinki has a high political involvement but the financial means are not enough. (LV)

A political discussion on how to attract investments in sustainable public transport is of common interest to the countries. Therefore, creating a critical mass to see the possibilities and needs of societies with a well developed system for public transport is an aim of Basaar. It has been successful since the discussion is now stronger. (CJE)

Stronger political negotiations are very important, much more than anticipated. The majority of the contacts between China and Europe are business contacts but it is clear that more political negotiations are needed, primarily to discuss future issues and sustainable business contacts. The upcoming need is clear when studying experiences such as the Baltic Pearl. It is an example of good intentions ending up in disaster because of lacking political will. Basaar started a discussion on the theme though the problems are still much unknown and has to be studied. (JHJ)

A concrete result is that of European Interregio establishing contacts with chineese provinces, a meeting is planned to the exhibition center in Shangai including two European regions. (JHJ)

Permitting stronger economic negotiations;

To some extent but the main aim is to have clear policies on how economic negotiations can affect the urban planning.
There are several examples of cities allowing too much economic negotiations, resulting in unclear policies and chaos. The city of Kalmar permitted very strong negotiations with a Chinese construction firm to establish a planned area, but it collapsed and the city council was criticized for not having enough knowledge on the business area. Another example of where the negotiations tend to override state policies is the Baltic Pearl, where the city council suddenly changed there policies on immigration. Instead of 35 000, only 3500 of the inhabitants of the new suburb to St Petersburg could be of Chinese origin. It shows how political negotiations and economic negotiations are not ready, and have to be coordinated.
The aim is more cooperation between city councils and businesses to see what the impact of economic negotiations will be on the urban planning in the long run, but there is a long way to go. Interregio might be a start to eliminate these risks. (JHJ)

Better social negotiation;
Involving labour unions mostly means troubles, why it is not a necessity to do it, but they have been rather active in the region of Helsinki Tallinn. (LV)

A critical mass of an attractive regional identity;

This is a part of what we are trying to do within Basaar. I think we have been successful to some extent, but mostly in the capitals, in the south coast of Finland and in the northern coast of Estonia. Facing a future of foreign direct investments and globalization, your nearest neighbours become more important. If we want investments in Finland we have to ask ourselves what is needed in the environment to attract this. And Finland IS too small in itself to attract scale economies. It is too small in the sense that Finland is interested in being involved in the globalizing plans of Russia and Asia like high speed railways and other investments. By creating a region with a strong regional identity we might manage to fulfil the needs of the future. (LV)

For new equipments infrastructures or services;
All of these are in the scenarios as questions, not as solutions. One of the main problems lies in having no geographical border, the need of good logistics on rail are limited due to Russia. (JHJ)

Philosophy is different and the system is different, but there have been some progress. Especially in the Helsinki Tallinn region; the success of the fast ferry with an ever increasing number of departures/day is an implementation to evaluate the impact of migration. There are a lot of discussions on how to create complementing systems for health care and social care. The issue is that the legal basis is different; legislation does not allow equalization at the point, even though technically it is possible. (LV)

Other; To raise future issues;
The food crisis and other issues which people have not thought about earlier, at least they are now on the agenda, these are questions very important for an interurban cooperation to enhance. (JHJ)

- Increasing the economic integration

The project has been successful in establishing the cities as a region in China, the next step is organizing seminars in China on the results of Basaar. (CJE)

Sectoral fairs;

We have a linkage to the academy of social studies, they like to study the clashes which we find. (JHJ)

Support to cooperation;

Has not been done yet. (CJE)

Diversification of the labour market in the area;

A clear need to support universities in diversification since there is a strong technological force in the east. (CJE)

The development of agricultural knowledge in Latvia has been discussed in the project, a know-how that is disappearing with aging. (JHJ)

- Valorisation of the equipment

Homepages and e-infrastructures could make it easier to unite the area and realize the possibilities that Basaar has identified. (CJE)

- Territorial planning

One aim was the exchange of experiences to present the tools that exist on urban planning in mixed economies like Sweden to the Baltic countries.

Urbanization

No poles exist at the moment but there is a need for integrating service poles and poles for the discussion of ethnic suburbs, which are beloved by Asians. (JHJ)

There are no real tools for the whole region yet. But there have been projects to bring planners together to understand each others systems and legal right. (LV)

Others; Water management

Catchment areas of water were established in all areas to see how the governments could enhance the water quality. The work has continued between the governments to envision new steps. The input on this subject was very rich since the northern countries gave input on practical management while knowledge of the state of the sea came from other countries. (CJE)

- Regulations.

The Basaar project has not dealt with taxes. (JHJ)

Nothing has been done but it should be. There have been critical speeches about the Baltic Sea strategy; it is a matter of compromises. Business law was never mentioned in any strategy paper of the region, though it has to. It is a very important problem. (LV)

We hope that the suggestions that we have made will be implemented at the beginning of next year. (IS)

- Environmental management

The understanding between the continents on sustainable development is varying. The Chinese think that Europeans pollute them, by electronic waste, while we find Asia polluting us with increased population. Europe needs new measures to weight social impact within sustainable development, not only to preserve the living environment for future generations. We need to ask what it means; do we know what future generations will value? This is an insight which Chinese seem more eager about than Europeans at the moment. (JHJ)

This is an important part of the cooperation, within the Baltic region the biggest barrier is the issue of structural funds, they are quite small. There are needs for real investments here, and those projects can only allow 50% usage for investments. The awareness of other possibilities of financing should develop. (LV)

- Transport improvement

  The Helsinki Tallinn regions were driving forces of the Via Baltica and now the Rail Baltica. A main controversy remains on how to include both better connections to Europe and Russia. (LV)

The work package of network and flows has been investing the transport possibilities of the region. The results were good. (IS)

- Limitation of negative agglomeration effects

Tallinn and Helsinki are linked by boat and airplane. Though the connections are good it has been a question of debate in an environmental aspect and will be an important question to solve to the future. (LV)

- Best practices exchange

The best projects are made with some good preparation

The shipyard in Finnish Turku where South Korea specifically invested in building a huge cruise liner is a good example of successful direct investments. It was good to see how it actually works there, how the management is organized. Sometimes you have certain expectations on your own but an exchange like this shows in what way Asians work differently. (IS)

The Basaar project tries to give advise on successful integration. By pointing out the Russian Baltic Pearl and Swedish Kalmar Project, some examples are given of failures of integration. The Russian example shows how political expectations did not meet with the reality. (IS)

- Implementation of a framework permitting cooperation

This is what the Basaar project is trying to do. (IS)

Summary on the interviews in Oresund, part 2

- **Gaining a critical mass…**

It is important to identify the exact winning point for each city involved, not just the main cities. The winning point might be an attractive regional identity to one city and new infrastructures to another. We have been trying to develop what each city needed in particular. For example supporting Malmö in building the regions biggest sports arena

Malmö Arena contributes as a good incentive for Malmö and branding the **airport in Kastrup** as the regions only international airport was important to Kastrup. (MS)

Labour unions
Reaching out to labour unions and tourist organizations has been useful, since it highlights common issues. (MS)

Health care
As for health care, integration has not been needed since the whole region has high valued health care within most cities. (MS)

- **Increasing the economic integration within the interurban cooperation**

Sectoral fairs
Öresund is facing Expo 2022 where the region is aiming to present the first carbon neutral region in the world. The attention will be important for Öresund. (MS)

Support to cooperation
Trainee programs as well as vocational schools have been supported in varying ranges. (MS)

Techno-pole
The creation of Techno-poles has been actively supported, but MS seems unsure of the importance. (MS)

- **Valorisation of the equipment**

At the moment it is peaceful and a good climate for young people with good universities in Copenhagen, Lund and Malmö, child care, communication possibilities and access to leisure activities. It is still needed to brand this further to level the financial efficiency. We also need to take good care of our students; the universities in the region need international support. (SJ)

The existence of good child care, work possibilities and living possibilities has created a good foundation for an integrated society. (MS)

- **Regulations decisions adopted in the cooperation area**

The varying tax systems count as one of the main obstacles for the region. To attract capital, tax incentives are needed to compete with other cluster regions. Lobbying is relatively efficient but the goals are far from reached and an equal tax system between the countries is more or less impossible to create. Tax incentives equal to those in Norway, UK, US could be a simple way to solve a great problem of finding foreign investors. (SJ)

Changing the personal tax so that one only needs to pay taxes in the country you live and changing the corporate tax to include more tax incentives is necesary. (MS)

If you change the rules to make it easier between Sweden and denmark, you make it harder to cooperate between Norway and Sweden, so the question is very delicate. (MS)

Environment management and common resources management

When it comes to environmental protection, ÖRUS (Oresunds regional development strategy) states that it is important to coordinate the municipalities and cities within the region to reach the common aim of decreasing CO_2 emissions. (ÖRUS)

The most important common resource is human capital and know-how, which has to be branded to survive, there are 250 bio-clusters worldwide competing against each other to attract employees and students. People outside the area have to know that we are good. But it costs a lot of money and we are running against countries where the governments are investing a lot of money to branding. (SJ)

- **Transport improvement**

Communication improvements have been a mayor part of the cooperation and the Oresund Bridge is a big part of the betterment. Fehrman Bridge is a vision of a shared world, but there is a risk in taking for granted that the Oresund Bridge is up and running sooner than it is, it might just dilute the resources. We are still not totally satisfied when it comes to i.e. punctuality and costs. (SJ)

- **Limitation of negative agglomeration effects**

The increased land prices surrounding the Oresund Bridge is important for the continuation of the region and how it affects integration. Future research should be focused on this matter.

Recommendations for follow up

More research is recommended with an aim to clarify why some sub regions, like Tallinn Helsinki, Stockholm Uppsala and Copenhagen Malmö, develop further than the rest of the region. Based on this report two hypotheses could be stated such as;

1. Proximity between cities creates bigger opportunities for a polycentric region.
2. Economic maturity and similarities in structure creates better conditions for common strategies. For example the development of clusters

Chapter 12 – Multiscalar changes in Europe and settlement systems and related policies

J. Robert

The present chapter aims at summarising changes in settlement systems at different scales and (mainly in) national policies addressing the related issues. Major information sources are, in this respect, the national reports elaborated by the Ministries for the recent European Conference of Ministers responsible for spatial/regional Planning (CEMAT ; 2010).

1. Changes in settlement systems at macro-territorial scale and related policies

1.1. Recent trends in Western Europe

A sample of countries (Italy, France, Ireland, Austria, Germany, Norway, Sweden, Finland) exhibits a number of converging trends, with however various noticeable differences. By and large, the process of metropolisation has been confirmed over the past 10 to 15 years. It is however modulated by the specific economic and demographic characteristics of the regions concerned.

In France, the major polarised conurbations (Paris, Lille, Lyon, Marseilles, Toulouse and Strasbourg) have all been gaining in population. The economic specialisation in different areas has an effect on the labour-related migrations. While major cities are attractive to executives and employees, they are largely by-passed by blue-collar workers. Medium-sized towns, which constitute "relay stations" between the small urban areas or even the non-urban areas and the major cities, are with the large towns and cities, the main beneficiaries of migration flows. They very often find themselves right in the centre of regional inter-urban systems, because of the intensification of daily mobility and they play a vital role as basis for public services. Small urban centres, especially those outside of the area of influence of large cities, are apparently the main losers of the migration processes.

In Ireland, where population has been significantly increasing, the main process has been one of growing population in the catchment areas of major cities, the catchment areas becoming themselves larger and larger (Dublin, Cork, Limerick, Galway, Sligo, Letterkenny, Athlone/Tullamore /Mullingar). A number of smaller medium-sized cities (Tralee/Killarney, Kilkenny, Wexford) experienced population growth below national average, although population in their catchment area has been substantially growing. The Dublin region's share in the economy has nevertheless been increasing.

In Germany, a significant difference prevails between the eastern and western parts of the country with regard to the dynamics of cities. The process of shrinking cities has clearly started in the eastern Länder, where outmigration flows have been substantial for a long time. In the western Länder, the divide is mainly between north and south, large and medium-sized cities gaining in population in the southern regions and much less in the northern ones with the exception of Hamburg. In addition to demographic factors, economic ones play also a significant part, explaining the growth of south-German cities of various sizes, while cities in old industrial regions (Ruhr area, Saarland) are more handicapped.

In Austria, large city regions (Vienna, Graz, Linz, Salzburg, Innsbruck) are more and more developing into growth poles of the Austrian economy. The growth process, especially in demographic terms, is more accentuated in the eastern regions (Vienna, Lower Austria) as a result of strong international migration net inflows.

In the Nordic countries, metropolitan areas have been further gaining population in recent years. In Sweden, the population of the metropolitan areas (Stockholm, Göteborg and Malmö) grew rapidly in the early 2000s. In Finland, the demographic magnetism of

large urban regions, mainly in the south (Helsinki, Turku, Tampere) continues. In addition, the northern city of Oulu, which benefits from new growing industries and from a favourable public image, has promising development. The winners in population attraction are the urban regions located within the reach of high-speed trains, highways and flight connections. In Norway, the largest population growth takes place in the central areas of the south-eastern (Oslo and Akershus) and western regions (Rogaland and Hordaland). Growth is strongest in the major cities (Oslo, Bergen, Trondheim, Stavanger). Many small and medium-sized urban settlements in the periphery are experiencing stagnation and decline.

1.2. Recent trends in central and eastern Europe

Recent changes in the macro-territorial aspects of settlement systems in Central and Eastern Europe have not been significantly different in nature, but their intensity has generally been stronger than in western Europe. They reflect the fundamental transformation of the economic system and the abolishment of political constraints regarding the movements of people and capital. Trends have however not been linear during the transition period and up to now. In various countries, several stages can be identified.

In the Czech Republic, the 1990s showed continuous growth of regional cities with more than 100 000 inhabitants. Later on, the polarisation process in the three metropolitan regions (Prague, Brno and Ostrava) intensified at the expense of smaller cities (Plzen, Olomouc), fuelled by migration and capital flows.

In Hungary, changes in the settlement system have taken place on the background of persistent population decline since 1981. In recent years, the few areas, which have experienced population growth, are the outskirts of major cities (primarily Budapest) and some economically prosperous areas (Balaton area, settlements located along the axis Györ-Budapest-Szekesfehervar). Regions with a significantly positive migration balance are the Pest county and the region of Györ-Moson-Sopron in westernTransdanubia. The small towns and villages of northern Hungary, southern Transdanubia and south-western parts of the Great Plain have experienced significant population decline in the same period.

In Slovakia, the dynamic process of concentration of population from rural into central urban areas, which prevailed before 1990, stagnated during the 1990s. Then concentration benefited the larger cities. On the background of growing population at national scale, the areas, which exhibited strongest demographic increase in recent years, are the metropolitan regions of Bratislava/Trnava in the West and Kosice/Presov in the East. On the opposite, the areas where population declined are the counties of Banska Bystrica, Nitra and Trencin. The economically strongest settlement is the metropolitan area of Bratislava/Trnava.

In Slovenia, the concentration process has largely favoured Ljubljana and, to a lesser extent, Maribor and the urban conurbation of Koper-Izola-Piran. The settlement system of Slovenia comprises numerous small towns, which are not strong enough to become development poles for their catchment area. This favours concentration in and around the largest cities and conurbations.

While Poland was traditionally characterised by dynamic demographic growth, the population has tended to decrease in recent years. Against this background, interregional migrations have been favouring the more developed regions of central and western Poland, in particular the large urban centres (Warsaw, Kraków, Wroclaw, Poznan, Lodz and Katowice). Although the inherited settlement system is characterised by a quite balanced polycentrism, the western regions have greater density of urban units than the eastern ones. The cities with a high level of development, rapid growth and strong, positive influence over their regional surroundings are, beside Warsaw, mainly Krakow, Wroclaw, Poznan, Gdansk-Sopot-Gdynia. The urban areas of Szczecin, Lodz and the post-industrial areas of the Gornolaska conurbation have been developing more slowly in recent years or have not developed at all.

In the Baltic states, with strongly unbalanced settlement systems, the metropolisation process has been steadily progressing throughout the transition period against a background of population decline. During the past decade, only a few large cities of Estonia (Tallinn, Tartu, Pärnu) have retained their population and experienced a relative demographic growth. The smaller county centres and towns have mostly been experiencing population decline during the past two decades, with the exception of a few of them (Kuressaare, Happasalu), which have benefited from tourism and recreational activities. The settlement system of Latvia is largely dominated by the Riga region, where almost half of the country's population lives. The concentration process of economic activities in the capital region has further progressed in the last decade, while the prosperity of smaller cities (Daugavpils, Jekapils, Jelgava, Jurmala, Liepaja, Rezekne, Valmiera, Ventspils) is largely based on the growing residential economy and the related service activities.
In the south-eastern Balkans, Romania has inherited from the former socialist regime a rigid hierarchy of settlements, in which industrialisation had a negative impact by over-sizing the medium-sized cities and by transforming the urban territory into a collection of monofunctional spaces. A notable issue of the transition period has been the decrease of the urban population, especially in large cities. Bucharest is the only city, which, compared with the year 2002, has registered a slight demographic increase. Only a few large cities, situated at a sufficient distance from the hegemony of Bucharest (Iasi, Cluj, Timisoara) emphasise some functionalism and may become the basis for the affirmation of more polycentrism.

1.3. Macro-territorial policies related to settlement systems

Settlement systems in the context of macro-territorial policies are generally considered by regional policies and by national territorial development strategies. Latter ones are not existing in every country. They are more numerous in Central and Eastern Europe than in Western Europe.
The main issues considered by such policies and strategies are territorial balance at national scale and polycentricity, while maintaining competitive and sustainable development.
In Western Europe, explicit macro-territorial strategies at national level for urban settlement systems are presently more the exception than the rule, while they were more systematic in the past. There are however various national policies, which influence, directly or indirectly, the settlement systems.
In England, the national urban policy of the former government (Labour) concentrated its macro-territorial priorities on addressing the economic challenges in northern regions and the increasing congestion and lack of housing in the London region. The Northern Way strategy, adopted in 2004, based on urban and regional reconversion, has been promoting two development corridors (M62 Liverpool-Manchester-Leeds-Hull; A1 Newcastle- Sheffield) and eight large urban poles along them, supposed to act as a single city region. In the South-East, growth areas were designed to focus major development around the London region (Ashford; Milton Keynes/South Midlands; corridor London-Stansted-Cambridge-Peterborough and the Thames Gateway).
The current Government is committed to decentralisation and returning decision-making to the local level. The Government has announced its intention to abolish Regional Strategies, and allow local areas to take the lead in considering appropriate levels of growth. A new duty to co-operate on local authorities with other local authorities and public and statutory bodies will be introduced, and proposals for directly elected Mayor's in the largest 12 cities in England will be brought forward.
A key element of the Government's approach is the introduction of Local Enterprise Partnerships which bring together business and local authorities in self-defined areas in order to pool resources and achieve local priorities for growth. The Government is also committed to bringing forward a Regional Growth Fund whereby private bodies and public-private partnerships (including local enterprise partnerships) bid for funding to invest in sustainable private sector led growth.

In the Netherlands, the adoption of the "Nota Ruimte" in 2005 has introduced a policy of networks of cities, including the Randstad and other more peripheral groups of cities. This new approach was added to the concept of specialised urban poles (port cities; technology poles, business and trade poles etc).
In Italy, it is considered that a polycentric development model implies evaluating the first level urban centres, which keep on growing economically and socially and the second level cities, by taking into account their economic and social growth dynamics, their distance from other first level nodes, their capacity to enhance the interoperability among harbours, airports and inter-ports (integrated platforms) and their capacity to share territorial alliances for common development projects. In this respect, large international corridors should no more be considered as the way to ensure transport connections between a few places and important nodes or between these nodes and the rest of Europe. They are also a valuable opportunity to implement those territorial projects, the target which focuses on second level urban nodes, with the aim not to let them be treated as marginal interchange spots.
In France, the large-scale dimension of settlement systems is addressed rather indirectly through various thematic policies, such as the policy of competitive clusters adopted in 2005, which has so far awarded official labels to 71 of them, together with a concentration of industrial and technological resources in these clusters.
Ireland has adopted a few years ago a National Spatial Strategy aiming at achieving sustained high levels of population increase, economic growth and physical development in “gateways” and “hubs” in ways likely to significantly enhance the quality of life in these areas and to support wider sub-regional development. A more balanced regional development is aimed at, with higher population increases, economic growth and physical development in areas of Ireland outside the Dublin's zone of influence. Trends since the adoption of the National Strategy exhibit however stronger physical de-concentration of the settlements with too strong dispersal throughout the countryside. The development of an "Atlantic corridor" (linking Cork, Waterford, Limerick/Shannon and Galway), likely to counteract the attraction of the Dublin region, has only partially materialised.
In Norway, as in France, large-scale issues related to the settlement system are indirectly addressed through thematic policies. One of them aims at relocating public administrations and agencies from the capital city towards a number of regional centres in need of consolidation.
In the countries of Central and Eastern Europe, recently elaborated territorial development strategies benefit, up to a certain extent (the competition of sectoral policies is generally still high) from Structural Funds resources.
The "Sustainable Development Strategy of Latvia up to 2030" (in course of approval in 2010) targets polycentric development providing support to the development of competitiveness, accessibility and attractiveness of urban territories and city regions. The ERDF-supported sub-programme "Growth of national and regional development centres for sustainable and balanced development of the country" promotes 17 municipalities (eligible for support to infrastructure development), together with other 18 "amalgamated municipalities" (resulting from the recent local government reform), with the aim to strengthen their competitiveness and to create functional links between development centres and the surrounding areas.
In Poland, the "Concept for territorial development 2030" (KPZK) integrates territorial planning with socio-economic planning. Its backbone is a polycentric metropolitan network based on dynamic development centres, an open system of numerous metropolitan areas together with their territories and other centres of growth, which are all interconnected, including with other metropolitan networks in Europe.
The "Territorial development concept of Slovakia" (KURS 2001) recommends a structural hierarchy of settlements, settlement nodes and economic agglomerations with respect to their national and international connections, such as the development of the main Slovak urbanised corridor. On that basis, the Territorial Development Plans for the Regions have to materialise the functional and physical links between the municipalities.
In Slovenia, it is already recognised that the "Spatial Development Strategy", addressing among others the strong imbalance between Ljubljana and other regions, has so far been

inadequately implemented. Main reason seems to be, in addition to the market economy's forces, the absence of synergy between them and the Spatial Development Strategy.
In Estonia, the ERDF-supported programme "Development of urban areas", adopted in 2008, provides support to investments in the five largest cities and their surrounding agglomerations.
The "Strategy for the territorial development of Romania", to be adopted in 2011, aims at developing the settlements network, at structuring functional problem areas and at promoting urban-rural solidarity. Seven regional cities are designed as "growth poles" (Constanta, Ploiesti, Iasi, Brasov, Cluj, Timisoara and Craiova) and further 13 smaller cities are designed as "urban development poles". This is intended to implement polycentric development in the country and to counterweight to the excessive polarisation of Bucharest.
The question remains open, in how far the ambitious objectives of such national territorial development strategies will be adequately implemented. Various examples already show trends in Western as well as in Central and Eastern Europe, which depart significantly from the territorial objectives of such strategies.

1.4. Perspectives for the macro-territorial development of urban settlements

The macro-territorial dynamics observed during the past 10 to 15 years in the evolution of settlement systems are presently under the influence of changing framework conditions in a variety of fields, so that their continuation is likely to be modulated by a diversity of factors, such as the outcome of the economic/financial crisis, population ageing and decline, transformations of the globalisation process and others. Although the identification of common perspectives for settlement systems in their micro-territorial dimension is not easy, the following can be mentioned:
- the economic/financial crisis has been particularly detrimental for urban settlements situated in regions with neo-fordist and old industrial economic base. It has accentuated the divide between urban settlements with a growing knowledge economy and others facing difficulties in modernising their production systems. Urban entities of Central and Eastern Europe with recent, but neo-fordist production plants might become more and more affected by external competition, as numerous West-European regions were during the past decade.
- another significant factor of divide between European cities is the demographic one. The number of European cities with shrinking population will significantly increase during the coming decades, as it can already be observed in eastern Germany and in other cities of Central and Eastern Europe. The divide will mainly be between Western and Eastern Europe, with however a growing number of regions with declining population in Western Europe, mainly in the peripheries (northern Nordic regions, North-West Spain, Mediterranean peripheries), but also in more central regions with a long tradition of outmigration (old industrial regions, landlocked rural regions). The number of regions at Europe-wide scale where demographic constraints will become critical for maintaining a lively settlement network will significantly increase.
- settlements located in regions with a prosperous residential/tourist economy are likely to be more and more favoured, especially if there are capable to attract retirees and a growing number of people belonging to a higher income groups.

2. Changes in metropolitan regions and related policies

2.1. Suburbanisation and densification

The past 10 to 15 years have been characterised by significant trends of suburbanisation around large and medium-sized cities as well as of densification in particularly attractive areas. These trends have developed at Europe-wide scale. Main differences between

countries and regions are related to the intensity of the process, which itself depends, among others, upon the stage of cities in the urbanisation cycle, upon the economic situation in the respective regions and upon the type of territorial governance applied.
The West European situation shows that the suburbanisation process has not been intense only in the Mediterranean regions.
In Ireland, population growth has been highest in rural areas surrounding large and medium-sized cities, creating dormitory areas for nearby towns and generating substantial flows of car traffic. In the Nordic countries, the concentration process of population activities in and around large towns, inevitably brings with it suburbanisation processes. In Norway, for instance, suburbanisation is widespread around major cities as well as small and medium-sized towns in centrally located regions. The city growth is absorbing the towns and villages, transforming them into suburban centres. This development is producing extensive housing and labour markets that are scattered over wide areas, generating large commuter volumes. This is particularly the case in the Oslo conurbation and around the cities of Stavanger-Sandnes, Bergen and Trondheim. In Austria, suburbanisation in recent years (2001-2007) has mainly developed in Lower Austria and Styria. In Vienna, during the past three decades, the suburbanisation process has shifted more and more outwards from the nucleated town, generating intense car traffic. The suburbanisation process stays in direct relation with progressive devitalisation of inner-city areas (outmigration of commercial activities, of middle and upper class population groups and also of jobs).
In France, urban sprawl has been developing systematically around Bordeaux, Montpellier and Toulouse and limited to specific areas in the vicinity of other large towns (Rennes, Nancy, Lyon, Marseilles). The suburbanisation rings have the highest annual progression of population.
In the case of Italy, urban decentralisation and the expansion of urban areas in large industrial districts (Milan, Varese) have caused the outlines of town borders to become blurred, creating boundless metropolitan areas characterised by intense traffic flows. Some other large towns, such as Rome and Naples, show stronger elements of continuity between the central and peripheral areas.
In Malta, migration out of the Harbours conurbation into newer settlements, from densely populated areas into quiet suburbs, in the north, central part and south of the island, has been observed for the past decades and is still evident. In the 1980s and 90s, this has led to individual settlements growing into each other and forming one large conurbation.
Densification processes take place also in attractive areas, which are not necessarily in the vicinity of large cities. Coastal areas and river valleys are largely favoured in this respect. In the case of France, densification takes place along the coastlines of Brittany (especially between Vannes and Nantes), of Vendée and of southern France as well as along various valleys, like between Avignon and Romans along the Rhône. In Sweden, densification is significant in along the Baltic coastline, north of Stockholm.
In Central and Eastern Europe, the suburbanisation process around mainly large cities has been particularly strong during the past 10 to 15 years, being at the convergence of a number of factors acting all in the same direction: the abolishment of regulations which prevailed in the former socialist regimes (control of migrations towards cities; land-use control; absence of real estate markets), existence of an intermediary period without real territorial governance and land-use control, strong increase of motorisation, increasing purchase power of specific population groups, concentration of activities in large towns, search of better living environments than those inherited from the socialist era etc.
In Slovenia, roughly 30% of the population now live in new suburban areas. Intense suburbanisation and urban sprawl trends have taken place, mainly around Ljubljana and Maribor and along motorway cross (E5-E10), with dispersed construction of detached houses and transformation of the settlement, landscape and environmental patterns. Main reasons identified with regard to this process are higher accessibility (new motorway network and rates of motorisation), higher property prices in various urban areas, lack of effective national instruments for land-use policy, practices of municipalities, ineffective control of property market development.

In Hungary, suburbanisation has been the most important territorial process of the period after the political transition, that affected first of all Budapest and, at a lower extent, the regional centres too. This has lead to the radical transformation of the city's surroundings, generating also loss of functions in the core areas. Around Budapest, population growth in neighbouring settlements is also accompanied by the expansion of local labour markets.

In the Czech Republic, a change has taken place in the relation between cities and their hinterland in the case of most regional centres, with the export of development activities and capital from the core city into the hinterland areas. Small municipalities (up to 2000 inhabitants) situated in the surroundings of large cities, show significant migration gains and this trend is gradually spreading also into less exposed areas of the hinterland of large cities. However, the emergence of unprecedented isolated settlements as a result of suburbanisation on green fields is occurring only very rarely. There is nearly always a relation to existing settlements. On the opposite, commercial suburbanisation is usually concentrated along major transport routes and their crossings and is almost always developing on green fields. It is moreover very unevenly spread on the territory and is mainly concentrated in the hinterland of the largest cities and regional centre is (Prague, Brno, Ostrava, Usti nad Labem, Liberec, Jihlava and Olomouc). In suburban areas, the built up areas, the transport and technical infrastructure as well as the service areas are not rationally used, so that investment and operating costs are growing. Suburbanisation is strongest in the metropolitan region of Prague, from where it is spreading into the whole territory of the region of Stredocesky. The development is also taking place in relatively remote settlements, insufficiently equipped with public facilities. Regional centres, such as Brno, Ceske Budejovice, Plzen and Olomouc are also affected by suburbanisation trends.

In Slovakia, suburbanisation processes are visible around all cities with more than 50,000 inhabitants and have intensified after 2000. They are strongest around the agglomerations of Bratislava and Kosice. Mainly in the case of Bratislava, suburbanisation affects also the cities in the surroundings, which are separate urban settlements. It stretches also across the national borders towards neighbouring areas of Austria and Hungary. Beside prestigious residential areas, facilities and services, suburbs are also getting large warehouses, logistics centres, shopping centres and service businesses, all of which are later becoming a major problem when it comes to overall residential, environmental quality improvements. Transport systems are considerably lagging behind current needs and expected development trends, generating excessive travel time to access the centres, as well as other types of inconveniences. A new division of labour is progressing within metropolitan regions, with suburban communities generating new jobs directly on their territory and improving the technical and social infrastructure.

In Poland, the suburbanisation processes vary in the various regions and are tightly linked to the cities' historical development. In the western parts of the country, urbanisation is undergoing restructuring in the form of a more rapid process of suburbanisation, shaping a network of towns of medium dimensions, with intense migration flows between urban centres, mainly from smaller towns to larger cities. In eastern Poland, a classic form of urbanisation is dominant, consisting mainly in migration from rural to urban areas.

In Estonia, strong urban sprawl is observed in the hinterland of the three largest cities (Tallinn, Tartu, Pärnu). In the case of Tallinn, densification in the hinterland (Harjumaa) is expected to continue. In Latvia, sprawl tendencies exist around Riga, but also around smaller cities (Daugavpils, Jekabpils, Jelgava, Jurmala, Liepaja, Rezekne, Valmiera and Ventspils). Along the increasing prosperity of the population up to 2008 and the search for better quality living environments, developments occurred outside the administrative borders of cities and towns in the form of uncontrolled sprawl. The suburban areas frequently lack the required infrastructure and associated services. Changes in the land-use patterns lead to a spatial mismatch between the location of jobs and residences, to modal split in favour of private cars and to increasing commuter flows. As several municipalities surrounding Riga serve mainly for housing purposes, the load of services provided by Riga City still increases, imposing an extra burden on the city's budget.

In Romania, between 1990 and 2008, the surfaces zoned for urban development increased by 70% and this has not been correlated with the development of infrastructure, both transport and amenities and has not happened following a process of urban planning but following real estate pressure in the context of lack of control by authorities on areas surrounding the cities. Many factors have contributed to urban sprawl, such as shifts in views regarding the housing style (from collective accommodations to individual ones), a relatively low price of land in outer city areas compared with inner-city land prices and the possibility to own larger lots, the existence of transport networks in and out of the cities, connecting rapidly the main functional areas, the advantages of areas with leisure profiles etc. Around each important Romanian city, residential areas have appeared. An example of such areas is Pipera in the north of Bucharest, where a very intense real estate pressure, the lack of any planning and of metropolitan cooperation leads to a chaotic urban development with no amenities and with multiple social problems. This type of urban expansion has negative effects on transport, the environment and agriculture and increases the costs.

2.2. Territorial policies related to metropolitan regions

At the scale of metropolitan regions, a variety of policies are being implemented, with a variable degree of success and efficiency, to contain urban sprawl, promote compact cities, strengthen the economic competitiveness and improve territorial governance through stronger cooperation.

a) Containing urban sprawl and ensuring coherent and sustainable development

With regard to the containment of urban sprawl and the enhancement of suburbs, the Italian priority is aimed at increasing the value of suburbs and at developing polycentric towns. It is considered that suburbs can become town centres in the future and can even represent a major development factor. A number of so-called "complex programmes" with comprehensive character are addressing the restructuration of suburbs. Some large Italian cities (Milan, Turin, Rome) have been provided with specific offices working on the restructuring of urban peripheral areas. In Rome, the Department for the development and recycling of peripheral areas coordinates several plans and projects, including those aimed at recycling urban areas that once were used as illegal housing districts, in accordance with sustainable development models.

In France, controlling urban sprawl is aimed at through the introduction of a new generation of SCOTs (Schémas de Cohérence Territoriale), which are more prescriptive, including minimum standards for urban density in terms of transport amenities and improving the approach to urban/suburban relations.

In the Netherlands, the aim is to meet at least 40% of the new housing demand, especially in the Randstad, in existing built-up areas, making stronger use of the possibility to transform former industrial port sites and railway yards into new living and working areas. Urbanisation will be intensified around transport junctions. In addition, new housing locations will be needed for which new sites will be designed, especially in Almere, Haarlemmermeer or in the east of Utrecht. In addition to the above-average intensification of urban densities in central and easily accessible locations, a part of the housing demand will have to be met in less dense environments for reasons of international competitiveness and of diversity of expectations. It is envisaged to develop metropolitan parks with large water areas, accompanied by highly attractive living environments in lower density areas.

In Malta, after the urban sprawl period of the 1980s and early 1990s, an increasing preference was given to the redevelopment of dwellings on previously developed land, as opposed to the take-up of fresh land. Following the relaxation of building heights, building densities have increased, bringing with them some pitfalls, such as disruption of streetscape continuity, smaller residential units and greater parking problems. Demand still exists for urbanisation schemes in which residential density is lower, such as villa areas.

In Sweden, urban and rural areas are becoming increasingly integrated, both socially and economically. Many people live their lives both in the countryside and in an urban setting, rather than just one or the other. Rural areas are therefore significantly contributing to the development and sustainable growth in cities and towns, just as the cities and other built-up areas contribute to rural development and growth. New technology and better infrastructure are facilitating close contact between people and between enterprises.
In Norway, the programme "Cities of the future" promotes, among others, stronger integration of land use and transport planning. Particular attention is being paid to the location of major institutions and service facilities.
In Ireland, it is advocated to strengthen the settlement structures throughout the country through focusing new development mainly into urban areas, according to coherent settlement strategies approved at regional and city/county levels, with the aim to counteract the expansion of small urban centres in the countryside. It is also recommended to achieve reduced travel times and distances and increased usage of sustainable modes, particularly in the case of journeys to work.
In Germany, on the background of rapid population ageing and of population decline in various regions, the suburbanisation areas of the 1960s and 1970s are likely to raise problems, in terms of overcapacity of single-family houses and emerging new residential demands with more urban character. There is a growing need for efficient technical, social and cultural infrastructures, for a higher quality of public spaces and for new, multifunctional settlement systems, enabling accessibility without cars.
The countries of Central and Eastern Europe, which have experienced the highest rates of urban sprawl during the past 10 to 15 years, are now starting to develop and implement instruments of land-use control and of coherent urban planning.
Horizontal cooperation at inter-municipal level is considered as an important leverage in metropolitan regions to contain suburbanisation trends and to ensure coherent, sustainable forms of urban expansion. Various West European countries have significant experience in this field (Germany, France, Austria). In some countries, it is however recognised that inter-communal cooperation is largely insufficient to ensure sustainable and competitive settlement systems (for instance in Norway). In the Netherlands, seven "urban regions" have compulsorily been set up by the government as inter-municipal cooperation bodies, four of which are in the Randstad around the 4 large cities, with the purpose of elaborating a strategic territorial plan, to plan the location of new housing, to promote the regional economy and to elaborate jointly the environmental policy.
In some countries of Central and Eastern Europe, inter-municipal cooperation at metropolitan scale is progressively developing. In Slovenia, suburban areas are establishing inter-municipal links in order to progress into functional urban agglomerations or conurbations, but mainly at an informal level of cooperation or being involved in joint development projects. An example is Koper-Izola-Piran.
In Estonia, a few large cities (Tallinn, Tartu) and their surrounding municipalities have started cooperation with the aim to strengthen joint planning at agglomeration level, primarily in land-use planning, public transport, waste management and provision of some other public services. It is however indicated that in a number of these countries (for instance Romania), inter- municipal cooperation at agglomeration level is still significantly insufficient. The Romanian government has decided to enforce peri-urban territorial planning documents for all cities and towns from 2011 onwards.

b) Promoting economic efficiency and competitiveness through networking of cities and stronger urban rural links within and around metropolitan regions

Territorial competitiveness is more and more targeted through stronger cooperation between urban entities belonging to the same urban or metropolitan region.
In Italy, the capacity of first and second level urban agglomerations to share territorial alliances for common development projects is presented as a strategic issue.
In France, the policy of competitive clusters is primarily a networking policy, which is supported by the government. The “Grand Paris” policy aims at increasing the physical and functional links between various high-level facilities (research centres, airports etc)

around the capital city, starting with a new public transport system in the metropolitan periphery.
In Ireland, the National Spatial Strategy attempts to achieve closer physical, economic, information and institutional integration between the Atlantic gateway cities (Waterford, Cork, Limerick/Shannon and Galway), so as to build a critical mass as counterweight to the attraction of the Greater Dublin Area and to achieve enhanced rates of growth along the southern/ western seaboards. The impact of the strategy has so far been limited, with small population growth in three of the four gateways (Galway excepted) and insufficient materialisation of true development corridors between them.
In Austria, Regional Management Bodies have gained importance in urban agglomerations in organising networking and promoting development processes in relation with concrete projects.
In Germany, networking at the scale of metropolitan regions is gaining in importance. With a view to maintaining and strengthening competitiveness, the strategic approach of "large communities of shared responsibilities" (urban-rural partnerships) between cities, metropolises and rural growth regions as well as peripheral and economically underdeveloped regions, creates an innovative instrument for the development-oriented and balancing spatial planning policy. The strategy is closely linked to the ambition of enabling all - strong and weak - areas to recognise, concentrate and network their potentials. The backbone for the application of such strategies is the network of metropolitan regions of European significance. One example of such strategies was the creation in 2007 of the "Initiative Europäische Metropolregion München" (EMM) as a non-compulsory association grouping 27 urban and rural districts. The territorial basis is composed of two concentric areas: the core area comprising the cities ofMunich, Augsburg, Ingolstadt, Landshut and Rosenheim, and their respective districts (altogether 4.65 million people) and an external ring with more rural character. Main fields of cooperation are the knowledge economy, the economic attractiveness, environment and health and mobility.
In the Netherlands, national networks of cities are particularly promoted at national level: the Randstad and the networks of cities of Brabant, South-Limburg, Twente, Arnhem-Nijmegen and Groningen-Assen. In such networks, the governmental policy aims at concentrating economic activities, infrastructures and urbanisation, strengthening the international competitiveness through urban centrality, improving accessibility and coordinating urbanisation with the development of infrastructures.
In Finland, the advantages of scale are leading urban regions to networking and specialising. Cities are more and more developing cooperation and joining resources. This change has already become visible in regional development based on development zones, twinning projects between cities and improved internal regional connections.
The networking of cities is also starting in some countries of central and eastern Europe, but at a modest scale. The fact that most countries have a strong monocentric settlement structure and lack powerful second-rank cities, is not a favourable prerequisite.
In the case of Poland, which has a polycentric settlement system with a significant number of large cities, the national strategy (Territorial Development Concept2030) advocates the networking and functional interconnection of all metropolitan areas, together with their peripheries and other centres of growth. In Romania, innovative approaches are adopted concerning the networking of localities through the development of regional clusters, which constitute an opportunity for capitalising on the territorial potentials.

2.3. Perspectives for the territorial evolution of metropolitan regions and related policies

During the past 10 to 15 years, the de-urbanisation/suburbanisation process, combined with the metropolisation one, has affected numerous urban regions in Europe. It has been stronger in southern, Central and Eastern Europe but also significant in peripheral countries of the northern half (Ireland, the Nordic countries). As not all countries and

regions are at the same stage of the urbanisation cycle, it is likely that this process will continue in a number of them.
It should however be considered that a number of factors are now converging to slow down this process: progressive population ageing and decline in a growing number of countries, the impact of the economic/financial crisis on the purchase power of citizens and on real estate speculation (Spain, Portugal, Ireland, UK, various central and east European countries) and the fact that the "catching up process" in Central and Eastern Europe in terms of de-urbanisation and suburbanisation is rather advanced and should no more progress significantly in future.
Against this background, the tasks of public policies in the coming decades will most probably concentrate, on the one hand, on the reshaping and restructuring of suburbs and suburban areas, which have developed chaotically. The aim will be to create new centrality nodes in areas of urban sprawl, to mobilise and enhance their potentials and to improve the quality of life in terms of sustainability. This is an innovative task for urban and metropolitan planning. In urban regions with shrinking population, the restructuring of suburbs and of urban sprawl areas will be confronted with additional difficulties, with regard to the real estate market and the shaping of new centrality nodes.
The second major task is more of an economic nature. On the background of growing external competition, all territorial potentials will be mobilised. This will happen more and more through the creation of networks of cities, largely centred on metropolitan areas, involving numerous medium-sized and small urban centres. Main transport infrastructure (transport corridors, major ports and airports) as well as clusters will play a major part in the structuring of such networks. Regions with shrinking population, especially of working age, will have to compete more strongly to attract qualified manpower and to adapt their production structures (substitution of capital and technology to labour). The involvement of peripheries in such networks may also be problematic there where the devitalisation process is rather advanced and where urban settlements are particularly weak.
For numerous regions in Central and Eastern Europe, the functional networking of cities is a particular challenge due to the limited number of powerful second rank cities, to the backwashing process which has taken place in the hinterlands of numerous metropolitan areas and to the weak demographic perspectives for the future. In addition, networking activities are not yet strongly rooted in the political culture of most of these countries.

3. Intra-urban issues and related policies

3.1. De-urbanisation and urban devitalisation processes

In the context of the de-urbanisation phase of the urbanisation cycle, numerous European cities and metropolitan areas have been and still are confronted with the devitalisation/depopulation process of their core areas, and sometimes of the entire city. This process has started earlier in north-west Europe, so that in between re-urbanisation processes have been at work there. Similar trajectories are starting into cities of other parts of Europe.
In Italy, large metropolitan areas are entering the so-called "urban de-centralisation stage", with wide ranging population decrease in the core areas generated by new economic demands and by the need for a better quality of life. A major issue is therefore how to rescue the existing city cores.
In France, population decline in the central municipalities of agglomerations is observed in a number of medium-sized cities (Le Mans, Caen, Le Havre). In Ireland, a trend of population decline is recorded in the administrative cores of second rank agglomerations (especially Cork and Limerick). In Austria, vacancies of commercial premises in the city centres contribute to urban depreciation. In addition, the outmigration of middle-class and upper-class population towards the suburbs tends to leave a number of serious social problems in the core cities. At the same time, more and more inner-city areas are becoming attractive for upper middle-class citizens, especially people with higher

education and a potential above average income, who benefit from dense urban areas and seek a culturally diverse environment.
In Germany, population decline affects a number of cities (not only the core areas), especially in the eastern Länder, but also in some western regions. In a much larger number of cities, especially in old industrial regions, the core areas have lost population.
In Norway, it is stated that the depopulation of inner cities is not a real issue.
In numerous cities of Central and Eastern Europe, the core areas have lost significant amounts of population, generally to the benefit of suburban areas. In Romania, a notable issue is the decrease of the urban population, especially in large cities, largely caused by the decline of industrial activities. During the past 15 years, the urban population has decreased by approximately 6%. Only Bucharest has registered a slight increase in population since 2002.
In Slovenia, decline of city centres, emergence of brownfields and inadequate urban renewal are observed in several cities. In the Czech Republic, the three largest cities (Prague, Brno, Ostrava) have registered depopulation in their inner-city areas as a consequence of suburbanisation and withdrawal of socially stronger young residents. This has generated the degradation of the housing stock and brownfields have appeared in former commercial areas. In the case of Ostrava, the total population of the entire city has declined during the 1990s.
In Hungary, population decline of the capital city started already in the 1980s. Budapest has lost 300 000 inhabitants between 1990 and 2000 and further 75 000 up to 2008. Population loss has also been experienced by industrial cities in north-eastern Hungary and by many former agricultural market towns of the Great Plain. Loss of functions and the emergence of crisis areas can be observed in the core areas of various towns.
In Latvia, substantial population decrease has taken place in the central parts of Riga and in several localities in the vicinity of the centre (from 20% to more than 55%). Numerous degraded areas have been emerging.
In Poland, cities have been likely to depopulate (outmigration and negative natural balance). The city centres remain an attractive place to work, but not enough attractive to live in. This has caused decline and degradation in inner-city areas. Depopulation trends observed during the period 1996-2004 in inner-city areas result also strongly from international outmigration and from negative natural balance.

3.2. Social polarisation in cities

During the past 10 to15 years, social polarisation has been growing in numerous European cities, as a result of transformations of the economy (growing importance of the knowledge economy), of the reduction of social transfers, of the growing number of immigrants and of increasing territorial segmentation of real estate markets in cities. Precarity is often concentrated in specific neighbourhoods.
In France, the urban areas generally face centre/periphery split, replacing the traditional dichotomy between the fashionable districts and the working class areas. The price of housing excludes lower-middle-class de facto from city centres, especially in view of the dwindling supply of social housing. New intermediate precarious areas are emerging, beyond the reach of general urban policy. Some rural areas, in particular, are facing increasing precarity. The increasing influx of alien population into the large cities creates precarious neighbourhoods, kinds of enclaves within gentrified agglomerations, which exhibit a significant concentration of social difficulties.
In Austria, the core cities are increasingly facing social problems, such as the integration of migrants, insufficient services to the elderly and persons in need of physically care as well as people in need of social support. Gentrification process is however progressing in various inner-city areas.
In Norway, escalating property prices in the inner city areas of large cities are pushing tenants and businesses with insufficient financial capacity out to suburbs. Oslo has the largest proportion of immigrants. This polarisation is causing certain problems related to integration and social coherence. The housing and social policies are not designed to counteract the market mechanisms.

In Germany, a recent survey has revealed that 1500 neighbourhoods belonging to more than 500 municipalities exhibit increasing needs for the integration of immigrants and socially deprived people.
In numerous cities of southern Europe, social polarisation expands through the development of so-called “closed condominiums”. These are gated communities of small dimension, but with similar characteristics. Gated walls and other explicit boundaries clearly define a private and exclusive territory within the city, only accessible for certain groups of residents. The contextual causes for the emergence of closed condominiums have been a relatively favourable economic situation with more entrepreneurial dynamism, the introduction of marketing techniques in urban planning, increasing urban insecurity, increasing financial restrictions imposed to local authorities and more demanding attitudes towards housing. Closed condominiums have expanded in large southern European cities as well as in tourist resorts. Alone in the metropolitan area of Porto, 367 closed condominiums have been identified in a recent survey. A typical closed condominium is a multi-family development with an average of 50 dwellings, mostly residential and with basic facilities (lounge, playground, swimming pool etc).
Social polarisation has significantly progressed in the cities of central and eastern Europe as a consequence of the transformations of the economy and society. Social polarisation is however more related to growing income disparities within the native population, to inclusion or not into the labour market and less to the influx of immigrants than in West European cities. A general phenomenon in Central and Eastern Europe is that the most well off young population groups have migrated from the inner city areas to the new suburban areas in search of a better living environment. The remaining population in the core cities are mainly the more modest and ageing population groups. Gentrification trends in some core areas are just starting.
In the Czech Republic, the number of immigrants is still modest but increasing Migrants from weak economic regions are also settling, mainly in inner-city areas. In Prague, some districts (Praha 5, Troja) have been prevented from population decline. Social polarisation in cities is still continuing.
In Hungary, the great majority of immigrants have arrived since the political transition. They are mainly Hungarian minorities from neighbouring countries (Romania, Ukraine, Serbia). The second significant immigrant group is now from Asia (China and Vietnam).
In Latvia, real estate speculation has contributed to social polarisation. Dwelling owners terminated renting contracts with tenants of apartments in downtown areas, expecting to gain profit from reselling their property. In Poland, problems of concentration of poverty, social pathologies, loss of economic functions concern some specific districts situated in a number of cities, even in the most dynamic ones. The cities with neighbourhoods characterised by economic and social problems are Warsaw, Olsztyn, Rzeszow, Gorzow Wielkopolski, Zielina Gora. In addition, there are also specific regional problems. An accumulation of economic and social problems can be observed in a number of cities situated mainly in the northern and central parts of the Slaskie voïvodship and in the southern part of the Lodzkie voïvodship. Poverty is unevenly spread. In large cities, it affects certain social groups such as teens from families with numerous children, families run by single mothers or inhabitants of gloomy districts of block of flats built under the communist system.
In Slovakia, social polarisation is expanding in cities. New social groups have reappeared (entrepreneurs, businessmen, tradesmen, merchants, financiers) while some social categories (unemployed, homeless) are suffering on the background of dramatic growth of inequalities in the distribution of wealth. In addition, social and regional disparities are closely linked. Slovakia has a long tradition of immigration (mainly from eastern Europe and Asia), prevailing over emigration. Illegal immigration is also significant. Despite this, extensive impoverished areas or ethnically segregated areas are hardly to be found in cities, with the exception of some Roma neighbourhoods in settlements mainly situated in the eastern regions of the country (Lunik IX in Kosice in particular).

3.3. Territorial policies addressing intra-urban regeneration and social polarisation

Public policies addressing the regeneration of inner city areas and the related problems of social polarisation are progressing in numerous European countries. In some of them, they already have a rather long tradition. Such policies involve more and more the dense urban settlements of urban peripheries built in the 1960s and 1970s, subject to severe social problems and to multiple deprivation.

In Italy, urban restructuring is not seen any more as a mere architecture-related issue, but rather as a complex set of social dynamics, in compliance with integrated policy models. These comprise an active participation of city dwellers in sharing the choices related to the territorial transformation. The active participation of municipalities, local committees, associations and citizens is generally achieved through several events, such as forums, focused groups, workshops, work teams, interactive communication, local labs and software-based tools. A series of so-called "complex programmes" (with integrated character) are being implemented to tackle the various issues of urban regeneration, restructuring and social polarisation. These are the "Integrated intervention programmes" and "Urban rehabilitation programmes" (public housing, restructuring of the problem and environmental assets, upgrading of services and networks), the "Urban restructuring programmes" (restructuring interventions for larger problem areas, applied to historical city centres, industrial and peripheral areas, public housing areas), the "District contracts" (improvement of infrastructure and services in poor urban districts, promotion of local economic development aiming at facilitating social integration), the "Urban restructuring and sustainable territorial development programmes" (widening the scope of the Urban rehabilitation programmes in involving the creation of networks). The practice of complex programmes is being spread across the country. The region of Umbria has already implemented 85 complex programmes over the last 10 years.

In France, the urban social policy already has a 30 years long history. Its aims are to promote access to employment for inhabitants of problem neighbourhoods, to improve the quality of life in such areas, to promote social de-segregation and social rebalancing in problem areas. The law "Solidarity and urban renewal", adopted in 2000, strengthens the role of social housing in urban renewal. The nationwide "Urban renewal programme" aims at securing a lasting transformation of problem neighbourhoods and at radically improving residents' living conditions. The so-called "Urban social cohesion contracts" between the state and a number of city administrations are geared to providing comprehensive responses to social exclusion in the urban environment.

In Sweden, various priorities and programmes exist for creating more secure local environments in relation with criminality and to counteract exclusion. The public housing policy is subject to significant changes (new Housing Bill of 2010), being brought closer to market rules. Local development agreements, involving public agencies and administrations, private actors and the civil society are set up for the implementation of local development work.

In Austria, formerly low quality residential areas in inner-city districts are being upgraded in combination with urban renewal measures, leading to the foundation of "creative industries" in problem core areas. Vienna has a long tradition in social housing and in sustainable urban renewal, with impacts preventing social polarisation. Since 1995, special emphasis has been put on the comprehensive quality of subsidised housing. Social, economic and ecological considerations are just as important as architectural ones.

Germany has recently adopted a new national urban development policy which actively supports, among others, the trend of re-urbanisation with measures aimed at increasing the attractiveness of urban residential areas, strengthening the inner-city areas and the centres of neighbourhoods in their multifunctionality and using reconstruction as an opportunity for increasing the quality of life in cities. In addition, the integration of citizens with a migrant background is a priority task of the Federal Government, the Länder and municipalities. The urban development programme "Urban districts with special development needs: socially integrated city" (Social city) of the Federal Ministry

and the Länder was launched in 1999 with the aim of stopping the downward spiral in depressed urban districts and of greatly improving the local living conditions. The Social City programme started in 1999 with 161 urban districts belonging to 124 municipalities. In 2008, there were already 523 areas involving 326 municipalities. The Social City programme adopts integrated complex, global development approaches, addressing social segregation, the integration of migrants, community cohesion, neighbourhood management etc.

In Norway, in order to facilitate social integration, public policies promote a creative economy, receptive and supportive to diversity, housing markets and social geography, the perception of good neighbourhoods and the renewal of public spaces. An example is the OXLO project (Oslo Extra Large) for the promotion of the intercultural city.

In the countries of Central and Eastern Europe, public policies addressing inner-city areas in terms of regeneration, restructuring, renewal and rehabilitation, while addressing also issues of socialpolarisation, are just starting.

In Estonia, some activities in this field are carried out in the context of the ERDF-supported programme “Development of urban areas”. In Hungary, in the context of the Regional Operational Programme, an integrated urban development strategy and an anti-segregation plan should be drafted by the local governments of towns and cities with more than 20 000 inhabitants. In Latvia, the challenge of the depopulation of inner-city areas is recognised and tackled (Riga long-term development strategy; Riga development programme and spatial plan of Riga). The ideas of developing compact environments and revitalisation of the degraded areas are being emphasised.

In Poland, it is considered that one way of counteracting social polarisation is to promote redevelopment projects. Warsaw has got its redevelopment strategy comprising social and economic actions. The strategy aims at coordinating several policies of the capital city in areas covered by the redevelopment programme and to support individual city districts in the field of urban sustainable redevelopment of the areas, which have lost their previous social and economic functions. The redevelopment process is related mainly to critical areas where several factors have led to a crisis. The main factor is the social one: high rates of unemployment, social pathologies and inertia. However, the redevelopment process is not limited to the most striking social problems. It is addressing people as a group, not as individuals. Activision of the local economy, redevelopment of buildings, good management of open spaces create real conditions for self-development of local communities. The approach must be comprehensive and should take into account the need to change people’s attitudes. Such programmes are not limited to physical redevelopment and repairs. They include social projects aiming at professional and social activation.

In Slovakia, several suggestions exist which would help reducing the deepening of polarisation in cities: inventory of community resources, increasing of employment stability, resolving housing and security problems, developing community financial institutions, increasing the use of social assistance benefits.

3.4. Perspectives for inner-city areas and related policies

In the context of growing population ageing and social polarisation, the regeneration of inner city areas is becoming an increasing task for public policies of various levels. Demand for new, high-quality living environments in cities, geared by specific population groups (retirees, creative professions etc.) is likely to increase significantly, especially in West European cities and, to a lesser but increasing extent, also in major cities of central and eastern Europe.

Although public authorities largely recognise the social issues related to urban regeneration and renewal, the risk is not small that the socially most vulnerable groups will be pushed out of inner city areas towards more peripheral areas in the vicinity of cities, as it can already be observed in various countries. Urban regeneration and renewal is not only publicly driven. Private interests will be more and more involved in this field, for which solving social issues is not necessarily the primary priority. The example of closed condominiums in south- European cities witness about this risk.

Public authorities have also largely recognised that urban restructuring and regeneration is a very complex task requiring comprehensive and integrated approaches. In this respect, it seems essential to combine area-based approaches with more thematic policies (support to specific population groups; education; integration into the labour market etc.) in order to avoid dramatic social impacts from urban restructuring and renewal programme.

In addition to true inner-city areas, public policies are addressing more and more the restructuring and rehabilitation of dense suburbs built in the 1960s and 70s where serious social problems have accumulated. This activity will intensify in the decades to come.

Urban restructuring and renewal activities will have to include more and more the dimension of environmental sustainability. Reducing greenhouse gas emissions is an important challenge for urban planning: reduction of mobility needs, increasing the use of public transport, better insulation of buildings, greening of cities, higher urban densities etc.

The economic/financial crisis will have a long-lasting negative impact on urban restructuring and renewal activities, as the financial capacity of local authorities has significantly been reduced on the background of indebtedness. At the same time, real estate speculation and the purchase power of numerous households have been reduced also. It is not unlikely that private interests play a stronger part in this field in future. It is therefore essential to establish consistent regulations aiming at protecting the population groups living presently in cities.

Chapter 13 – FOCI Scenarios on the future of European cities and settlement systems

1. Scenario base

1.1. Long-term aspects of the urbanisation process

The long-term aspects of the urbanisation process in Europe have to be analysed at two different scales:

- considered at macro territorial scale, the urbanisation process appears as a secular trend which started in the 19th century in north-west Europe to reach certain parts of southern Europe in the 1980s. Observed on a shorter timescale, starting roughly at the end of the fordist period in the 1970s, a new paradigm related to the development of functional networks between metropolitan areas was added to the traditional Christallerian hierarchical networks. The metropolitan networks are largely shaped by multinational firms. In the knowledge society, global players organise "global value chains" which determine the spatial division of labour as well as the control of knowledge within certain privileged places. Trade flows, FDI, the international fragmentation of production processes made possible by telecommunications, trade liberalization and increasing specialisation are driving the global economic integration, while shaping the settlement systems, especially the upper level entities. The concentration of modern activities and skilled population in metropolitan areas at the expense of less urbanized regions can also be explained by the need felt by employees and enterprises to reduce risks (related to employment and to the availability of skilled labour force) and to optimise their access to services and facilities (business services, education, culture etc).

  The development of metropolitan networking throughout Europe has not been homogeneous in time and in intensity. Metropolitan networking started earlier in north-west Europe and, more generally, in the European "pentagon" London-Paris-Milan-Munich-Hamburg, so that its intensity is particularly high in these regions. It reached more recently the metropolitan areas of the southern and eastern peripheries, where multifunctional networking is less intense and advanced. The urban systems of the European peripheries are often characterised by a stronger hierarchy between cities and towns, according to their size and by much lower interactions and synergy within the urban system. With regard to Central and Eastern Europe, the contrast has been particularly strong between the settlement policy which prevailed during communist times, which favoured (at least in the first decades of the regimes) the medium-sized and small towns at the expense of larger ones, and the powerful, rather uncontrolled development of capital cities and other metropolitan areas which has taken place since the mid-1990s.

- considered at intra-regional scale, the long-term urbanisation process reveals a succession of phases[110] (in reality a cycle) which were not homogeneous in time throughout Europe. The first phase, generally called "urbanisation phase", was driven by rural-urban migrations and industrialisation. In north-west Europe and parts of central Europe, this phase was largely over before the Second World War and continued somewhat during the reconstruction phase after the war. In southern and south-eastern Europe, this phase went on until the late 1980s. It

[110] K. Kunzmann, M. Wegener : « The pattern of urbanisation in Western Europe ». Ekistics.NR 350/351. 1991

was followed by the “suburbanisation phase”, in which the suburbs of agglomerations grew faster than the core. Residential functions in the core were pushed further away by the service economy and by increasing prices. Back office jobs moved also to the outskirts of agglomerations. During the third phase, called the “de-urbanisation phase”, the shifts took place to the urban periphery and beyond towards the small and medium-sized towns of less urbanised metropolitan surroundings. The core cities lost more people and jobs than the suburbs gained. By 1990, counter- or de-urbanisation tendencies could be found primarily in the highly urbanised countries of the North West and Central Europe as well as in northern Italy, whereas in the Mediterranean basin the urbanisation phase was still sustained by higher birth rates and rural-to-urban migrations. The concerns raised by the de-urbanisation process called in numerous cities for active re-urbanisation policies. The revitalization of inner cities through restoration programs, “pedestrianisation” schemes and new public transport systems became a general priority. In numerous cases, such as in the cities of the Netherlands, Germany, Scandinavia as well as in Italian cities such as Bologna and Florence, the revitalization strategies were successful and the exodus from the inner cities could be stopped, while a reverse trend, however a more qualitative one, started. The re-urbanisation phase has to be considered in the wider macro-economic context. It started precisely when the macro-economic paradigm moved from the fordist-keynesian model to the neo-liberal model in the 1980s. In numerous cases, the urban revitalization strategies were deeply market-oriented, bearing the risk of excessive short-term strategies of investors in the most attractive parts of urban areas, associated with growing social problems in less favoured neighbourhoods.

Networking activities between metropolitan areas, already observed at macro-scale, largely driven by multinational firms, have also emerged from the 1980s onwards at intra-regional scale, between metropolitan areas and the surrounding medium-sized and small towns as well as between medium-sized towns themselves in a number of regions without significant metropolitan area. Such networking activities have mainly been driven by local and regional authorities and supported in a number of cases by the national authorities. The objective has been to increase their critical mass and their competitiveness in the Single European Market and, more generally in the context of growing globalization, through stronger specialization of individual towns and the sharing of infrastructure and service facilities.

Such networking activities at intra-regional scale are more common in Western Europe than in Central and Eastern Europe. Networking between cities at intra-regional level is however not limited to the public sector. Enterprises contribute also to the strengthening of ties between urban nodes, especially there, where economic clusters exist. Similarly, it has been observed that the diffusion of innovations from large cities concentrating multiple networks occurs preferably towards smaller ones, a trend which reinforces larger economic nodes like mega city-regions. Cross-border networking activities are progressing in a number of cross-border regions, either in the case of metropolitan areas, the functions of which are stretching over the border (for example Lille, Geneva, Basel, Luxemburg) or in the case of a number of significant neighbouring cities located on both sides of the border (MHAL Maastricht-Hasselt-Aachen-Liège; Upper Rhine metropolitan region stretching from Basel to Karlsruhe, including Freiburg, Mulhouse, Colmar and Strasbourg; Öresund metropolis Copenhagen-Malmö).The case of gateway cities, bridging worldwide networks with the European territory deserves special attention. They are mainly large port and airport cities and are particularly subject to the dynamics of worldwide integration, in terms of trade and migration flows, but also of FDIs and exchange of knowledge. Their worldwide interface functions favour their intra-European networking at macro-scale as well as at intra-regional level.

It becomes therefore more and more obvious that the prosperity of cities and the dynamics of urban systems depend upon the level of connections of urban nodes to multiple networks as well as upon changes taking place within the networks. Networks are generating cumulative effects on specific nodes and poles. The issue of stability/volatility of economic, technological and social networks is therefore a crucial one with regard to the future of European settlement systems.

Networks are diverse in nature, comprising intangible and physical ones. Looking at the second category, it can be observed that in numerous European countries, the territorial organisation, in terms of visions and policy objectives, is based explicitly or implicitly on nodal-axial systems. Concepts such as development axes or "eurocorridors" etc. resulted from such approaches. A particularly important aspect, in this respect, has been the need to ensure the profitability of expensive transport infrastructure. It can also be observed that the nodal-axial systems, as policy objectives and backbone of the territorial organisation, have crossed various economic paradigms (keynesian-fordist, , post-fordist economy, information society, global economy) and have maintained a rather high level of continuity.

1.2. Polarisation, densification and suburbanisation during the pre-crisis period

The long-term analysis of urbanisation processes shows a succession of polarisation/contraction and dispersal/depopulation processes. Looking more carefully at this evolution, it can be recognized that the nature of processes very much depends upon the scale at which they are observed. It frequently happens that polarisation/contraction processes observed at macro-territorial scale are simultaneous of dispersal processes observed at intra-regional scale.

Metropolitan areas have been, during the past two decades, the main beneficiaries of the polarisation/densification processes considered at macro-scale. Densification/contraction processes have also been observed in other territorial categories, such as coastal areas and numerous mountain valleys. Dispersal trends, which counteract contraction processes, are dominating the territorial evolution in the surroundings of metropolitan areas, where the progress of suburbanisation is still significant. Other territorial categories also benefit from dispersal trends, such as attractive rural areas with their small and medium-sized towns, which are more and more favoured by the migration of retirees and self-employed.

Considered at macro-territorial scale, the European pentagon, although far from being homogeneous, comprises the leading European urban functions. It includes also major centres of technological excellence, developing, among others, the converging technologies (biotechnologies, nanotechnologies, information and communication technologies), such as Cambridge, Oxford, Louvain, Heidelberg. The pentagon has been tending to expand along major corridors in various directions: towards the East, as a consequence of the EU enlargements, especially along the corridors leading to Vienna/Bratislava, Budapest, Prague and southern Poland, to Berlin and Warsaw, but also towards the north (Copenhagen and southern Sweden) and towards the south (Rhône Valley and connection to the metropolitan areas of the "Latin Rim"). In England, the pentagon progresses towards the Midlands.

Remarkable macro-territorial disparities can be observed in the field of technological competitiveness (measured by the number of patents declared), which is generally high in most prosperous cities, especially in the pentagon, but also relatively high in some capital and non-capital cities of central and eastern Europe, while it is low in more peripheral and remaining convergence regions.

Considered at intermediate scale[111], the population and GDP share of metropolitan regions have not increased substantially between 2000 and 2006 in the average. Five EU member countries saw their population share in the metropolitan regions shrink (among them Ireland and the UK), while some countries did see an increase in the population share of their metropolitan regions (Bulgaria, Austria, Finland, Sweden). In most EU countries, economic activity did not shift to metropolitan regions between 2000 and 2006. It was however the opposite which prevailed in some of the less developed EU countries, with a significant shift in economic activities towards their metropolitan regions, and especially their capital region (Baltic States, Bulgaria, Hungary, Greece). In several more developed countries, growth is higher outside the metropolitan regions. More than half of the metropolitan regions have suffered significant decline in their GDP/head relative to the country as a whole, but in several large countries, the GDP shares of metropolitan regions in the national context did not change at all (Germany, Spain, UK, France). In central ad eastern Europe, the economic higher growth of the capital region with respect to other metropolitan regions reflects differences in the business environment and confirms that agglomeration economies are more important in less developed countries. In the EU-15, seven capital regions faced between 2000 and 2006 a relative decline of their GDP/head (Brussels, Paris, Stockholm, Madrid, Helsinki, Berlin, Vienna).

Considered at local/regional level, the observation of the urbanisation process during the 1996-2001 period shows that two thirds of cities in the EU experienced population growth, , while the remaining third experienced a decline[112]. There was a major trend towards suburbanisation. In 90% of urban agglomerations, population in the suburbs grew more than in the core city. In only a few cases — such as Lefkosia, Copenhagen, Brussels, London and Ljubljana — did population in the core expand more than in the suburbs and in a significant number, population in the core declined despite growing overall. Moreover, even where population declined overall, there were only a small minority of cities where there was also suburban decline. This, however, was the case in many second-tier cities where heavy industry is, or used to be, located (such as Glasgow, Newcastle, Manchester, Liverpool, Sheffield, Birmingham in the UK, Bremen in Germany, Łódź, Katowice, Bydgoszcz in Poland, Ostrava in the Czech Republic, Miskolc in Hungary, Liepaja in Latvia, Maribor in Slovenia, and Brăila, Sibiu, Călăraşi, Giurgiu and Alba Iulia in Romania). Relative decline of population in the core coupled with growth in the suburbs was particularly marked in Dublin, Lisbon, Berlin, Munich, Vienna, Rome, Athens, Prague, Bratislava, Budapest and Warsaw. Population growth around second tier cities with population loss in the centres is evident in most cases in Austria, Poland, Slovakia and Italy. This was also the case in cities in eastern Germany, while in the western part, suburban population growth was associated with either little change in the centre or some increase. There is also evidence that population growth in the suburbs is being accompanied by the suburbanisation of economic activity. In 16 of the 20 cities in which GDP can be measured at NUTS 3 level in the core and suburban areas, the share generated in the latter increased between 1995 and 2003, in some cases, substantially, especially in the new Member States (in Budapest, Prague, Sofia and Warsaw), though also in Munich.

After the year 2000, suburbanisation trends have changed, mainly in the most densely urbanised regions of Europe, along an axis stretching from northern England towards northern Italy, with some eastwards extensions. There, it can be observed that in numerous large metropolitan areas, the core cities experienced stronger population growth than the suburbs[113]. This applies in particular to numerous cities in the UK, to

[111] This section is based on « Metropolitan regions in the EU » by Lewis Dijkstra. Regional Focus N°01/2009. European Union. Regional Policy. Metropolitan regions are defined as NUTS3 regions or a combination of NUTS3 regions which represent all agglomérations of at least 250 000 inhabitants. These agglomerations were identified using the Urban Audit's Larger Urban Zones.
[112] European Commission. Fourth Cohesion Report. 2007.
[113] Core cities and Larger Urban Zones according to the Urban Audit's definition.

some large German cities, to Vienna as well as to the two large cities of northern Italy (Milan and Torino), excluding however Amsterdam and the Hague. Various factors are likely to explain this new trend: the fact that the suburbanisation phase started there much earlier and has progressively come to slowing down, being replaced by a process of re-urbanisation supported by public policies (urban renewal, rehabilitation and regeneration) and strengthened by immigration and population ageing. It remains however true that the suburbanisation process maintains its dominance in other parts of Europe, especially in most of Mediterranean, Irish and central and east-European cities.

In Europe, cities have traditionally been compact, developing a dense historical core shaped before the emergence of modern transport systems. However, European cities were more compact and less sprawled in the mid 1950s than they are today[114]. Historical trends, since the mid-1950s, show that European cities have expanded on average by 78 %, whereas the population has grown by only 33 %. Over the past 20 years the extent of built-up areas in many western and eastern European countries has increased by 20 % while the population has increased by only 6 %. During the ten year period 1990–2000 the growth of urban areas and associated infrastructure throughout Europe consumed more than 8 000 km2. Significant contrast can however be observed: in Munich and Bilbao population has grown more rapidly than the built-up area. Palermo with 50 % growth in population generated more than 200 % growth in the built-up area. Moderate increases of population accompanied by a large expansion of urban areas can be observed in Spain, Portugal, Ireland and the Netherlands. The urban areas particularly at risk are in the southern, eastern and central parts of Europe. Southern European cities have a long urban tradition in which the urbanisation process has been slower, with fewer periods of rapid growth and the cities have been very compact. In recent decades, however, urban sprawl has started to develop at unprecedented rates. Clusters of compact cities are also evident in the former socialist countries of central and eastern Europe. Recently, these cities have been facing the same threats of rapid urban sprawl as the southern European cities as the land market is liberated, housing preferences evolve, improving economic prospects create new pressures for low density urban expansion, and less restrictive planning controls prevail. Along the coastal regions of Europe major population growth is accommodated by continuous sprawling development. During the period 1990–2000, urbanisation of the coast grew approximately 30 % faster than inland areas, with the highest rates of increase (20–35 %) in the coastal zones of Portugal, Ireland and Spain.

Rather diverse situations can be observed with regard to the economic relationships between cities and their hinterland. The main determining factor seems to be the macro-territorial situation of the respective cities. In the highly industrialized regions, especially of north-west Europe, the spillover from the large cities into their hinterland has created rather integrated and homogenous economic spaces of quite large dimension. It is however observed that the process of adaptation to the knowledge economy, which is rather selective and territorially concentrated, reduces somewhat this homogeneity. On the opposite, in less developed contexts, especially in the countries of central and eastern Europe and also in the case of regions with smaller cities in peripheral locations, the ties between cities and their regional hinterland tend to be broken. The large cities of central and eastern Europe join rapidly the mainstream of an open networked economy. They create and strengthen ties with other European and non-European metropolitan areas, while the links with their regional hinterland, which is often characterized by low productivity in agriculture and declining traditional industries, is weakening. In the present phase of the cycle, the city-hinterland relationships in central and eastern Europe is more of a backwash/aspiration type. Spillover effects can however be expected to some extent in the future.

[114] « Urban sprawl in Europe – the ignored challenge ». EEA Report N°10/2006.

More generally, city-hinterland or urban-rural relationships are heterogeneous in nature. They concern in particular the commuter flows from rural residential areas to urban employment and service areas, the flows of urbanites towards rural recreation and leisure areas, the supply of cities with food products and water, the development of second homes in rural areas and numerous other processes. Suburbanisation is only but one aspect of the intensification of urban-rural relationships. The arrival in rural areas of increasing numbers of people from towns and cities can alter the rural character of areas. While it might push up income and tax receipts and so help to maintain public services and expand the local market, it can lead to widening social disparities and new tensions by increasing house prices to levels that locals cannot afford.

During the past decade, the issue of social polarization, especially in cities, has been growing in importance. A number of factors converge in relation to this issue, including the transformation of the economy (transition towards the knowledge-based economy which increases professionalization) and increasing immigration of low qualified people (regrouping of families, new economic demand in the field of personal services favouring the immigration of women). The situation is not uniform in all parts of Europe with regard to social polarization and socio-economic integration. A first difference can be made between the size and location of cities. Low-qualified people seem to benefit from more job opportunities in large cities than in the rest of the country. This is also true for large world cities like London, Paris, Amsterdam, Frankfurt or Milan, but it does not apply to Madrid and Barcelona and some large East-European cities. Considering the whole urban population, the situation with regard to unemployment is rather similar. In numerous cities, especially the large ones of the most peripheral countries of southern, northern and eastern Europe, unemployment rates are lower than national averages. In some of the richest European cities, however, like London, Vienna, Brussels, Paris, Amsterdam, unemployment rates are often higher than national average, a fact that reflects a decoupling between economic welfare and social cohesion. Social disparities at the intra-urban scale are generally very significant, but heterogeneous among countries. With regard to the unemployment rates, the highest levels of intra-urban disparities are reached in France, the UK, Belgium and in some cities of southern Europe. The lowest levels are found in Eastern-European cities (except Poland), in the Nordic countries, in western Germany and northern Italy. During the period 2001-2004, intra-urban income disparities in Europe as a whole have not significantly increased, while income disparities between various types of cities and between various macro-territorial contexts seem to have changed more substantially.

2. Drivers and perspectives for the coming 15 to 20 years

Demography

On the background of a number of general, Europe-wide trends, future demographic situations in European regions and cities also depend upon national and regional peculiarities. The background factors include the stabilization of fertility rates at low levels, including a number of Mediterranean regions (northern Italy, northern Spain), with slight increase in some countries (France, Sweden), the regular increase of life expectancy (which reaches high values also in some Mediterranean regions (for example Greece) and is still lower than average in major parts of central and eastern Europe and the probable continuation of immigration. Mediterranean countries and Ireland became also countries of mass immigration at the end of the 1990s, until the economic crisis. Immigration trends have also started before the crisis in various countries of central and eastern Europe, although at a rather modest level. For the future, it must be considered that the push factors in the countries of outmigration remain important and that new economic demand for immigration in Europe has started, especially in the field of

personal services. On the background of the ageing process, this new demand is likely to grow.

The number of European regions where population will stagnate and then decline will be growing. Population ageing will accelerate and dependency rates as well as mortality rates will increase in most regions. The increasing number of “oldest old” (aged 75 and over) will generate a significant demand of health care. The size of the population of working age will further diminish in most regions. There are however regions in Europe where the demography is still dynamic, with strong cohorts of young people. Winners will be more and more the regions capable of attracting qualified manpower and/or well off retirees. An open question is the amount of external in-migration towards Europe.

At urban and metropolitan level, changes will primarily reflect the respective national and regional trends, especially when not considering the very large cities. Large cities generally attract more migrants and expulse more inactive population groups (retirees in particular). This process occurs at different scales, according to the position of the cities in the urban hierarchy. Despite population ageing in numerous European cities and population decline in a growing number of them, the number of households is generally still growing, while their size diminishes. This puts pressure on specific segments of the housing market. In addition, in the West-European countries with a long tradition in low fertility rates (for instance Germany), population ageing is reaching the suburban areas built in the 1960s and 1970s. The corresponding segments of the housing market will become soon affected.

Economy

The global economic context will continue to be of great importance for the future of European cities. With regard to possible changes in the features of the globalization process, the progress of large-scale economic integration is likely to become stronger inside the various large world regions than between them, consolidated by the possible emergence of new common currencies (Asia, Gulf States) and by the possible concentration of FDIs within these world regions, rather than at intercontinental scale. With regard to Europe, however, the impacts of the economic crisis on a number of businesses and the weakening of the Euro, combined with the accumulation of capital outside Europe (BRIC, energy producing countries, sovereign funds) may facilitate the taking over of an increasing number of European enterprises by non-European groups looking for good investment opportunities, advanced technologies and short-term profits. This may endanger the long-term prosperity of increasing segments of the European economy. It is also likely that wages will increase and technology will significantly progress in the emerging economies. Their comparative advantage of low labour costs will progressively be replaced by a competitive advantage, challenging the European economies on world markets in segments of significantly higher added value. The likely increase of wages and related production costs in emerging economies (especially Asian countries) may induce inflation likely to spread throughout the world economy. The emergence of higher interest rates and progressing inflation is not improbable during the recovery from the economic crisis and also for a longer period.

Being the most volatile factor of territorial development, the economy may follow rather different paths, each having its own territorial impacts in Europe. In this respect, the most strategic issue is the way, how Europe will position itself at global scale after recovering from the economic crisis. Will the emerging economies (BRIC) become stronger competitors and bring Europe into a defensive attitude or will Europe be boosted by the shock of the crisis and invest massively in new technologies in order to gain largest shares of external markets? Will the internal EU market of 500 million consumers be more efficiently used to let new forms of endogenous growth emerge, taking advantage of the complementarities existing between European regions? Will the political

priority to curb down climate change be utilized to change massively the energy paradigm and to generate economic growth through a “Green New Deal”?

In addition to issues related to the global and macro-economic context, intra-European issues are also relevant, such as the future extent of the catching up process of central and eastern Europe. The engine behind this process has largely been up to now the substantial amount of western FDIs in these countries. Will the flow of FDIs continue with the same intensity and in the same direction after the recovery from the crisis or will western FDIs be significantly re-directed towards countries outside EU borders, farther in the East and in the eastern and southern parts of the Mediterranean Basin? Will the countries of central and eastern Europe generate sufficient endogenous growth in order to compensate for a likely reduction of FDIs?

With regard to more regional/local economic issues, a number of questions remain open, especially with regard to the further concentration or not of investments and wealth in metropolitan regions. Is the knowledge economy compatible with stronger growth outside rather than inside metropolitan regions, as it was observed after the year 2000 in a number of West-European regions? Are centres of technological excellence, especially those developing converging technologies, necessarily included in metropolitan regions or can they generate an autonomous expansion and growth process? Is an economic overspill process from metropolitan areas towards more distant small and medium-sized towns likely to emerge in the countries of central and eastern Europe? Will the requirements on the qualification of human resources become so demanding that business investors will more and more overlook small and medium-sized towns in remote locations? In how far will European regions become handicapped by the decline of the working age population and by the scarcity of qualified manpower? Will the residential/tourist economy, driven by the acceleration of the ageing process, benefit in future to a larger number of regions? Is it likely that it will also benefit significantly to non-metropolitan regions in central and eastern Europe?

Energy

In the present context, energy prices are very closely related to the level of global economic growth at world scale. Despite strong price fluctuations in recent years, the general trend is upwards. Recovery from the crisis and further development of the BRIC countries are likely to strengthen this trend. The energy sector is largely globalised because of the concentration of large fossil energy resources in a small number of countries. The external dependency of Europe in terms of energy supply will remain high in the 15 years to come and therefore subject to the inelastic relation between global supply and demand. Possible depletion of oil resources in some large oilfields could generate a process of oil peaking (declining supply in a context of growing demand) which would result in extremely high energy prices.

The possible scarcity and depletion of uranium resources should not be underestimated in the context of growing demand related to the construction of numerous nuclear power plants at world scale. Coal will remain a significant energy source for the transition period between the old and the new energy paradigm. Thanks to new technologies (CO2 capture), it will be possible to reduce considerably the air pollution generated by coal-fuelled power plants.

The development speed of renewable energy sources will depend both upon the price evolution of conventional fossil energy sources and from the political willingness to depart from carbon-related energy and to promote the new energy paradigm. The introduction of substantial carbon taxes would play a major part in this respect.

Transport and accessibility

The main critical issues for the future in the transport sector are the elimination of congestion, the impact of transport on climate change and improvement of the accessibility of less favoured areas. The likely change of energy paradigm in relation to climate issues and the possible scarcity of oil resources, are major challenges for the transport sector. They will significantly affect transport costs and therefore locations (households, businesses) and mobility patterns. New transport technologies will emerge in the coming decade. The speed of their diffusion and generalization is however uncertain. If significant carbon taxes are introduced, the present modal split patterns will be affected to the benefit of more environmentally friendly transport modes. They will also have an impact on the mobility of people, favouring even more the development of ICT services, as a substitute to physical mobility. Public transport networks and services are likely to be strengthened, both in urban regions and between them. High-speed train networks will continue their expansion, with new cross-border connections.

A major problem remains that of the accessibility of small and medium-sized towns in remote regions. The probability of high speed rail services in future is relatively low if the regions concerned are not crossed by a HST line servicing metropolitan areas. Low-cost airlines generally use medium and small size airports, but these are servicing intermediate cities and are not a universal solution for all cities in remote regions. Growing differences in relative accessibility are a serious handicap for the less favoured cities.

Values and socio-cultural expectations

A number of factors contribute to changes in the systems of values and socio-cultural expectations within the European society. Population ageing brings with it new ways of life and of consuming, with a much stronger accent on qualitative aspects. With regard to the ways of life, the elderly appreciate quiet environments, but expect a good accessibility (without using cars) to a large variety of services. This will raise a number of issues for the future of weakly serviced suburban areas, where the population is likely to decline both because of ageing and of insufficient attractiveness. The increasing preference for a higher level of urbanity in the living environment is likely to boost new policies of urban redevelopment aiming at shaping high-quality multi-functional urban areas.

Various other factors also contribute to changes in values and behaviours such as the high energy prices in the period 2006-2008 and the risk of oil depletion, the increasing awareness about issues related to the environment and to climate change as well as the impacts of the economic crisis of 2008/2009. All these factors have impacts on mobility patterns (decreasing use of cars, preference for small, less polluting cars; increasing demand for public transport etc.) as well as on consumption in general (increasing attitude towards savings, more intangible consumption etc.).

Immigration remains an important issue, not only because of the important shares of immigrated population in numerous European cities, but also because the perspectives of significant flows of immigrants into Europe in the coming decades are far from negligible. Lessons from the past show that the successful integration of immigrants is a long-term process, driven by the existence of cultural problems for the immigrants themselves and by necessary delays for the attenuation of xenophobia within the indigenous European population. The experience shows that xenophobia is more important in southern European countries where immigration is recent than in more northern countries (UK, Netherlands, Nordic countries), which have a longer experience in this field.

Public policies

Numerous public policies have impacts on the evolution of cities and urban systems. A first distinction can be made between “sectoral” macro-policies of the European and national levels, which are not territorially targeted (although their impacts are territorially not neutral) and the more specific territorial development policies which can be applied at various scales.

The first category includes macroeconomic, energy, innovation, social and environmental policies. Trade policies (liberalization / protection) strongly influence the attitude of enterprises in terms of investments, location and relocation. Further liberalization and globalization, especially in the field of services, may significantly influence the economy of cities. The monetary stability of Europe has been affected by the economic crisis. Decisions related to the recovery of the stability or to the further expansion of the Eurozone are likely to affect the parity with foreign currencies, and therefore trade flows and the future of manufacturing cities. The creation of sovereign funds in Europe may protect European enterprises from being taken over by non-European groups. Strengthening the control of the banking system aimed at preventing new large-scale financial collapses, may, directly or indirectly, make the access of enterprises, especially of SMEs, to credit much more difficult and may restrict productive investments. Macroeconomic policies influence also, especially through fiscal measures, the level of employment and the real income of households. National social and cultural policies have significant impacts on the level of social integration, on the lower segments of the housing market, on the level of education and qualification of human resources as well as on the welfare of families.

A particularly important aspect for the future of the European economy is related to the possible move towards the “green economy” (introduction of carbon taxes, promotion of renewable energy sources and of energy savings, development of new transport systems and vehicles). If ambitious strategies are adopted at international level, new economic growth could be generated at Europe-wide scale.

Territorial development policies are applied at various geographical scales and often involve several governance levels, from the European level down the local one. Macro-territorial policies are strongly dependent upon EU structural policies (support to less developed regions; co-financing of major infrastructures etc). Several issues are important for the future: the level and territorial criteria of a EU support after 2013, the dilemma about the promotion of metropolitan areas as an essential element of global competitiveness versus support to least developed regions to ensure territorial cohesion. A related issue is the policy to be applied to small and medium-sized towns outside metropolitan regions and, more specifically, the strategies concerning the improvement of accessibility, the qualification of human resources, the promotion of the residential economy and the maintain of services of general interest.

At intermediate scale, the networking of cities is becoming a crucial issue for ensuring both the polycentric development of metropolitan regions (cooperation networks between a metropolitan area and the surrounding medium-size cities) and the competitiveness of non-metropolitan regions (co-operation networks between medium-size cities).

At more regional/local level, various territorial policies contribute to shaping the future of cities: land-use policies (containment of urban sprawl; influence on the real estate market), transport policies (public transport; facilities for new vehicles like electric cars), urban renewal and regeneration policies, housing, socio-cultural and integration policies (reduction of urban deprivation and of social segregation, integration of ethnic and marginal groups, improvement of security etc), environmental policy (greening of cities; improvement of the living environment, reduction of noise and emissions), economic

policies (supports to clusters; improvement of the embeddedness of exogenous businesses), development of facilities and services for the elderly. Local/regional policies often benefit from the support of national policies (housing, transport, energy, urban renewal, social integration etc) and, in the eligible areas, of the EU structural policies.

In the present context, public policies of the national, regional and local levels are seriously handicapped by the very high level of public indebtedness which results from the economic crisis and from the policies applied to re-boost the economy.

Perspectives for cities and urban systems

Cities and urban systems will be facing a number of challenges during the coming decades. Some are the results of trends continuation, others will be generated by the emergence of exogenous factors and new global priorities, especially those related to climate change.

Trend-related challenges concern the rebalancing of urban systems there where capital cities and large metropolitan areas have largely captured growth in the past. This is a particular challenge for the countries of Central and Eastern Europe. Most challenges are however to be found at the scale of metropolitan regions and urban entities. The continuation of urban sprawl in the surrounding of numerous cities and growing social polarization with all related impacts (security, riots, social segregation, ethnic tensions etc) within cities are growing concerns in numerous European towns.

Population ageing issues will in general less affect cities than the countryside because of the presence of larger groups of young population. The needs for additional health care services for the elderly will nevertheless increase.

Policies addressing climate change are likely to have significant impacts on cities, especially in the field of transport systems and mobility, building and construction, urban planning, greening of the urban environment etc. In case energy price will substantially increase and/or carbon taxes will be sufficiently high, changes towards more compact cities, especially with stronger concentration of settlements around the stations of public transport networks can be expected.

Municipal finances are particularly affected by the economic crisis and its impacts. Municipalities will face increasing difficulties to meet the above-mentioned challenges with more limited resources. It is likely that local taxes will increase in a number of countries.

3. Scenarios of urban development in Europe

3.1. Logic of scenarios

The destiny of European cities is much too dependent upon the global context and upon macro-policies to envisage credible alternative scenarios of urban development, which are derived only from different urban development policies. This is why the two scenarios proposed hereafter have each its own logic in terms of global background and of macro-policy mix. The territorial development policies defined at each level pursue in each scenario specific objectives, but have to cope with the respective impacts of global factors and more general policies.

In this respect, the positioning of the scenarios with regard to the Europe 2020 Strategy, proposed by the European Commission and adopted by the European Council in March 2010, is a relevant issue. With regard to the global context, the Europe 2020 Strategy

recognizes that significant changes are underway (increasing global competition, risks in the financial system, challenges related to climate and resources), but leaves room for various possible situations, especially in relation to the impact of the economic crisis and the world economic stability in the coming decade. Although it militates in favour of economic recovery and stability, it does not (and cannot) exclude the emergence of new serious problems.

In terms of policies, the Europe 2020 Strategy accentuates a number of existing policies (innovation, education, industrial development, resource efficiency, social and economic inclusion) and insists on some new policies (like the de-carbonisation of the economy and related modernization of the transport sector) on the background of the climate change issue. The Strategy remains however balanced and the policy measures are , at this stage, only outlined. In case of significant changes in the global context, it is likely that the Europe 2020 Strategy will be revised. As awareness raising tools, scenarios can therefore highlight the impacts for cities and urban systems of further changes in the global context or of more accentuated policies targeting specific challenges, without being in complete contradiction with the Europe 2020 Strategy.

Although the hypotheses chosen for the two scenarios widely differ in many respects, a number of assumptions for the future are valid for both scenarios. They are elements of common reference. They include the European demographic stagnation and decline on the background of population ageing, the regionalisation, up to a certain extent, of the globalization process at the scale of world macro-regions, possibly with the emergence of new joint currencies (Asia, Gulf states), growing disparities in the productivity of the main economic sectors as well as the emergence, during the coming 15 to 20 years, of a number of new technologies, especially in the fields of energy production, nanotechnologies, biotechnologies, transport systems, communication technologies etc, which will, directly or indirectly, affect territorial development.

The very significant changes, which have been occurring since 2008 with the emergence of the economic/financial crisis and the new policies applied in this respect, strongly reduce the relevance, for the awareness raising process, of a trend or baseline scenario. This is why two sets of hypotheses for the scenarios were selected, which differ mainly through the characteristics of the global context and the nature of policy responses to the most significant challenges. Territorial development policies are part of the global policy responses and are adapted to the respective comprehensive strategies. Both scenarios are strongly policy oriented, but assume rather different global contexts.

The first scenario (“Green economy”) aims at sustained recovery from the economic crisis, while addressing in priority the challenge of climate change. It requires a high level of stability in the global context and is based on the assumption that the massive adoption of new technologies aiming at drastically curbing down greenhouse gas emissions may generate significant growth and open new markets at world scale;

The second scenario (“Enhancing the European potential”) is generated primarily by the emergence of new serious economic/financial troubles in the global context, with various large, but strongly indebted countries (USA, Japan etc) having lost their capacity of debt reimbursement. In this highly unstable and threatening environment, Europe adopts a more protective strategy and puts the priority on the enhancement of its own potential (500 million consumers; skilled manpower and technological excellence in various fields).

Both scenarios have a time horizon of 15 to 20 years, divided into two periods, the first being of 7 to 10 years. The following table provides a summary overview of the scenario hypotheses detailed in the pages thereafter.

Common changes and issues

- Demographic stagnation and decline on the background of population ageing at European scale, with significant differences between European countries;
- Regionalisation, up to a certain extent, of the globalisation process at the scale of world macro-regions;
- Slower progress of real incomes in Europe then before the crisis of 2008/2009;
- Growing disparities in the productivity of the main economic sectors;
- Trend towards a change of energy paradigm, departing from fossil energy sources;
- Emergence of a number of new technologies, especially in the field of energy production, nanotechnologies, biotechnologies, transport systems, communication technologies etc. which will affect, directly or indirectly, the territorial development;
- Continuation of climate change with accentuation of territorial impacts

Global context

Scenario "Green economy"	**Scenario "Enhancing the European potential"**
• Important decisions adopted at international level aiming at curbing down the speed of climate change; • Global recovery from the crisis of 2008/2009; • Significant investments of the more developed economies and of BRIC countries in the less developed countries to develop local markets and create demand; • Efficient global coordination of macro-economic policies.	• No sustainable recovery at world scale from the economic/financial crisis of 2008/2009 due to the incapacity of various countries to reimburse debts; • Emergence of new, large-scale crises affecting public budgets, banks, enterprises and individuals; • Growing inflation at world scale driven by highly indebted countries.

	Scenario "Green economy"	**Scenario "Enhancing the European potential"**
Macro-economic policies	- International decisions to curb down the speed of climate change are efficiently used in Europe as an opportunity to generate significant economic growth; - Well-coordinated public decisions (carbon taxes etc.) and active involvement of the civil society in a global context of economic recovery and stability; - Significant increase of technological investments, especially in sectors related to the "green economy"	- Major efforts developed to reduce the economic fragmentation of Europe, to support the transnational cooperation of clusters and of individual enterprises and to facilitate the relocation of European enterprises into Europe; - Creation of European sovereign funds to safeguard European enterprises; - Strong development of neighbourhood policies; - Stronger protection against exacerbated external competition (anti-dumping measures; preference for European products etc.)

Technology and innovation policies	• Support to the technological development and to the accelerated adoption of new solutions in the sectors pertaining to the green economy (energy, transport, housing and building etc.).	• Support to technology and innovation strongly related to the individual regional potentials (more regionalised innovation policies); • Support to trans-European cooperation in a number of strategic sectors and initiatives. • Efforts towards the economic use of innovations produced.
Education, labour and social cohesion policies	• Significant efforts to enhance the education level and the qualification of human resources; • Encouragement of labour mobility in order to alleviate unemployment in neo-fordist regions and to facilitate the transfer of manpower towards areas where the green economy and other sectors are developing; • Concentration of public resources on the support to economic growth likely to generate jobs than on social cohesion	• Significant efforts to enhance the education level and the qualification of human resources; • Education and labour policies are more regionalised and more directly related to the mobilisation of regional potentials. • Safeguarding jobs, while making enterprises more competitive, through stronger intra-European cooperation is a priority objective. • Social inclusion policies go far beyond the labour market and address particularly the deprived population groups.
Environ-ment policies	• The main environmental policy is the reduction of greenhouse gas emissions through a variety of measures (energy, transport, heating etc). It includes incentives but also restrictive measures and new norms (taxes, regulations etc)	• The reduction of greenhouse gas emissions has a lower priority; • The environmental policy is more diversified and regionalised. It aims largely at enhancing the regional potentials and at increasing the regional attractiveness.
Transport policies	• The objective of curbing down greenhouse gas emissions leads to an important shift in modal split in favour of rail and waterborne transport at the expense of road and air transport; • Numerous innovative applications are developed in the field of information technologies aiming at reducing mobility needs.	• The shifting of modal split is not the primary priority; • Attention is put on the accessibility of the various regions in relation to the mobilisation of regional potentials as well as to better integration of the European territory, especially with regard to the permeability of borders, to the overcoming of physical obstacles and to the improvement of transnational and interregional corridors in landlocked areas.
Territorial and local policies		
	Scenario "Green economy"	**Scenario "Enhancing the European potential"**
Macro-territorial policies	• The macro territorial priorities favour the regions with significant resources in renewable energy as well as those with important and competitive clusters in the various sectors pertaining to the green economy. Cities located in such areas, rather independently from their size, benefit from such policies ;	• Regional policies favour the mobilisation and exploitation of regional potentials and the constitution of efficient interregional and transnational business networks; • Regional and macro-territorial policies favour cities and regions with significant potentials to be developed as well as nodes belonging to the networks to be strengthened, with the aim to contribute to territorial cohesion.

Metro-politan and urban develop-ment policies	• Policies favour compact settlement systems in order to minimise and rationalise transport flows and related energy consumption; • Policies pay particular attention to the control of land-use changes and urban sprawl, to the redevelopment of urban brown fields, to the improvement of the urban environment (greening of cities, promotion of public transport and of electric cars, reduction of mobility needs), to more energy-efficient town planning principles and building techniques; • Policies favour the development of medium-sized cities of the metropolitan hinterlands serviced by efficient public transport networks, corresponding to the objective of polycentricity.	• Metropolitan development policies pay much less attention to the compactness of cities and invest fewer resources in sustainable transport systems; • In metropolitan areas, efforts are concentrated on the development of sites with good accessibility in relation to endogenous resources (science and technology; high level services); • Small and medium-sized cities are promoted according to their economic potential
Local social cohesion policies	• Social inclusion and cohesion are not the primary objective. • The aim is rather to rapidly improve the urban environment through a variety of measures (redevelopment, greening, reduction of traffic noise and air pollution etc).	• Policies pay significant attention to social cohesion at local level. This is being promoted through a variety of measures (public housing policies, economic regeneration of deprived neighbourhoods, special training programmes for marginal groups etc.); • Application of such measures in metropolitan areas, but also in smaller towns and in more remote regions with specific social integration problems.

Table 1. The hypotheses underlying the scenarios

3.2. The “Green Economy” scenario

The scenario is based on the assumption that the decisions adopted at international level aiming at curbing down the speed of climate change are efficiently used as an opportunity to generate significant economic growth throughout Europe. The realization of the scenario requires not only substantial, courageous and well-coordinated public policies (such as the introduction of high carbon taxes), but also the active involvement of economic actors and of the civil society in a global context of economic recovery and stability. The large emerging countries are pulling up the world economy while moving towards more technology-intensive activities. The international financial order is stabilized by the diversification of currency reserves.

The economic post-crisis economic development is encouraging and involves also the USA and Asia. The more developed economies and also the BRIC invest in the less-developed countries in order to develop local markets and to create demand, especially in Africa and south America.

In Europe, the strategy consists of increasing significantly technological investments boosting productivity, but generating in a first stage higher unemployment rates. Only after a period of 5 to 7 years, employment is growing again. Higher skills and qualifications are required, which doesn't mean that Europe's employment is mainly composed of managers. The race for stronger tertiarisation is being attenuated thanks to a rapid development of the “green economy” which creates jobs both in R&D and in manufacturing activities. Services move towards higher added value segments. In the context of a more regional globalization, higher financial services are being re-centered on Europe. Through higher competitiveness and stronger public support, European enterprises are less in danger of being taken over by non-European groups or external sovereign funds.

The concretisation of the “Green Economy” is far from being an easy task, especially in the medium range, as long as the benefits are not tangible. The introduction of significant taxes in the context of declining purchase power and high unemployment levels is not popular at all. Numerous local authorities choose to take action in relation to climate change, but their resources are limited by the impacts of the economic crisis. The potential investments of SMEs are constrained by difficulties in obtaining bank credits. The transition from carbon-related energy systems towards a new energy paradigm based more largely on renewable energy sources is affected by the levels of necessary investments and by constraints of profitability. The international harmonization of policies is also a difficult issue which generates distortions.

The progressive emergence of new economic growth and the creation of significant amounts of new jobs after a few years generate however trust in the strategy related to the “Green Economy”, so that more and more businesses and households invest, with encouraging returns on investment. This leads to a mass effect that ensures sustained economic growth and strengthens social cohesion.

In the demographic sector, fertility rates are subject to a revival, boosted by the positive economic evolution, but their impact remains a long-term one. The shortage of population of working age in a growing number of regions favours the immigration of qualified manpower.

Impacts of the scenario on the evolution of cities and city networks

a) Cities’ positioning in economic development

The territorial impacts of the scenario change somewhat over time. During the first phase (5 to 7 years) growth is concentrated on metropolitan areas, especially in Western Europe, because of significant investments in advanced technologies. In a second stage, while advanced activities continue their expansion in metropolitan areas, production activities related to the "green economy" diffuse towards cities of second and third level and also towards regions of central and Eastern Europe as well as towards the more peripheral regions of Western Europe. The scenario enables intra-regional polycentricity to the benefit of regional cities.

The general development of the "green economy" at global scale favours the emergence of large-scale, specialised cooperation networks, based on R&D, technological development and industrial production. Integration is not limited to the individual European macro-regions. It takes place at Europe-wide scale, favouring however the links and flows between the large metropolitan areas, especially of the pentagon. Gateway cities with intercontinental functions are also efficiently involved in the process. A number of medium-sized and small cities in more rural areas, distant from metropolitan regions, benefit from new income sources originating from both the production of renewable energy and from the residential economy, including soft tourism.

b) Cooperation and competition

The promotion of the "green economy" will generate both new competition and increased cooperation. Competition is not only intra-European in nature. It also intensifies between Europe, North-America, Asia as well as other emerging economies. At intra-European scale, cities in competition are those with important clusters related to the "green economy" (solar and wind energy, automotive industries etc.). The EU institutions will however promote transnational cooperation, so that cooperation networks will stretch over numerous cities at EU-wide scale. Cooperation will also intensify both at the scale of European macro-regions (similarities of natural conditions in relation to the exploitation of renewable energy and to climate change; East-West division of labour in some transnational cooperation areas) and at the intra-regional scale (organization of the city-regions; division of work between metropolitan areas and medium-sized and small cities).

c) Sustainability

The development of the "green economy" has important impacts on the morphology and organization of cities. More compact urban forms are being developed in order to take advantage of the expansion of public transport networks. The use of electric cars is increasing, but more slowly than expected, because of limited autonomy and technical issues. Hybrid cars appear as a more flexible option, despite higher fuel price. Urban expansion, driven by economic development, benefits to the various levels of the urban hierarchy, but remains rather compact. The greening of cities and the further development of ICT limit the motorized mobility for working and leisure purposes.

Macro-economic policies that aimed at boosting the economy during and after the economic crisis, were conceived centrally and sectorally, so that they were not optimal with regard to sustainability. Boosting the demand for new motorcars has in fact promoted conventional technologies (although somewhat more environmentally-friendly) and has not primarily benefitted to new ones (electric cars, fuel cells engines etc.), which were not yet sufficiently advanced in their development. The rapid progress of these technologies, strongly supported by public policies, limits however the negative impacts on sustainability of some macro-economic measures.

South- and East European cities are more challenged by sustainability issues (strong suburbanization trends; less developed modern public transport systems; more polluting cars, busses and trucks; lower amount of green areas; less public resources for

improving the environment etc.). EU policies target especially these cities with the aim of implementing efficient measures against climate change.

d) Inequalities and tensions

The period following the economic crisis of 2008/2009 is characterized by a continuation of unemployment growth in numerous European regions and cities, especially those with less performing manufacturing activities, a fact which has significant impacts on social cohesion. After a few years, however, the improvement of the economic situation favours again employment, including the provision of jobs with medium-level qualifications. This has positive impacts on the reduction of social inequalities and enables the integration into the regional labour markets of less skilled labour force. The social polarization in cities increases during the first period, but is attenuated afterwards.

e) Promoting growth through a more efficient territorial organisation of city-regions and settlement networks

The continuation of the globalisation process makes the pyramid of urban hierarchy steeper, with an over-proportional concentration of advanced activities in very large metropolitan areas. This trend is somewhat attenuated by the fact that the « green economy » does not only concentrate on activities of R&D and technological development, but includes also the implementation of new techniques at large scale in a wide diversity of fields (manufacturing activities, building and planning activities etc.) which benefits also to lower rank urban entities. Territorial development policies contribute to the optimisation of this process through the promotion of compact and sustainable forms of metropolitan development (stronger coordination between public transport systems and urban development/redevelopment ; improvement of the quality of life, of security and social cohesion in urban neighbourhoods) and through an efficient networking between metropolitan areas and the surrounding lower-rank urban entities, enabling also better regional connections between the medium-sized and small towns themselves. The intra-regional interactions between urban entities increase the efficiency of the « green economic paradigm ». The territorial development strategies are however adapted to the peculiarities of the respective regional contexts. In a number of regions with unbalanced urban pattern and with a macrocephalitic capital city (there are numerous examples in central and eastern Europe as well as in various West-European regions), it proves more difficult to spread economic activities throughout a regional network of cities. Efforts are then concentrated on the rational development/redevelopment of the main city, looking for a compromise between densification and quality of life.

3.3. The Scenario “Enhancing the European potential”

In this scenario, the recovery from the economic/financial crisis is not sustainable at world scale. In the very short term, a number of large, developed countries, having accumulated an enormous amount of debts (before and after the crisis) are no more in a position to reimburse or refinance their loans and bonds. Various central banks being threatened by bankruptcy, a new large-scale crisis emerges and expands, which affects both public budgets, banks, enterprises and individuals. In addition, inflation is growing worldwide, driven by the highly indebted countries.
Although some European countries are deeply involved in the new financial turmoil (UK in particular), the problems outside Europe are of a much larger dimension (USA, Japan) and affect lastingly the global expansion process. The central banks of various Asian countries (China etc.), which had bought large quantities of American bonds, are particularly affected also. The global context being highly unstable and risky for trade and investments, Europe chooses the strategy of enhancing its own potential and to concentrate external cooperation on neighbouring countries and on few others, non-problematic ones. The strategy comprises both the promotion of the internal European

potentialities (know-how and technologies, qualified human resources, large-scale market of 500 million consumers, regional specialisations and complementarities, well-developed infrastructures in numerous countries) and stronger protection against exacerbated external competition (strengthening of anti-dumping measures and preference for European products, incentives for the relocation of businesses, which had left Europe, protection against the taking over of European companies by non-European groups, strengthening of the specialisations by regions or groups of regions, more strict control of technology transfers to emerging economies).
During the first decade, characterized by strong instability in the international environment, the main objectives of the European strategy are to safeguard jobs, while increasing the qualification of human resources and to increase the purchase power of European citizens, especially of the medium and low segments of the social hierarchy, in other to boost domestic demand. The strategy prevents Europe to be subject to a new, deeper recession. Specific programmes are implemented, such as the speedy realization of infrastructures (mainly on PPP basis in order to limit further public borrowing), the promotion of endogenous resources and local products (less subject to external competition), the creation/strengthening of European leading companies in strategic sectors (to overcome the fragmentation of European production structures), the constitution of European sovereign funds (aiming at protecting European businesses and at avoiding the growing external appropriation of European technologies), the development of venture capital and seed money and the facilitation of access to credit for SMEs (aiming at the transformation of new knowledge into advanced products and services). During the first decade, the structural transformation of the European economy is slow but sustained. It takes place through stronger regional specialisation and promotion of territorial capital. Growing domestic demand makes increasing productivity compatible with job creation, especially in more qualified segments of the labour market.
After one decade, when the global context has improved and stabilized and external demand is growing again, the European economy has been consolidated and more efficiently integrated and is in a better position than it was in 2010 to face the more global context and to draw benefits from it. The necessary structural adjustments generally do not have dramatic consequences.

Impacts of the scenario on the evolution of cities and city networks

a) Cities' positioning in economic development

The economic crisis of 2008/2009 has generated slowing down of the expansion of towns and cities, especially in regions with traditional manufacturing industries as well as in Central and Eastern Europe, where the flows of FDIs, which had fuelled the expansion of metropolitan regions before the crisis, have significantly diminished.
The Europe-centred strategy favours a more balanced settlement pattern than it was the case during the pre-crisis period. The mobilization of territorial potential in most regions does not favour only metropolitan areas, but also medium-sized and smaller cities. Intra-European competition is increasing. National capital cities play an important part as network centres of national markets. In a few countries (such as Germany or Italy) other large cities have also leading functions in intra-European transactions. The structural adjustments, which take place at the expense of obsolete manufacturing industries and of sectors with over-production capacities (motorcar Industries in particular), are often compensated by the creation of new SMEs. The slowing down of relocations outside Europe stabilizes the settlement systems of intermediate manufacturing regions and also of larger cities as far as services are concerned. Stronger regional specialization and the strengthening of advanced clusters favour intra-European FDIs. The residential economy benefits increasingly small and medium-sized towns in attractive regions. Migrations of retirees intensify, also at transnational level within Europe. The development and modernization of infrastructures and facilities increases the accessibility and attractiveness of numerous medium-sized and small towns, also in rather remote locations. Labour related immigration is rather strictly controlled and oriented towards

regions with manpower shortage. Disfavoured regions are those where large amounts of technologically obsolete activities are affected by intra-European competition as well as those with rapidly ageing and declining population.

b) Cooperation and competition

Both cooperation and competition intensify within Europe. Networking activities are strongly promoted at Europe-wide scale and within transnational macro-regions, especially between clusters, higher education and research institutions, technology development and transfer centres etc. Not only metropolitan areas are involved in the cooperation networks, but also numerous medium-sized cities with universities, research centres and other scientific institutions. EU support to cooperation networks is organized on the basis of ambitious, applied projects with direct use for productive activities and commercialisation. Cooperation networks are also developed with the EU neighbouring countries, especially with the Russian Federation, the southern and eastern Mediterranean countries, the Balkan area and Ukraine, where markets are expanding.
Competition between the most advanced European metropolitan areas, progresses, especially for attracting investments, qualified labour force and international events. It is strengthened by the creation of new large European enterprises generated by the integration (mergers and acquisitions) of national enterprises, contributing to the reduction of the productive fragmentation in Europe and increasing the global competitiveness.
At intraregional scale, cooperation is efficiently organized in order to increase the profitability of infrastructures and facilities and to promote the territorial capital. Networks of regional SMEs are created, connected with R&D institutions and marketing organisations, in order to provide higher profile to regional specialisations.

c) Sustainability

The context of the scenario is one of huge challenge for the European economy in a global context severely and lastingly affected by financial and economic troubles in the public as well as in the private sector. The first European priority is to avoid the collapse of the European economy in drawing all possible benefits from the European potentialities. Environmental aspects are not at the highest place on the agenda. The curbing down of greenhouse gas emissions requires worldwide consensus, which is not possible in the context of the scenario. This does not mean, however, that the objective of sustainability is neglected. On the contrary, various factors contribute to limiting possible damages to the environment. The rate of economic growth being modest and economic development favouring a rather balanced evolution of urban settlement systems, the strong trends of metropolitan expansion and related suburbanization which characterized the pre-crisis period, have been significantly slowing down. The strengthened development of infrastructures, aiming at increasing the accessibility of cities while safeguarding employment, pay significant attention to environmentally friendly transport modes. Among the EU-supported programmes of technological development, several address issues related to sustainability and lead to concrete applications.
The trend towards stronger population growth in the core areas of cities, observed in the pre-crisis period in various cities of the European pentagon, expands further to concern a large number of cities throughout Europe. More extensive programmes of urban regeneration are implemented, which benefit to the improvement of living conditions in cities.
A number of areas are however subject to problems of sustainability. These are, on the one hand, the large urban regions handicapped by strong traffic congestion and, on the other hand, the towns and settlements experiencing serious population decline caused by ageing, emigration and loss of employment opportunities. In both cases, public resources are not sufficient to improve significantly the living conditions.

d) Inequalities and tensions

Various factors contribute to the limitation of inequalities and tensions between social groups, especially in large cities. The macro-economic policies aiming at improving the purchase power of the medium and lower segments of the social hierarchy, contribute, up to a certain extent, to the reduction of inequalities. The more strict control of labour-related immigration and its orientation towards regions with manpower shortage does not cause excessive concentration of immigrants in large cities. Programmes aimed at developing housing at affordable conditions are likely to facilitate the integration of less favoured social groups.

While the worsening of inequalities and tensions is not likely to happen in the context of the scenario, large cities characterized by severe problems in this field (strong concentration of immigrants and marginal groups, low level of integration, urban violence, social segregation etc) do not however experience a drastic improvement of the situation. Social inequalities related to unemployment are likely to increase in areas characterized by a strong concentration of obsolete economic activities. Poverty may also continue to be significant in a number of remote rural areas, subject to emigration or with strong concentrations of deprived ethnic groups.

e) Promoting growth through a more efficient territorial organisation of city-regions and settlement networks

The general strategy of the scenario, which has a strong economic orientation, converges with a more efficient organisation of settlement systems. Networking of cities is a priority for the scenario. In intermediate and less urbanised regions, networking will be applied primarily to medium-sized towns with the aim to share infrastructures, increase their productivity and generate economies of scale. In metropolitan regions, networking will strengthen the links and synergies between the metropolitan area and the medium-sized towns in the surroundings, with the aim to favour a more polycentric settlement pattern and to increase the competitiveness and international attractiveness of metropolitan systems. The scenario will however contribute only weakly to the development of overspills from metropolitan areas towards their respective hinterlands in the countries of Central and Eastern Europe. The growth process will be too modest and resources in the wider hinterlands of large cities insufficient for this purpose.

3.4. Comparison of the outcomes of the two scenarios

As the future is relatively open, especially with regard to the global/international context, the basic hypotheses of the scenarios in this field are diametrically opposed. While the first assumes a global economic recovery after the crisis of 2008/2009, the second is facing a worsening context with considerable financial/economic problems outside Europe (especially in the USA and Asia). Both scenarios are strongly policy-oriented and the policy orientation is, in each case, closely related to the global context. In the first scenario, the promotion of the “green economy” requires general economy growth and stability and above all – a solid international consensus on the reduction of greenhouse gas emissions. The rapid development of the “green economy” is understood as a strategy capable of combating climate change while enabling economic growth through a radical change of the economic paradigm. The strategy assumes further that no restrictions are placed on the globalisation process and that Europe will compete successfully at world scale thanks to its massive investments in all sectors related to the “green economy”. In the second scenario, the concentration of the strategy on Europe itself is both a response to the rapid deterioration of the international environment and a new awareness of the fact that numerous potentialities in Europe are not fully exploited. Macro-economic strategies aiming at boosting domestic demand in Europe and at protecting the European economy for a while from exacerbated external competition make the mobilisation of numerous endogenous resources possible while favouring the

further integration and modernisation of the European economy and increasing its competitiveness.
Although starting from opposed context hypotheses and based on very different strategic policies, the territorial outcomes of both scenarios are less extremely dissimilar than expected, even if differences are more than simple nuances. The territorial outcomes are however not uniform throughout Europe. They depend largely from territorial and urban development policies, which vary from city to city.
With regard to metropolitan expansion, the first scenario is likely to generate more economic growth, which may benefit, at least during the first phase, large cities. Territorial policies will however promote compact cities and channel metropolitan expansion in such a way as to minimise its environmental footprint, especially in concentrating new settlements along public transport taxes. The second scenario will generate less economic growth, at least during the first phase, and ensure a rather balanced settlement pattern. The scenario does not exclude however the continuation of classic suburbanisation trends around a number of cities. As far as the core areas of large cities are concerned, the first scenario will promote more greening and improvement of the living environment. This may cause some increase in the gentrification process, first in the West European cities and, later on, in central and east European ones. The second scenario, although pursuing primarily economic objectives, has also a strong social orientation. It will promote the development of social housing in cities and the regeneration of derelict and deprived urban area.
The first scenario is more prone to generate overspills from metropolitan areas, which may benefit to the medium-sized and smaller towns of their respective hinterlands, especially in Western Europe. A number of large cities' hinterlands in Central and Eastern Europe are also likely to benefit from this process, but mainly in the second phase. In the second scenario, which is more driven by the availability of endogenous resources, the economic development of the wider hinterlands of large cities mainly depends upon their endowment with resources (skills, insertion in value chains, local specialisations etc.) and infrastructures.
Having its justification in a prosperous global context, the first scenario will favour the European gateway cities at the interface with other continents (cities with major ports and airports). The second scenario, which is more Europe-centred, is of advantage for European trade hubs (which are frequently capital cities, but also in some cases other large cities) as well as for cities along major transnational corridors, including those connecting the EU with neighbouring countries.
Territorial integration within the European macro-regions, although progressing in the first scenario, is likely to be stronger in the second one, but mainly in the second phase. It will benefit from strong efforts aiming at supporting and encouraging the productive networking of cities.
With regard to medium-sized and smaller towns outside of metropolitan influence, the first scenario favours those with good accessibility, facilitating the attraction of external investments as well as those located in regions with strong potential in renewable energy (biomass, wind, solar, geothermal etc). In the second scenario, the improvement of the accessibility of more remote medium-sized and small towns is an explicit part of the strategy, aiming at facilitating the exploitation of local and regional potentials. The economic performance of the towns concern depends however more from the regional endogenous resources than from external investments. The progress of the residential economy is likely to benefit to attractive areas in both scenarios.
In the case of depressed, remote and landlocked rural regions prone to emigration and population ageing, the first scenario is only helpful if significant amounts of renewable energy resources are exploitable. The second scenario, which has a stronger social orientation, may provide some support in the field of infrastructures and services of general interest. In both cases, the situation will however remain problematic in many respects.
The two scenarios may also exhibit some differences in their impacts on social integration and possible pensions, especially in large cities. The first scenario is more open to further immigration. According to the logic of the scenario, urban policies generally put their

priorities on environmental issues, more than on social ones, so that further social segregation in the core areas and outskirts of cities is not excluded. In the second scenario, immigration is more limited and more strictly controlled. It should not lead to an increase of the number of unemployed immigrants in large cities. In addition, measures are taken to facilitate the integration of disfavoured groups through the promotion of social housing and related infrastructures.

The following table provides a synthesis of the territorial impacts of the two scenarios.

	Scenario “Green economy”	Scenario “Enhancing the European potential”
Macro-territorial aspects	Growth is first concentrated in the pentagon and in a few others large cities, while neo-fordist regions are negatively affected, then it expands towards eastern Europe and peripheral regions of western Europe	First, no significant evolution of the settlement pattern (low economic growth; protection of manufacturing employment). Then, rather balanced development of urban systems, thanks to the promotion of regional potentials.
Metropolitan areas	Metropolitan areas benefit from the development of R&D activities, services and advanced manufacturing activities. International gateway cities benefit from further globalisation	The centres of national trade networks (mainly capital cities) are favoured + large cities along trans-European corridors.
Hinterlands of metropolitan areas	In industrial regions of western Europe, urban settlements in the hinterlands of metropolitan areas are involved in the development process. In the second phase, this happens also in a few cases in the eastern European countries.	The hinterlands of metropolitan areas change according to the level and mobilisation of regional potentials. Existence of very different situations. Weak overspill from metropolitan areas towards their hinterlands in central and eastern Europe.
Medium-sized and small towns outside metropolitan regions	Medium-sized and small towns with an industrial basis are generally negatively affected during the first phase. A number of them are involved in the development process in the second phase.	Thanks to the pro-active promotion of regional endogenous potentials, numerous small and medium-sized towns benefit from development opportunities
Networks of cities Cooperation / competition	Emergence of large-scale, specialised cooperation networks, also with large cities outside Europe. Growing competition at global scale.	Progress of intra-European networking, especially within transnational macro-regions (clusters, R&D institutions, businesses) benefitting also to medium-sized towns. Increasing networking also with EU neighbouring countries. Growing competition at intra-European scale.
Sustainability	Priority to more compact urban forms serviced by public transport. Decrease of air pollution in cities thanks to electric cars. Regeneration and greening of core areas of cities. Stronger environmental challenges in southern and eastern Europe (suburbanisation; motorisation)	Economic growth is limited because of unfavourable global conditions. No uncontrolled metropolitan expansion. The balanced evolution of the settlement pattern ensures sustainability. However, no significant environmental improvement in congested areas.
Social polarisation and tensions	Tensions related to unemployment in the first phase, especially in industrial cities. Improvement in the second phase. Possible increase of social segregation in large cities.	Growing purchase power in the medium and low segments of the social hierarchy reduces social polarisation. Social policies in cities (housing, regeneration of problematic neighbourhoods) limit and reduce social segregation and tensions.

Competitiveness of the territorial organisation of settlement systems	Compact development in and around metropolitan areas and efficient networking between metropolitan areas and the surrounding medium-sized and small cities ensure higher competitiveness	More polycentric urban systems within and outside metropolitan regions. Efficient networking of cities in most regions (generation of network economies

Table 2. The territorial impact of the scenarios

4. Policy messages from the scenarios

The first policy message from the scenarios is that the future of European cities is closely linked to changes in the global context, including global policies.
Both scenarios are pro-active, policy-oriented scenarios. In each of them, policies of all levels are targeted towards the solution of specific challenges, which result from particular changes in the global context. The first scenario gives a strong priority at global level to the issues of climate change in an economic context of good recovery from the crisis, which makes the implementation of such policies possible. The second scenario orientates European, national and regional/local policies towards the promotion of territorial potentials within European regions in a context of weak recovery from the economic crisis. Both scenarios have different impacts on the evolution of cities. Such impacts depend in turn upon the specific characteristics of each city. They will not be identical in the case of cities subject to strong population growth or to demographic decline.
The second policy message is that coherence is necessary between policies at various scales. For example, the introduction of carbon taxes may have strong impacts at local scale and may strengthen the profitability of public transport systems implemented by local authorities, but it is not realistic at the scale of a single country. Coordination of policies in this respect is required at least at European scale. Place-based policies and thematic/sectoral policies should not be in contradiction with each other. Incoherent policies at the various levels generate tradeoffs and additional economic, social and environmental costs.
The third policy message from the scenarios is that regional/local policies related to cities and metropolitan areas have to be tailor-made with respect to the specific characteristics of each regional or local settlement system. The evolution of cities is subject to a variety of drivers, the combination of which results in unique situations and perspectives. While general policy orientations related to new and emerging issues (like climate change, population ageing, social polarisation etc.) are meaningful, the way they have to be concretely implemented very much depends upon the local context and may vary significantly from city to city.
If one compares the two scenarios with the present situation and evolution two years after the most severe economic crisis of the post-war period, the present European context (with the exception of a few countries) is closer to the second scenario, which displays a slow recovery. This does not mean that the pro-active policy approach described in scenario 2 (efficient promotion of the respective territorial potentials) is presently being efficiently implemented everywhere throughout Europe. The failure of the Copenhagen Summit at the end of 2009 shows that conditions for a “Green New Deal” at world scale are not yet met. This issue may however become topical again in the medium-term in relation with the possible depletion of fossil energy sources, making the development of a “Green New Deal” unavoidable. The Europe 2020 Strategy contains elements of both scenarios. The promotion of the environment and of renewable energy sources is part of scenario 1, while a number of other measures pertaining to “smart growth” are closer to scenario 2. The Europe 2020 strategy is however not a scenario in the strict sense of the word. It determines long-term targets without making explicit the characteristics of the global context likely to make the achievement of such targets feasible.

Chapter 14 – FOCI Policy Options

David Ludlow, UWE

1. Territorial Development Policy Overview

This report has highlighted some of the key trends and developments in European cities today. It has also provided a future perspective and alternative scenarios for the future evolution of Europe's cities according to different conceptions of the interplay of the various drivers of change impacting on European cities.

The cities of Europe today face a number of critical challenges concerning the maintenance of the economic vitality of cities, the social welfare, health and quality of life of citizens, as well as a range of environmental concerns. In addition to these long-standing priorities on the urban political agenda, new political challenges have recently arisen in response to new drivers of change including climate change, as well as the global economic and fiscal crisis.

Territorial development policy represents one of the prime drivers of change and the specification and implementation of territorial policy can have major impacts on the success or otherwise in achieving the desired future directions for urban development. This policy options assessment aims to provide a territorial development policy perspective on these issues, providing linkage to the discourse advanced in this report.

This policy options assessment provides an overview of the principal policy options in response to these challenges, addressing policymakers at all levels of governance. In the context of multi-scalar governance EU and national level policies greatly influence the development opportunities for cities, nonetheless the prime purpose here is to provide specific focus on local level policymakers, and to explore the room for manoeuvre at the city-region level.

It should be noted that limitations on the extent to which these objectives to define policy options at the local level were raised in the introduction to this report. Specifically, that innovative research in the report, although providing interesting new insights generally does not have the conclusive potential nor sometimes the spatial breadth necessary for a decisive policy oriented review. Furthermore, the specificity of the project outputs in policy terms does not permit a clear transposition from the high-level policy objectives to specific policy options at the lower levels of governance.

The policy options assessment is delivered on the basis of the subsequent sections of this chapter as follows:

- review of the principal policy related challenges facing the cities of Europe today;
- review of the interconnected, complex, and common origins of the challenges facing cities, and the need for territorially differentiated but integrated policy responses defined in the context of integrated urban management;
- review of the principal policy frameworks at the European level, within which policy options at the city-region level are defined;
- review of policy options at the city-region level, focused on both the territorial differentiation of policy responses, as well as limitations on policy effectiveness at the local level;

- specifications of city-region policy options in relation to economic development and competitiveness, social cohesion, and environmental sustainability;
- specifications of policy options for integrated urban management.

2. Principal Policy Challenges facing Cities

The scientific report has provided an assessment of the various drivers of change and related impacts at the local level. The following summarises the critical policy challenges associated with the long-term and on-going trends in relation to economic, social and environmental transformations.

2.1 Policy Challenge - Economic Development and Competitiveness

The long-term trends in relation to the economic transformation of Europe, with resulting industrial restructuring and offshore relocations, has left many older industrial and mining towns without a viable economic base. These underlying transformations of the economy will increasingly challenge Europe's cities.

The prime concern is with loss of employment and economic decline, prompting population out-migration, abandoned homes and areas, and a declining support base for commercial activities and public facilities.

These problems have been exacerbated more recently by the global economic crisis, which directly and deeply affects the economic growth potential of cities, further reducing employment. In addition, the crisis has limited foreign direct investment, and reduced municipal funding, and thereby has constrained expenditure for state-initiated urban and infrastructural projects.

2.2 Policy Challenge - Social Cohesion

Achieving integrated and equitable urban environments remains a major challenge for Europe's cities. Socio-economic polarisation has been growing in recent years, but the lack of compatible data based on a systematic empirical assessment, makes true assessment of the degree of socio-economic polarisation in the cities of Europe problematic to assess.

The changing structure of urban labour markets arising as a consequence of economic transformations, has generated a growing polarization of occupational and income structures, exacerbating urban income inequality. The changing structure of labour markets has also left many urban residents poor and unemployed, and deteriorated public housing estates now coexist with new urban mega-projects.

Furthermore, city competitiveness, the desire to attract foreign investment and urban development, fuelled by a booming property market (until recently) have driven processes of gentrification and suburbanisation, segregating many cities and towns into elite enclaves and sprawling middle-class suburbs. This, in turn, has given rise to urban areas with major contrasts between areas of wealth and poverty, creating in some contexts rising crime levels, fuelling the desire by the wealthy to spatially separate themselves from the poor. Consequently, income inequality and territorial fragmentation are mutually reinforcing, leading to more segregated and potentially violent cities.

2.3 Policy Challenge - Environmental Sustainability

A key challenge for the metropolitan regions of Europe remains the process of suburbanisation and urban sprawl, in which differentials between the cities of Europe in relation to growth are attributed to the stage in the process of urbanisation (still strong in

parts of east Europe), the underlying economic structure, and the effectiveness of territorial governance at the local level.

The major part of new growth is still taking place on the urban edge, and in some parts is linking existing settlements to form extended urban corridors. Elsewhere, the shrinking population of cities particularly in the east Europe, arising from demographic and migratory change, raises a related challenge for territorial governance at the local level.

Current trends in urban development and the territorial structure towards sprawl, fragmented development and car domination have expanded both the territorial and ecological footprint of cities, with additional adverse impacts in respect of urban economic efficiency, social marginalization, loss of natural resources, and quality of urban life. Furthermore, much of this new development is fragmented, and lies beyond the boundaries of municipal governments, areas that are difficult and expensive to service in conventional ways.

In the longer term, global oil supplies will begin to decline, and the impact of carbon dioxide (CO2) emissions from petroleum-driven vehicles on climate change will also encourage a move away from oil-dependent cities.

In response to these challenges for Europe's cities identified above, policy responses are developed at all levels of governance from city-region to EU level, in order to ameliorate and redress the impacts of the drivers of change. These responses exhibit a number of common characteristics that are reviewed below, before a more detailed assessment is provided of policy responses and options at all levels of governance in the subsequent sections of the chapter.

3. Policy Responses – Territorial Differentiation and Integration

3.1 Commonality and Differentiation

In many respects a broad consensus of political priority at all levels of governance can be identified, which reflects the common origin of the key drivers of urban change and their common impact for many cities in Europe. The drivers are largely common to all European cities precisely because they predominantly arise from sources that are both pan-European and global. Public policy in aiming to steer the city towards a desired urban future, can build upon this commonality of the drivers of change, as challenges arising from a common causation permit the specification of common solutions that can be applied to many cities throughout Europe.

At the same time, pan-European regional variations in political priorities clearly exist, which in part reflect differentials in the impact of the common drivers of change in relation to both the socio-economic and environmental specifics of the territory, as well the local administrative model.

Issues concerning territorial differentiation and differential policy responses are well illustrated by suburbanisation and densification. Over the past 10-15 years European cities have been characterised by significant trends of suburbanisation around large and medium-sized cities. These trends have developed across Europe, although differences between countries and regions can be identified in respect of the intensity of the process, which depends upon the factors identified above. For example, differentials in the process and rate of urbanisation in the former Eastern Bloc territories, and policy responses at the local level can be traced to the distinctively different political, economic, and administrative models operating in those regions until relatively recently.

Again pan-European territorial differentiation between cities of Europe is evident in relation to social polarisation, which has significantly increased in the cities of Central and Eastern Europe as a consequence of the transformations of the economy and society.

Social polarisation in Central and Eastern Europe is, however, more related to growing income disparities within the native population, to exclusion from the labour market, and less to the influx of immigrants evident in West European cities.

This mix of commonality and regional differentiation of the impacts of drivers of change, and the associated political priority at the city region level requires the development of policy responses, defined according to territorial specifics and assets at the local level.

Furthermore, in the context of multi-scalar policy development and delivery, which links action at local, member state and EU levels, policy options at the different levels of governance will also be differentiated. Generally speaking high level agencies define broad policy frameworks which are increasingly specified at lower levels of governance, and at these lower levels questions concerning policy implementation become increasingly dominant.

3.2 Interconnected Impacts and Integrated Policy Responses

The drivers of change not only deliver common impacts at the local level, but are also highly interconnected. For example economic transformation and rising unemployment has not only direct social consequences in terms of loss of income, but can also have adverse environmental impacts within the city. The interconnectedness of the issues also highlights the complexity of any intervention at the urban level and indeed for integrated management of the territory at the urban regional scale.

Nonetheless, an integrated approach to the assessment of the drivers of change, and the ensuing policy responses is universally viewed as desirable. This integrated approach is evident in the aim to secure vertical coordination between policy initiatives promoted by different levels of governance from local to European, as well as the coordination between agencies at the local level in a horizontal perspective. Territorial development policy at the city-region scale cannot operate in isolation from policy frameworks specified at the regional, national and supra-national scales. However, certain urban problems can only be addressed at the regional or national scale, even though both policy development and implementation is coordinated with the higher levels of governance.

An integrated approach is also strongly characteristic of place-based policies at the city region level where territorial development is concerned with the attainment of multiple objectives including the reduction of urban sprawl, creation of compact cities, enhancement of economic effectiveness, stronger inter-regional cooperation and improved governance. Horizontal cooperation at the inter-municipal level is an important lever in city regions in managing suburbanisation trends and to ensure coherent, sustainable forms of urban expansion. In the Netherlands, for example, seven "urban regions" have been established by the government as inter-municipal cooperation bodies, four of which are in the Randstad. The aim is to elaborate a strategic territorial plan, to plan the location of new housing, to promote the regional economy and to secure a common environmental policy.

In Central and Eastern Europe, where the suburbanisation process around mainly large cities has remained strong during the past 10 to 15 years, some countries have developed inter-municipal cooperation at the metropolitan scale. In Estonia for example, a few large cities (Tallinn, Tartu) and their surrounding municipalities have begun cooperation with the aim to strengthen joint planning at agglomeration level, primarily in land-use planning, public transport, waste management and provision of some other public services. However, it is also clear that elsewhere in central and eastern Europe e.g. Romania, inter-municipal cooperation at the agglomeration level remains poorly developed, although the Romanian government has decided to enforce peri-urban territorial planning documents for all cities and towns from 2011.

This integration imperative is also supported by the Green Paper on Territorial Cohesion which highlights the importance of the organising principle of sustainable development in the following terms:

"the concept of territorial cohesion builds bridges between economic effectiveness, social cohesion and ecological balance, putting sustainable development at the heart of policy design".

This review of the policy options at the city region level, generated in response to the scientific analysis of this study, emphasises this need to determine an appropriate balance between social, economic and environmental objectives as a key organising principle for the specification of the policy options in the context of integrated city-region management.

4. Policy Frameworks – European Level

As indicated above planning at the urban or local scale cannot operate in isolation from planning at the regional, national or even supra-national scales. Management of the city region, in relation to its economic potential, and the need for balance sustainable development, requires coordinated and integrated territorial planning and management involving all levels of governance.

The various challenges identified above are have differential impacts on the policy priorities at the different levels of governance. In response to these various challenges governance needs to be coordinated between levels, coherent in relation to policy objectives, and also specified at different levels according to the responsibilities of specific agencies.

For example, the sectoral macro-policies of the European and national levels, are strongly dependent upon EU structural policies, and provide support to less developed regions via co-financing of major infrastructures etc. A critical debate in this context, reinforced by the economic crisis concerns the level and territorial criteria of EU support after 2013, and the dilemma concerning the promotion of metropolitan areas as an essential element of global competitiveness versus support to least developed regions to ensure territorial cohesion.

Three key policy documents define the pan-European perspective and the broad framework for multi-level policy development, territorial coherence, and integration at the local level. These include:

- Europe 2020
- Territorial Agenda of the European Union
- Leipzig Charter and Toledo Declaration

4.1 Europe 2020: strategy for smart, sustainable and inclusive growth

At the European level the overarching agenda in response to the crisis and related priorities has been recently defined by the EU report Europe 2020: A strategy for smart, sustainable and inclusive growth, published in March 2010. The report identifies the challenges resulting from the *"world's worst economic crisis since the 1930s"* , and in response the Europe 2020 strategy sets out a vision of Europe's social market economy for the 21st century. Europe 2020 puts forward three mutually reinforcing 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.

In relation to these priorities the Commission is proposing five measurable EU targets for 2020 that will steer the process: for employment; for research and innovation; for climate change and energy; for education; and for combating poverty.

Europe 2020 will rely on two pillars: the thematic approach outlined above, combining priorities and headline targets; and country reporting, helping Member States to develop their strategies to return to sustainable growth and public finances. Integrated guidelines will be adopted at EU level to cover the scope of EU priorities and targets. Country-specific recommendations will be addressed to Member States.

The Commissioner for Regional Policy, has argued for *"a more strategic and focused but flexible system"*, based on the following principles:

- **More strategic approach** - aligning Cohesion Policy as far as possible to EU 2020 objectives to help achieve goals for Smart, Green and Inclusive growth. Creating a competitive, connected and greener economy based on integrated investments in high-speed internet, smart transport and energy infrastructures, measures to foster energy efficiency and renewable energies, green public procurement and well functioning administrations.
- **Tailor-made solutions for each and every region** - closely linked to a strategic approach and based on the focused but flexible system. This implies concentration of funding in regions on a limited number of objectives in order to ensure that they have a tangible impact and achieve critical mass, according to commonly agreed EU-level strategies, and regional strategies of neighbouring regions, implying a degree of central coordination.
- **Multi-level implementation framework** - integrating the regional dimension in strategic objectives and ensuring regions decide, within the constraints of a degree of central coordination, on the objectives and measures on which to concentrate funding. Decisions evaluated according to the performance orientated and multi-dimensional nature of Cohesion policy goals eg smarter and greener growth will also be evaluated according to environmental and resource criteria, as well as economic criteria.

4.2 Territorial Agenda of the European Union

The Territorial Agenda of the European Union highlights the fact that whilst the regions and cities of Europe face common problems for which common solutions are sought, they equally must respond to distinctive challenges at the local level, reflecting the territorial differentiation of Europe. Territorial development is identified as a major opportunity to solve the multifaceted problems of climate change, demographic change and migration, as well as those associated with unbalanced territorial structures which have an adverse effect on sustainable development. The Territorial Agenda provides perspectives for the territorial development of the EU with a key focus on extending the Lisbon Strategy to ensure that the territorial dimension is more effectively accommodated in policy-making.

The prime thrust for the development of the Territorial Agenda lies in the appreciation that the implementation of a more territorial orientated development approach for the cities and regions of Europe will not be successful unless territorially significant aspects inform the shaping and application of national and European sectoral and economic policies. In particular it is argued that policy at the EU level has so far exhibited significant incoherence with regard to its territorial impact. For example EU cohesion policy has the greatest direct and indirect impact on territorial development through its pro-rata funding and support to regional development. However, the policy is still mostly being implemented according to standardised procedures, without taking distinctive regional features into account.

The Territorial Agenda is built on three main aims for Europe's territorial development

- development of a balanced and polycentric urban system and new urban rural partnership
- securing parity of access to infrastructure and knowledge
- sustainable development, prudent management and protection of nature and cultural heritage

The following priorities for territorial development of EU were identified as follows:

- Strengthen Polycentric Development and Innovation through Networking of City Regions and Cities
- New Forms of Partnership and Territorial Governance between Rural and Urban Areas
- Promote Regional Clusters of Competition and Innovation in Europe
- Support the Strengthening and Extension of Trans-European Networks
- Promote Trans-European Risk Management including the Impacts of Climate Change
- Strengthening of Ecological Structures and Cultural Resources as the Added Value for Development

The Territorial Agenda is currently under review together with an update of the accompanying analytical report Territorial State and Perspectives of the EU. This update and review process is in response to developments since the publication of the Territorial Agenda in 2007. These include notably the economic and financial crisis and concerns for the long-term impact of the structuring of European regions, as well as the impact of enlargement of the EU, and recognition of a more complex view of territorial policies in Europe generated by the Green Paper on Territorial Cohesion: Turning Territorial Diversity into Strength.

This process of updating and review is on-going (2010), however prime policy fields already identified as a focus for the review process include:

- Global and European dimension
- EU dimension
- Policy dimension
- Economic and financial dimension
- Social dimension
- Territorial cohesion
- Territorial cooperation
- Territorial governance

4.3 Leipzig Charter and Toledo Declaration

Taking into account the urban dimension of the current crises and future challenges faced by European cities, European Ministers met in Toledo in June 2010 to examine the Europe 2020 strategy in detail and its implications for urban development consequently

The Toledo Declaration, as a follow-up to the Leipzig Charter and associated processes, highlights in the short and medium terms, the major challenges European cities are facing in overcoming the economic crisis and the need to secure a strong recovery. But the declaration also identifies other structural and long term challenges - including globalisation, climate change, pressure on resources, migrations, ageing and demographic change, etc.- with a strong urban dimension and impact on cities' economy, urban environment deterioration, increasing risk of social polarisation and exclusion, etc, all of which have to be tackled at the same time.

The declaration identifies these challenges as a wake-up call, and an opportunity to chart a firm course based on the principles of integrated, smart, sustainable, cohesive, inclusive urban development, as the only way to achieve a greater economic competitiveness, eco-efficiency, social cohesion and civic progress in European cities, and to guarantee citizens' quality of life and welfare in the present the future.

The Toledo declaration highlights the need to promote a smarter, more sustainable and socially inclusive urban development in European urban areas, cities and towns, based on the following key principles:

- the integrated approach in urban development policies and the need for a common understanding
- importance of integrated urban regeneration and its strategic potential for a smarter, more sustainable and socially inclusive urban development in Europe.

5. Policy Options – Member State Specifications

For a detailed synthesis of the member state level policy options specifications, including a more territorially differentiated analysis, see section XXX of this scientific report. This analysis provides reference to the actual policies implemented across Europe, based on reports elaborated in 2010 by national ministries for the Council of Europe Conference of Ministers Responsible for Spatial/Regional Planning (CEMAT). This chapter of the scientific report summarises the vision that national policy makers have of their respective urban issues and policies.

6. Policy Options – City-region Specifications

Policy options at the city-region level in response to the principal challenges identified in this report, are defined in the following context:

6.1 Policy Options – Economic Development and Competitiveness

Policies concerning regional economic competitiveness at the level of macro territorial planning, focused on the growth of the metropolitan area and its associated hinterland, have been mostly defined at regional and national levels, and have been most actively pursued in central and eastern Europe where the stronger intensity of transformations has been supported by structural fund policy frameworks. In general terms the policy issues are focused on territorial balance and the polycentric development of the territory, whilst maintaining competitive sustainable development.

Regional economic competitiveness can be advanced by a number of policy levers at the local level including the enhancement of local and regional connectivity, and integration with the hinterland, and in respect of human capital via education, although not always a competence at the local level, and more generally via housing provision. Nonetheless, evidence indicates that the model of regional economic competitiveness based on metropolitanisation process supported by strong city-hinterland relations, may be evolving with the weakening of city-hinterland relations.

The capability and capacity of a city to mobilise policy options in support of regional economic competitiveness, is influenced by local vision and governance capability, factors which may remain problematic in parts of central and east Europe.

The economic crisis has the potential to extend the divide between west European knowledge-based economies, and those in the east aiming to modernise production,

whilst remaining vulnerable to external competition. The fiscal crisis for cities associated with the economic downturn, also seriously decreases the room for manoeuvre by cities.

However, agglomeration economies supporting city competitiveness, and the future economic development of cities, are most dependent on the nature of the recovery from the economic crisis taking place in a global context, and are therefore substantially beyond the control of city region governance.

6.2 Policy Options - Social Cohesion

The extent of socio-economic polarisation depends substantially upon the national context, and the degree of insertion in the global economy, whereby knowledge-based jobs requiring higher skill levels tend to enhance socio-economic polarisation. Also in the national context, the extent to which cities have been subjected to more substantial welfare cuts and higher levels of migration, especially from the east of Europe, has increased socio-economic polarisation.

City-regional policies in support of social cohesion are probably relatively ineffective given the significance of the national policy context, furthermore it is evident that there is a real policy conflict identified in the relationship between the contradictory impacts of policies to promote engagement in the knowledge society for the benefit of the local economy and society, and the impact that this policy has in enhancing socio-economic polarisation at the local level. In this relationship a clear decoupling of the relationship between social cohesion benefits and economic advancement is evident.

Socio-spatial polarisation has also increased in line with socio-economic polarisation, although socio-spatial polarisation appears to be specifically exacerbated by the impacts of both the gentrification and suburbanisation processes, that lie within the control of city-region governance, in contrast to the national and global drivers of socio-economic polarisation. Clearly, there has to be careful assessment of policy impacts when designing policies to "gentrify " or enhance the attractiveness of urban cores, which also have unintended consequences in increasing socio-spatial polarisation.

Looking forward there is concern that the economic crisis will only serve to intensify socio-economic and spatial polarisation, and decisions at the member state level, rather than the local level, concerning the nature of the welfare state model and the potential for new social compromise, will significantly influence the opportunities for social cohesion in the cities of Europe.

6.3 Policy Options - Environmental Sustainability

Cities are at the forefront of the challenge of environmental sustainability, responding to the need for climate change mitigation and adaptation measures, energy and resource efficiency as well as the emerging challenges concerning the transition from oil to alternative energy sources.

The complex and interconnected nature of these issues at the local level demands an integrated place-based management perspective, for which sustainable development is the paradigm. Indeed the place-based policy of integrated urban development necessarily combines not only policies concerning the environmental challenges facing cities, but also typically strongly influences both social and economic outcomes in the city. The strategic policy objective is to secure the policy co-benefits whereby policies addressing environmental objectives, secure also desired outcomes in respect of socio-economic criteria.

However, as identified above, policy conflicts are evident, for example, where regeneration policies aiming to support the economic development potential and the revitalisation of central areas, result in a process of gentrification whereby the socially and economically less advantaged are displaced elsewhere in the city.

Territorial governance and the role of local policy frameworks to counter urban sprawl are critically important. These are articulated primarily in the framework of compact city planning, including the promotion of smart growth principles, development of the role of transit-oriented development, making the infrastructure plan a central element of the territorial plan, together with coordination of growth across municipal boundaries, supported by regional structures that manage growth, and assisted by appropriate planning strategies.

Looking forward, with a slowing down of processes of suburbanisation, particularly in eastern Europe, combined with ageing population and the impacts of the economic crisis, local policy concerns with the retrofitting of the existing urban areas to address environmental and associated policy objectives become increasingly significant.

European towns and cities were planned on the assumption of high levels of individual car ownership, and the reshaping and restructuring of the suburbs requires the definition of new centrality nodes based on public transportation systems. Reconfiguring cities from car dependent to public transport-based and non-motorized movement systems, supported by bicycle and pedestrian movement networks, implies significant spatial and territorial change.

Low-density, car dependent suburbs may need to be abandoned or turned to other uses, and energy-efficient buildings (low-rise, high plot coverage) accommodated in different open space and movement systems. The overall objective is to mobilise and enhance all potentials, to address the environmental objectives, and at the same time to secure economic vitality and quality of life.

New and incremental approaches to service and infrastructure delivery, in partnership with local communities, are also evident, based on more distributed service networks and alternative technologies (solar or wind energy) which may be the most appropriate way to service these areas. The planning of these peri-urban areas, also calls for local and regional planning action, and the identification of the level of governance which is best placed to manage such areas. A combination of regional and local planning approaches is typically required, an issue which is discussed further in section 11.7 Policy Options and Integrated Urban Management, below.

6.4 Policy Options and Policy Specifications

The following table identifies the various policy options at the city-region level, structured according to the principal challenges considered in this report, and defined as policy specifications.

	Policy Options City-Region Level
FOCI Policy Challenge	**Economic Development and Competitiveness** ***Policies concerning regional economic competitiveness at the level of macro territorial planning, focused on the growth of the metropolitan area and its associated hinterland, are mostly defined at regional and national levels. Regional economic competitiveness can be advanced by a number of policy levers at the local level including the enhancement of local and regional connectivity, and integration with the hinterland.***
Strategy / Vision	-- promote governance capacity, and governance structures to formulate integrated vision based on horizontal integration, supported by well-coordinated public decisions and active involvement of the civil society in economic recovery and stability.
Smart Growth	- promote technological development and accelerated adoption of new solutions in the green economy - energy, transport, housing and building etc. - promote technological investments, especially in sectors related to the green economy - energy, transport, housing and building and develop sites with access to endogenous resources eg science and technology; high level services.

Employment	-- promote the demand side and the creation of high quality sustainable jobs for vulnerable groups like young people. -- promote tax system to attract certain types of investment. -- promote networks of cities to provide indirect support. -- promote creation of immediate but temporary jobs in municipalities (bringing forward labour intensive investments).
Human Capital	-- promote development of human capital via general education system. -- promote more intensive support for those made redundant and the long term unemployed, extending education, and preparing workers for the upturn by, for example training in the skills required for future growth sectors.
Networking of Cities	-- promote increased collaboration between municipalities and other public entities at the level of the metropolitan and functional urban area, promote networks of urban systems within and outside metropolitan regions, to support efficient networking of cities in regions (generation of network economies).
Connectivity / Accessibility	- promote mobilisation of regional potentials and develop local and regional connectivity and integration of the hinterland. – promote these cross-border links to facilitate the potential for development of new integrated growth areas outside the pentagon, and the mobilisation and exploitation and regional potentials.
FOCI Policy Challenge	**Social Cohesion** ***The extent of socio-economic polarisation depends substantially upon the national context and decisions concerning the pursuit of a knowledge-based development path, and welfare re-distribution. City-regional policies in support of social cohesion, are essentially played out in the context of urban regeneration responses to gentrification and suburbanisation processes, that lie within the control of city-region governance***.
Urban management and social segregation	- promote social cohesion via urban regeneration measures (see environmental sustainability below) to limit and reduce social and spatial segregation generated as a result of gentrification and suburbanisation processes. - promote social cohesion through a variety of additional measures eg promote social housing system to reduce spatial polarisation.
Healthy and Inclusive Cities	-- promote principles for healthy and sustainable urban design including pedestrian movement systems for lower-income groups. - promote provision for cultural expression as well as demand for high-quality urban environments.
Social well-being and Economy	-- promote economic development policies: to favour the attraction of both low skill employment as well as high-level services and qualified jobs.
FOCI Policy Challenge	**Environmental Sustainability** ***Cities are at the forefront of the challenge of environmental sustainability, responding to the need for climate change mitigation and adaptation measures, energy and resource efficiency as well as the emerging challenges concerning the transition from oil to other energy sources. However the complex and interconnected nature of these issues at the local level demands an integrated place-based management perspective, in which coordinated policy responses involving all levels of governance is critical.***
Place-based Strategy	-- promote a place-based strategy to make cities more self-sufficient in a range of different ways, from job creation and food production to energy production, whilst aiming to reflect the uniqueness of 'place' in all urban developments. -- promote scaling up of plans making the development of a whole area, including the development of natural resources, recreational facilities and infrastructure, part of a coherent plan. -- promote integrated approach across the different sectors to create synergies with climate change policies (resource efficiency and emissions).
Strict Land Use Policy	– promote strict land use policies with appropriate enforcement at the city level, together with public control over real estate and housing markets. -- promote taxes on greenfield development to assist in balancing urban growth and the protection of the landscape.
Secure	-- promote stakeholder agreement on the characteristics of the equitable and sustainable

Stakeholder Agreement	city, including higher densities; low rise; mixed uses; public transport based; territorial integration; a defined and protected open space system.
Sustainable Transport Strategy	-- promote design of neighbourhoods, cities and regions according to a sustainable urban transport strategy based on integrated, efficient and affordable public transport system, as well as cycling and pedestrian infrastructure. -- promote new centrality nodes in areas of urban sprawl, to mobilise and enhance their potentials and to improve the quality of life in terms of sustainability.
Green Infrastructure Strategy	-- promote a green infrastructure strategy, to create biodiversity corridors, provide biofuels and biomass energy, reduce run-off, feed aquifers, linked to local urban agriculture projects. -- promote shift from large centralized power and water systems to small-scale and neighbourhood-based systems, including expansion of 'green infrastructure', supported by incentive packages for photovoltaic cells, grey water systems.
Renewable Energy	-- promote the use of renewable energy techniques and technologies, from the region to the building level to reduce the ecological footprint. -- promote strategies to progressively tap local resources, and recognise renewable resources as part of the capital base of the city, assisted by building ordinances to facilitate the application of renewable energy.
New Technological Applications	– promote applications including non-polluting vehicle types, increased usage of telecommunications, supported by monitoring of technological innovations with potential territorial impacts.
Carbon Neutral Cities	-- promote carbon-neutral cities through energy efficiency modes replacing fossil fuels, enforced through schemes that mandate standards for significant reductions in carbon in all development and offset CO2 emissions.

Table 1. Policy Options and City-Region Challenges

7. Policy Options and Integrated Urban Management

The multilevel implementation framework identified by Europe 2020, and other informed opinion at all levels of governance, forms arguably an essential conceptual foundation for coordinated and integrated territorial planning and management of the city region. Challenges raised in respect of the implementation of integrated urban management include the procedural, and the structural basis for policy specification and implementation, as well as the form of the plan and nature of the relationship with the market economy, all of which can have major impacts on the delivery of policy options at the city region level. The nature of the response to these challenges create both regional variation in respect of the definition and implementation of policy options, and also influence significantly the effectiveness or otherwise of the policy options identified. The following identifies some of the key issues surrounding the potential for the realisation of integrated urban management at the city regional level.

7.1 Procedures and Structures

Prioritizing Policy at National Level - some countries have moved ahead to integrate urban policy at the national scale and to highlight the importance of cities. A national urban policy can set out a framework for urban settlements and urbanization policy that can serve to coordinate and align national sectoral policies, and an overall set of normative criteria which can guide urban planning and development. For example, national constitutions and preambles to national legislation can contain a commitment to the basic principles of social and environmental justice and sustainability, and an acknowledgement of the importance of rights to access urban opportunities. A national urban policy can also set out a national territorial perspective that considers the long-term balance between urban and rural, and between different kinds and locations of urban settlements.

Decentralization of Planning Functions - the principles of subsidiarity require that decisions on urban planning issues are taken as close as possible to those affected by them. This implies the decentralization of urban planning decisions to the urban level of government, which also provides an important precondition for developing planning debates with urban communities and stakeholders. The decentralization of urban planning decisions requires effective local governments, greater capacity in terms of urban planning professionals, and more resources at the local level. It may also require a reconsideration of municipal boundaries in areas where urban development has outgrown older administrative limits.

Integrating Sectoral Policy - as city governments have become increasingly complex and sophisticated entities, managing large resource flows and budgets, so the problem of achieving integration between various line-function departments, and between different levels of government has increased. This is an important issue for planning as it relies on the relationships between functions and tiers in order to achieve territorial coherence and integration on the ground.

Territorial governance provides a mechanism for sectoral integration, as all sectoral policies and programmes have territorial implications, and this role encourages all urban professionals to work together in plan production and implementation.

Different ways of achieving this include participatory budgeting processes that serve as a way of linking the work of departments to particular areas and action plans. Municipal programmes such as the Local Agenda 21, the Safer Cities Programme, the Healthy Cities Programme, the Sustainable Cities Programme and the Urban Management Programme have all served to integrate territorial governance. Introducing cross-cutting issues, also requires different departments, professionals and levels of government to work together.

Relationship to the Market - market orientated approaches to territorial governance have recognized the need to redefine the relationship between the system of governance and the economy (the market). One important implication of rapid urbanization and city growth has been an escalation in urban land prices, (excluding countries where land is under public ownership) and urban development driven increasingly by land speculation and developer-led projects. This is placing unforeseen demands on urban infrastructure, as well as resulting in fragmented and inefficient urban growth and negative social and environmental impacts. Territorial governance potentially provides an important tool for governments to better manage these forces.

Unless territorial governance can be seen to provide an efficient and useful service, delivering commercial land speedily, it will always be subjected to attempts to bypass, subvert or corrupt it. The other side of this coin, however, is that the governance system must be firm enough to deal with the externalities of private development and to extract public financial gain (betterment, value capture, and development taxes) where it is due. The degree of flexibility within any governance process may therefore vary: very firm decisions may need to be made by public authorities concerning environmental protection and socio-spatial exclusion; but a more flexible approach might be needed with regard to the form and direction of private-sector activity both formal and informal.

Related to the foregoing is the understanding that land-use regulations are generally quite good at preventing development and the protection of areas, but are not very good at making development happen. This is where the directive governance system is crucial, playing a role in directing public budgets, shaping projects, coordinating sectoral spending and negotiating with the private sector.

New Forms of Plan - essentially, the purpose of territorial governance is to set in motion processes that will improve the quality of life of urban residents. A key weakness in this respect is the fact that governance agencies usually lack sufficient power

and/or stability to exercise such control over all the agencies involved in urban development. Territorial governance therefore needs to give more attention to the way in which other agencies operate, and recognize the limits of their ability to predict future development trajectories.

A key shift in thinking about territorial governance has been the advocacy of more proactive, flexible approaches to intervention in urban development trajectories. However, in some circumstances, precisely specified designs for the future may be useful, and in cases where natural environments have to be protected, then firmness and not flexibility may be required. Critical to all this is finding right mix of agencies and instruments that promote and safeguard the collective interest. Urban management also needs to concern itself with the qualities of space and place, the form, scale and identity of urban places which people will experience on a daily basis.

These various considerations in respect of the procedures and structures surrounding policy development and implementation are linked with a series of recommendations in the following table.

FOCI Policy Challenge	Integrated Urban Management
Multi-Scale Governance	– promote both vertical coherence between the levels of governance, and horizontal coherence between organisations at the local level.
Policy Coordination	-- promote regional structures that manage growth, assisted by appropriate governance strategies, to develop a framework for the coordination of urban policies and major projects.
Combined Policies	– promote policy combinations in the perspective of integrated urban management whereby macro policy objectives defined at the EU and member state levels are linked to territorial policy objectives implemented at the city level.
Policy Mix	- promote policies that are appropriately differentiated and select options according to the specific objectives to be addressed in these differing contexts.
City Region Context	– promote policies for urban development to fully reflect interconnectedness in the city-region context, and ensure that appropriate city and regional monitoring systems are in place to support the development of appropriate policy responses.
Infrastructure and land-use planning	- promote infrastructure plans as a central element of the territorial plan recognising the central importance of transport–land-use links at both a city-wide and more localized levels.
Regions of Growth and Decline	– promote both the restructuring of the urban fabric involving central area regeneration and suburban retrofitting.
Institutional Capacity	-- promote effective measures to improve institutional capacity, particularly for the Eastern European MS in the process of modernisation of municipal management systems, but also more widely given the impacts of the economic crisis with new capacity constraints due to job loss and funding cut-backs.
Implementation Capability	– promote capability of a city to influence the above factors by developing the competencies of civil servants in the relevant fields and their capacity for integrated and strategic planning.
Stakeholder Engagement	promote involvement of a wide range of stakeholders in the development of a shared and consistent approach, based on credible analysis and understanding of trends and forces.

Table 2. Policy Options and Integrated Urban Management

www.espon.eu

The ESPON 2013 Programme is part-financed by the European Regional Development Fund, the EU Member States and the Partner States Iceland, Liechtenstein, Norway and Switzerland. It shall support policy development in relation to the aim of territorial cohesion and a harmonious development of the European territory.

ISBN 978-99959-684-0-3