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Policy Challenges of Demographic Change for European Regions and Cities

Projecting and benchmarking sub-national demographic trends in Europe on the basis of regional and local data sources

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1 Introduction

Demographic change is one of the major challenges of the 21st century in Europe which already has a noticeable impact on a wide variety of social and policy issues. In every European country major changes in the composition of the population can be observed. Due to the ongoing increase in life expectancy in almost every European country the number of older persons is growing rapidly. Additionally, most European countries are confronted with low fertility rates while the prospect of negative natural population change becomes a reality for an increasing number of countries. Also migration has a large impact on the size and the structure of the population, albeit with distinct divergences across Europe such as out-migration in Eastern European as compared to in-migration in Western European countries. When these demographic changes are studied at the national level, large differences between countries become visible. The differences across Europe become however even more outspoken when demographic trends are analysed at the sub-national level. The demographic regimes and prospects of European regions and cities show a large diversity in the pace and the intensity of demographic change including different patterns of population growth and decline as well as differences in population ageing.[1]

Information on the current and future socio-demographic state of their territories is important for regional and local authorities, also because of the impacts of demographic trends on the provision of services and infrastructure to citizens. This Research Note aims to illustrate the wealth of demographic and population-related information which is available at the regional level to policymakers who need to make informed decisions. We focus on two approaches: regional population projections and regional demographic benchmarks. It will be argued that adequate regional level databases of high quality and comparability are vital tools for policymakers.

In the first part of the Research Note, which was prepared by NIDI, current and future demographic trends and patterns are described including trends in mortality, fertility and migration, the impact on population growth and population ageing. A special focus will be given to the impacts of demographic trends on the size and composition of the potential work force. Also a demographic typology of European regions will be presented. For the future trends the outcomes of the most recent regional population projection EUROPOP2008 of the Statistical Office of the European Community (EUROSTAT) will be used.

The second part of the Research Note was made by RCDC and describes two databases of EUROSTAT: the EUROSTAT REGIO database with regional demographic information and the EUROSTAT Urban Audit database. The high quality of these databases in terms of coverage, accessibility, validity and compatibility of the data, makes them important sources for European statistics on both the regional and urban level. How to use regional statistic for policy relevant comparisons and benchmarking will be treated in more detail in. Since the "Lisbon Strategy" was agreed upon in 2000, benchmarking in economic and social issues has received more interest as a policy tool. Examples of policy relevant benchmarks will be described with a special focus on methodological aspects and presentation of results. Also the development of a demographic benchmark will be illustrated. By constructing an index based on data taken from the Urban Audit database, European cities will be ranked according to the strength of demographic change impacts.

[1] A definition of "regions" by EUROSTAT can be found in Annex 1.

The Research Note opens with an introductory section where the main findings are summarized and concludes with a discussion and summary of policy implications and policy responses to the challenges of demographic change.

1.1 Highlights

- There are large differences in population dynamics such as population ageing and population growth and decline across European countries. These differences are magnified at the sub-national (regional or local) level.
- In the 1990s net migration was positive in 69 per cent of European regions. Since 2000 this has increased to 76 per cent. In contrast, the percentage of regions with positive natural growth has decreased from 60 to 50.
- In the last decades of the 20th century fertility rates have declined all across Europe and fertility is low in most European regions. In over half (55%) of the European regions the average number of children per woman (the so-called total fertility rate, TFR) is 1.5 or lower. Fertility is particularly low in most southern, central and eastern European regions.
- The rate of population ageing is reinforced by the increase in life expectancy. High life expectancies can especially be found in northern and southern European regions.
- In about 75 per cent of all regions the total migration balance was positive for the period 2000-2007. In 40 per cent of the regions, both internal and external migration were positive. These regions can mainly be found in France, Italy and Spain. In another 30 per cent of the regions a positive total migration balance resulted from negative internal and positive external migration. .
- Population growth is relatively high in several western and southern European regions, and negative in several northern and eastern regions.
- According to the regional population projections EUROPOP2008, between 2008 and 2030 the population may increase in two out of every three European regions. By the year 2030, however, slightly over half of the regions are projected to see continued population growth.
- During the period 2003-2007 most European regions experienced growth of the working age population due to cohort turn-over (the gradual replacement of earlier born cohorts by later ones) and/or positive migration. Major exceptions were regions in Germany, Latvia and Lithuania. However, according to EUROPOP2008 a shrinking working age population is foreseen for the majority of NUTS2 regions during the period 20028-2030.
- The median age of the population in the regions in 2030 is projected to range between 34.2 years and 57.0 years, while in 2008 this was between 32.9 years and 47.8 years. Similarly, in 2030, the share of the population aged 65 years or over is expected to range between 10.4 % and 37.3 %. In 2008 this was between 9.1 % and 26.8 %.
- Also the potential labour force is ageing in most of the European regions. The share of older workers of 40-64 among the 20-64 year old population is expected to rise from 55 to 59 per cent over the period 2008-2030. The working age population will be less aged in the northern and western parts of Europe and more aged in the central, eastern and southern parts of Europe.
- A benchmark of German municipalities (Wegweiser Kommune) indicates that the predominantly rural and peripheral regions in Eastern Germany have the most unfavourable demographic developments in terms of population ageing and population decline.
- Also in another benchmark (the Demographic Risk Map) a strong East-West divide of demographic risk in Germany as well as on the European level is found. In addition to the profound gap between the new and the old member states of the European Union, high demographic and economic location risks are observed for regions in Southern European countries like Greece, Portugal and (Southern) Italy.
- Information about regional population dynamics is crucial for regional and local decision makers because at this level of governance the impact of demographic change is felt directly.
- Policy responses to regional population dynamics such as population decline should explicitly take regional and local conditions into account and "build on the strength of regions" through a coordinated approach.

2 Demographic trends and patterns in European regions

Populations grow through the arrival of new members either by birth or by in-migration and become smaller either through death or out-migration. The members of the population also grow older over time. Thus the drivers of population change are the demographic processes of fertility, mortality and migration. Each of these drivers has a specific impact on population growth as well as on the age composition of the population. Changes in the size, the growth rate and the composition of a population reflect major trends in society and have an important impact on a wide range of policy domains. Up to date and concise information on these demographic changes is an important tool for policymaking.

This chapter[1] summarizes recent trends in population growth in European regions. Indicators for the drivers of population growth that are used include the Total Fertility Rate (TFR) as a measure for the average number of children that a woman may expect to have during her life when current fertility conditions would prevail. As an indicator of mortality trends the average life expectancy is used. This indicator represents the average number of years that an individual may expect to live when current health conditions prevail. The balance of the processes of (international) migration for a given population is indicated by the net migration rate.

The chapter focuses on demographic differences across the so-called NUTS2 regions[2]. To understand changes over time, population growth in the 1990s is compared with population growth since the year 2000. Combining the various components of population growth, six types of population growth are distinguished. They range from positive population growth due to positive natural increase and positive net migration to negative population growth because of negative natural increase and negative net migration. Regional differences in population ageing at the regional level are discussed as well. Also changes in the size of the working age population (defined as the 20-64 years old population) are studied. Furthermore, a demographic typology of regions will be presented. Finally, this chapter will focus on possible future regional trends of the number of births, deaths and migrants. Regional differences in population growth between 2008 and 2030 are discussed, as well as differences in the process of population ageing.

2.1 Current trends and patterns of population change in European regions

2.1.1 Comparisons of the 1990s and the period since 2000

NUTS2 regions can be classified on the basis of the criterion whether total population growth, natural increase and net migration are positive or negative. This shows in which regions population growth or decline is caused by positive or negative net migration and by positive or negative natural growth

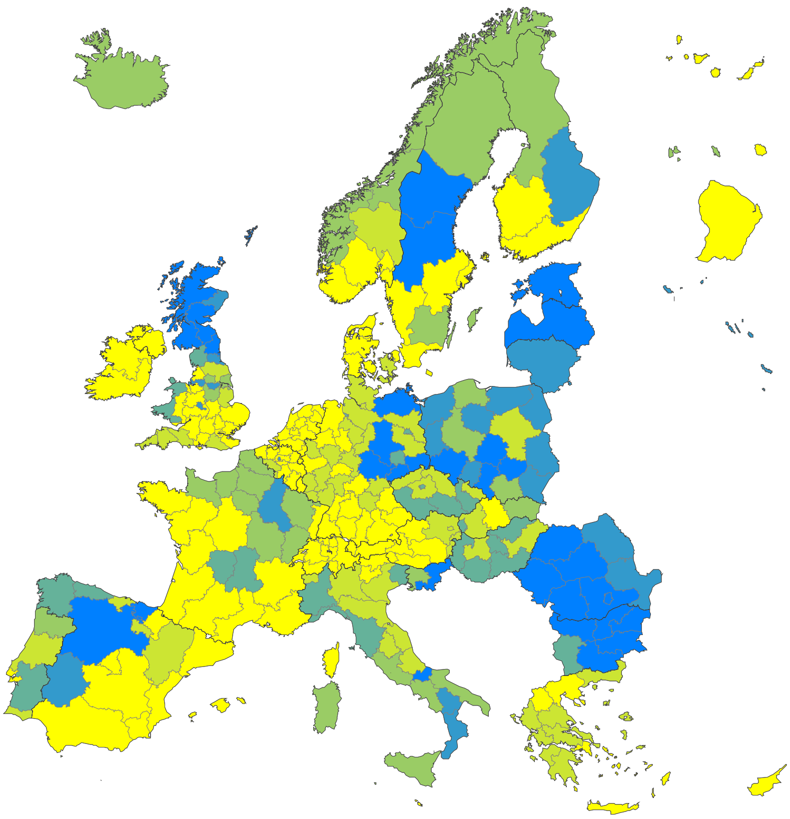
It appears that in the 1990s 71 per cent of all NUTS2 regions had positive total population growth (Map 1). Most regions (40 per cent) had both positive natural increase and positive net migration (category 1), 20 per cent of the regions had positive population growth even though natural increase was negative (category 2), and 11 per cent had positive population growth despite negative net migration (category 3). In contrast, in 9 per cent of the regions positive net migration was not high enough to compensate for negative natural increase (category 4) and also in 9 per cent of the regions positive natural increase did not compensate negative net

[1] This chapter is partly based on Van der Erf & De Beer (2009) Population Growth in Europe and its Regions.
[2] For information on the criteria used for the NUTS classification reference is made to Annex 2.

migration (category 5). Finally, in the 1990s, in 11 per cent of the regions the population size declined due to both negative natural increase and negative net migration (category 6).

The comparison of Map 2 with Map 1 learns that the percentage of regions with positive population growth has slightly increased since 2000, from 71 per cent to 73 per cent. The contribution of net migration to population growth has increased, whereas the contribution of natural increase has decreased. Net migration has been the main source of population growth since the 1990s. In the 1990s in 69 per cent of the regions net migration was positive. Since 2000 the percentage of regions with positive net migration has increased to 76 per cent. In contrast, in the 1990s, in 60 per cent of the regions natural increase was positive. Since 2000 this percentage has dropped to 50, i.e. half of all NUTS2 regions. Most remarkable is the decrease of the number of regions with type 5, negative population growth in combination with positive natural increase and negative

Map 1 Type of population growth of NUTS2 regions, 1990-1999*



Type	Total growth	Natural increase	Net migration	NUTS2 regions
1	+	+	+	116
2	+	-	+	57
3	+	+	-	32
4	-	-	+	25
5	-	+	-	25
6	-	-	-	32

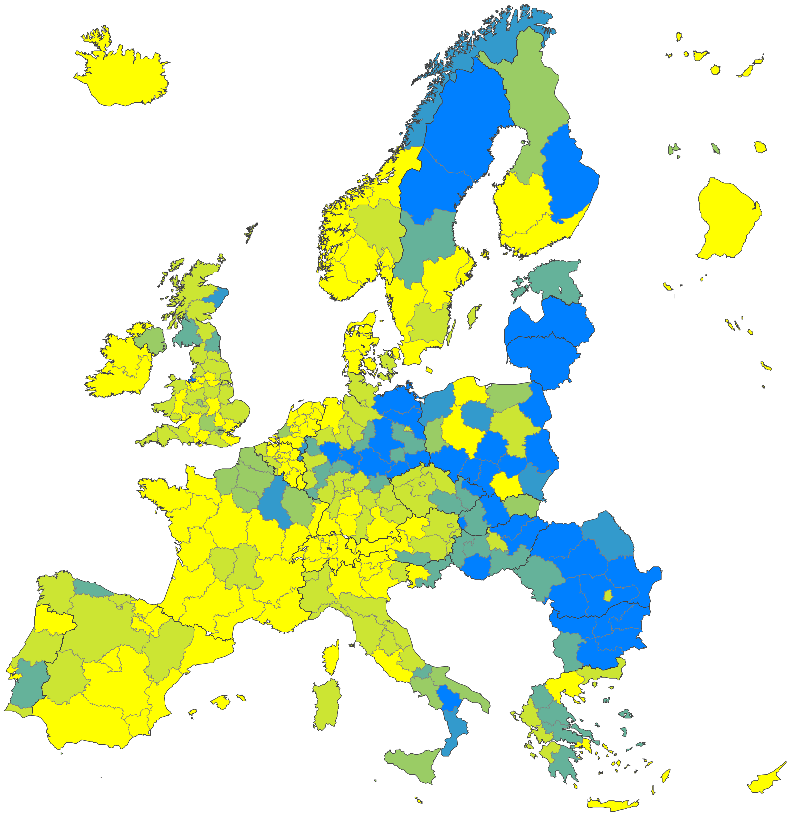
* Or part of this period.
NB. NUTS2 regions in 27 EU countries and 4 EFTA countries.
Source: EUROSTAT; calculations by NIDI.

Table 1 Change of type of population growth from the 1990s to the 2000s, NUTS2 regions in Germany

	To						
From	1	2	3	4	5	6	Total
1	5	8		1			14
2		8		6		3	17
3							
4		2		1			3
5							
6						5	5
Total	5	18		8		8	39

NB. 2000s is for Germany 2000-2007.
Source: EUROSTAT; calculations by NIDI.

Map 2 Type of population growth of NUTS2 regions, 2000-2007*



Type	Total growth	Natural increase	Net migration	NUTS2 regions
1	+	+	+	113
2	+	-	+	75
3	+	+	-	22
4	-	-	+	30
5	-	+	-	9
6	-	-	-	38

* Or part of this period.
NB. NUTS2 regions in 27 EU countries and 4 EFTA countries.
Source: EUROSTAT; calculations by NIDI.

Table 2 Change of type of population growth from the 1990s to the 2000s, NUTS2 regions in the UK

	To						
From	1	2	3	4	5	6	Total
1	8	4	4				16
2		6					6
3	1	2					3
4		2					2
5	2	1	1		1	1	6
6		2		2			4
Total	11	17	5	2	1	1	37

NB. 2000s is for the UK 2001-2003.
Source: EUROSTAT; calculations by NIDI.

In particular in Germany and the UK important shifts have occurred. A closer look (Table 1) learns that in Germany only 5 of the 14 regions with both positive natural increase and positive net migration (type 1) in the 1990s have remained in this category in the 2000s: Stuttgart, Freiburg, Tübingen, Oberbayern and Weser-Ems. For eight regions total population growth is still positive despite negative natural increase and for one region (Gießen) total population growth turned into population loss caused by negative natural increase that is not compensated for by positive net migration. Furthermore, of the 17 type 2 regions in the 1990s more than half moved to a type with population loss. In three cases both net migration and natural increase have been negative in the period since the start of this millennium (Brandenburg-Nordost, Kassel and Arnsberg). The latter regions join the five that remained in type 6 (Mecklenburg-Vorpommern, Chemnitz, Dresden, Sachsen-Anhalt, and Schleswig-Holstein.

Table 2 shows that in the United Kingdom half of the 16 regions that had both positive natural increase and positive net migration in the 1990s have had either negative natural increase (4 regions) or negative net migration (4 regions) since 2000. However, each of these regions still has positive population growth. Three regions with positive population growth but negative net migration in the 1990s (East Yorkshire and Northern Lincolnshire, West Yorkshire, and Derbyshire and Nottinghamshire) have had positive net migration in the 2000s. Of the 12 regions with population losses in the 1990s only 4 are left in the period since 2000. Two regions with type 5 even turned into type 1 (Greater Manchester and South Yorkshire).

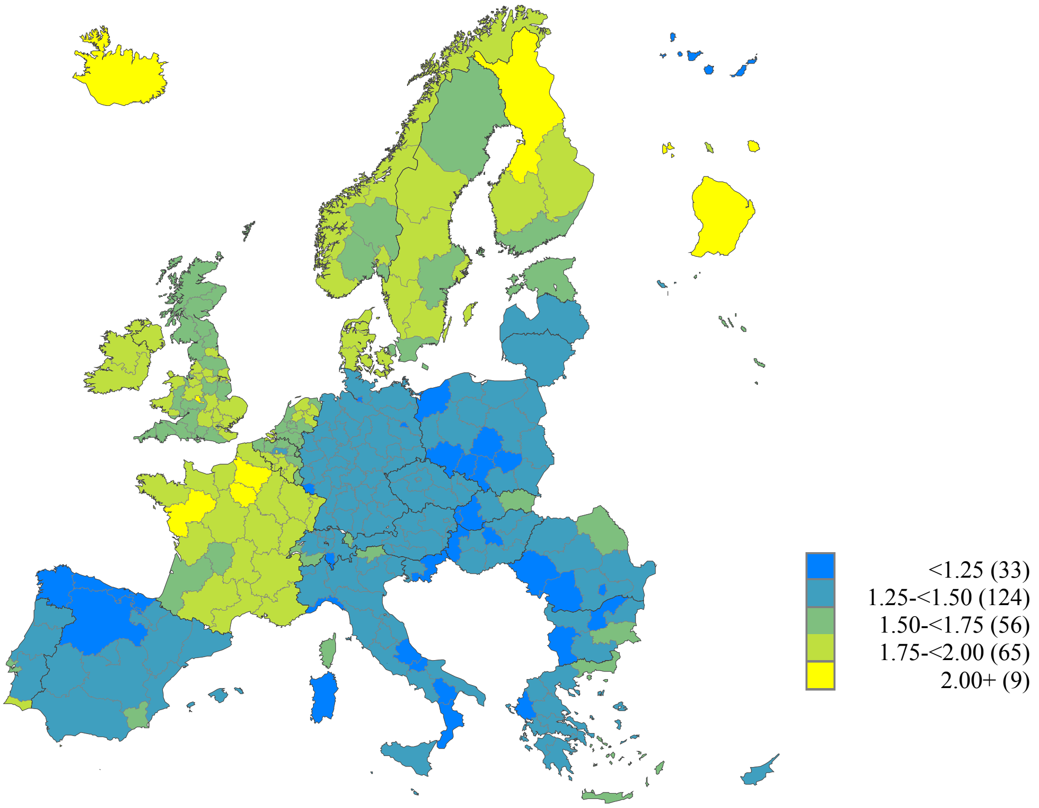
2.1.2 Fertility, mortality and migration

In the last decades of the 20th century fertility rates have declined all across Europe. As a result fertility levels have become rather low in most European regions. In 55 per cent of the regions the TFR is 1.5 or lower (Map 3).

Less than ten European NUTS2 regions had a TFR of 2 or higher in 2005. TFRs are relatively high in northern regions, and in most regions of France, Ireland and the UK. Low levels of fertility can be observed in most southern, central and eastern regions.

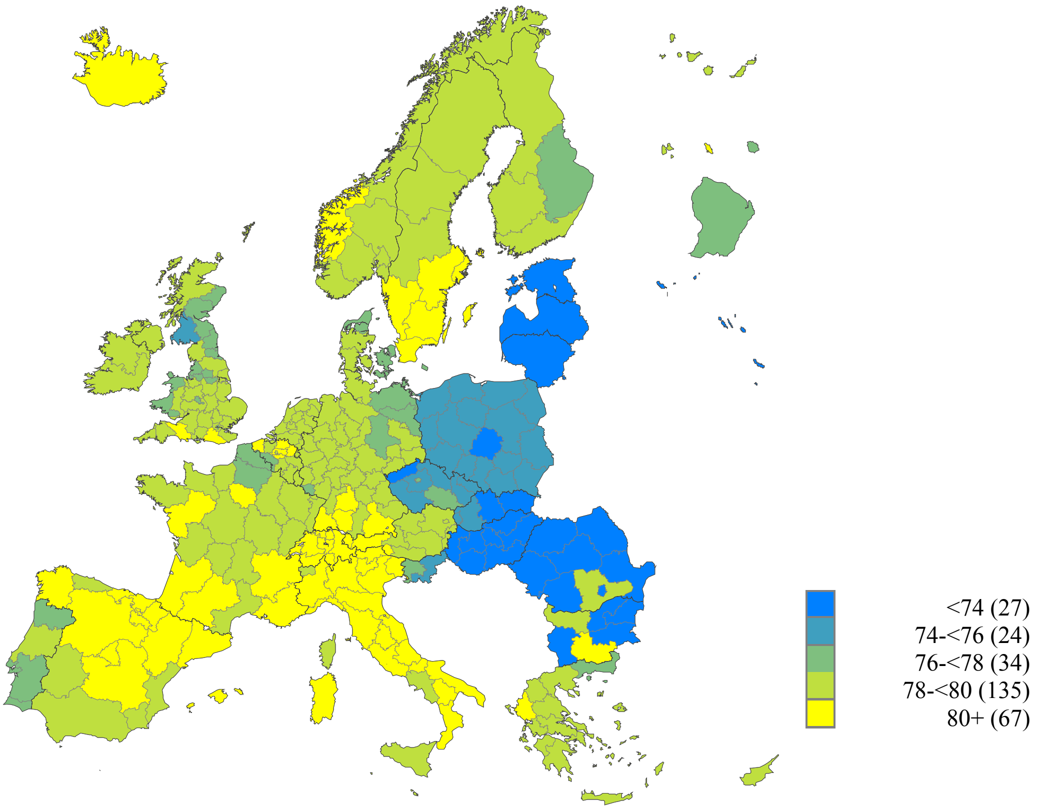
Whereas the low level of fertility is the main cause of ageing, the rate of ageing is reinforced by the increase in life expectancy. In 23 per cent of the European regions average life expectancy is 80 years or over (Map 4). In contrast, 18 per cent of all regions have a life expectancy of 76 years or younger. The latter regions can mainly be found in the eastern parts of Europe. High life expectancies can be found in both northern and southern regions.

Map 3 Total fertility rate (TFR), NUTS2 regions, 2005



Source: EUROSTAT; calculations by NIDI.

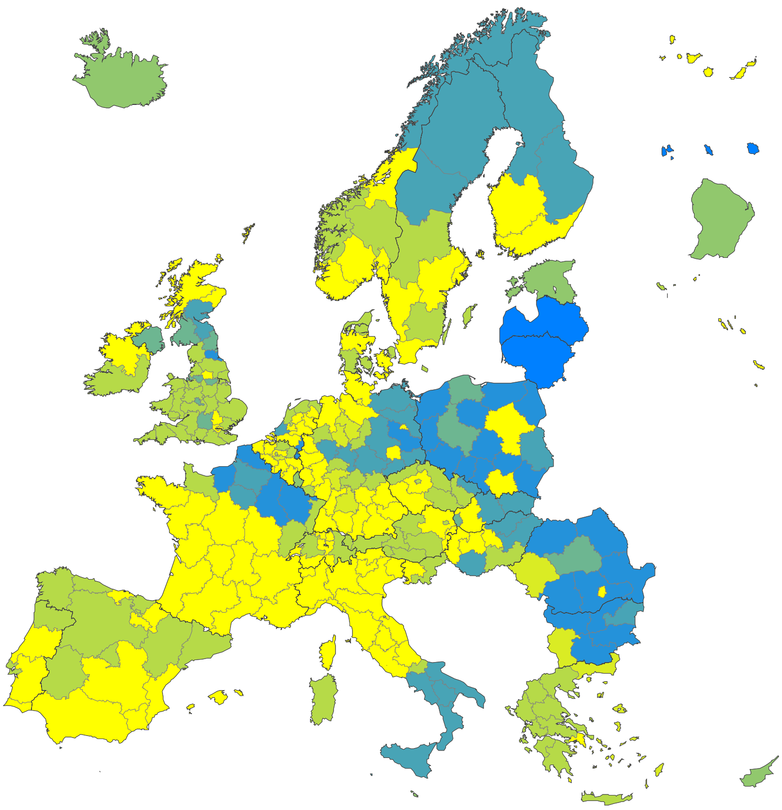
Map 4 Life expectancy at birth (e_0), NUTS2 regions, average 2002-2004



Source: EUROSTAT; calculations by NIDI.

To some extent positive net migration may compensate for the effects of low fertility and high life expectancy on ageing. At the regional level, population change through migration consists of two different components: internal migration between regions within individual countries and international migration to and from different countries. The influence of these components varies considerably from region to region (Map 5). For about 75 per cent of all regions the total migration balance was positive for the period 2000-2007. The combination positive internal and positive external occurred most (40 per cent), especially in France, Italy and Spain. The second most numerous combination is positive total, negative internal and positive external (30 per cent). Conversely, there are hardly regions with positive internal migration and negative external migration. Regions with both components negative (10 per cent) can mainly be found in Poland, Bulgaria and Romania. Three regions in the northern part of France belong to this category as well.

Map 5 Components of net migration, 2000-2007



Total migration	Internal migration	External migration	NUTS2 regions
+	+	+	112
+	+	-	10
+	-	+	82
+	na	na	7
-	+	-	12
-	-	+	31
-	-	+	28
-	na	na	5

na= no differentiation between internal and external migration (countries with only one NUTS2 region and French overseas departments).
Source: EUROSTAT; calculations by NIDI.

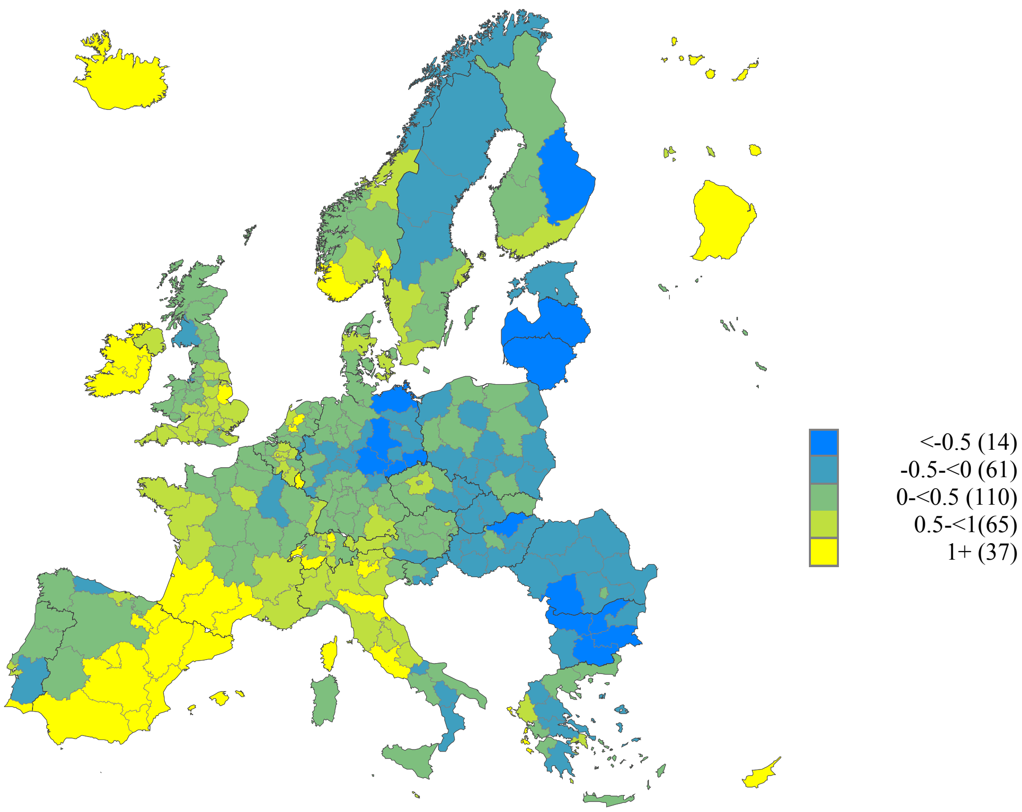
2.1.3 Population growth

Since 2000 most European regions have experienced low population growth. The low levels of fertility have only partly been compensated for by an increase in net international migration, particularly in western and southern parts of Europe. In one quarter of the regions annual average population growth has even been negative, whereas in almost 40 per cent of the regions population growth has been positive but below 0.5 percent per year (Map 6). Only one in eight regions has had a population growth above 1 per cent. Population growth has been relatively high in several northern and southern regions. In the north-eastern part Europe population growth has been high in Iceland, and Ireland. In the southern part of Europe population growth has been relatively high in south-eastern regions of Spain, several southern regions in France, northern regions of Italy, and Cyprus. In addition, there are some scattered regions with high population, e.g. in Luxembourg, Norway, the Netherlands and Switzerland.

Population has been declining in north-eastern and eastern European regions as well as in several central parts of Europe and in some scattered regions in western Europe. In the north-eastern part population has been declining in several northern regions in Norway and Sweden and one eastern region in Finland. In the eastern part of Europe population has been declining in the majority of regions. However, in Poland some regions have had moderate positive population growth. Furthermore, there has been population decline in a number of eastern German regions. In the other parts of Europe there are several scattered regions that have experienced negative population growth, e.g. in Greece, Portugal, Spain, and France.

In very broad lines the picture could be summarized as follows: population growth has been relatively high in several western and southern regions, and negative in several northern and eastern regions. In most other regions population growth has been moderate.

Map 6 Annual population growth rate, NUTS2 regions, average 2000-2007



Source: EUROSTAT; calculations by NIDI.

2.1.4 Ageing

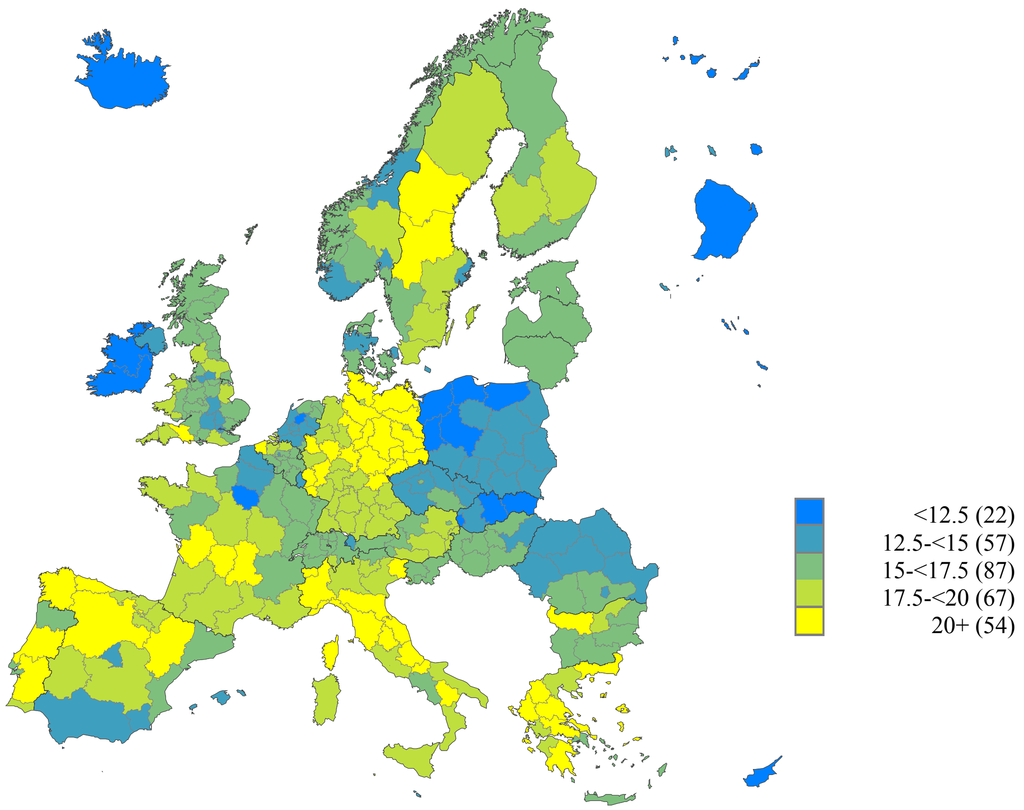
Whereas fertility has reached low levels in most regions, life expectancy has risen strongly in northern, western and southern regions. As a result, population has been ageing in those regions. Even though the development of life expectancy in many eastern regions has not been that favourable, population has been ageing in those regions as well due to very low fertility levels together with negative net international migration.

In 54 of the 287 NUTS2 regions more than one fifth of the population was aged 65 or over on 1 January 2008 (Map 7). Many of these regions can be found in Germany, Italy, Spain and Greece. On the other hand, there are 22 regions where the percentage 65+ is below 12.5, e.g. in Poland, Slovakia, Ireland and Iceland. The most remarkable region in this context is Paris.

Ageing will have many effects on European societies. Three main affects are the increase in costs of retirement schemes, the slowing down of the growth of the working age population and the increase in the demand of health care and long term care due to the increase in the number of the oldest old. At the national level the increase in the number of people receiving retirement benefits compared with the size of the working age population will be one main challenge for policy makers. Since the financing of retirement schemes is usually organised at the national rather than the regional level, these problems are not so much the object of regional policies.

At the regional level ageing may ask for policy interventions because of the decline in the growth of the working age population on the one hand and the increase in the demand of long-term care and health care due to the increase in the number of the oldest old on the other.

Map 7 Percentage of population aged 65+, NUTS2 regions, 1 January 2008



UK: 1 January 2004.
Source: EUROSTAT; calculations by NIDI.

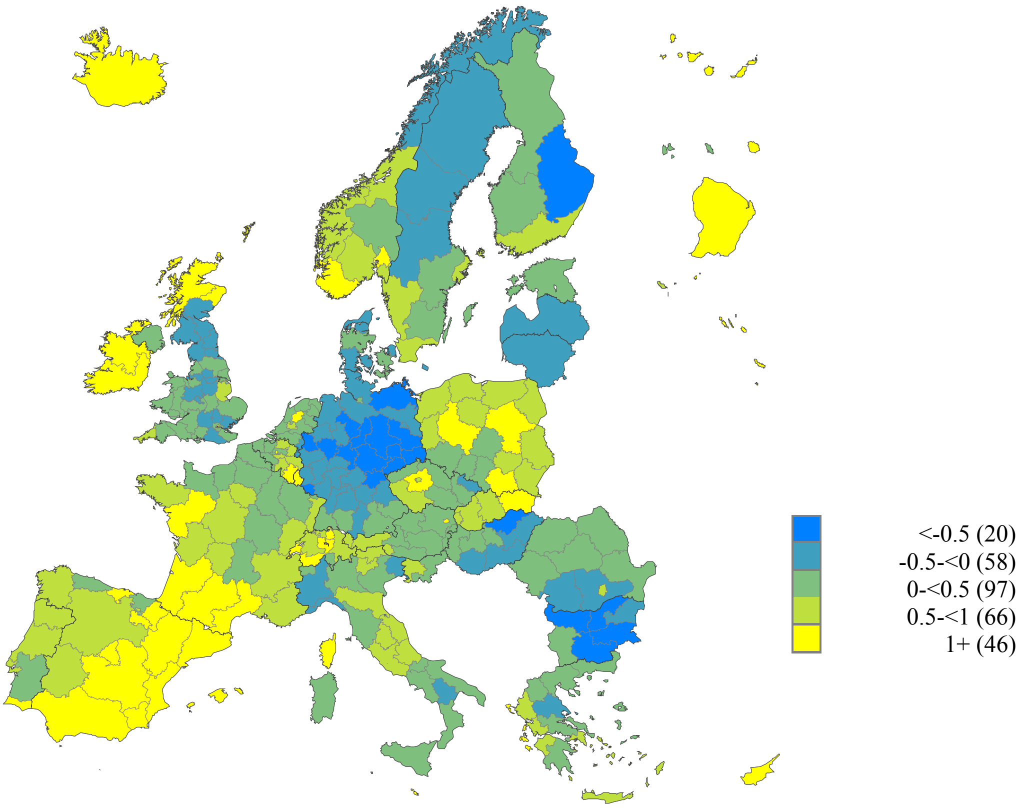
Since long-term and health care tend to be labour intensive and are strongly related to the area where the oldest old are living, the combined effect of an increase in the number of oldest old and the decrease in the working age population are likely to lead to shortages of labour at the regional level. Thus the growth rate of the working age population and the growth of the number of oldest old are important indicators of ageing at the regional level.

In one quarter of the NUTS2 regions the working age population has been declining since 2000 (Map 8). In one third of the regions the growth of the working age population has been positive, but very moderate, i.e. below 0.5 per cent. Thus in more than 60 per cent of the European regions the growth rate of the working age population has not contributed much to economic growth.

Since 2000 the size of the working age population has been declining in most regions in Germany, in the eastern regions more strongly than in the western regions. Furthermore, the working age population has been declining in northern regions in Norway and Sweden, in one eastern region in Finland and in two of the three Baltic States. In the eastern part of Europe, several Bulgarian regions have witnessed a decline in the working age population. In contrast in most Polish regions there has been a moderate growth of the working age population.

Only 16 per cent of the European regions experienced annual growth of the working age population of more than 1 per cent. Growth rates above 1 per cent have particularly been observed in the eastern part of Spain and several southern regions of France, as well as in several regions in Poland and Ireland.

Map 8 Annual working age population growth rate, NUTS2 regions, average 2000-2007

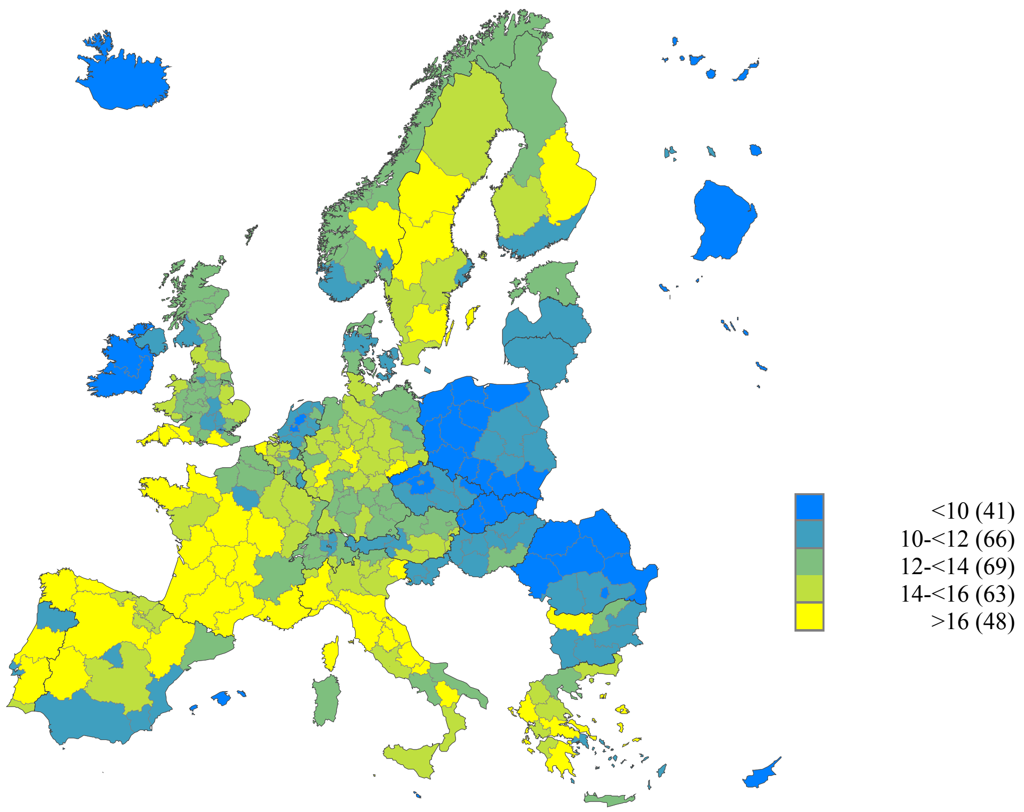


Source: EUROSTAT; calculations by NIDI.

For assessing the effect of ageing on the increase in the demand of care the rise in the number of persons aged 75 or over per 100 people aged 20-64 is a better indicator than the percentage 65+. In the whole EU27+4 area this 'very old age dependency ratio' increased from 11.0 in 2000 to 12.9 in 2008. The number of regions with a ratio below 10 more than halved (from 96 to 41), while the number of regions with a ratio above 16 almost tripled (from 17 to 48). In 21 regions there has been a decline in the very old age dependency ratio. Many of these regions include big cities (e.g. London, Stockholm, Brussels, Oslo, and Wien).

In 2008 the lowest very old age dependency ratios, i.e. below 10, occurred in the central and eastern European countries, as well as in Ireland, Iceland, Cyprus and Malta (Map 9). High ratios are not concentrated in specific geographical areas. They can principally be found in Spain, France, Italy, Greece, Sweden and the United Kingdom.

Map 9 Population 75+ per 100 population 20-64, NUTS2 regions, 1 January 2008



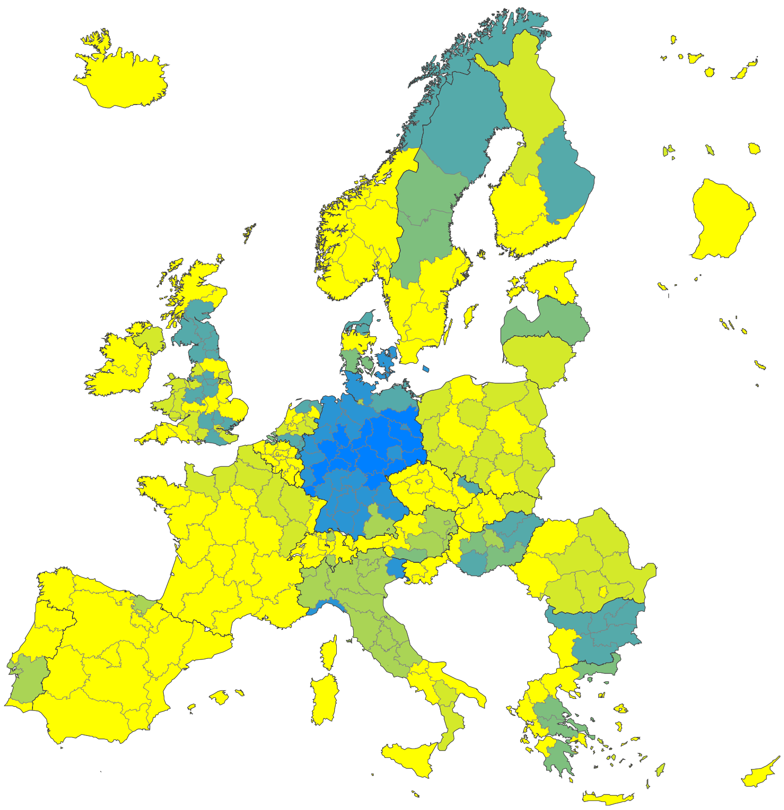
UK: 1 January 2004.
Source: EUROSTAT; calculations by NIDI.

2.2 Impact of migration, mortality and ageing on the working age population

Changes over time in the working age population occur because of the simultaneous operation of cohort turn-over (the gradual replacement of earlier born cohorts by later ones), migration and mortality. Most regions still experience growth of the working age population due to cohort turn-over as well as positive net migration (type 1 in Map 10). These regions are found in almost all countries with the exception of Germany, Latvia and Lithuania. In most Western European countries this is the dominant class of regions.

The second largest class contains of regions with positive total growth due to positive cohort turn-over that exceeds negative net migration (type 2). These regions are typically found in France, Poland, Romania and the United Kingdom.

Map 10 Type of growth of working age population, NUTS2 regions, 2003-2007



Type	Total growth	Cohort turn-over	Migration	NUTS2 regions
1	+	+	+	130
2	+	+	-	47
3	+	-	+	24
4	-	+	+	12
5	-	+	-	34
6	-	-	+	26
7	-	-	-	14

UK: 2000-2003.
Source: EUROSTAT; calculations by NIDI.

If current trends continue for most of these regions the transition to a declining potential labour force will only be a matter of time. In the regions with type 5 the negative net migration already outweighs the positive cohort turn-over. Various examples of these regions are found in the UK and Bulgaria.

In type 3 the total growth is positive due to positive net migration that exceeds negative cohort turn-over. Most of the regions with this type can be found in Italy. Regions where the decline of the working age population may be attributed entirely to mortality (type 4) are few in number and are particularly found in Greece. Regions of type 6 are almost exclusive for Germany (22 out of 26 regions): negative total growth as a result of negative turn-over that is not compensated by migration. Finally, in 14 regions in Germany all three factors of change, i.e. cohort turn-over, migration and mortality, contribute to the shrinking potential labour force (type 7).

Changes in the size of the working age population, defined here as the 20-64 years old population, are caused by the inflow due to in-migration and young persons who reach the age of 20, and by the outflow due to out-migration, mortality and persons who reach the age of

65. For labour market dynamics, in addition to changes in the size of the working age population, the age structure is important as well. For that reason the ‘younger’ working age population (defined as the population aged 20-39 years) is distinguished from the ‘older’ working age population (40-64 years). Although it is often assumed that younger workers are more innovative and productive, scientific evidence is not conclusive in this respect. By way of illustration the changes in the working age population for the NUTS2 regions in Austria during the years 2003-2007 are presented in Figures 1-3.

The data show that in Austria as a whole as well as in all but one of the Austrian regions the younger working age population decreased during the years 2003-2007 due to the cohort turn-over effect (i.e. more outflow of people aged 35-39 than inflow of people aged 15-19). The opposite is true for the older working age population. The region Wien differs from other regions with a growth of the younger working age population. The strong negative cohort turn-over effect of Wien is more than compensated for by the surplus of (internal and external) migration. This phenomenon occurs in similar (capital) regions in other countries as well, indicating the attractiveness of large cities for young migrants. The changes in the total working age population are smaller than the changes in the younger and older parts of the working age population. As a consequence the percentage 20-39 among the potential labour force is declining in all Austrian regions: the most in Kärnten (from 45.5 in 2003 to 41.6 in 2008) and the least in Wien (from 47.4 to 46.8).

A summary of the changes in the younger and older working age population on the regional level is shown in Table 3.

All over Europe from 2003 to 2008 the young working age population decreased in 205 regions and increased in 82 regions. It is remarkable that only 14 central and eastern European regions saw their young working age population decrease while in just 40 of these regions the young working age population increased. Because of a different fertility history in the central and eastern European countries the inflow of 15-19 year old persons in most of these regions exceeded the outflow of 35-39 year old persons. The young working age population grew in all regions of Poland, Romania and Slovakia and also in Estonia and Latvia.

In most Western European regions the inflow of 15-19 year olds was by far not sufficient to compensate for the outflow of 35-39 year olds. In some countries the size of the young working age population declined in all regions (Germany, Denmark, Finland and the Netherlands). Only in 42 regions positive net migration was able to counterbalance the cohort turn-over effect (type 3). Similar to the region Wien in Austria, other regions with large cities showed growing young working age populations due to migration such as around Brussels, Genève, Zürich, the Paris region, around Budapest, Oslo, Bucharest and Inner London). Other regions where the young working age population grew through migration can be found in Spain.

In practically all regions the older working age population increased during the years 2003-2007, mostly through positive cohort turn-over and positive net migration. For 24 regions the older working age population declined; in 16 primarily because of mortality, all in the central and eastern European countries.

The distribution of the type of growth for the total working age population differs strongly (see also Map 8).

Figure 1 Austria: growth of the 'young' working age population (20-39), 2003-2007 (%)

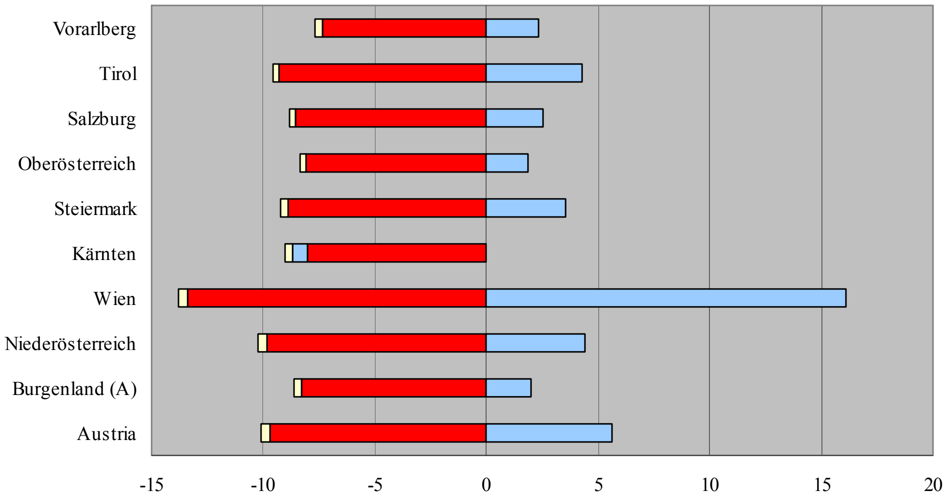


Figure 2 Austria: growth of the 'old' working age population (40-64), 2003-2007 (%)

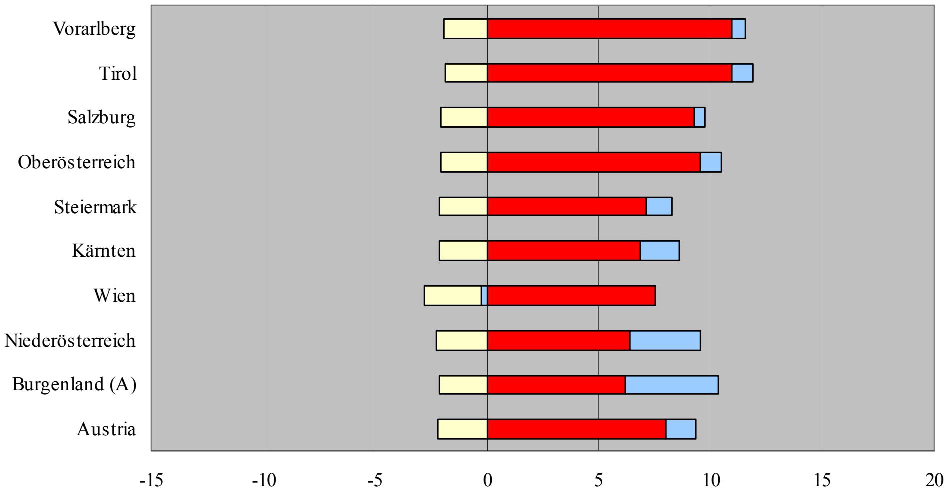
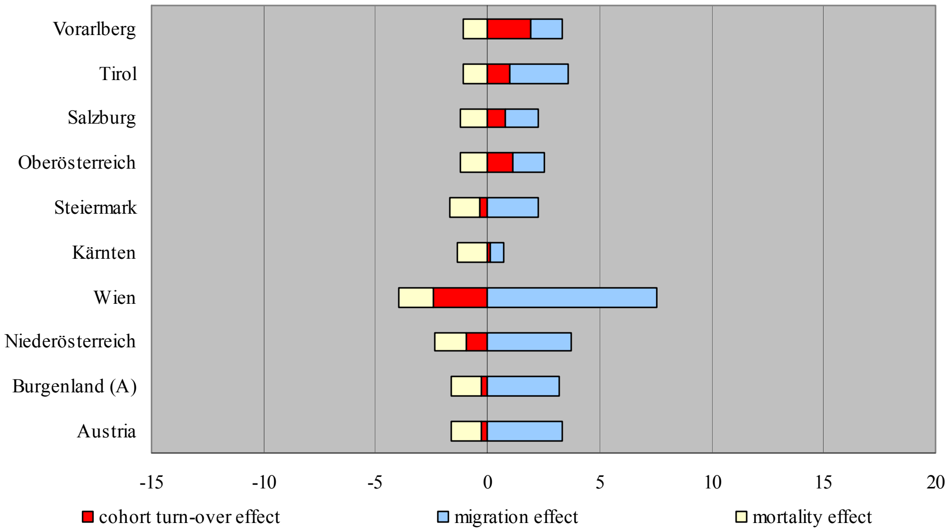


Figure 3 Austria: growth of the total working age population (20-64), 2003-2007 (%)



Source: EUROSTAT; calculations by NIDI.

Table 3 Type of growth of the young and old working age population in NUTS2 regions, 2003-2007

	20-39							40-64							20-64						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
AT			1			7	1	8	1						4		4	1			
BE			2			9		10	1						11						
BG	1				5			1			3	2			1				5		
CH			2			5		7							5		2				
CY	1							1							1						
CZ			6			1	1	8							7				1		
DE						20	19	25	9			4		1			2		1	22	14
DK						3	2	4	1						1			1	1	2	
EE	1										1				1						
ES			12			5	2	18	1						16	2	1				
FI					2	3		5							3	1			1		
FR	1		4		2	8	11	18	8						17	9					
GR			3			9	1	13							8	1		4			
HU	2		1		4						7				1		1	2	3		
IE	2							2							2						
IS			1					1							1						
IT			1			16	4	21							5	2	12			2	
LI						1		1							1						
LT					1			1								1					
LU			1					1							1						
LV		1									1							1			
MT	1							1							1						
NL						4	8	6	6						4	3		1	4		
NO			3			2	2	5	2						6				1		
PL	4	12						11	4			1			4	12					
PT	1		2			4		7							5		2				
RO	3	5						2	2		4				3	5					
SE			1			3	4	7	1						5			2	1		
SI						1	1	2							2						
SK	2	2						3	1						3	1					
UK			3			8	26	17	20						11	10			16		
Total	19	20	43		14	109	82	206	57		16	7		1	130	47	24	12	34	26	14

1 total growth +, cohort turn-over +, migration +; 2 total growth +, cohort turn-over +, migration -
3 total growth +, cohort turn-over -, migration +; 4 total growth -, cohort turn-over +, migration +
5 total growth -, cohort turn-over +, migration -; 6 total growth -, cohort turn-over -, migration +
7 total growth -, cohort turn-over -, migration -
UK: 2000-2003.
Source: EUROSTAT; calculations by NIDI.

2.3 A demographic typology

Within the framework of the programme of the European Spatial Planning Observation Network (ESPON) a demographic typology of the NUTS2 regions has been developed. On the basis of cluster analysis on four variables (percentage 20-39 and percentage 65+ on 1 January 2005, annual average natural increase and net migration for the period 2001-2005) seven demographic types have been distinguished (ESPON, 2010):[3]

Type 1 – Euro standard
Euro standard includes around 28 per cent of all regions (79 from 286) with nearly 128 million people, i.e. more than 25 per cent of the population of the ESPON space (27 EU countries and 4 EFTA countries). The title ‘Euro standard’ seems to be adequate because all four cluster-indicators are displaying values close to average of the EU27+4. Only the age

[3] The number of regions for this typology is 286 (instead of 287) because for London the NUTS1 level was used.

group 20-39 is slightly below the overall average. Although the natural population balance is just positive, the total population is increasing, due to a predominately positive migratory balance. Within this type the variations of the variables (with the exception of the net migration rate) are relatively small.

Except for Sicily, this type is a distinct Western and Northern European type, to be found in Scandinavia, the United Kingdom, the Benelux countries, Southern and Western France, some western parts of Germany and also in Switzerland, Northern Italy and the South East of Austria (Map 11).

Type 2 – Challenge of labour force
Compared to the EU27+4 average, this type of 61 regions with a population of 117 million people (23 per cent of the EU27+4 population) features a relatively young age structure due to higher respectively slightly lower shares of the population in the 20-39 and 65+ age groups. Although the average migratory balance is just positive, the total population is stagnating, respectively declining on a low level due to a weak natural population decrease. The spectrum of this type includes regions with both positive and negative natural population and migration balance.

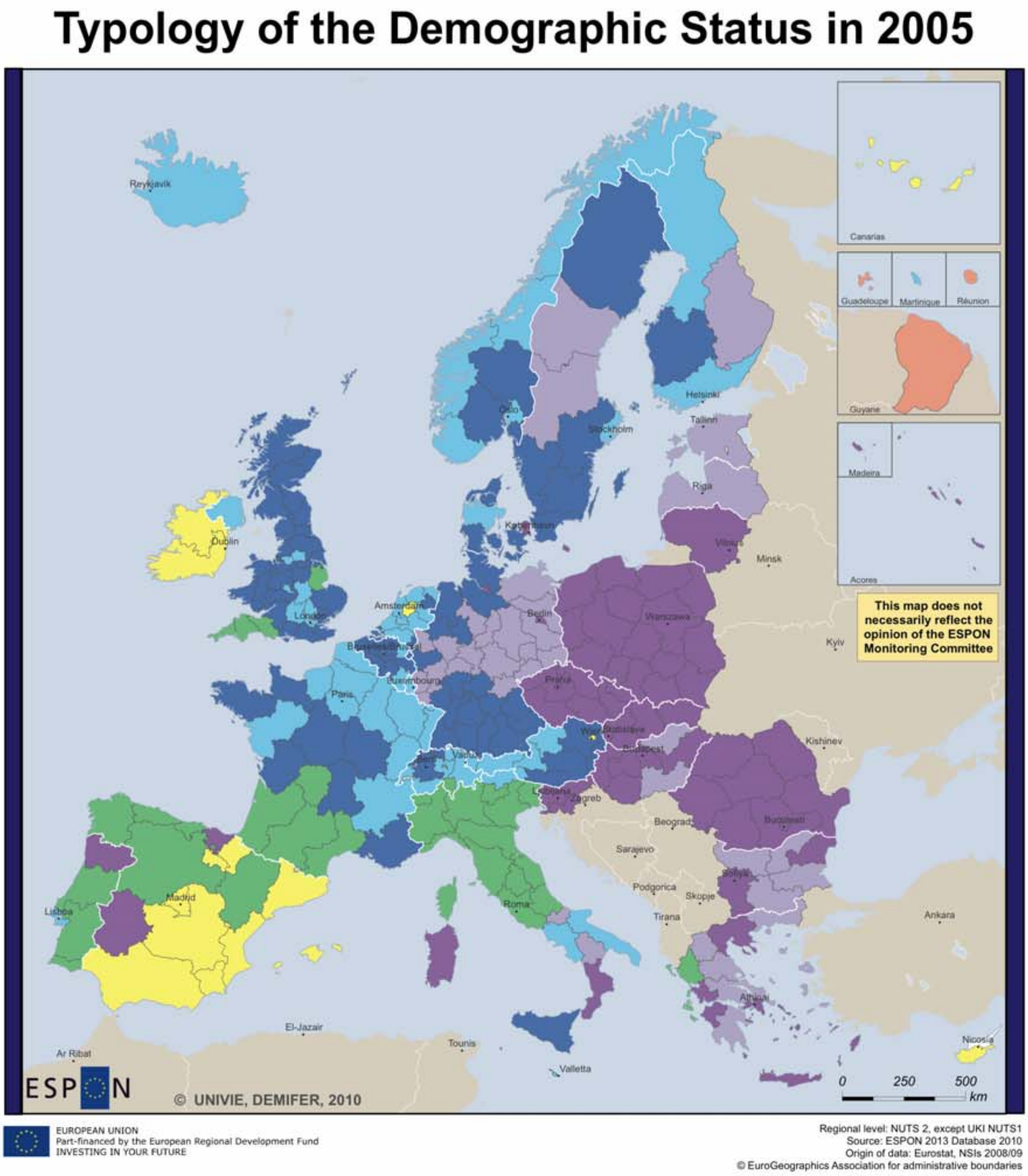
Most notably this type can be found in the newly accessed EU Member States. Besides that, regions in Western Greece, Southern Italy, on the Iberian Peninsula as well as on the Portuguese islands of Madeira and the Azores, and also some distinctly urban regions in Germany and Denmark (Berlin, Hamburg and Copenhagen) belong to this category.

Type 3 – Family potentials
Around 20 per cent of the population of the EU27+4 (105 million people) lives in the 55 regions of this type. The demographic characteristics are also very close to the average of the EU27+4, but can be clearly distinguished from Euro standard (Type 1) due to its younger age structure and strictly positive natural population increase. The title ‘Family potentials’ is attributed to the combination of these two facts. Compared to the EU27+4 average the age group 20-39 shows higher and the age group 65+ lower values. Next to Type 7 (Overseas) the natural population increase is the highest overall. The migratory balance within Type 3 is varying, but still positive in most of the regions, resulting in a significant increase of the total population.

With some exceptions in the South of Europe (in the southern parts of Italy, Malta and the Lisbon region) and the island of Martinique, this type shows a similar geographical distribution compared to Euro standard (Type 1) and can be found also mainly in Western and Northern Europe: in Scandinavia, the United Kingdom, the Benelux countries, northern and eastern parts of France, Switzerland and Western Austria.

Type 4 – Challenge of ageing
This type consists of 33 regions with a population of 64 million people (13 per cent). ‘Challenge of Ageing’ can be primarily explained by the high share of the elderly population, which clearly surpasses the EU27+4 average. On the other hand the proportion of the population aged 20-39 is still relatively high. Despite this high amount of young adults in their reproductive age, the natural population balance is showing an annual average decrease significantly below the average of the EU27+4. Adding the higher share of elderly people and the resulting higher numbers of deaths, the population of this kind of regions would decrease, if it would not display a significantly positive (but within this type strongly varying) annual average net migration.

Map 11 Demographic typology of the NUTS2 regions, 2005



					Age Group 20-39 (%)			Age Group 65+ (%)			Natural Population Increase (per 1000)			Net Migration (per 1000)		
					2005						average per annum 2001-2005					
Type	Classification	Cases	Population		avg	min	max	avg	min	max	avg	min	max	avg	min	max
1	Euro Standard	79	127 915 217	25.41%	25.68	22.57	28.72	17.46	15.33	20.30	0.01	-2.67	2.47	3.43	-2.11	9.36
2	Challenge of Labour Force	61	116 767 795	23.20%	30.43	28.33	33.84	14.51	10.60	18.96	-0.78	-4.76	2.89	0.08	-7.35	9.19
3	Family Potentials	55	104 556 600	20.77%	28.15	24.80	36.32	14.57	11.13	16.96	3.72	1.06	9.00	2.12	-3.51	9.59
4	Challenge of Ageing	33	63 838 208	12.68%	26.87	21.52	31.19	20.83	18.51	26.51	-1.74	-6.19	1.43	9.42	4.14	16.99
5	Challenge of Decline	38	50 166 688	9.97%	26.32	21.47	30.04	19.49	15.89	22.55	-3.39	-10.35	-0.59	-1.20	-11.25	3.70
6	Young Potentials	15	38 542 821	7.66%	32.26	29.36	35.86	14.45	8.70	19.03	3.61	-0.15	9.78	17.10	9.96	26.30
7	Overseas	5	1 555 069	0.31%	30.40	27.02	32.55	9.04	3.71	11.81	13.56	8.40	25.28	-1.78	-8.18	9.07
EU 27+4	ESPON Space	286	503 342 399	100%	27.82	21.47	36.32	16.63	3.71	26.51	0.33	-10.35	25.28	3.16	-11.25	26.30

Source: ESPON, 2010

This type of region can be found nearly exclusively in the South of Europe: in Greek regions (along the Albanian border), Northern Italy, in the northern and eastern parts of Spain, in Portugal and also in the South of France. Besides that, this kind of regions can also be found in the south eastern regions of England, as well as Lincolnshire (at the coast of the North Sea).

Type 5 – Challenge of decline
These 38 regions, with a population of around 50 million people (nearly 10 per cent of the total population in the EU27+4), are facing severe demographic challenges. Due to a negative natural population balance and a negative migration balance, the depopulation regions of the EU27+4 are concentrated within this type, which is also confronted with the second highest share (behind Type 4) of people above age 65.
Besides Eastern Germany, this type includes also the peripheral regions of Scandinavia and some parts of Western Germany, Southern Italy and Greece and is sprawling over large parts of the Central and Eastern European (CEE) countries (Bulgaria, Hungary as well as Latvia and Estonia).

Type 6 – Young potentials
This type, consisting of 15 regions and representing 8 per cent of the total population can be characterised by its relatively young age structure and the consistently positive population development of both components: a positive natural population development and a positive net migration. The age groups 20-39 and 65+ clearly show higher respectively lower proportions compared to the EU27+4 average. The prevailing population increase of this type of regions is driven by an above average natural population increase and the highest positive net migration rates.

Apart from the Republic of Ireland, Cyprus, Vienna and the Flevoland region, this type can be found on the Spanish mainland and islands (Canaries and Baleares).

Type 7 – Overseas
This special type of 5 regions (the French overseas departments of Guyane, Guadeloupe and Réunion, as well as the Spanish exclaves of Ceuta and Melilla) summarises the regions outside of the European mainland (continent) – with the exception of Martinique, which belongs to Type 3 (Family potentials). Compared to the other six types, this category features significantly different – and hardly comparable – demographic characteristics with very low shares of elderly people as well as a very positive natural population increase. In quantitative terms, this type of only 1.5 million inhabitants (i.e. 0.3 per cent of the total population of the EU27+4) is almost negligible.

2.4 Future trends in regional population dynamics

2.4.1 Introduction

Population projections are 'what-if' scenarios which aim to provide information about the likely future size and structure of the population. As with EUROSTAT population projections at the national level, EUROPOP2008 regional population projections present one of several possible population change scenarios at the NUTS2 level based on assumptions for fertility, mortality and migration for the period 2008-2030 (EUROSTAT, 2010a).

The projections have been compiled using the standard demographic cohort-component model. The country specific input parameters that were used for the national population projections (age specific fertility rates, age specific death rates and migration) become region-specific for the respective regions. Additionally, the regional variation in demographic behaviour is quantified for the period 2008-2030.[4]

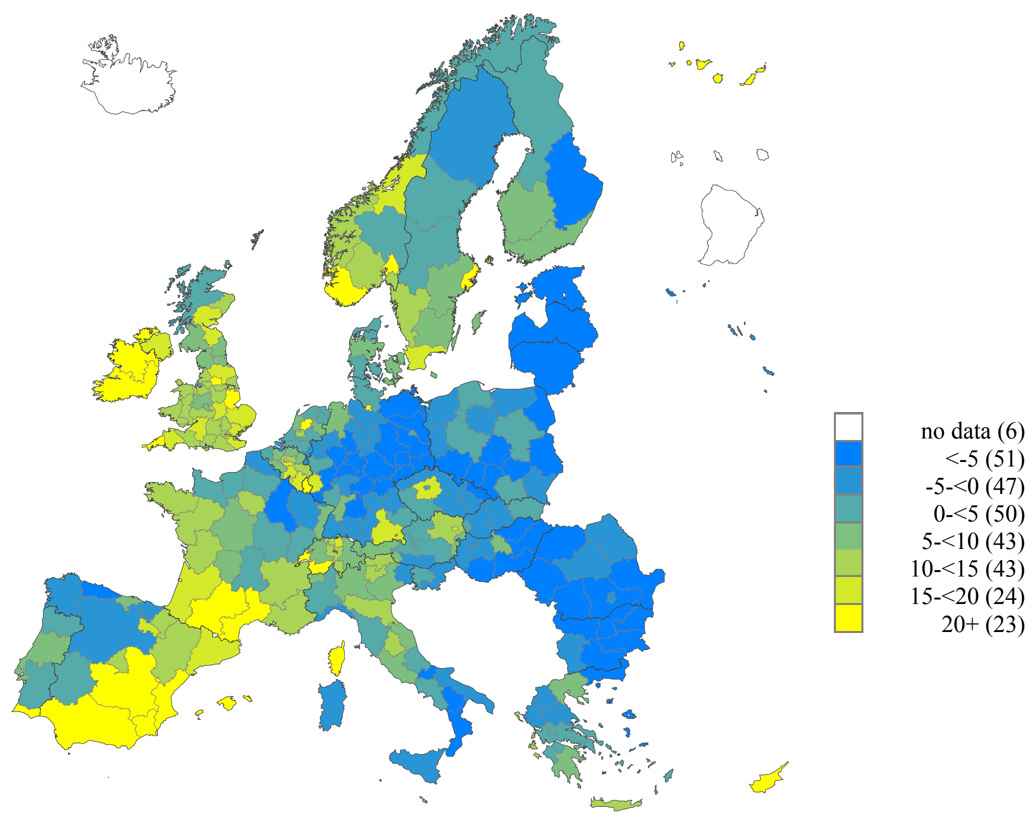
This chapter will focus on possible future regional trends of the number of births, deaths and migrants. Regional differences in population growth between 2008 and 2030 are discussed, as well as differences in the process of population ageing. Changes in the size of the working age population are studied too.

2.4.2 Expected population change between 2008 and 2030

According to EUROPOP2008 the population in the whole region, here EU27 plus Norway and Switzerland, is expected to grow from 508 million in 2008 to 534 million in 2030, i.e. with 5.3 per cent. The variation between the regions is shown in Map 12. In almost 100 regions a population decrease is projected. Most of these regions can be found in Bulgaria, the Czech Republic, Germany, Hungary, Poland Romania, and Slovakia. However, also in Spain, Greece and Italy there are various regions with a projected population decline. Regions with an expected decrease of more than 20 per cent are Severozapaden (Bulgaria) and Chemnitz, Sachsen-Anhalt, Dresden and Thüringen (all Germany).

Population growth is foreseen for two out of three European regions. Next to Cyprus, Luxembourg and Malta the population in all regions of Belgium, Denmark, Ireland, Norway, Switzerland and the United Kingdom is expected to increase. This is also the case for the majority of regions in Austria, Finland, France, Greece, Italy, the Netherlands, Portugal and Sweden.

Map 12 Population change between 2008 and 2030, NUTS2 regions, EUROPOP2008



Source: EUROSTAT.

[4] For more details see EUROSTAT, 2010a.

The regions with the highest population growth, more than 30 per cent over the period 2008-2030, are the two Irish regions (the Border, Midland and Western region; and the Southern and Eastern region), three Spanish regions (Castilla-la Mancha, Región de Murcia and Comunidad Valenciana), one region in Portugal (Algarve) and one in Norway (Oslo og Akershus), and Cyprus.

2.4.3 Expected population growth by components over the period 2008-2030

In Table 4 the type of population growth for NUTS2 regions (as defined in Map 1) is presented for 2008 (observed) and 2030 (projected).

Table 4 Type of population growth of NUTS2 regions in 2008 and expected in 2030

Type	Type 2030						
2008	1	2	3	4	5	6	Total
1	52	44	4	19		2	121
2	5	36		29			70
3		1	8	1	3	4	17
4			1	15			16
5	1			1		10	12
6				18		27	45
Total	58	81	13	83	3	43	281

NB. NUTS2 regions in 27 EU countries, Norway and Switzerland.
Source: EUROSTAT; calculations by NIDI.

The number of regions with positive growth (types 1-3) is expected to decrease from 208 in 2008 to 152 in 2030. Most remarkable is the drop of type 1 (both natural increase and net migration positive). Due to the turn of the sign of natural increase, 44 regions move to type 2 (positive net migration compensates negative natural increase), 17 to type 4 (positive net migration does not compensate negative natural increase) and even 2 to type 6 (natural increase and net migration both negative). Also many type 2 regions in 2008 move to type 4 in 2030. As a consequence, this latter type will probably become the most numerous type in the future.

Because of fewer births (through below replacement fertility and smaller cohorts of women reaching the reproductive age) and more deaths (due to population ageing), the number of regions with more deaths than births is projected to rise from 131 in 2008 to 207 in 2030. An overview of the changes in type of growth per country is given in Table 5.

Of the 58 regions with positive growth in 2008 and presumably negative growth in 2030, 10 are situated in Germany, 7 in Italy and 5 in the Czech Republic, Greece and Poland. For only two regions it is expected that positive growth will replace negative growth: Sterea Ellada in Greece and Merseyside in the United Kingdom. The latter country is also the only one where the number of regions with positive growth will increase (from 36 to 37). Countries with the same number of positive growth regions are Belgium, Denmark, Ireland, Luxembourg, Portugal and Switzerland. In the other countries this number will decrease (apart from the Baltic States with negative growth in both years).

2.4.4 Expected ageing during the period 2008-2030

The driving forces of population ageing are sustained low fertility and increasing longevity. Fertility in Europe is among the lowest in the world, life expectancy among the highest.

Table 5 Type of population growth of NUTS2 regions in 2008 and expected in 2030, per country

	1-1	1-2	1-3	1-4	1-6	2-1	2-2	2-4	3-2	3-3	3-4	3-5	3-6	4-3	4-4	5-1	5-4	5-6	6-4	6-6	Total
AT	1	2		2			2	1							1						9
BE	5	3	1			1	1														11
BG								1												5	6
CH	3	3					1														7
CY	1																				1
CZ		1		3				2							1					1	8
DE		1		1		2	5	9							5		1		10	5	39
DK	1	1	1				2														5
EE																				1	1
ES	2	7	1		1		3	3		1					1						19
FI		3										1							1		5
FX	6	4		1			3		1	3		2						2			22
GR	1	1		2		1	1	3						1					3		13
HU								1							3				1	2	7
IE	2																				2
IT		5		2			6	4					1		1			1	1		21
LT																				1	1
LU	1																				1
LV																				1	1
MT				1																	1
NL	4	3		1	1					1	1				1						12
NO	4	1					1						1								7
PL				4									1					4		7	16
PT		3					2											2			7
RO								1							1			1	1	4	8
SE	3	1					1	3													8
SI				1				1													2
SK				1									1		1				1		4
UK	18	5	1			1	8			3						1					37
Total	52	44	4	19	2	5	36	29	1	8	1	3	4	1	15	1	1	10	18	27	281

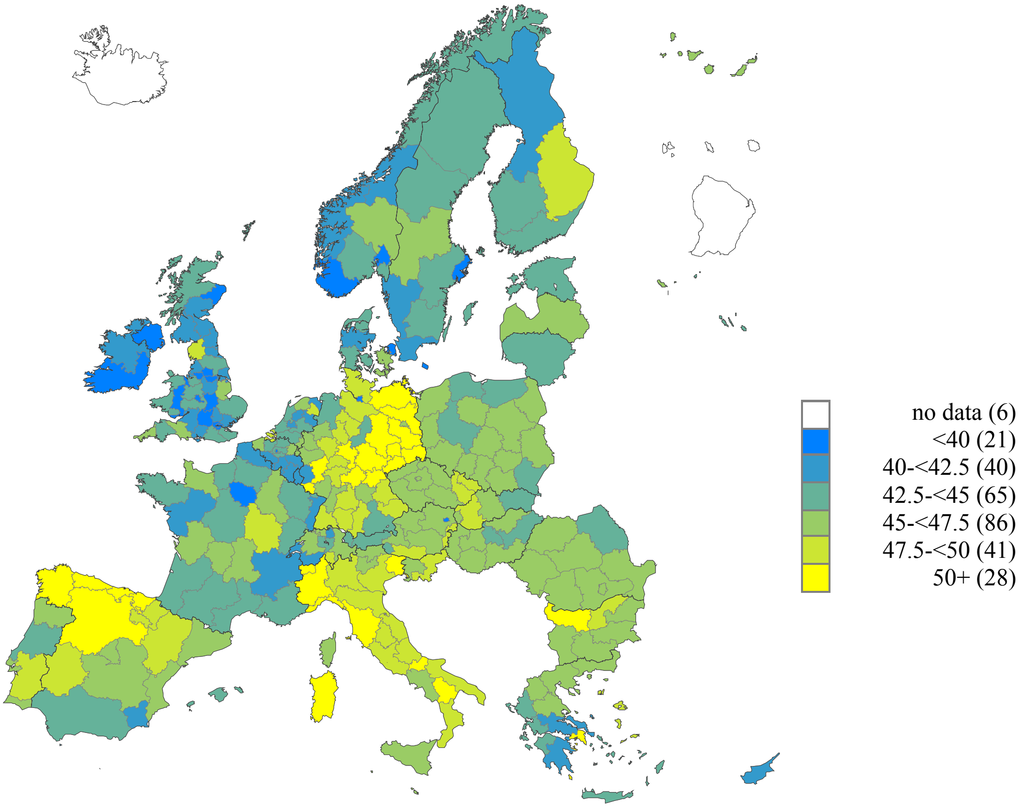
NB Empty columns have been skipped.

One of the various ways to measure the degree of ageing is the median age, the age that splits a population in two equal parts. For the whole area (EU27 plus Norway and Switzerland) the median age is projected to increase with 5 years, from 40 in 2008 to 45 in 2030. In all but seven regions the median age is expected to rise. These seven regions are Hamburg and Trier (Germany), Sterea Ellada and Peloponnisos (Greece), Wien (Austria) and West Midlands and North Eastern Scotland (United Kingdom).

There are ten regions where the median age will increase with more than ten years: Brandenburg–Nordost, Dresden, Sachsen-Anhalt and Thüringen in Germany, Região Autónoma dos Açores and Região Autónoma da Madeira in Portugal, Západné Slovensko and Stredné Slovensko in Slovakia, Sardegna in Italy, and Attiki in Greece.

In Map 13 the projected median age for NUTS2 regions on 1 January 2031 is shown. The highest values (above 50) can mainly be found in Germany, Italy and Spain and the lowest (below 40) in the United Kingdom. The top five regions (above 55) are all part of Germany: Chemnitz and the four German regions already mentioned above in the group most increased median age (Brandenburg-Nordost, etc.). These regions are characterized by a significant negative population growth due to a relatively low number of births.

Map 13 Median age, NUTS2 regions, 1 January 2031



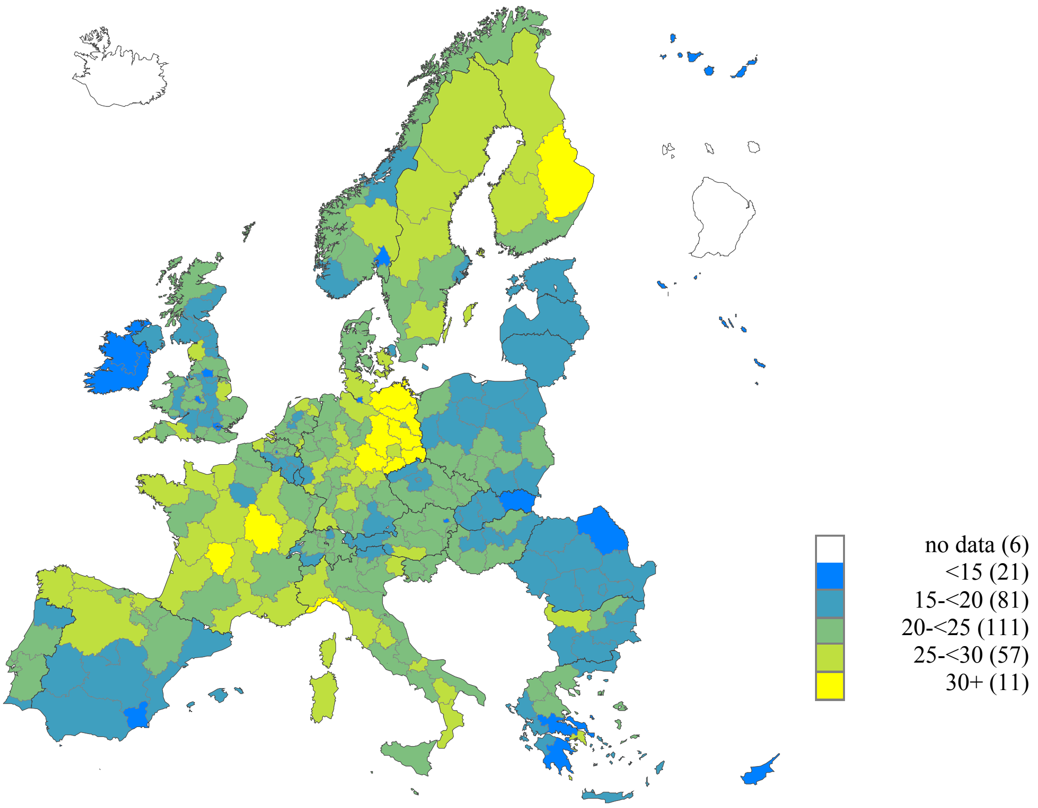
Source: EUROSTAT; calculations by NIDI.

It is remarkable that there are seven capital city regions among the regions with the lowest projected median age: Île de France, Oslo og Akershus, the Southern and Eastern Ireland, Bruxelles-Capitale, Hovedstaden (including Copenhagen), and Inner and Outer London. Especially, the expected positive natural increase is due to these relatively low values. Other regions with a projected median age below 39 are all situated in the United Kingdom: Greater Manchester, Northern Ireland, West Midland, West Yorkshire, and South Yorkshire.

Another way of measuring the degree of ageing is the old age dependency ratio. This ratio serves as an indicator of the demographic pressure on the working age population (age 20-64) to take care of the older populstion (age 65 and over). In 2008 the vast majority of European regions observed old age dependency ratios between 20 and 35. Higher values can mainly be found in Italy, Greece and Germany, while most of the lower values can be found in Poland and Slovakia. For assessing the effect of population ageing on the increase of the demand for care, the rise in the number of persons aged 75 or over per 100 people aged 20-64 is a better indicator. In the whole area this 'oldest old dependency ratio' is projected to rise from 13 in 2008 to 21 in 2030. The number of regions with a ratio below 15 will go down from 204 in 2008 to 21 in 2030, while the number of regions with a ratio above 20 will rise from 4 to 179. The expected distribution on 1 January 2031 is presented in Map 14.

By far the lowest oldest old dependency ratio is expected for Inner London (7), followed by Outer London (12). Other regions with a ratio below 14 are the two Irish regions, the Spanish regions Murcia, Ciudad Autónoma de Ceuta, and Ciudad Autónoma de Melilla, the German region Hamburg, the Greek regions Sterea Ellada and Peloponnisos, and the Norwegian region Oslo og Akershus. On the other hand, the highest ratios are projected for the German regions Chemnitz (41) and Dresden (38).

Map 14 Population 75+ per 100 population 20-64, NUTS2 regions, 1 January 2031



Source: EUROSTAT; calculations by NIDI.

Other regions with an expected oldest old dependency ratio above 30 are in Germany, Brandenburg–Nordost, Brandenburg–Südwest, Mecklenburg-Vorpommern, Sachsen-Anhalt and Thüringen, in France, Bourgogne and Limousin, in Italy, Liguria, and in Finland, Itä-Suomi.

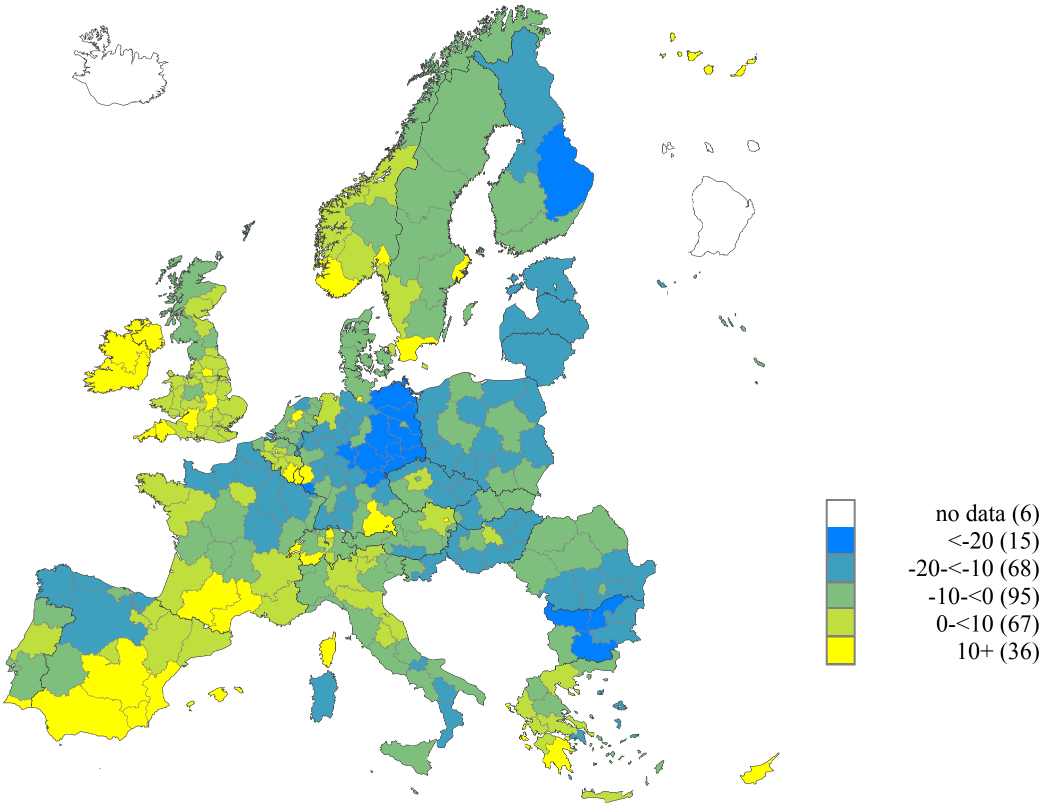
2.4.5 Expected change of the working age population during the period 2008-2030

Changes over time in the working age population occur because of the simultaneous operation of cohort turn-over (the gradual replacement of earlier born cohorts by later ones), migration and mortality. According to EUROPOP2008 a shrinking working age population is foreseen for the majority of European regions (178 out of 281; see Map 15).

For six regions a strong decrease of more than 30 per cent is expected during the period 2008-2030: five German regions (Chemnitz, Dresden, Mecklenburg-Vorpommern, Sachsen-Anhalt and Thüringen) and one Bulgarian (Severozapaden). The only region outside Germany and Bulgaria with an expected decrease of more than 20 per cent is Itä-Suomi in Finland. On the other hand, in ten of the regions with an expected growth of the working age population this growth is more than 20 per cent. Four of these regions can be found in Spain (Castilla-la Mancha, Comunidad Valenciana, Illes Balears and Región de Murcia), two in Ireland (region Border, Midlands and Western and region Southern and Eastern), one is Cyprus, one in Norway (Oslo og Akershus), one in Portugal (Algarve), and, strikingly, one in Germany (Hamburg).

For labour market dynamics, in addition to changes in the size of the working age population, the age structure is important as well. For that reason the 'younger' working age population (defined as the population aged 20-39 years) is distinguished from the 'older' working age population (40-64 years).

Map 15 Growth of the working age population (20-64) between 2008 and 2030, NUTS2 regions



Source: EUROSTAT; calculations by NIDI.

Table 6 shows that the projected changes of the younger working age population differ strongly from the projected changes of the older working age population. Whereas the younger part is expected to grow in one of the three regions, the older part is expected to grow in two of the three regions. Especially the cohort turn-over is the cause of these different developments: for the younger working age population the inflow is often smaller than the outflow, while for the old working age population the opposite is the case.

Table 6 shows that the expected negative growth of the younger part of the working age population is compensated by a positive growth of the older part in a minority of 29 regions. Most of these regions can be found in Spain, Greece and Italy. In many more regions, i.e. 68, the positive growth of the older part is not sufficient to compensate the negative growth of the younger part. This combination is typical for the regions in the Czech Republic, Poland, Portugal, Romania and Slovakia. However, the most numerous combination is negative growth for both the young and old working age population (95). One out of three of these regions is German.

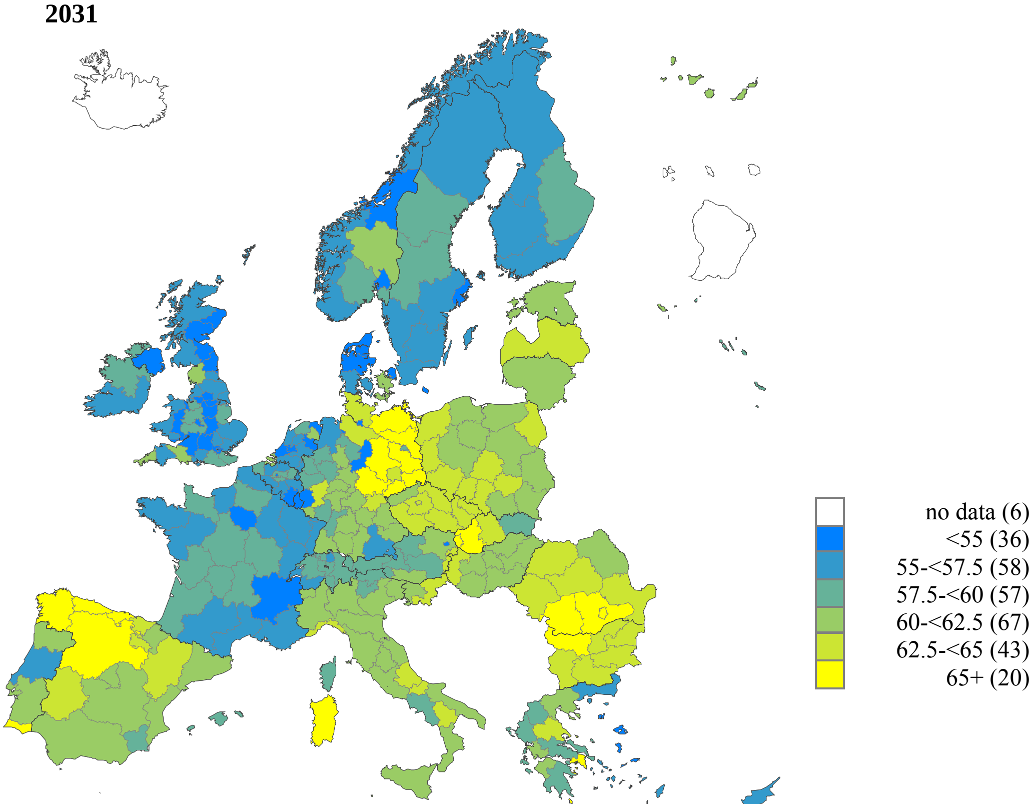
As a consequence of different growth patterns for the younger and the older part, the potential labour force is ageing in most of the regions. For the whole area the percentage 40-64 among the 20-64 year old population is expected to rise from 55 to 59 in the period 2008-2030. According to Map 16, the working age population will be less aged in the northern and western parts of Europe and more aged in the central, eastern and southern parts of Europe. Extreme values concern on the one hand Inner London (43 per cent) and on the other hand Brandenburg-Nordost (72 per cent).

Table 6 Expected growth of working age population by age group, NUTS2 regions per country, 2008-2030

	Total growth +			Total growth -			NUTS2 regions
	20-39 + 40-64 +	20-39 - 40-64 +	20-39 + 40-64 -	20-39 - 40-64 +	20-39 + 40-64 -	20-39 - 40-64 -	
AT	1	1		3		4	9
BE	7		1		1	2	11
BG				2		4	6
CH	3	1		1		2	7
CY	1						1
CZ		1		6		1	8
DE	3		2		1	33	39
DK			1		3	1	5
EE				1			1
ES		12		6		1	19
FI					1	4	5
FR	9				1	12	22
GR	2	5		4		2	13
HU		1		2		4	7
IE	2						2
IT	1	5		9		6	21
LT				1			1
LU	1						1
LV				1			1
MT				1			1
NL	2				3	7	12
NO	5					2	7
PL				13		3	16
PT		2		5			7
RO				8			8
SE	3				2	3	8
SI				1		1	2
SK				4			4
UK	27	1	3		3	3	37
Total	67	29	7	68	15	95	281

Source: EUROSTAT; calculations by NIDI.

Map 16 Projected percentage 40-64 in the working age population (20-64), NUTS2 regions, 1 January 2031



Source: EUROSTAT; calculations by NIDI.

3 Monitoring and benchmarking regional demographic trends in Europe

The Lisbon Strategy promoted the use of benchmarking as a policy tool. Benchmarks can be used to detect national and regional disparities in policy-relevant fields (e.g. in terms of demographic and social trends and patterns, quality of life or economic performance) and their specific determinants. Standardized interregional benchmarks can be useful to compare the current status of regions and for highlighting potential policy challenges in the future. Another major use of benchmarking regional differences is to evaluate the effectiveness of specific policy responses or to evaluate the impact of economic changes.

The Statistical Office of the European Commission (EUROSTAT) and some of the national statistical offices in Europe have build comprehensive, accessible and regularly updated databases with regional statistics of high quality. On the European level the EUROSTAT REGIO and the EUROSTAT Urban Audit databases are unique in terms of comparability, validity and data coverage. Both databases, presented in more detail in this Research Note, are vital tools for benchmarking demographic, economic and social disparities on a regional level.

Two examples of "good practice" of regional benchmarks will be presented and evaluated in this part of the Research Note: the so-called "Wegweiser Kommune" of the Bertelsmann Foundation and the Demographic Risk Map of the Laboratory "Demographic Change". Both benchmarks are remarkable for their choice of data sources, the presentation of the results (by mapping) and methodological aspects such as the documentation. A special features of the "Wegweiser Kommune", a benchmark of German municipalities and major cities, is the policy advice which is generated for clusters of regions. This generalised advice is developed by experts of different sectors (e.g. academic institutes and planning agencies).

The Demographic Risk Map of the Laboratory "Demographic Change" in cooperation with the Rostock Center for the Study of Demographic Change evaluates European regions in terms of the impact of demographic change but also includes non-demographic factors as economic location risks.

In the last part of the Research Note a demographic benchmark is introduced which is based on the Urban Demographic Change Index and which ranks cities and urban regions in Europe according to the state of demographic transition.

All benchmarks offer a stylized overview of a complex, multi-dimensional reality of regional and urban differentials. They can be criticized with regard to the underlying assumptions (for instance regarding the oversimplification of social realities), the methods, the choice of indicators and the interpretation of results. If these issues are reflected on critically and limitations of interpretation are mentioned and documented, benchmarking can be a useful policy tool.

3.1 Major findings of the Regional and Local Demographic Benchmarks

The "Wegweiser Kommune" ("Guide for Municipalities") is published by the Bertelsmann Foundation. One of the major outcomes of this benchmark of German municipalities is that the predominantly rural and peripheral regions in Eastern Germany show the most unfavourable demographic developments in terms of population ageing and population decline with impacts on various policy domains. Similar trends and impacts are also visible in some Western German regions, concentrated in North Western Germany. The common characteristics of these regions are a low percentage of children and young people and a high percentage of older people, a high out-migration of people aged 18- 30 (especially young women and people with a high qualification; "brain drain") and very low regional economic performance. On the other hand, high growth potentials are observed for six of the major cities in Eastern Germany (Rostock, Berlin, Potsdam, Leipzig, Dresden, Erfurt and Jena). Five cities in Eastern Germany (Magdeburg, Halle an der Saale, Gera, Cottbus and Chemnitz) are classified as regions with profound trends of population ageing and decline. Most of these cities are relatively small and not part of larger agglomerations. Based on its benchmark, the Bertelsmann Foundation identifies structural deficits in the process of economic reorganisation since the social and economic transition in the 1990s as the major causes of these demographic trends.

The second benchmark, the Demographic Risk Map created by the Laboratory "Demographic Change" in cooperation with the Rostock Center for the Study of Demographic Change, also reveals a strong East-West-divide of demographic risk in Germany as well as on the European level. In this project European (NUTS-2) regions are evaluated in terms of impact of demographic change and economic location risk. In addition to the profound gap between the new and the old member states of the European Union, high demographic and economic location risks are observed for regions in Southern European countries like Greece, Portugal and (Southern) Italy. Best values in the demographic benchmark are shown for Luxembourg, Inner London (GB), Utrecht (NL) and Midi-Pyrenées (F). The most unfavourable trends are displayed for Centru (RO), Opolskie and Slaskie (PL), some of the Eastern German regions and Asturas (E). By comparing past and future conditions, the benchmark indicates the strongest impacts on regions in North-Eastern Scotland, Ceuta and Melilla (E) and many German and Austrian regions. The project also includes a decomposition of effects on benchmark results. The decomposition allows for evaluating the changes in population size and age structure and their effects on the benchmark result. It shows, for instance, that in Southern Europe population ageing has a higher impact on regions in Southern and Eastern Spain than on most of the Greek regions. In the Greek regions, which show nearly the same benchmarking results, population decline has the strongest influence on demographic change.

Based on regional demographic trends, the Demographic Risk Map also considers regional discrepancies in economic location risks. A profound East-West-Divide in location risks can be observed. The largest economic opportunities are detected for regions in Benelux and Ireland, in Denmark, and for the urban regions in Sweden and Finland, in France, Central England, Southern and Eastern Spain, Western Austria, and Southern Germany. In addition, the capital and major city regions (like Madrid, Hamburg, Vienna, London) are characterised by high opportunities as well. In contrast, high and moderate risks are measured for regions in Portugal and Greece, North-Western Scotland, Eastern German regions and for almost every region in Eastern and Central Eastern Europe.

In the last part of the Research Note a benchmark of urban demographic change is introduced. By using data of the Urban Audit database, cities and urban regions among the European countries, the outermost regions (OMR) of the European Union and Turkey are ranked in accordance to their state of demographic transition. The general result of the benchmark is the detection of divergent trends of cities on the level of countries (e.g. the East-West gap) as well as strong disparities on the sub-national level for some European countries. Among the member states of the European Union, Norway and Switzerland, most of the cities within a country seem to be very homogeneous with only a few outliers. Notable heterogeneity appears for Belgium, Portugal, Poland, Ireland, Spain, Austria and Germany. Some of the cities in these countries show favourable trends while others are very strongly influenced by population ageing and population decline.

The cities of Turkey are a very special case with respect to demographic trends. Almost every Turkish city is ranked at the top of the benchmark. The only exceptions are Kocaeli in the Marmara region, Zonguldak and Kastamonu in the Black Sea region and Kars in the North of Eastern Anatolia. An explanation for the deviant classifications of Kocaeli, Kars and Zonguldak is the shrinkage of population in these cities, while the number of inhabitants increased in all other major cities in Turkey. In contrast Kastamonu grows in inhabitants, but shows an advanced stage and high pace in terms of population ageing.

Seven cities covered by the benchmark are located in the overseas territories of France, Portugal and Spain. The benchmark shows very divergent trends among this heterogeneous group. Funchal in Madeira (P), Pointe-à-Pitre in Guadeloupe (F), and Port-de-France in Martinique (F) score low on the benchmark, while Ponta Delgada in the Açores (P), and Las Palmas in the Canarias (E) are rated above the average, and Cayenne in Guyana (F) and Saint Denis in La Réunion (F) even reach the top positions. The two last-mentioned cities have these ranks due to high rates of population growth and a young age structure of their population.

Combining the three benchmarks, a detailed overview of demographic trends in the European regions is available at different spatial levels. Starting with a benchmark of German municipalities, followed by a ranking of European NUTS-2 regions, and finally a ranking of major urban regions, it is possible to compare and evaluate past, present and future demographic trends.

3.2 Regional and local data sources for European countries

3.2.1 Regional databases – Types, techniques and specifics

In the last decades statistics on population, the economy, the environment, health and other social aspects have become more important for policy and research in Europe. When the demand for data expanded, so did the statistical infrastructure and the quality of statistical data and methods; also the number of data from registers and surveys increased. The increasing quantity of data led to the construction of databases which aimed to combine various indicators. Many databases were built at the national level in Europe in the last century. In the European Union the European Statistical Office and its predecessors have tried to establish international data collections with comparable and reliable statistics. More recent attempts also focussed on statistics of the regions in Europe and on making them publicly available. Today databases are a vital tool for policy at the European, the national and regional levels.

In the fields of empirical social and economic research, databases can be differentiated and classified according to the mode of data collection (EUROSTAT 2004, 2007). Databases can be built from direct, indirect or both modes of data collection. Direct data collections are almost always interview-based surveys where data are collected from a (mostly randomized and representative) sample of persons. Examples of interview surveys at the European level are the Labour Force Surveys (LFS), the Household Budget Survey (HBS), the Gender and Generations Survey (GGS), the Survey of Health, Ageing and Retirement (SHARE), and the Urban Audit Perception Survey (which will be explained in more detail in the following chapter). The German Micro census is an example of a national survey.

Indirect data collections are based on administrative and statistical registers (EUROSTAT 2004, 2007). Administrative statistics are mostly process-generated data which are collected and managed by national and local governmental institutions and agencies. Examples of such data collections are the vital and resident statistics of the registry offices, and the employment statistics of the local job centres. Also semi-government institutions such as health insurance funds, non-government organizations and private enterprises maintain registers that could be interesting for research in many political, social and economic fields.

Many (international) databases combine data from both modes of data collection (mix-mode data collections). Examples of these types of databases are the EUROSTAT REGIO and the Urban Audit database. Due to the different modes of data collection which involve different methodological problems influencing the accuracy, the documentation of the origin of data (e.g. by flags) is indispensable.

In addition to the mode of data collection, data sets can be classified by the type of coverage of the data in regard to the target population (EUROSTAT 2004). In some data collections, the target population is completely covered. Examples of these data collections are population censuses or business registers. Data collections which partly cover the target population are sample surveys.

Sample surveys, regardless of whether they are direct or indirect, are often less reliable than data covering the total target population (EUROSTAT 2007). Based on the type of population coverage, different statistical techniques have to be applied to compile the statistics. Enumerated statistics is the most common type and primarily used for full coverage data sources. Weighted statistics is needed for data from sample surveys. The weights are defined by using enumerated statistics or by assumptions. The third type is modelled data. A modelling process is needed if data is not available (e.g. for historical data or data for redefined spatial units). Like the weighted data, modelled data needs assumptions or additional information from other data collections. In comparison to enumerated data, the accuracy of modelled and weighted data is expected to be lower. But also the accuracy of full coverage data is restricted for instance due to errors of measurement, non-coverage or other methodological problems.

The last aspect of classification mentioned here is the type of accessibility of a database. Especially with regard to regional databases this is an important issue. Due to the commitments to data privacy and research ethics, collections of regional population data are subject to specific regulations. These regulations become more restrictive when the spatial units become smaller. Three main types of classification exist. The first type is regional databases with an unrestricted public access (such as the EUROSTAT REGIO database). These databases exclusively offer anonymous data (e.g. micro data) or aggregated information (e.g. macro data).

Figure 4 Scheme of the different data options, by data collection mode and coverage with respect to the target population (by EUROSTAT 2004)

DATA COLLECTION MODE	COVERAGE WITH RESPECT TO TARGET POPULATION	
	A. PARTIAL COVERAGE: SAMPLE SURVEY	**B. FULL COVERAGE: CENSUS SURVEY**
1. DIRECT DATA COLLECTION **Interview survey** Mode examples: - Computer Assisted Personal Interview (CAPI) – Computer-Assisted Telephone Interview (CATI) - Computer-Assisted Self-interview (CASI) - Paper-and-Pencil Interview (PAPI) **Mail survey** **Internet survey, Web survey, Web Panel, eSurvey**	**Option 1a. Sample survey using direct data collection mode** This survey type is a traditional one. Examples: - Microcensus - Labour Force Survey LFS - European Community Household Panel ECHP - Statistics on Income and Living Conditions EU-SILC - Household Budget Survey HBS	**Option 1b. Full-coverage Census survey using direct data collection mode** This survey type is a traditional one. Examples: - Population Census covering the whole population with direct data collection using short form (Census) and long form (sample) questionnaires - Register data collected for statistical purposes or as part of an administrative procedure
2. INDIRECT DATA COLLECTION **Data source:** **Register** - Full coverage of the relevant target population - Continuous updating **Administrative register** - By-product of an administrative procedure **Statistical register** - Compiled by a statistical agency	**Option 2a. Administrative register with partial coverage of the relevant target population** This survey type is seldom met in practice.	**Option 2b. Full-coverage Census survey using data compiled from administrative and/or statistical registers** This survey type is becoming increasingly popular in the scope of Official statistics. Examples: - Register-based Population Census - Business Register - Taxation register - Claimant count register - Register on the use of social security benefits - Register of old-age pensioners
3. MIXED-MODE DATA COLLECTION **Data source:** Combination of direct and indirect data collection modes	**Option 3a. Sample survey using micro-merged interview data and register data** This survey type is becoming increasingly popular in the scope of Official statistics Examples: - Joint use of LFS and Claimant count data - Joint use of HBS and Census data - Joint use of Business survey and Business Register data	

Source: EUROSTAT (2004).

Another type is databases which are only accessible after agreeing to their terms of use (such as for instance interview surveys which include regional codes like the German Micro census or the German Socio-Economic Panel). In this case, "scientific user files" are available for research purposes. Two other examples of restricted databases, usable for research only, are the UK Data Archive and EUROSTAT New Cronos.

The third type is highly restricted databases such as administrative registers. Only few persons (mostly civil servants and government staff) have access to these sources of data. One example of an international, non-public database is the SIRE database, the European infra-regional information system, a project of EUROSTAT. In this database data from population and housing censuses are collected on the level of local administrative units (LAU). The major objective of the SIRE database is to collect data needed for the EU structural funds (EUROSTAT 2007).

For databases of high quality, documentation of methodical issues and of the origin and type of data and indicators included in the databases is vital. The aspects outlined in this section should be taken into account for both the choice of database and the choice of indicators used for citations, further analysis, and comparisons.

3.2.2 Examples of European regional data sources

In the previous chapter some examples of data collections were mentioned. For most of them the target population is the total population in a country and thus they are representative only on country level. Current challenges to official statistics in Europe are to offer reliable and comparable data also on sub-national levels. Almost every national statistical office in Europe established public accessible databases including regional statistics in the last decades.

In addition international institutions seek to offer data on a regional level. One of these institutions is the Statistical Office of the European Commission (EUROSTAT). With the objective to offer reliable and comparable statistics for a wide range of purposes EUROSTAT built two extensive databases: the EUROSTAT REGIO database and the EUROSTAT Urban Audit Database. Both databases are unique in Europe in terms of quality, accessibility and coverage of data. Both data sources will be described in more detail in the next two chapters.

Another international institution which offers data on regional level is the Organisation for Economic Co-operation and Development (OECD).[1] The OECD database includes data for the OECD countries (most of the member states of the European Union, Australia, Canada, Iceland, Japan, Korea, New Zealand, Norway, Mexico, Switzerland, Turkey and the United States). Three territorial levels (TL) are defined: large regions (TL2), small regions (TL3) and "non-official grids". The data include demographic statistics, regional labour markets (TL1 & TL2), regional accounts (TL 2 and 3) and innovation and social indicators (TL2). Due to the fact that the OECD database is focussed on economic aspects, demographic and social indicators are underrepresented. However, most of the European statistics are based on the EUROSTAT databases. Vice versa the EUROSTAT REGIO Database uses statistics from the OECD database for non-European regions. Thus, both databases are strongly interconnected.

1 http://stats.oecd.org/index.aspx (accessed March 2010).

3.2.2.1 The EUROSTAT REGIO Database

The Regions domain of the EUROSTAT database (REGIO) is usually the first source of statistics on European regions. The REGIO database covers regions in all member states of the European Union, Liechtenstein, Switzerland, Norway, Iceland, Croatia, the Former Yugoslav Republic of Macedonia and Turkey. Since spring 2008, regional data is also available for countries outside Europe. Based on the OECD database, key indicators are included for regions in Australia, Canada, Japan, Korea, Mexico, New Zealand and the United States of America (EUROSTAT 2009a).

The spatial concept of the REGIO database is the "Nomenclature of Statistical Territorial Units" (NUTS classification), which was established in the beginning of the 1970s by EUROSTAT.[2] This classification is an effort to obtain a "single, coherent system for dividing up the European Union's territory in order to produce regional statistics for the Community" (EUROSTAT 2009a: 3). Due to the fact that this classification system is vital to ensure comparability and availability of regional statistics, regulations to give NUTS a legal status were adopted by the European Commission in early 2007. Due to the enlargement of the EU, the regulation was amended and adopted in 2008 (EUROSTAT 2009a).

The NUTS classification includes three types of spatial units.[3] NUTS 1 are regional aggregates with an average population from 3 million to 7 million people. NUTS 2 are aggregates with less than 3 million inhabitants while regions with 150,000 up to 800,000 inhabitants are NUTS 3 units.[4] For some countries, no NUTS type 1 or 2 is defined. Especially smaller countries do not have NUTS 2 level regions (such as Cyprus, Denmark, Latvia, Lithuania, Luxembourg, Estonia, Malta, and Slovenia). NUTS 1 level regions are not defined for the Czech Republic, Hungary, Ireland, Slovakia, Sweden, and Romania (Tivig et al. 2008). Smaller regions were formerly defined as NUTS 4 and 3, but EUROSTAT redefined them as local administrative units (LAU 1 and 2). For the non-European Countries, EUROSTAT maintains the territorial level (TL) classification of the OECD.

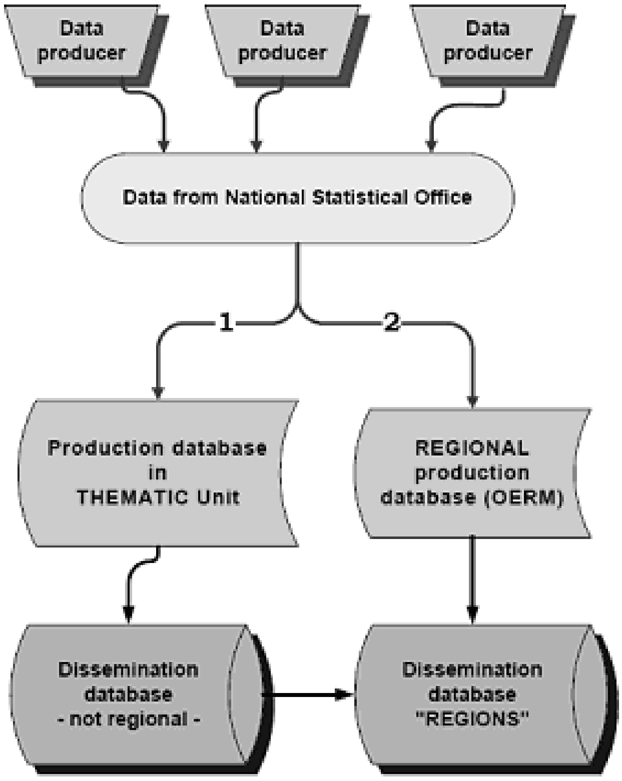
In EUROSTAT (2009a) the mechanisms of regional data collection is explained. National statistical offices collect data from various sources. The data is thematically divided and then send to EUROSTAT's Thematic Units (Option 1). After validity checks data is then loaded into the corresponding thematic section of the EUROSTAT databases. The data is copied from the thematic domain to the Regions domain by the Regional Statistics Section. In Option 2, data is send directly to the Regional unit and is loaded into the regions domain after validation. This is performed mainly for labour market statistics at NUTS 3 level and for all Urban Audit data.

All regional and national statistics collected by EUROSTAT are publicly accessible via the website of the European statistical office.[5]

In former years, regional and national level data were managed in one database, which was divided into thematic units such as demographic or education statistics. Since 2000, all regional level data is combined in one central regional database, which is also divided into thematic units. These changes improved the usability of the database.

2 http://ec.europa.eu/eurostat/ramon/nuts/introduction_regions_en.html (accessed March 2010).
3 In some studies countries are also classified as NUTS 0.
4 http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/regional_statistics/nuts_classification (accessed March 2010).
5 http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/regional_statistics/data/database (accessed March 2010).

Figure 5 EUROSTAT's standard model for the data flow of regional (and urban) statistics



Source: EUROSTAT (2009a)

The REGIO database is currently divided into 13 thematic data sets (collections) with one additional set planned. The 14 collections are:

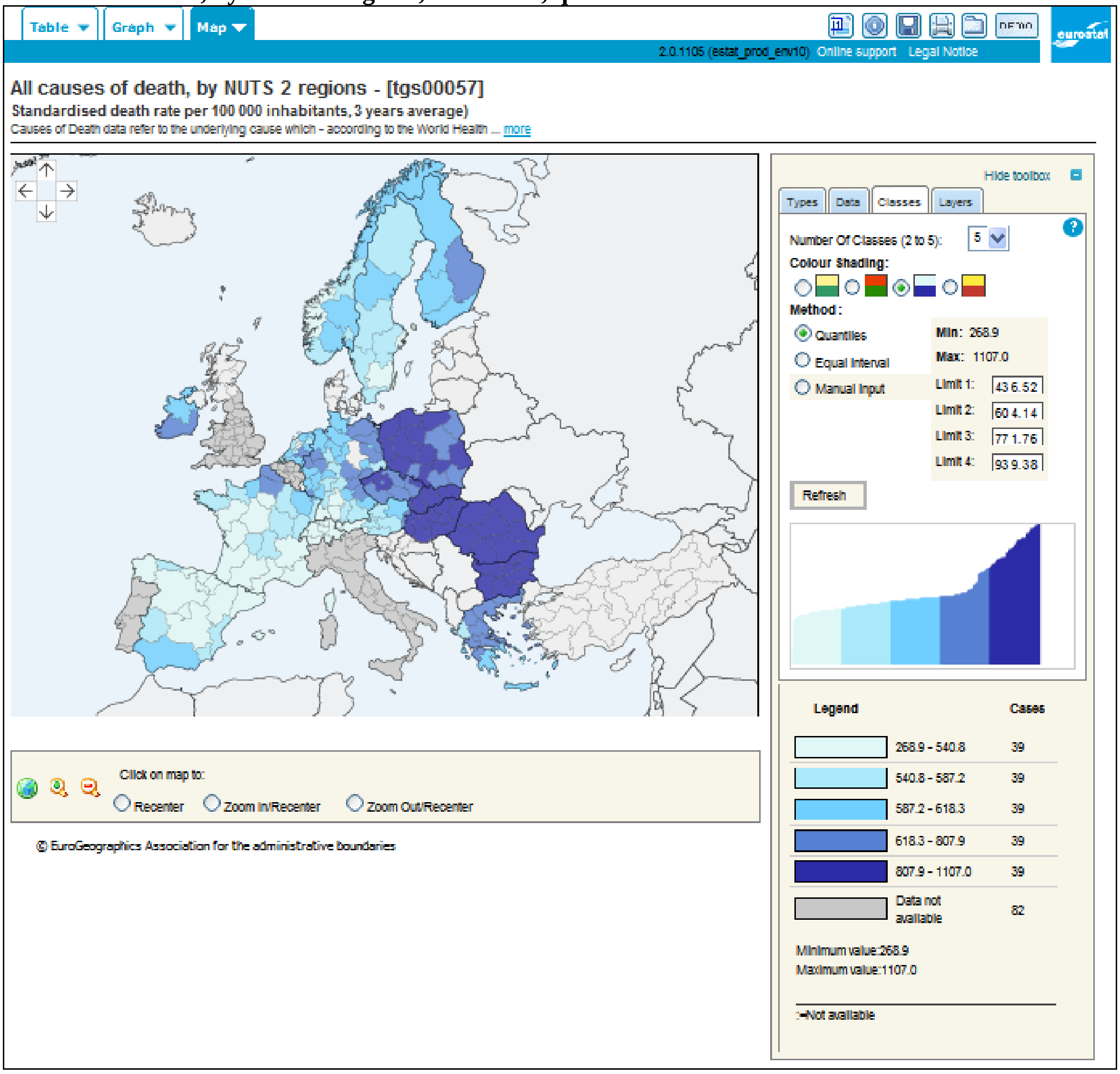
Agriculture statistics	Tourism statistics
Demographic statistics	Transport statistics
Economic accounts	Labour market statistics
Education statistics	Labour cost statistics
Science and technology statistics	Information society statistics
Structural business statistics	Migration statistics
Health statistics	Environment statistics (planned in 2010)

Each collection consists of “groups” and “subgroups”. For example the demographic statistics collection contains the groups “population and area”, “population change”, “population projections”, “Census: Regional level census 2001” and “Life table – NUTS level 2 regions”. The group “Census: Regional level census 2001” contains the subgroups “population structure”, “active population”, “educational level”, “households”, and “dwellings”. In the last step, the users are directed to the EUROSTAT Data Explorer where they can design their tables selecting indicators, spatial levels, and observation periods. In a final step data can be downloaded for further analyses. A direct download is also possible, if the user is registered at the EUROSTAT website or uses the “bulk download” option.[6] This option can be used to get the whole database of EUROSTAT for analysis in spreadsheet or database management programmes.

6 http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/bulk_download (accessed March 2010).

An additional feature is the EUROSTAT "Tables, Graphs and Maps" Interface (TGM) which can be found under "Main tables". The TGM interface allows visualisation of selected regional statistics using graphs or maps out of the REGIO database (see Figure 6). Only a small subset of indicators can be visualised using this module, but it can be a helpful tool for presentation of regional statistics.

Figure 6 Example of mapping data from EUROSTAT REGIO with the TGM Interface: all causes of death, by NUTS 2 regions, 2006-2008, quintiles.



Source: EUROSTAT, EuroGraphics Association for the administrative boundaries.
(http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/regional_statistics/data/main_tables).

A complex overview of regional trends and divergences in the European Union, the candidate and EFTA countries in terms of demography, labour market, economic performance, household accounts, information society, science technology and innovation, education, tourism and agriculture can be found in the **EUROSTAT regional yearbook** (EUROSTAT 2009b). For each domain, methodological notes are included for further information. This report also contains a chapter named "European cities" where data from EUROSTAT Urban Audit database are given.

3.2.2.2 The EUROSTAT Urban Audit Database

A different approach is adopted by the Urban Audit database. The Urban Audit database is a joint project of the Directorate-General for Regional Policy (DG REGIO) and the European

Statistical Office (EUROSTAT). In contrast to the EUROSTAT REGIO database, the Urban Audit is focussed on selected, highly urbanized regions in Europe. The Urban Audit can be seen as the second pillar of sub-national data collections in European statistics (EUROSTAT 2009a). The objective of the Urban Audit database is to collect comparable, reliable and multi-sectoral statistics and indicators for the European cities.[7]

"The Urban Audit is a response to the growing demand for an assessment of the quality of life in European cities, where a significant proportion of European Union citizens live. (…) Comparison of cities by regional, national and European agencies as well as between the cities themselves, according to their position in Europe (central – peripheral; North – South) and certain developments in different areas (economic activity, employment, public transport, education level etc.) as well as disparities within cities are very useful, not to say crucial, for policy measures." (EUROSTAT 2007). The European Commission conducted an interim data collection in 1999 which acted as a pilot project for the Urban Audit. After the test, the Commission decided to continue and to improve the approach due to a strong demand for information on urban development.[8]

In 2003 EUROSTAT ascertained the first full-scale Urban Audit for the 53 largest cities (except London and Paris) in all of the 15 member states of the European Union (before the enlargement processes). With the enhancement of the EU in 2004 the number of cities covered by the project was increased. In addition to the 10 new member states the latest admitted countries, Bulgaria and Romania, and Turkey were included in the Urban Audit project. Urban Audit Round 2003/2004 included 258 European cities in total. Between 2006 and 2007 the second full-scale data collection was accomplished. This round covered 321 cities in the 27 EU member states and 36 cities in Switzerland, Norway, Croatia and Turkey. In the current conception of the Urban Audit, data collection will be repeated every three years. However, an annual update of selected indicators is performed from 2009 onwards (EUROSTAT 2009a, p. 17).

Coordinated by EUROSTAT all national statistical offices and some of the cities participate in data collection. To ensure the quality of data, National Urban Audit Coordinators (NUAC) were selected who are responsible for data collection, validation and transmission of data to EUROSTAT (EUROSTAT (accessed March 2010).

The Urban Audit is based on four types of spatial units:
1. the Central or Core City (C);
2. the Larger Urban Zone (LUZ) ;
3. the Sub-city Districts (SCD) and
4. the Kernels (K).

Core Cities (C) are the basic level of the Urban Audit and defined by established administrative boundaries. For many aspects such as developing and maintaining infrastructure and providing public services, local authorities and city planners are mainly interested in data on an administrative level. Thus, statistics on core city level are needed.

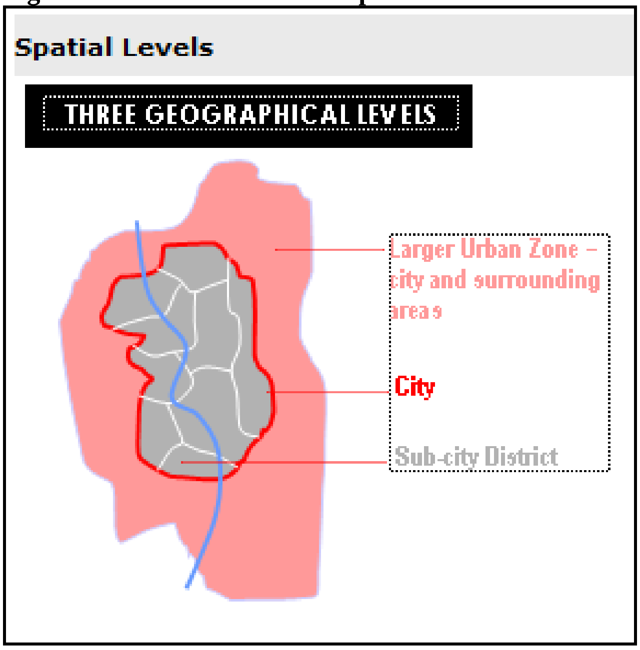
But also the regions in the urban periphery are influenced by cities. Effects of cities on the surrounding areas include commuting, job concentration and infrastructure. To reflect these effects functional urban regions (FUR) are defined, which combine the cities and their hinterland. In the Urban Audit, the concept of functional areas **is represented by Larger**

7 http://www.urbanaudit.org/ (accessed March 2010).
8 http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/city_urban (accessed March 2010).

Urban Zones (LUZ). The approximation of the LUZ in the Urban Audit is primarily based on commuting rates, employment structures and on national expert assessment. Thus, national differences might be present.[9]

Data on both levels of Core Cities and of Larger Urban Zones can be important depending on the policy or research objective. For example core city data is relevant when analysing municipal expenditure and provision of services for the inhabitants of the city. In contrast, the Gross Domestic Product should be considered on the level of LUZ (EUROSTAT 2009).

Figure 7 Three of the four spatial levels of the Urban Audit



Source: http://www.urbanaudit.org/help.aspx.

For some smaller cities no LUZ are constructed while for some larger cities (e.g. Marseille, Nice, Saint-Etienne), the Core city concept is identically to the LUZ concept.

Disparities on intra-city level can be analysed by using data of **Sub-city Districts (SCD)**. Each SCD is defined as a region with a minimum of 5,000 and a maximum of 40,000 inhabitants. For some smaller cities, no units on SCD level are defined.
In addition to these spatial levels, another geographical unit is defined. To yield comparable spatial units also for very large cities, **Kernels (K)** were created for some capital cities such as Paris and London. The construction method of the Kernels is explained in detail on the Urban Audit website.[10]

For the Urban Audit Round 2009, EUROSTAT introduced another spatial unit, the city hinterland, which will be the LUZ minus the Core City. The selection of cities in the Urban Audit is based on the following criteria:

1. population in the Urban Audit cities in a country should represent about 20% of national population, cities should reflect the geographic distribution within the country (peripheral, central);
2. coverage should reflect a sufficient number of medium-sized cities (medium-sized cities: population of 50,000 – 250,000 inhabitants, large cities: 250,000 and up);
3. all capital and, where possible, all regional capital cities should be covered, and

9 For detailed information see: EUROSTAT (accessed March 2010).
10 http://www.urbanaudit.org/help.aspx (accessed March 2010).

4. aspects of data quality (availability, comparability, reliability).

Due to the fact that not all data could be collected in the same year, four reference periods have been defined (1989-1993; 1994-1998; 1999-2002; 2003-2006). 2001 and 2004 are the reference years for the two Rounds of the Urban Audit while 1996 and 1991 are the references for the "historical" (retrospective) data collections.

The Urban Audit database includes various types of statistics based on different types of data collection methods. Indirect data from administrative and statistical registers is combined with directly collected data such as interview surveys as well as data which completely (e.g. censuses) or partially (e.g. the Labour Force Surveys) covers a target population (EUROSTAT 2007). The variables, harmonized in regard of unified definitions and validated by the NUACs, are finally integrated in the database or are used by EUROSTAT for the calculation of indicators. In the most up-to-date Urban Audit Round 2006/2007, 338 variables are included after revision by the advice of the Urban Audit Think Tank, DG REGIO and DG Environment (EUROSTAT 2009a).

Because all data in the Urban Audit is based on existing data sources with varying coverage/quality, it is very difficult and sometimes impossible to ensure full comparability, especially between cities in different countries. To improve comparability, data were estimated for some cities. To make the origin of data transparent, the database entries are marked with a flag.

The Urban Audit covers a wide range of variables and domains (see Table 7). The two fields "Demography" and "Social Aspects" are of special interest for social and demographic research. In these domains, variables like the number of resident population and total population at working age (total and sex specific), total number of households and total deaths per year (total and sex specific) are included. Based on the variables, several indicators were constructed. Examples of these indicators are sex and age group specific proportions of population, change of population over 1 or over approximately 5 years, three types of demographic dependency ratios, proportions of foreign born population, of lone parent or lone pensioner households, and of households with children under the age of 17, migration flows, crude death and (infant) mortality rates per year (both sexes and sex specific), live birth rates and number of hospital beds per 1,000 residents. The complete database contains more variables and indicators interesting for policy makers and researchers.

Table 7 Variables and domains in the Urban Audit

1. Demography	**6. Environment**
1.1 Population	6.1 Climate/Geography
1.2 Nationality	6.2 Air quality and noise
1.3 Household structure	6.3 Water
2. Social aspects	6.4 Waste management
2.1 Housing	6.5 Land use
2.2 Health	6.6 Energy use
2.3 Crime	**7. Travel and transport**
3. Economic aspects	7.1 Travel patterns
3.1 Labour market	**8. Information Society**
3.2 Economic activity	8.1 Users and infrastructure
3.3 Income disparities and poverty	8.2 Local e-government
4. Civic involvement	8.3 ICT sector
4.1 Civic involvement	**9. Culture and recreation**
4.2 Local administration	9.1 Culture and recreation
5. Training and training provision	9.2 Tourism
5.1 Education and training provision	
5.2 Educational qualifications	

Source: EUROSTAT (2009a).

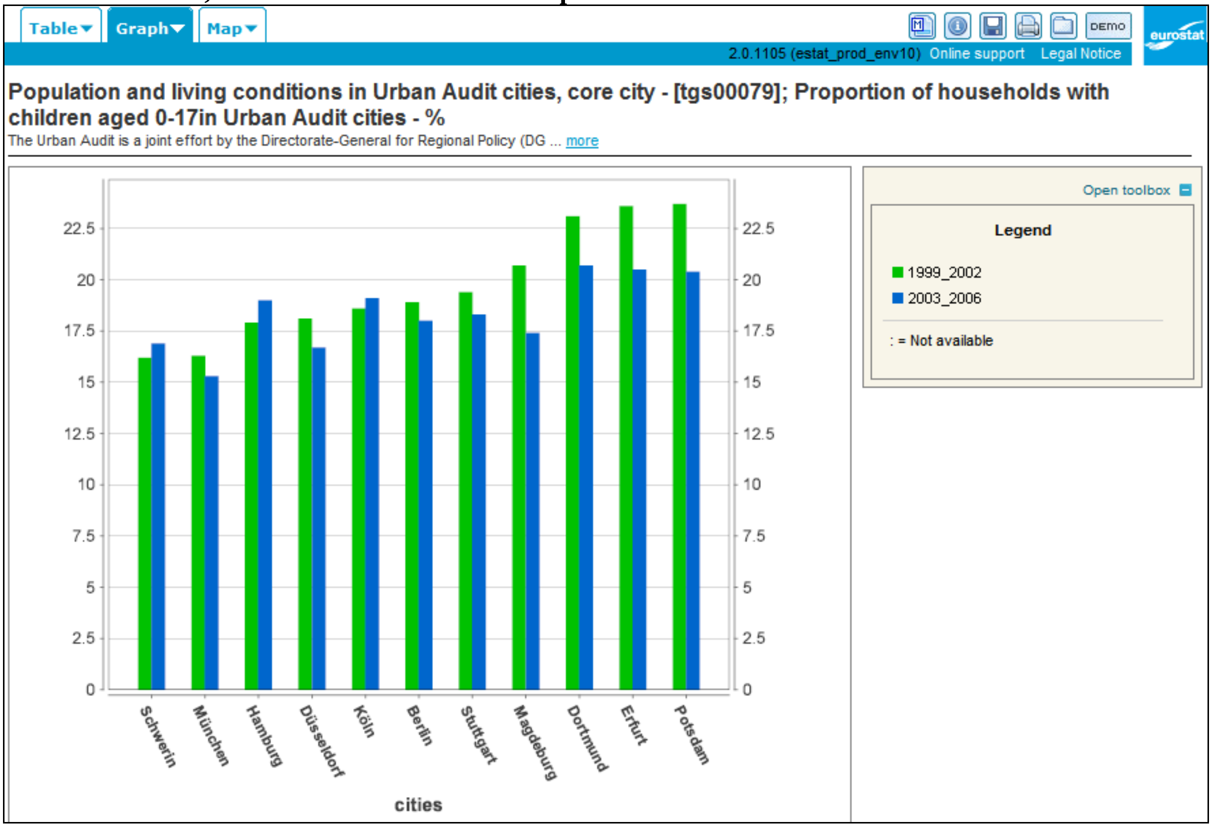
There are three major ways of (public) access to the Urban Audit database. The first is to download the whole database from the EUROSTAT website.[11] The second way is to use the online portal on the EUROSTAT website.[12] The third option is online access on the website of the Urban Audit (www.urbanaudit.org). Each of the three ways has advantages and disadvantages. The benefits of the two data portals on the EUROSTAT website are that the user is able to get the data directly for later calculations, comparisons or mapping. The data of the EUROSTAT page is regularly updated and new facts or revised data will be incorporated with short delay, while the Urban Audit website will be updated only once per year.[13]

The downloadable database is the only way to get all variables and indicators for all spatial levels and periods data is available for. Flags which mark the source of the data are also included. To handle the downloadable files knowledge about the internal structure of the Urban Audit (codes of indicators and cities) and of spreadsheet / database management programmes is necessary.

The data section of the online portal on the EUROSTAT website is separated into two domains: “Main Tables” and “Database”. The “Main Tables” section uses the “Tables, Graphs and Maps” Interface (TGM) which allows visualisation of (a very restricted number of) indicators for the Urban Audit cities (Core city and LUZ level, all periods). An example of the TGM is shown in **Fout! Verwijzingsbron niet gevonden.**Figure 8.

[11] http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/bulk_download: All data files starting with “urb” (accessed March 2010).
[12] http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/city_urban/data_cities/database_sub1 (accessed March 2010).
[13] Information based on an email from 22.03.2010 with EUROSTAT.

Figure 8 Example of the TGM interface on the EUROSTAT online portal: vertical bar graph of the proportion of households with children aged 0-17 in per cent, selected German Urban Audit cities, 1999-2002 and 2003-2006 compared



Source: http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/city_urban/data_cities/tables_sub1 (accessed March 2010).

Additional indicators can be found in the “Database” section. However, only selected indicators are available and data is confined to the periods 1999-2002 and 2003-2006. For accessing the database an interface called “Data Explorer” is provided.

The most comfortable way to get an overview of the database is the website of the Urban Audit which provides general information about the Urban Audit and shows different ways to use the data. The website offers options to download a City Profile (all spatial levels), to rank (core city level) and compare cities (LUZ and core city), to get an insight into a city’s structure (all spatial levels) and to extract data tables (all spatial levels).

Special attention is paid to the options to compare cities. An indicator-specific comparison by quintiles between all Urban Audit cities is included in every city profile (see Figure 9).
Another way to benchmark cities by indicator is to use the rank option on the website (see Figure 10). Several indicators of various sectors, all included periods and lots of other specifications are available.

Figure 9 Example for a City Profile in the Urban Audit: Magdeburg (Extract)

Magdeburg

Magdeburg is the capital of the German federal state of Sachsen-Anhalt (Saxony-Anhalt), located on the River Elbe. The city has a population of 230,000. Magdeburg's economy used to be based around mechanical engineering. Nowadays, the economic growth of the city is linked to three sectors: innovative mechanical engineering and plant engineering, eco-technology and life-cycle management of products and processes, and health management. Ministries and governmental agencies of Sachsen-Anhalt's government are seated in Magdeburg. The city is part of a Larger Urban Zone (LUZ), as defined by the Urban Audit, of almost 610,000 inhabitants that covers an area of 4,364 km2.

CITY AND LUZ LEVEL

	CITY		QUINTILES Comparison with UA cities						LUZ		
			Low				High				
INDICATORS	YEAR	SCORE	5th	4th	3rd	2nd	1st	CASES	YEAR	SCORE	Ratio City:LUZ
DEMOGRAPHY											
Total resident population	2004	226,675			•			342	2004	588,875	1:2.60
Total annual population change over 5 yrs.	2004	-1%	•					247			
Percentage of households that are 1-person households	2004	40%			•			152	2004	34%	1:0.85
Percentage of households that are lone-parent households	2001	10%					•	273	2004	9%	
Average size of households	2004	1.97		•				173	2004	2.09	1:1.06
SOCIAL ASPECTS											
Average price per m2 for an apartment	2004	€1,000		•				150			
Average price per m2 for a house	2004	€1,130		•				157			
Percentage of households living in owned dwellings	2001	14%	•					305	2001	32%	1:2.33
Percentage of households living in social housing	2004	13%			•			92	2001	6%	
Average living area in m2 per person	2001	35			•			229	2001	37	1:1.05
Number of recorded crimes per 1,000 population	2004	155.49					•	223	2001	106.07	

Source: http://www.urbanaudit.org/CityProfiles.aspx (accessed March 2010).

Figure 10 Example of a ranking on the Urban Audit website: Demographic old age dependency ratio, cities with over 2 million inhabitants, 2004 (Extract)

Regional Policy - Inforegio

Home City Profiles Rank Compare Structure Data About URBAN AUDIT Contact Us

Urban Audit: How cities rank

1. Demography 2. Demogr. old age dependency: > 65 / 20-64 years 3. --- Population: over 2,000,000

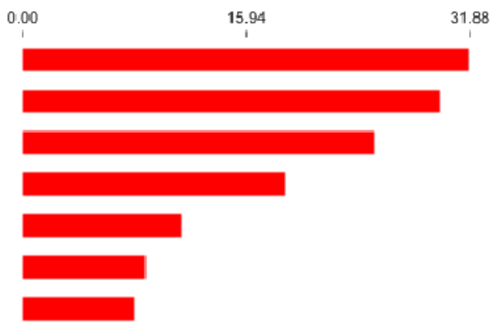
4. Score Descending 5. 2004 Go Reset

Demographic old age Dependency Index: (> 65 years) / 20-64 years

Average : 19.1 **High :** 31.88 **Low :** 7.96

You are on page 1 of 1 (7 records)

Rank	City	Score
1	Roma (IT)	31.88
2	Madrid (ES)	29.79
3	Berlin (DE)	25.16
4	London (UK)	18.78
5	Izmir (TR)	11.38
6	Ankara (TR)	8.78
7	Istanbul (TR)	7.96



Source: http://www.urbanaudit.org/rank.aspx (accessed March 2010).

In relation to the Urban Audit project, two additional approaches were launched in the last years: the Large City Audit and the Urban Audit Perception Survey.

The **Large City Audit (LCA)** is a collection of statistics of all cities in the EU with more than 100,000 inhabitants, which are not included in the Urban Audit. In agreement with national authorities, a reduced number of items are collected for the participating cities. The spatial units for the LCA are Core Cities and the reference years are 2001 and 2004. By combining the LCA and Urban Audit data sources, comparable and valid key indicators are available for all large cities in the EU (EUROSTAT 2009a).

The **Urban Audit Perception Survey** differs in a very special way from the general Urban Audit and the Large City Audit. In contrast to both audits, the Perception Survey is a direct data collection with the objective to measure the perceived quality of life in a city. Carried out in 2004 for the first time, representative random samples of each 300 inhabitants of 31 cities in EU-15 were surveyed in telephone interviews. In 2007, the number of cities was increased to 75 cities of the 27 EU Member States, Turkey and Croatia with a representative sample of 500 citizens per city. In the survey, persons are interviewed about issues such as their satisfaction with the city itself, with public transport, schools, hospitals, green space, air quality, cultural facilities or their perception of integration of foreigners, employment opportunities, financial well-being, the quality of local administration services and safety in their city (EUROSTAT 2009a).

The advantage of such a survey is to include the subjective perspective on the situation in a city e.g. in city planning concepts. Although the results are of limited comparability due to cultural differences, they give an insight in urban problems and challenges.

At present (March 2010), publications based on the Urban Audit are rare. However, some analyses can be noted. The most complex study based on the data of the Urban Audit is the “State of the European Cities Report – Adding value to the European Urban Audit” of ECOTEC in cooperation with NordRegio and Eurofutures contracted by the European Commission (ECOTEC 2007). With respect to the depth of analyses and the great amount of results presented in the 224-page report, only a brief overview can be given in this report. The City Report pointed out the specific urban demographic trends (natural population change, migration and the effects on ageing) and the geographic divergences in these trends. Special attention is paid to the competitiveness of cities, including the economic performance of cities. A typology based on urban competitiveness concludes the second part. The third part of the report is focussed on living in cities and covers fields such as unemployment, housing, household size, education, health and public transport. The last part covers the role of city government. An index of city power is developed and presented. The City Report is a comprehensive source of information enabled by the Urban Audit data collection. A shorter, but also notable report was published by Feldmann (2008) who compared and ranked European cities with selected variables from the Urban Audit database.

A brochure presenting results from the Urban Audit Perception Survey can be noted.[14] The paper compares the perception of quality of life in 31 European cities. The cities are ranked on eight aspects (employment opportunities, housing costs, safety, cleanliness of cities, public transport, air pollution, integration of immigrants and overall satisfaction with the quality of life in the city).

14 http://www.urbanaudit.org/UAPS%20leaflet.pdf (accessed March 2010).

The last source of information is the article "European Cities" in the EUROSTAT online encyclopaedia "Statistics explained".[15] The entry gives an overview of the main statistical findings of the Urban Audit and the Perception Survey, describes data sources and availability and provides links to further information. Notable are also the articles "European cities: spatial dimensions"[16] and "Urban rankings"[17], which offer additional explanations about the concepts of the Urban Audit.

3.2.3 Potentials and limitations of regional data sources

The demand for regional statistics of high quality is huge but so is the number of problems to provide these statistics. The complexity of limitations grows, if the regional statistics should be used for comparisons on an international level.

In the previous chapters, two notable sources of data for European regions and cities were presented that are confronted with such limitations.

A regional database of high quality has to meet requirements especially in terms of:

1. quality of data and data sources (including comparability/harmonisation, validity, coverage, update frequency and relevance of data and indicators);
2. documentation of methodological issues (e.g. origin of data or construction of indicators) and restrictions e.g. due to missing harmonisation or redefinition of spatial units, and
3. usability (including accessibility and available features e.g. visualisation tools).

Both European databases, the EUROSTAT REGIO database and the EUROSTAT Urban Audit database spend much effort in accomplishing these requirements. The most serious limitations of the EUROSTAT databases are the quality and source of data. National definitions can deviate from European standards (e.g. definitions of target populations). Thus, the harmonisation is impossible and comparability is limited (EUROSTAT 2007). Also the coverage and update frequency of data directly depends on the efforts of the national statistical offices to collect and to provide the data. In both databases, completeness of data differs in the various domains. The demographic key indicators in the Urban Audit database, for example, are available for nearly all cities, while others such as environmental indicators are missing for more than 50 percent of cities (EUROSTAT accessed 2010).

Another issue is the relevance of the indicators which are comprehensive, well established, but more descriptive than policy-goal oriented (Jacob 2009).

An advantage of both databases is the documentation of methodological issues and restrictions. Methodological notes are available and contact details are denoted in case of further questions or problems. Flags and footnotes are widely used to provide information about the source of data, the mode of data collection and restrictions concerning the data. However, a major advantage of both databases is the accessibility: all data is publicly available on the internet. Notable features are the interfaces for mapping and visualisation of selected data provided on the EUROSTAT website. The city profiles and ranking modules of the Urban Audit website are also interesting examples of how to use statistics.

While EUROSTAT's TGM interface is just a first step towards mapping and visualisation, regional databases combined with Geographic Information Systems (GIS) could improve their potential for analyses. Notable examples are the Statistical Atlas of the European Union (STATLAS)[18] of the Leibnitz-Institut für Länderkunde, the OECD eXplorer tool[19] of the

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15 http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/European_cities (accessed March 2010).

16 http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/European_cities:_spatial_dimension (accessed 2010).

17 http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Urban_rankings (accessed March 2010).

18 Project stopped due to licencing regulations http://www.ifl-leipzig.de/283.0.html?&L=1 (accessed March 2010).

Linköping University and the Urban Atlas, a new project of the European Commission supported by the European Space Agency.

The European Urban Atlas will combine detailed maps of city structure, e.g. of urban infrastructure, with statistical data from the Urban Audit. A total of 185 cities from all 27 EU member states will be included in the pilot project. By 2011 the project is planned to include all cities in the EU. As the Urban Atlas is still being developed, an evaluation can not yet be given in this report but when the project is concluded it could be a useful tool to inform local decision makers.

Two other approaches which are still under development are the databases of the European Spatial Planning Observation Network (ESPON) and the database of the Max Planck Institute for Demographic Research. The ESPON 2013 database integrates data of different spatial levels (from local to global statistics) provided by EUROSTAT and ESPON projects. It covers the entire European Union plus Switzerland, Norway, Iceland and Liechtenstein (ESPON space). The database, an enlarged and updated version of the ESPON 2006 database, will be publicly accessible and linked to a mapping tool, the ESPON HyperAtlas[20] (see also chapter 2).

The Population and Policy Database (PPD) of the Max Planck Institute for Demographic Research is even more focussed on social research demands. The objective of the PPD is to provide "longitudinal demographic, political, and socioeconomic data at different geographical levels (supra-national, national, regional)" which "supports longitudinal multilevel research" and "foster quantitative research on the intersection of demographic and political processes". [21] Both databases have a high potential for further policy and research demands.

Regional databases can be used for the monitoring and benchmarking of regions and the impact of policy measures. The Urban Audit website offers some basic features for comparing and ranking cities. Other examples for benchmarks based on sophisticated methods will be presented in the following paragraphs.

3.3 Policy relevant monitoring and benchmarking of regions

One example for the use of regional data sources is the utilization as basis for benchmarking and monitoring. The benchmarking and monitoring of regions – particularly focused on policy relevant issues – will be introduced at the beginning of this paragraph, followed by a selection of benchmarks of regions in Europe. Two benchmarking projects will be described in detail: The Demographic Risk Map of the Rostock Center for the Study of Demographic Change and the "Wegweiser Kommune", part of the Demographic Change Campaign of the Bertelsmann Foundation. Because of their advanced combination of statistics, methods and measurements, accessibility, and presentation, both projects are notable examples of policy relevant benchmarks of selected regions in Europe. The paragraph will be closed with an evaluation of benchmarking with special attention paid to benchmarks focused on local policy issues.

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19 http://ncva.itn.liu.se/explorer/vislets?l=en (accessed March 2010).

20 http://www.espon.eu/main/Menu_ScientificTools/ESPON2013Database/ (accessed March 2010).

21 http://www.demogr.mpg.de/en/research/1355.htm (accessed March 2010).

3.3.1 Monitoring and benchmarking regional trends and patterns

An interesting use of regional databases is the comparisons of different regional entities such as NUTS regions or urban areas. Since the so-called “Lisbon Strategy”[22] was agreed by the heads of state and government and the European Commission in 2000, regional benchmarking grows in importance in Europe. To reach the aims of the “Lisbon Strategy” regional data and benchmarks are required to identify current and future challenges in European regional policy. The European Cohesion Policy and the Structural Funds are examples of programmes which require regional data and benchmarks to identify current and future challenges.

A definition of benchmarking can be found in Koellreuter (2002): “Benchmarking takes place in space and it is about comparison and positioning vis-à-vis a marked point – known or assumed. This implies that benchmarking is not necessarily with the highest point (the “best”) but actually with any point chosen by the benchmark agent.” These marked points differ depending on the benchmarked domain. Policy and business benchmarks are often equal to comparisons with the “best in class” and aim at learning from its “best practices”. Additionally, the marked points can change over time, making “benchmarking […] not static but essentially dynamic” (Koellreuter 2002).

Benchmarks can be useful for of regional policy. Koellreuter (2002) assumed that the quality of regional foresight can be improved by the introduction of the interspatial/interregional dimension. He defined regional benchmarking and its objectives as: “Interregional comparisons of performance, processes, practices, policies and resources and using this information in order to improve regional development” (Koellreuter 2002).

Benchmarks are mainly descriptive measures based on assumptions, definitions, specified methods and (mostly quantitative) data. Benchmarks can include static and dynamic indicators, allowing states and developments to be benchmarked.

A special type of time-series comparisons is called monitoring. Monitoring can be described as a systematic and periodical process of observation. A basic form of monitoring can be achieved by regularly repeating benchmarks which are based on the same indicators and methods. Monitoring can be used to detect changes in specific conditions in a chronological context (“Did it change and when did it change”?) and determinants of these changes (“What caused the changes?”).

Two types of benchmarking can be distinguished: Qualitative and quantitative benchmarks. Qualitative benchmarks mainly employ methods of expert assessments while quantitative benchmarks, also referred to as performance benchmarks, use empirical data and methods. In this study, quantitative benchmarks will be considered only.

In a quantitative benchmark the following elements have to be considered:

- choice of target units and reference groups;
- choice of data source;
- choice of benchmarking method;
- choice of benchmarking indicators/determinants;
- choice of weights of the indicators/determinants;
- choice of cutting points;
- choice of interpretation.

The choice of target units to be ranked is often predetermined by the research question. Examples of target units are companies, institutions or even spatial units such as regions or

[22] The major objective of the “Lisbon Strategy” is to improve education and economic competitiveness by employing “open methods of co-ordination and benchmarking”.

cities. In most cases it is useful to define a reference group ("league") with comparable specifics and objectives (such as IT companies or high-tech regions). The choice of the reference group has to be adequately supported by theory and should not be arbitrary (De la Porte et al. 2001). For regional benchmarks, the reference groups can also be defined by geographical aspects like distance. The distance between regions can have effects in terms of "transregional complementarities, competition and co-operation" (Koellreuter 2002).

The choice of data source is the next step of a benchmark. The quality of data has a direct effect on the quality of benchmark results. Validity, comparability, coverage or the mode of data collection are aspects of data quality, as explained in the previous chapter. The choice of the benchmarking method also has an effect on benchmark quality. The simplest type of benchmarks is the univariate ranking. In univariate rankings only one indicator is used to compare the target units. The ranking module on the Urban Audit website (see previous paragraph) is an example of such a type of benchmark. Rankings that are based on only one indicator are mainly useful for preliminary examinations in the benchmarking process or in cases where the benchmark purpose is completely covered by one indicator (e.g. benchmarking regional population decline).

Social and policy issues are mostly multidimensional and cannot sufficiently be described by only one indicator. Multivariate benchmarks are used to combine various indicators, but require additional methodological determinations as the choice of included indicators and assumptions about their "impact". The choice of indicators is driven by the theoretical framework[23] and aspects of validity.[24] Based on theoretical assumptions, these factors can be weighted by their expected "impacts". When benchmarking regional economic performance, for example, the Gross Domestic Product can be assumed to be a better indicator than internal investments. Multivariate benchmarks can be realised e.g. by the construction of indices (scores) or by using methods of factor and cluster analysis (typologies). In some benchmark methods such as scores, cutting points can be specified. Cutting points define the ranks of "bad" and "good" performances. These points can be calculated using statistical methods (e.g. mean, percentiles, standard deviation or factor loadings) or by expert assessment (primarily used in qualitative benchmarks).

One of the major challenges of benchmarks is the interpretation of the indicators and the results. For score-based methods, interpretation is implied by the way of construction (e.g. high values correspond to good performance). For classification or typology methods, interpretation in terms of ranks is much more difficult and closer to qualitative methods.
In the following some examples for benchmarks will be presented. In these examples, different benchmarking methods are used. The methods will be discussed at the end of the chapter.

3.3.2 Examples of demographic benchmarks of regions in Europe

In contrast to economic benchmarks for competitiveness, profitability or performance on the level of companies or regions, social, policy and demographic benchmarks are rare. In the following two examples will be introduced that are focused on the effects of demographic change on regions on various levels: the Demographic Risk Map project and the "Wegweiser Kommune" of the Demographic Change Campaign of the Bertelsmann Foundation.

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[23] e.g. population shrinkage and ageing as indicators of population change.

[24] e.g. higher validity of the old age dependency ratio as an indicator for population ageing than percentage of pensioners which is even influenced by socio-political and economic factors.

The Demographic Risk Map (DRM) compares all regions in the European Union in terms of demographic change impacts and economic location risks. The DRM uses methods of scoring and classification based on a scoring procedure. The quantitative benchmark includes various indicators from the EUROSTAT REGIO database and combines them in two indices.

The "Wegweiser Kommune" (to be translated as "Guide for Municipalities") is an example of how to compare regions in terms of demographic trends. The "Wegweiser Kommune" (henceforth referred to as WK) project developed a typology for about 2,800 German municipalities in terms of demographic patterns using methods of cluster analysis. The WK project is a combination of a regional database, a regional population projection and a classification of regions, which is based on the database and the projection. Both benchmarks are good examples in terms of methodological aspects (combination of methods and data), presentation and usability (e.g. public access and visualisation).

3.3.2.1 The Demographic Change Campaign

The "Wegweiser Kommune" (WK) is a project of the Demographic Change Campaign of the Bertelsmann Foundation. It involves a collection of practical information including suggestions for policy response, research studies and examples of "best-practice" for local authorities in Germany. The WK is part of a larger project focussed on demographic change and its impacts on economy, education, social situation and integration in Germany and Europe launched by the Bertelsmann Foundation. The WK is a joint venture of non-government organisations, private businesses, regional planning institutes and academic experts.[25]

In the following the description is focussed on the analytical part of the demographic benchmark of the WK project.[26]

The WK offers statistics, population projections and a demographic classification for all municipalities with more than 5,000 inhabitants in Germany. In total 2,927 municipalities (Kommunen) and 301 districts (Landkreise) are covered by the WK database (about 85% of the population in Germany).

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[25] Major Project Partners: Zentrum für interdisziplinäre Regionalforschung (ZEFIR) of the Ruhr-University Bochum, Deenst GmbH, Institut für Entwicklungsplanung und Strukturforschung GmbH (ies) of the University of Hanover,]init[AG, Lutum+Tappert geomarketing.de, Gesellschaft für Beratung, soziale Innovation und Informationstechnologie (GEBIT) Munster, experts from the TU Kaiserslautern and the Forschungsgesellschaft für Raumfinanzpolitik mbH (FORA) Bottrop.

[26] http://www.wegweiser-kommune.de/global/wegweiser/Wegweiser.action?renderZielsetzung& (March 2010).

Figure 11 Homepage of the "Wegweiser Kommune": Data and Projections (Excerpt)

Source: http://www.wegweiser-kommune.de/datenprognosen/DatenPrognosen.action?gkz=15003000.

The regional database combines statistics from domains such as demography, economy and employment, housing, education, finance, social situation and integration. More than 250 socio-economic indicators are included in the database and available for most of the municipalities in Germany. The database combines statistics from the Federal Statistical Office and the Statistical Offices of the Länder, the Federal Employment Agency, infas GEODaten GmbH, Stifterverband Wissenschaftsstatistik and Central Register of Foreigners (AZR). Based on demographic data from the Federal Statistical Office and the Statistical Offices of the Länder, population projections with a projection horizon up to 2025 are calculated on level of municipalities and districts. The reference data for the projections are birth, death and (interregional and international) migration statistics of the years 2003 till 2006.

Besides the regional population projection and the database, the Bertelsmann Foundation also benchmarked German regions using data from the database and the projection. The chosen benchmarking method is a classification of municipalities realised with different types of cluster analysis (Behrensdorf 2007).

Data used for the cluster analysis are:
1. change in population size 2003 to 2020*;
2. median age 2020*;
3. centrality of work area 2003 (ratio employed people at place of work to employed people at place of residence);
4. change in employment rates 1998 to 2006;
5. unemployment rate in percent 2003;
6. municipal tax receipts per inhabitant (average of 2000 to 2003);
7. percentage of persons with high qualifications in percent 2003;
8. percentage of persons in multi-person-households with children in percent 2003.

All data marked with * are outcomes from the population projection.

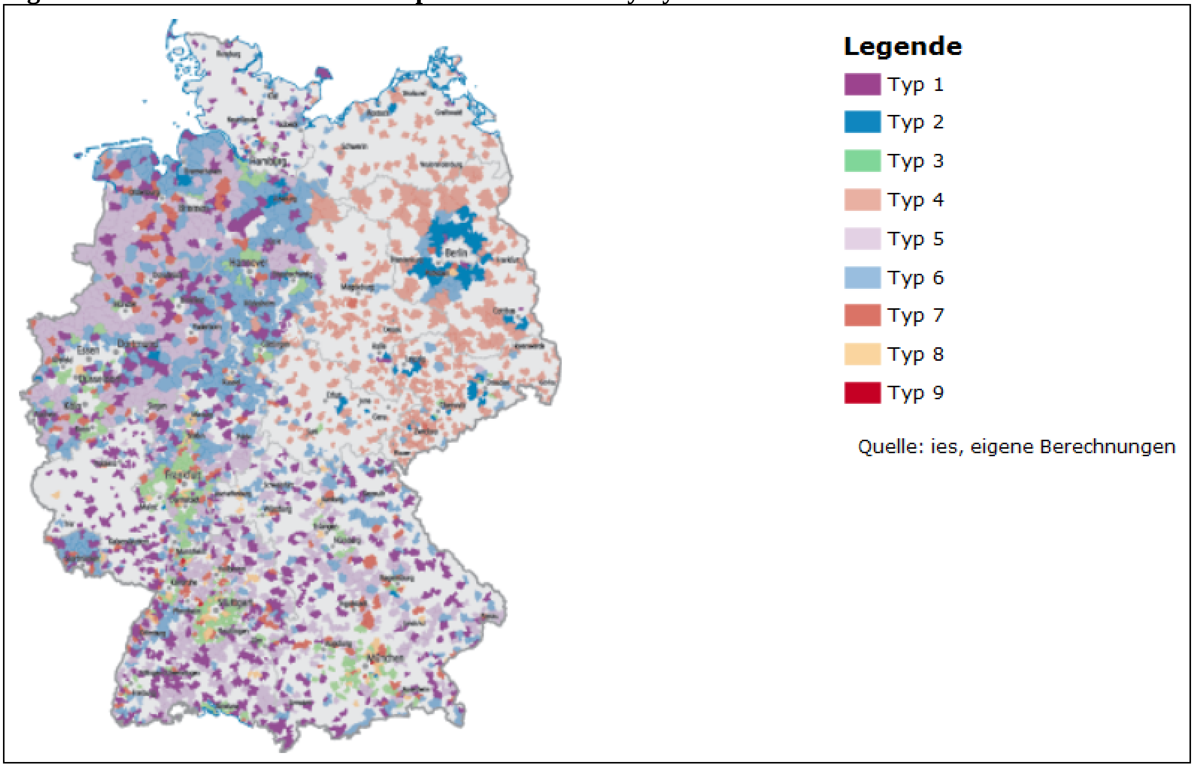
The classification of clusters was defined separately for regions with more than 100,000 inhabitants (large cities) and regions with 5,000 and up to 100,000 inhabitants (rural regions, small and intermediate cities). In total 6 demographic clusters are identified for the large cities (Type G1 to G6) and 9 clusters for municipalities (Type 1 to 9) with less than 100,000 inhabitants. Each of the clusters can be described by the factor loadings determined by the clustering method.[27]

The **municipalities (5,000 to 100,000 inhabitants)** for which valid data were available can be classified as follow (in brackets: number of regions in the cluster):
- type 1: Stable medium-sized cities and regional centres with a low percentage of families (514 regions);
- type 2: Suburban regions with high growth potential (90 regions);
- type 3: Suburban regions with negative growth potential (361 regions);
- type 4: Shrinking and ageing cities and municipalities with high out-migration (352 regions);
- type 5: Stable cities and municipalities in rural regions with a high percentage of families (740 regions);
- type 6: Cities and municipalities in rural regions with low dynamics (579 regions)
- type 7: Prospering cities and municipalities in rural regions (165 regions);
- type 8: Cities and municipalities with good economic performance and a high centrality of work area (70 regions);
- type 9: Special locations (overall good performance, but entirely different from all other types, 5 regions).

Regions of type 4 show the most negative trends of ageing and shrinking of population, mostly due to a high out-migration. In this cluster, almost every municipality is located in Eastern Germany (332 of 352 regions). Only 20 regions are part of West Germany (concentrated in North Western Germany). The characteristics of this cluster are a low percentage of children and young people and a high percentage of old people, a high out-migration of people aged 18 to 30 (especially young females or people with a high qualification; "brain drain") and a very low economic performance. To a greater extent than most of the other regions in Germany, regions classified as Type 4 are currently and prospectively confronted with the challenges of demographic change.

[27] http://www.wegweiser-kommune.de/datenprognosen/handlungskonzepte/Handlungskonzepte.action? (accessed March 2010).

Figure 12 Classification of municipalities in Germany by the Bertelsmann Foundation



Source: Bertelsmann Foundation, Institut für Entwicklungsplanung und Strukturforschung GmbH.

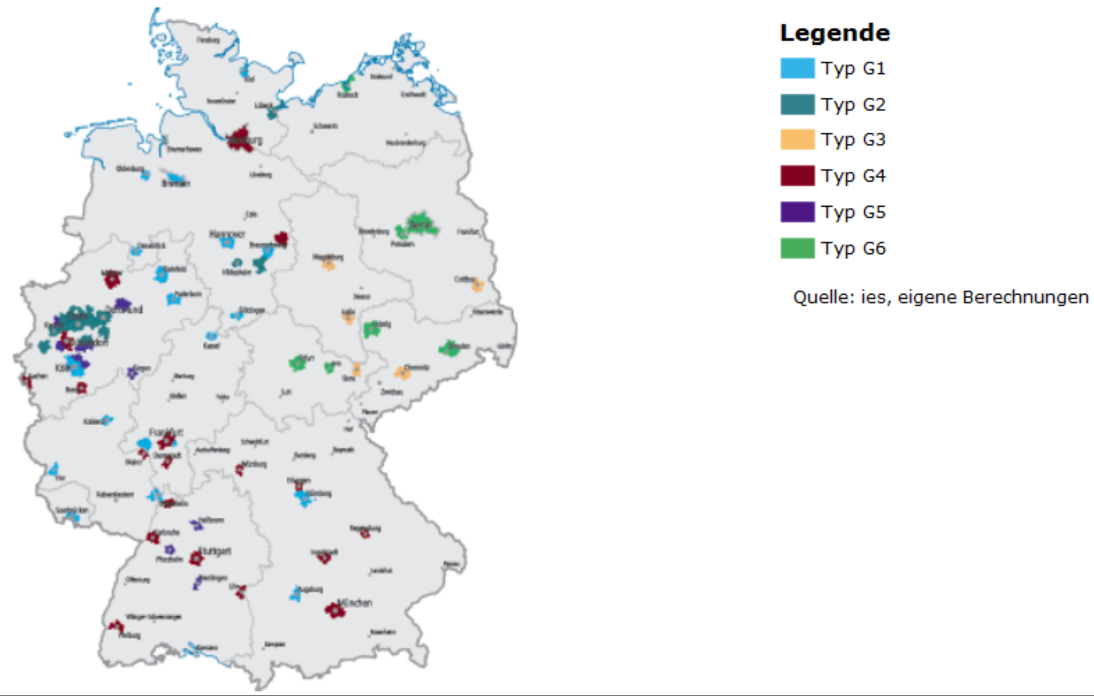
For **major cities** in Germany **(more than 100,000 inhabitants), t**he Bertelsmann classification also regards the extent of demographic change. The major cities are categorised in 6 types:

- type G1: Stable major cities with a low percentage of families (21 regions);
- type G2: Shrinking major cities in post-industrial transformation (19 regions);
- type G3: Shrinking and ageing major cities in Eastern Germany (5 regions);
- type G4: Prospering economic centres (19 regions);
- type G5: Stable major cities with a high percentage of families (11 regions);
- type G6: Upcoming major cities with growth potential (7 regions).

In the major city classification, the type G3 is the equivalent to type 4 of the municipality typology. Five cities in East Germany are classified as regions with profound trends of ageing and shrinking. These cities are mainly relatively small and apart from agglomeration areas. Besides the demographic trends, the Bertelsmann Foundation identified structural deficits in the process of economic reorganisation since the social and economic transition in the 1990s, which intensify the policy challenges in these urban regions.

For each of the clusters, regional demographic profiles are offered which combine information based on the socio-economic indicators and general advices for local authorities. The advices that are developed by employees of regional planning agencies are available for each type of cluster.

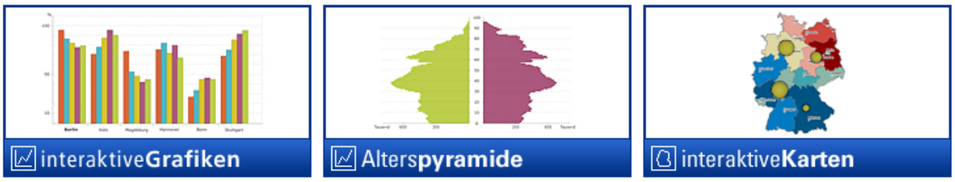
Figure 13 Classification of major cities in Germany by the Bertelsmann Foundation



Source: Bertelsmann Foundation, Institut für Entwicklungsplanung und Strukturforschung GmbH.

Figure 14 Example of comparing regions by the WK database of the Bertelsmann Foundation in regard to demographic statistics (Excerpt)

Demographische Entwicklung / Bevölkerungspotenzial



Über Icons in der Tabelle können Sie Grafiken und Karten einzelner Indikatoren aufrufen.

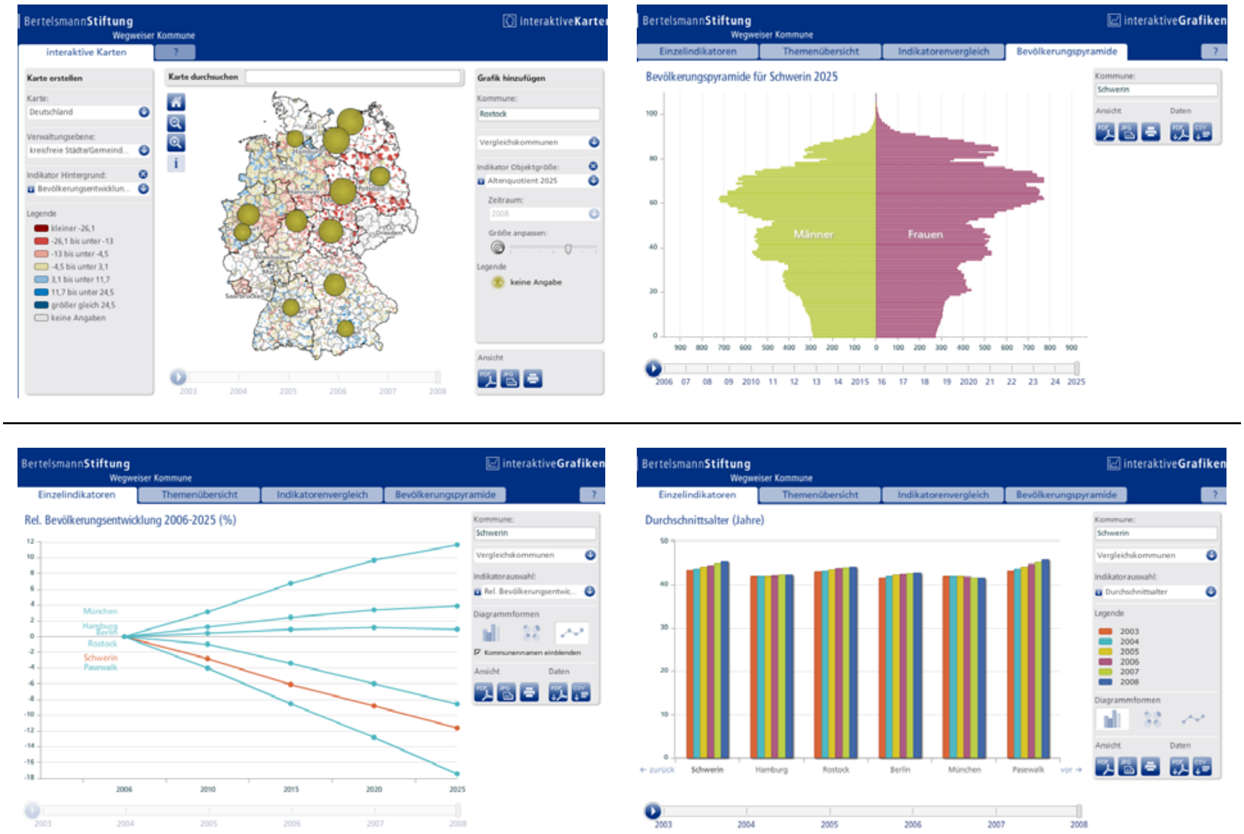
Download (pdf)
Download (csv)

Indikatoren	**Schwerin**	Magdeburg	Rostock	Köln	Hamburg	Berlin
Bevölkerungszahl 2008	**95.551**	230.047	201.096	995.420	1.772.100	3.431.675
Demographietyp	**Typ 4 (pdf)**	Typ G3 (pdf)	Typ G6 (pdf)	Typ G1 (pdf)	Typ G4 (pdf)	Typ G6 (pdf)
Bevölkerungsentwicklung vergangene 7 Jahre (%)	**-4,4**	0,1	1,1	2,8	2,6	1,3
Bevölkerungsentwicklung 2006 bis 2025 (%)	**-11,6**	-7,3	-8,6	5,8	3,9	0,9
Frauenanteil an den 20- bis 34-Jährigen (%)	**47,9**	47,9	47,5	52,5	50,6	50,1
Fertilitätsindex (%)	**-1,1**	-6,9	-9,9	-8,2	-11,6	-11,2
Ausländeranteil (%)	**3,9**	3,4	3,9	16,5	13,8	14,0
Familienwanderung (Pers. je 1.000 Ew.)	**-4,2**	-2,9	-6,0	-6,4	-1,5	-3,8
Bildungswanderung (Pers. je 1.000 Ew.)	**1,7**	86,3	62,4	86,3	65,7	50,7
Wanderung zu Beginn der 2. Lebenshälfte (Pers. je 1.000 Ew.)	**0,9**	0,1	0,6	-5,1	-4,6	-3,8

Source: Bertelsmann Foundation and Project Partners.

A major advance of the WK project of the Bertelsmann Foundation is the public accessibility of detailed municipality-specific information and statistics. Each municipality and city included in the database can be compared with other selected regions in regard to a huge range of social, demographic and economic indicators. Additionally, graphs and maps can be displayed and designed for specific indicators and for specific spatial levels (municipalities and cities, districts, and federal states). By mapping selected indicators, spatial differences can be detected and analysed. Scatter plots integrated in the graphic tool can be used e.g. to study potential relationships between different indicators (such as demographic effects on economic performance) or to identify specific divergences between the regions (such as heterogeneous region-specific demo-economic interrelations). For most of the regions, population pyramids of current and projected population and time-series data are available.

Figure 15 Examples of mapping and plotting regional statistics with the WK database



Source: Bertelsmann Foundation and Project Partners.

The variety of presentation and benchmarking features are advantages of the WK project. For every municipality and major city, demographic profiles and reports can be generated and downloaded. The reports offer a compact overview including the key facts such as current and projected population statistics, selected graphs, the demographic Type, and Type-specific advices for policy responses.

Unfortunately, all publications based on the WK project are only available in German language. An example of such a study is the regional report published by Neumann and Wiechmann (2008). In this publication demographic trends and regional disparities of Type 4 regions in Saxony, Saxony-Anhalt and Thuringia were analysed in detail. Potential and general policy strategies and fields of action in spatial planning policy were noticed and discussed in the report. Due to the fact that the policy responses are developed according to the German legal framework, applicability to other regions in Europe is limited.

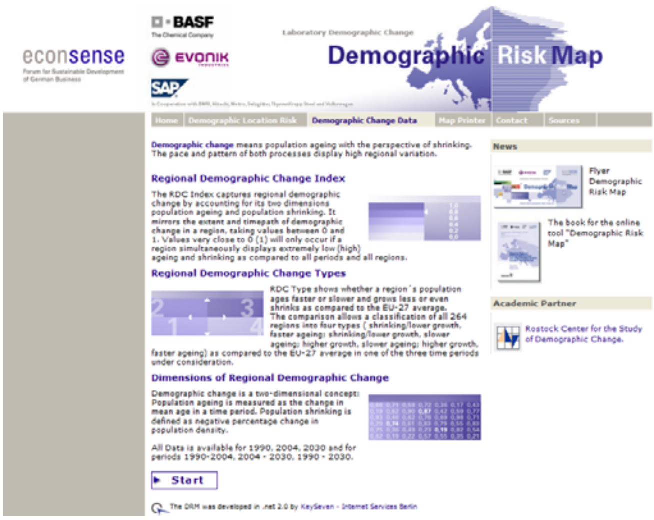
3.3.2.2 The Demographic Risk Map of the Laboratory "Demographic Change"

Another example of a policy relevant benchmark is the Demographic Risk Map of the Laboratory "Demographic Change". The Laboratory "Demographic Change" is a European network of business corporations (like BASF, Evonik and SAP), Econsense (the Forum for Sustainable Development of German business) and the Rostock Center for the Study of Demographic Change under the patronage of the then EU Commissioner for Employment, Social Affairs and Equal Opportunities Vladimír Špidla[28]. The academic partner of the Laboratory is the Ageing Labour Force unit of the Rostock Center which developed the Demographic Risk Map (DRM) and is responsible for the preceding research for data and methods. The DRM was published in May 2008.(cf. Tivig et al. 2008).

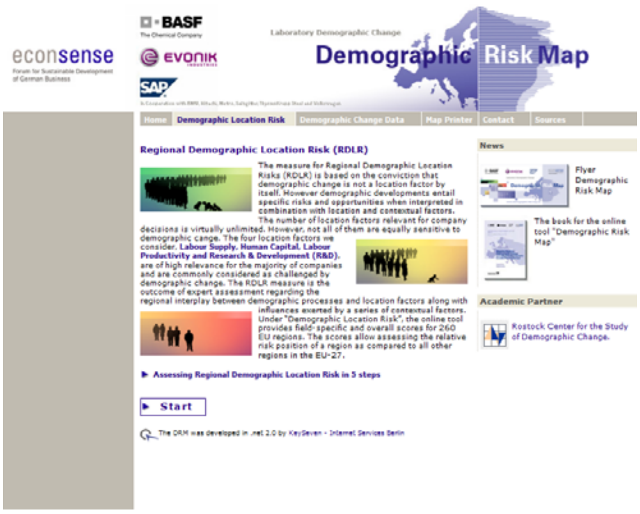
The Demographic Risk Map shows demographic developments in Europe and their strategic challenges for business companies (e.g. in terms of sustainable personnel policies in Europe[29]). The DRM is interested in the business perspective of demographic change as it mainly addresses economic actors and business planners (Tivig et al 2008). But due to the strong interrelation of economic performance and a wide range of policy relevant aspects, the DRM is also of value for policy makers or social researchers.

The widened perspective on regional demographic trends and resulting local risks are the most important advantages of the DRM. As shown in the last chapters, international comparisons on the macro level alone are insufficient to obtain a complete picture of the social and economic divergences. The results and the basic data are also included in this note. The broad accessibility of the benchmarking results (e.g. online access) and the way of presentation by mapping are additional features of the DRM.

Figure 16 Website of the Demographic Risk Map: portals to the RDC and the RDLR Index



Source: http://www.demographic-risk-map.eu/intro_demographic_change.aspx



Source: http://www.demographic-risk-map.eu/intro_demographic_risk.aspx

From a methodological point of view, the main advantages of the DRM consist of the quality of data used and the self-developed methods and their documentation. To ensure scientific conformability, all information is available in a methodological note. The following description of the DRM bases on Tivig et al. (2008).

All of the 264 NUTS 2 regions in the 27 countries of the European Union are covered in the DRM. The data used in the DRM is official statistical data from EUROSTAT and the

28 http://www.demographicchange.info/ (accessed March 2010).

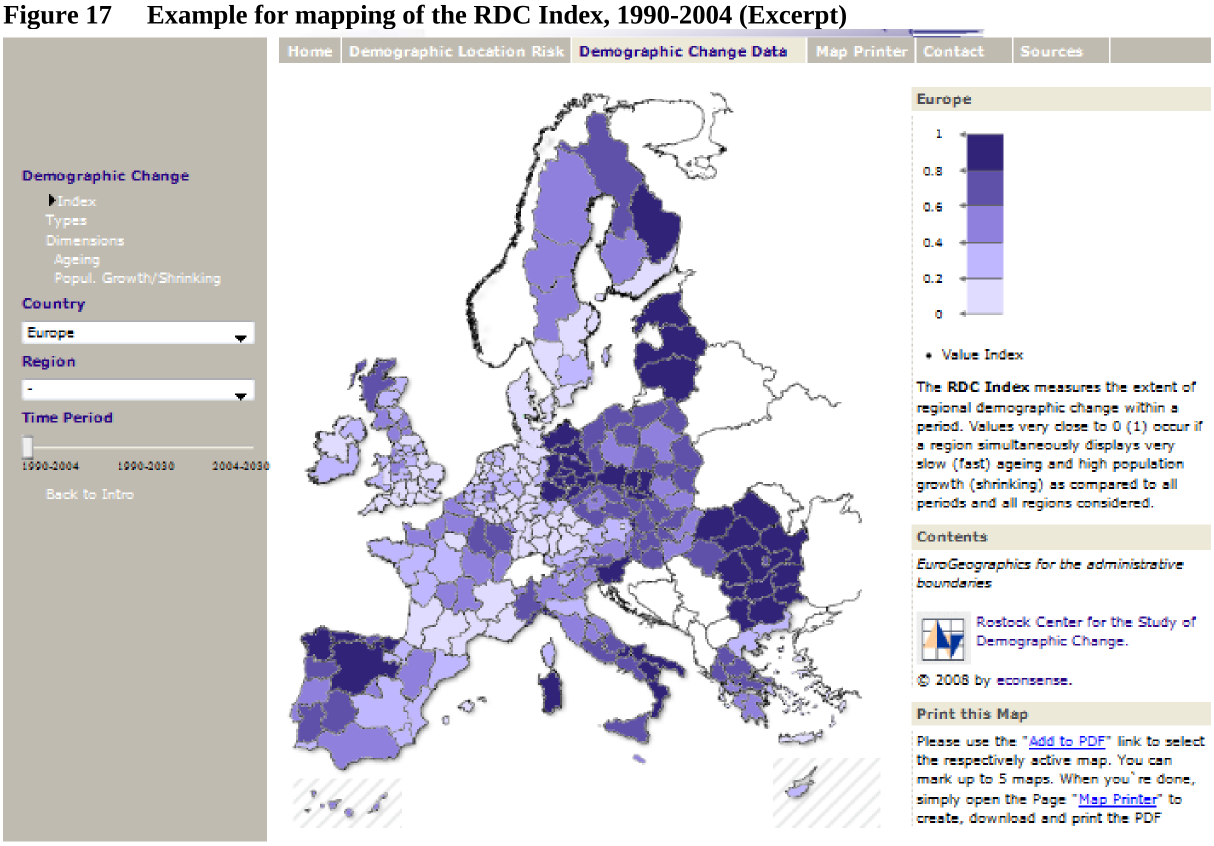
29 http://www.demographicchange.info/en_index.asp (accessed March 2010).

National Statistics Offices of the included countries. So a high quality of data (depending on indicator and country) can be expected.

The methodological approach and the underlying theoretical concept of the DRM and its outcome are described in detail in the next section. The chosen benchmarking method is a combination of indices and a classification based on an index. As a result two indices and a demographic typology of regions are newly introduced to the DRM: the Regional Demographic Change (RDC) index, the Regional Demographic Location Risk (RDLR) index and the Regional Demographic Change typology (RDC Type).

The index of Regional Demographic Change (RDC) is a ranking of regions in respect to processes of demographic change. Two dimensions of demographic change are covered by the index: the change in regional population size (growth, shrinkage or stagnation) and the change in population age (paces of ageing). The selected indicators are population density (computed by population number and size of region) and the mean age of the population. The statistical material is available for 1990, 2004, 2030 and the periods in-between. Due to missing data in 1990, extrapolations were done for some regions. Data of future trends (until 2030) is based on the regional population projection of EUROSTAT (chapter 2) except for France and the United Kingdom where population projections of the particular national statistical offices were used for the regions. The demographic benchmark of all regions in Europe is computed separately for three periods: the past (1990-2004), the future (2004-2030) and the entire period (1990-2030).

Figure 17 Example for mapping of the RDC Index, 1990-2004 (Excerpt)



Source: EUROSTAT and National Statistics Offices; calculations by Tivig et al. (2008). EuroGraphics for the administrative boundaries, http://www.demographic-risk-map.eu/demographic_change.aspx (accessed March.2010).

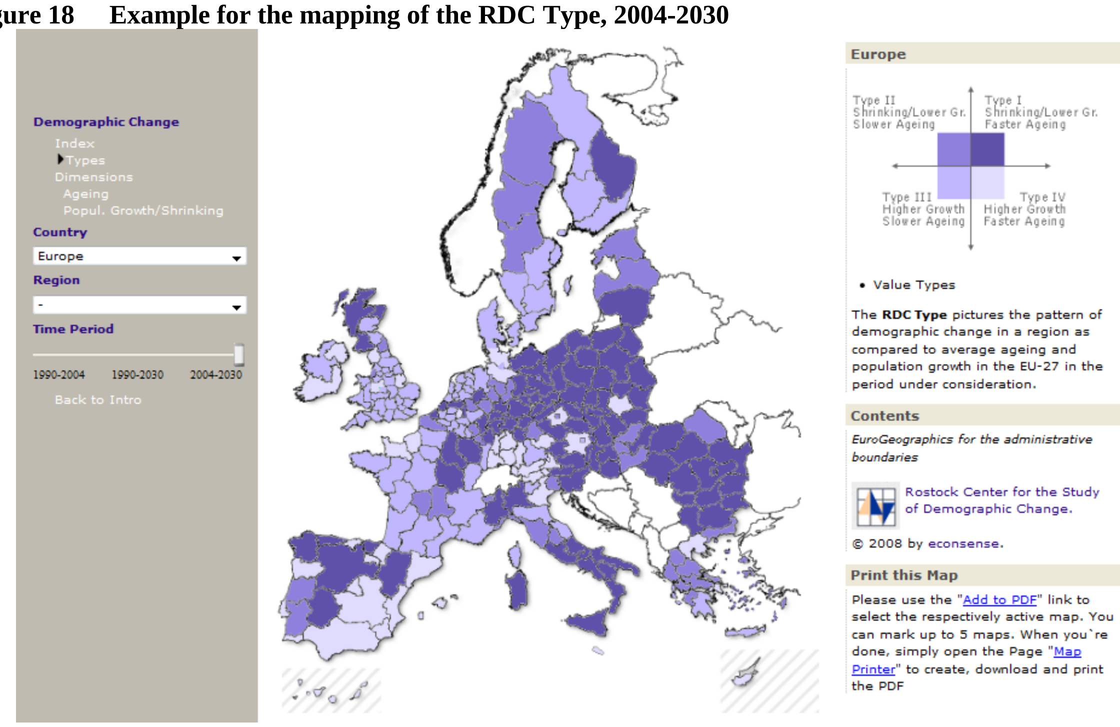
The index is computed by using rescaled yearly average changes in regional population density and mean age. Both indicators are weighted equally. Values of the RDC range from 0 (low ageing and shrinking) to 1 (high ageing and shrinking). An index value of 0.5 can be observed for regions with fast ageing and growth/lower shrinking (e.g. Andalucía, ES), slow ageing and high shrinkage (e.g. Estonia) or moderate trends in changes of population size and age (e.g. Haute-Normandie, FR).

For the entire period, best values were stated for Luxembourg, Inner London (UK), Utrecht (NL) and Midi-Pyrenées (FR). The most unfavourable trends are displayed for Centru (RO), Opolskie and Slaskie (PO), some of the East German regions and Asturas (SP). By comparing past and future trends, the RDC index indicates the strongest impacts on regions in North-Eastern Scotland, Ceuta and Melilla (ES) and many German and Austrian regions. Besides mapping the composite index, trends in population change and ageing can also be displayed and mapped separately for different periods on the website. [30]

Based on that index or rather the two dimensions included, a classification of regions was developed. In the Regional Demographic Change (RDC) typology, regions are differentiated by their demographic trends compared to the EU-27 average. This requires z-standardization of yearly average changes in population age and size of each region and location in a matrix. The centre of that matrix represents the EU-27 average in both indicators. The regions are classified into the four quadrants of the matrix and so four types can be identified:

RDC Type 1: Regions with *negative/lower population growth* and *faster ageing*
RDC Type 2: Regions with *negative/lower population growth* and *slower ageing*
RDC Type 3: Regions with *higher population growth* and *slower ageing*
RDC Type 4: Regions with *higher population growth* and *faster ageing*

Figure 18 Example for the mapping of the RDC Type, 2004-2030



Source: EUROSTAT and National Statistics Offices; calculations by Tivig et al. (2008). EuroGraphics for the administrative boundaries, http://www.demographic-risk-map.eu/demographic_change.aspx (accessed March 2010).

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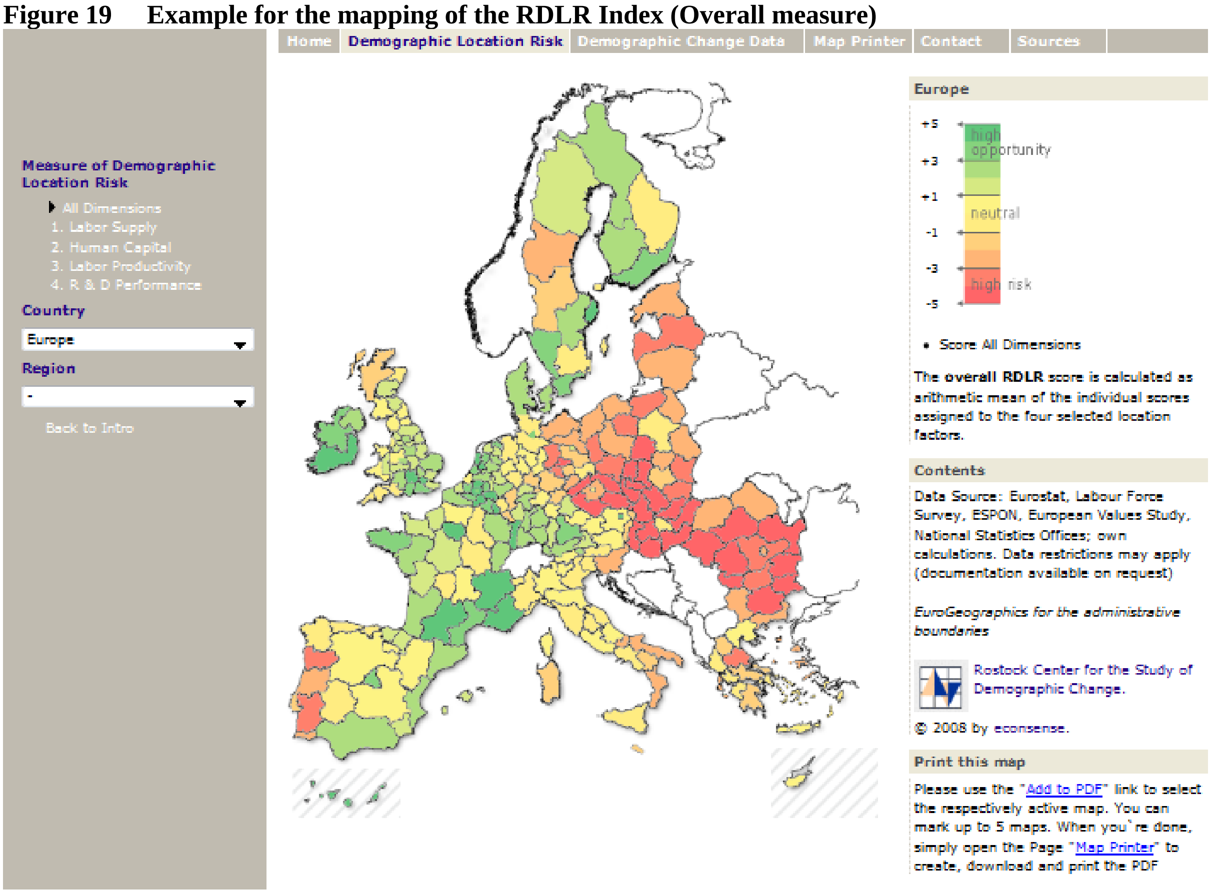
[30] http://www.demographic-risk-map.eu/ (accessed March 2010).

This classification allows for a better understanding of the trends in the two demographic dimensions. So it is possible to evaluate the accounts of changes in population size and age and their effects on the RDC index. For example ageing has a higher impact on regions in Southern and Eastern Spain than on most of the Greek regions with nearly the same value in the RDC. In conclusion, shrinkage is the strongest influence on demographic change in the Greek regions. Even other examples could be found to underline the advantages of that measurement.

The second benchmark measure is the Regional Demographic Location Risk (RDLR) index. The basic idea of the measure for Regional Demographic Location Risks (RDLR) presented in Tivig et al. (2008) is to combine information about demographic developments with location and contextual factors in contrast to treat the demographic change as a location factor.

Four location factors with high relevance for the majority of companies are taken into account when constructing the index: Labour Supply, Human Capital, Labour Productivity and Research & Development (R&D). These four factors are generated from 20 different indicators of location, demographic characteristics and contextual influences. The selection of indicators and composition of factors is the result of expert assessment. The indicators are taken or calculated from EUROSTAT, National Statistics Offices, the Labour force survey, ESPON and the European Values Study. Melilla, Ceuta (ES), the Azores and Madeira (P) had to be excluded from the measure due to missing data. Most of the indicators, especially the contextual, measure fixed states (static information for the last year data is available). For some indicators like the demographic, expected changes until 2030 are used.

Figure 19 Example for the mapping of the RDLR Index (Overall measure)



Source: EUROSTAT and National Statistics Offices; calculations by Tivig et al. (2008). EuroGraphics for the administrative boundaries, http://www.demographic-risk-map.eu/demographic_risk.aspx (accessed March 2010).

A scoring system is employed to calculate the factors. Then the relative risk position for each region is assessed by comparison with all other regions in the EU-27. These indicator-specific scores will be combined into a score for the corresponding factor. The arithmetic mean of all four factors of each region equals the specific RDLR measure.[31]

The values of the RDLR index, like the values of the four factor scores, range from -5 (highest risk compared to the other regions) to +5 (highest opportunities in comparison to all other regions). As a result, strong regional discrepancies in location risk are observable. The entire period (1990-2030) shows a profound East-West-Divide. Highest opportunities are shown in Benelux and Ireland, in Denmark, the urban regions in Sweden and Finland, in France, Central England, Southern and Eastern Spain, Western Austria, and Southern Germany. Also the capital or major city regions (like Madrid, Hamburg, Vienna, London) are marked by high opportunities. In contrast, high and moderate risks are measured for regions in Portugal and Greece, North-Western Scotland, Eastern German regions and for almost every region in Eastern and Central Eastern Europe.

To get a deeper insight for the reasons of differences in risks and opportunities, the factor-specific benchmarks of the regions should be noticed. On the website, these scores can be mapped for the 260 regions.

Additional to the facts on the website, the Demographic Risk Atlas was published in 2009. In Tivig & Kühntopf (2009), a profound profile is compiled for every region in the EU-27. It is an interesting source of information not only for business planners, but also for local policy makers.

3.3.3 Evaluation of the pros and cons of benchmarking

The previous paragraph outlined two examples of regional benchmarks, data sources, methods, key results and literature based on the analyses. The basic objective of policy relevant regional benchmarks is to compare selected spatial units as municipalities, cities or NUTS 2 regions in regard to one or more dimensions (e.g. social, demographic or economic). As a result, regions can be classified and ranked according to the benchmarking issue (e.g. in regard to impacts of demographic change on population structure or location risk). The major objective of policy-relevant benchmark is to detect the specific determinants of divergences in benchmark positions. Regions with more favourable benchmark results than most of the others can be assumed as examples of "good practice". An analysis of the determinants (e.g. specific local policy measures, economic initiatives, characteristics of location) is a helpful tool to evaluate and consider future regional planning strategies or policy responses. Thus, benchmarking could be a starting point in the search for reasons of social and economic regional differences and for potential policy interventions. Based on benchmarking results, policy advice can be compiled by expert assessment, as done in the "Wegweiser Kommune".

However a critical reflection of benchmarking should not be omitted in the evaluation.[32] In the introduction of the third chapter, the basic steps of benchmarking methods were presented. Each step requires choices which can be criticised, especially when these choices are unfounded (e.g. do not base on a scientific theory). The following paragraph focuses on criticisms regarding the choice of indicators, methods and interpretation.

[31] More detailed information on that complex scoring method can be found in Tivig et al. (2008).
[32] An overview and a critical discussion of potentials and limitations of international benchmarking can be found in Lundvall & Tomlinson (2001).

From a methodological point of view, the selection of methods is a central point of criticism. Each method differs in terms of basic assumptions. Each assumption as the choice of included indicators, chosen reference group, cutting points or weights of indicators has a direct effect on the benchmark results. Thus, the inclusion or exclusion of indicators, changes in cutting points and reweighing of indicators can lead to a substantially different ranking.

The choice of indicators should be reflected on especially according to the assumed meaning as a benchmark parameter. Due to the fact that most of the regional, social or economic benchmarks have the effort to cover various relevant aspects in one measure, indicators for these aspects have to be defined and selected for the benchmark. However, the required selection of indicators can hardly represent social realities because most of the relevant aspects are very complex and strongly interrelated. Therefore reality has to be oversimplified, to an extent, that interpretations of the benchmark results have to be discussed thoroughly.

In addition, the choice and interpretation of relevant indicators and benchmark results is mostly very normative. When benchmarking economic location risk, for example, population ageing can hardly be interpreted as a bipolar indicator (like higher population age means a higher location risk). So, higher population age could also be an opportunity e.g. in terms of services and requirements of elderly people. The interpretation of indicators also has to be considered when interpreting the benchmark results. Regions with unfavourable benchmark results could have potentials that are not included in the benchmark (e.g. due to missing data for "soft" location factors) (Seidel-Schulze & Grabow 2007).[33]

In conclusion, benchmarks have to be discussed critically especially according to the interpretation of the results and covered parameters. However, if these issues will be considered and limitations of interpretation are mentioned, benchmarking is a useful tool for policy decisions. Frequently repeated benchmarks (based on unchanged assumptions and methods as in monitoring processes) could be helpful to evaluate specific policy measures in a chronological context. This could be of future value for policy-relevant social, demographic and economic benchmarking of regions and cities confronted with the challenges of demographic change.

3.4 Illustrative development of a demographic benchmark for European cities

This last part of the Research Note illustrates how regional databases can be used for demographic benchmarking. A (simple) demographic index was built using the database of the Urban Audit to demonstrate the benchmarking method. In conclusion an overview of the results of the Urban Demographic Change index (UDC) will be presented and problems (e.g. selection of data source and methods) will be discussed briefly.

3.4.1 Demographic trends in European cities

In the European Union (EU-27) nearly three quarters of the population lives in cities with more than 5,000 inhabitants (Feldmann 2008). Thus, urban policy is one of the key issues in regional policy of the European Union. Cities are very special spatial entities marked by high population density, ethnic diversity, economic and academic performance, cultural and political importance in a region and above. Cities are mostly characterized by a very high attractiveness as main place of residence and working which had a strong influence on (mostly very selective) migration flows. Cities still attracting people living in the surrounding

[33] Different benchmarking methods (like the new dashboard tool) will be presented and discussed by Seidel-Schulze & Grabow (2007). Additionally, the usability of the EUROSTAT Urban Audit for benchmarks will be evaluated.

regions (e.g. the rural hinterland of a city), but cities are often also destinations for international migrants. There are many different reasons why people move to a city. Examples are economic/occupational, social/sociological, biographical/ individual and infrastructural/policy-based aspects, same as the expected associated improvements in quality of life and living conditions.

In the history of European cities, divergent dominant trends of change in urban population size and composition by fertility, by mortality and (especially) by migration can be detected. After a long period of rural-urban-migration (urbanisation) with its explosive increase since the beginning of the industrialisation, growth of most cities levelled or stagnated. Instead of an ongoing urbanisation, trends of disurbanisation, means a distinct urban out-migration, took place in many cities. Different types of disurbanisation and urban deconcentration can be differentiated by the destination of out-migrants: counter and suburbanisation. Counter urbanisation means "an above-average growth in population and employment" in rural regions, which are not "directly border upon urban centres" (Panebianco & Kiehl 2003). On the other hand, suburbanisation is the "above-average growth of population and employment" (ibid) in peripheral, suburban regions (urban hinterland). In newer urban studies, trends of reurbanisation can be observed.

As all forms of volitional migration, these interregional migration flows are highly selective, e.g. in terms of age and socio-economic status. Thus, the social and demographic composition of resident population differs substantially between urban, suburban or peripheral, rural regions. But demographic and socio-economic disparities are even immanent within the cities and their quarters. Social-cultural changes like simultaneous urban gentrification or ghettoisation processes had an ongoing impact on sub-city diversity. International migration also had a very strong impact on the composition of a population in a city or in a city quarter. Initiatives and incentives for acculturation and integration of international migrants in society in urban regions are very vital to intervene in trends of urban (ethnic) segregation and social exclusion.

Most of these trends in demographic and social composition of urban populations are very sensitive to contextual changes like alterations of land costs or change of environmental, economic and infrastructural conditions. One notable example of how changes in social, political and economic conditions influenced the social and demographic composition of urban regions is the natural experiment of accelerated demographic change in the Eastern and Central Eastern European countries in the 1990s onwards (Steinführer & Haase 2007).

Furthermore, policy interventions of local authorities are able to directly or indirectly influence some of these conditions. But the influence of policy often cannot be measured immediately. Instead social and demographic developments can indicate the underlying economic and policy conditions and their influence on the quality of life of the inhabitants. One evaluation method has been explained in the former chapters: the benchmarking or ranking measures.

In literature some examples for urban benchmarks can be found. One example is the fDi Magazine's Cities and Regions of the future 2010/11 ranking published in February/March 2010 (fDi 2010). 223 cities and 142 regions in Europe are included in the fDi benchmark. The criteria of this ranking are mainly focused on economic aspects and include economic potential, human resources, cost effectiveness, quality of life, infrastructure and business friendliness (and a self-developed category: the "FDI promotion strategy" submitted by a judgment panel). The chosen method is a score that is not explained in detail by the authors.

A different policy-relevant social sector was taken into account in a benchmark of the INTI-Cities project, coordinated by EUROCITY and other international institutions.[34] The final report of the INTI-Cities project contains a newly developed benchmark of integration governance in selected European cities. This benchmark is based on the peer-review process.

These are only two different examples, how to benchmark cities in Europe in regard to selected social aspects. In the following part, a benchmark of European cities will be developed focusing exclusively on demographic changes. The main goal of that chapter is to explain the stages of the benchmark and discuss the specific problems of this method.

3.4.2 Data and methods

At the beginning of a ranking some methodological aspects must be examined. Beginning with the selection of a proper data source, this benchmark uses the Urban Audit database due to the advantages explained in the last chapter.[35]

The Urban Audit database covers a wide range of social and demographic statistics and indicators. Inspired by and referring to the Regional Demographic Change (RDC) index of the Demographic Risk Atlas two dimensions of demographic change should be pointed out: the shrinkage and the ageing of population (Tivig et al. 2008). The data needed to measure the population change is the total number of residents (de1001i) for at least two different years. On the other hand population ageing could only be included by using an indicator. A frequently used ageing indicator is the so called old age dependency ratio (OADR), which is the ratio of persons aged 65 years and older to persons aged 20 to 65. The Urban Audit database offers the OADR for different years, named as demographic old age dependency (de1060i).

The predefined geopolitical entities for the benchmark are the core cities, because it is the basic level in the Urban Audit database with the highest availability of data. The problems of this choice will be discussed in a later stage. The time period ranges from 1989 to 2006, but differs substantially between the cities and less between the indicators.

Like in the Demographic Risk Atlas the benchmark method will be realized by the construction of a composite index which will combine the two dimensions of demographic change (size and age of urban population). All calculations can be realized by using spreadsheets like Microsoft Excel.

Step 1: In the first step of the index construction, the absolute changes in urban population size (ΔP) and age (ΔA) for each city i will be calculated by the following formulae:
Absolute change in urban population size: $\Delta P_i = P_{i,t} - P_{i,s}$
Absolute change in urban population age: $\Delta A_i = A_{i,t} - A_{i,s}$
The absolute change in urban population size is the difference of population size P in the first (s) and the last year (t) for which data is available in the Urban Audit database. The absolute change in urban population age is measured in the same way by using the old age dependency ratios (A). An increase in the old age dependency ratio is defined as ageing and a decrease in population size as population shrinkage. Due to the lack of data for many cities, the first and last observation years differ between the cities and the indicators. Explanations for this approach and problems with city- and indicator-specific observation periods will be discussed shortly in the next chapter.

34 http://www.migpolgroup.com/publications_detail.php?id=182/ (accessed March 2010).

35 More precisely: the downloadable database is used (http://europa.eu/estatref/download/everybody/data/ (accessed March 2010).

Step 2: Because of these problems, the absolute changes will be standardised by dividing by the city-specific observation period (t_i-s_i). The following formulae are used for the calculations:

Standardised annual average change in population age: $\overline{\Delta}A_i = \frac{\Delta A_i}{t_i - s_i}$

Standardised annual average change in population size: $\overline{\Delta}P_i = \frac{\Delta P_i}{t_i - s_i}$

These standardized indicators can be interpreted as annual average changes in population size and age.

Step 3: In the next step the standardised indicators should be normalised to the interval [0,1]. By the way, interfering effects of outliers should be eliminated. Like in Tivig et al. (2008) a slightly modified maximin-procedure will be used which is based on indicator-specific minimal and maximal values (Nardo et al. 2005, p. 18-20). This method sets the normalised and rescaled indicators $\left(\tilde{\Delta}A_i\right)$ to one for cities with standardised annual average changes equal or higher than the 90-percentile and zero for cities with values equal or lower than the 10-percentile. Values between the 10- and 90-percentiles are usually normalised. The following formulae are used for the calculations (Tivig et al. 2008):

$$\tilde{\Delta}P_i = \begin{cases} 0 & \text{for } \overline{\Delta}P_i \leq \Delta P_{10\%} \\ \dfrac{\overline{\Delta}P_i - \Delta P_{10\%}}{\Delta P_{90\%} - \Delta P_{10\%}} & \text{for } \Delta P_{10\%} < \overline{\Delta}P_i < \Delta P_{90\%} \\ 1 & \text{for } \overline{\Delta}P_i \geq \Delta P_{90\%} \end{cases}$$

$$\tilde{\Delta}A_i = \begin{cases} 0 & \text{for } \overline{\Delta}A_i \leq \Delta A_{10\%} \\ \dfrac{\overline{\Delta}A_i - \Delta A_{10\%}}{\Delta A_{90\%} - \Delta A_{10\%}} & \text{for } \Delta A_{10\%} < \overline{\Delta}A_i < \Delta A_{90\%} \\ 1 & \text{for } \overline{\Delta}A_i \geq \Delta A_{90\%} \end{cases}$$

Step 4: The last steps in the development of the index are similar to the Regional Demographic Change index in Tivig et al. (2008), but in the next step the indices differ. Contrary to the RDC index, a weighting factor will be included in the Urban Demographic Change index. When comparing the Urban Audit cities in regard to ageing process, a very strong increase in percentages can be stated for some cities. However, some of these cities still have a very young age structure, especially the cities in Eastern and Central Eastern Europe and Turkey. To incorporate changes and the stage of age structure of the urban population, the standardized and normalized average annual changes in population age get weighted by the state of old age dependency ratio in the last available year t of city i ($SA_{i,t}$). The weighting factor will also be normalised. The calculation is as follows:

$$\tilde{S}A_{i,t} = \begin{cases} 0 & \text{for } A_{i,t} \leq A_{t,10\%} \\ \dfrac{A_{i,t} - A_{10\%}}{A_{90\%} - A_{10\%}} & \text{for } A_{t,10\%} < A_{i,t} < A_{t,90\%} \\ 1 & \text{for } A_{i,t} \geq A_{t,90\%} \end{cases}$$

Step 5: In the last step the three indicators will be combined into the Urban Demographic Change index. A growing number of residents and a declining old age dependency ratio

should be interpreted as favourable developments, shrinking and ageing as unfavourable trends. Due to a different direction of the demographic indicators, the last term will be subtracted from the population change indicator.
The formula of the Urban Demographic Change index for city i is stated below:

Urban Demographic Change index: $UDC_i = \widetilde{\Delta}P_i - \left(\widetilde{S}A_{i,t}\right) \cdot \widetilde{\Delta}A_i$

Changes in age structure have a high influence on the index in cities in an advanced stage of ageing. On the other hand, the change in population size has a higher impact on the index for cities with a young population.

The UDC index includes values from -1 (strongest effects of demographic change) to +1 (weakest effects of demographic change). The index has no interpretable units and is non-normalised. Thus, the mean of the index is not zero due to the inclusion of the weighting factor. However, the UDC is able to rank the cities and categorize them into percentiles, which allows for further comparisons.

3.4.3 Results of the urban benchmark

The Urban Demographic Change index (UDC) is available for 324 cities in 30 countries in Europe (including Turkey). Due to an unrecoverable lack of data 47 cities have to be excluded from the analysis. These exclusion are: one city in Belgium (Namur), one urbanized region in Malta (Gozo), one city in Slovakia (Trenčín) and the latest in the Urban Audit included cities in the Czech Republic (9 cities), Spain (7 cities), Italy (5 cities), the Netherlands (5 cities and 8 extra cities) and the United Kingdom (5 cities), as well as all the cities of the EU member candidate Croatia (5 cities).[36]

In the following map the UDC index is visualized for all 324 cities in Europe (including Turkey) and the overseas territories. Due to the conception of the index, percentiles seem to be the best type of classification and mapping. The 20 percent of cities with the strongest impact of demographic change are presented in orange and the 20 percent with the weakest impact compared to all Urban Audit members are dark blue coloured.

First of all a noticeable divergence between the cities in the old and the new member states of the European Union can be stated. Most of the Eastern and Central Eastern European cities (esp. in the Baltic States) show a comparative strong demographic impact, while the demographic change is mostly weaker for the Western and Northern European cities.

Among the new EU countries very low values of the UDC index are indicated for Riga and Liepaja in Latvia, Tallinn and Tartu in Estonia, Kaunas in Lithuania and Jelenia Góra in Western Poland. Besides the cities of the Baltic States, the Urban Audit predominantly ranks cities in Slovenia, Hungary, Bulgaria and Romania on lower positions.

Different demographic trends are visible for most cities in Western, Southern and Northern Europe. The cities among the Netherlands, the Scandinavian countries, France, Luxembourg, Greece, and the United Kingdom are top-seeded. In the old member states of the European Union best positions are achieved by Galway in Ireland, Palma di Mallorca, Toledo and Murcia in Spain, Oulu in Northern Finland, Braga in Northern Portugal, Toulouse and Montpellier in France, Tilburg and Utrecht in The Netherlands, and Irakleio in Greece.

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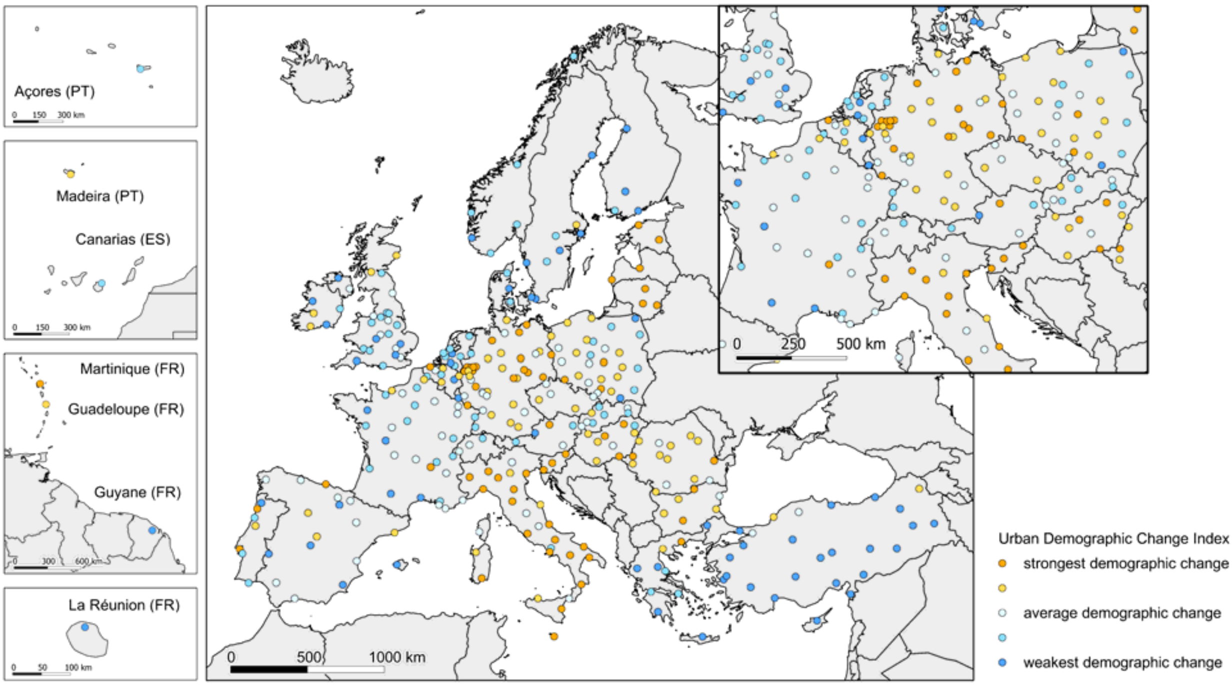
36 Also Large Urban Cities like Rostock (Germany) are included, if data are available.

But there are also strong exceptions from the East-West-Divide. The UDC index for German and Italian cities mainly is on an extreme low level and indicates a very unfavourable demographic development. Especially the Eastern German cities Schwerin, Magdeburg, Halle an der Saale, Frankfurt (Oder) and Rostock and the Italian cities Cagliari, Venezia, Torino, Roma, Taranto and Genova took the last ranks compared to the other Urban Audit members. West German cities, mainly the large cities in the Ruhr district, are only slightly better ranked than the Eastern German cities.

However, other cities in Western and Southern Europe show a similar exceptional demographic progress. Notable examples are Oporto and Lisboa (Portugal) Valetta (Malta), Kavala (Northern Greece), Santander (Northern Spain), Saint-Etienne (Central France), Brugge (Belgium), and Linz (Austria).

On the other hand age structure and number of inhabitants developed favourably in some cities of the new EU members as it can be observed in Lefkosia in Cyprus, Suwałki in Northern Poland and Nowy Sącz in Southern Poland.

Figure 20 Demographic benchmark of European cities by the Urban Demographic Change (UDC) Index



Source: EUROSTAT Urban Audit database, National Statistical Offices, own calculations and mapping. EuroGeographics for the administrative boundaries.

Among the members of the European Union, Norway and Switzerland, most of the cities within a country seem to be very homogeneous with only a few outliers. But a notable heterogeneity appears for Belgium, Portugal, Poland, Ireland, Spain and Austria, where some cities show favourable trends while others are very strongly influenced by ageing and shrinkage.

The cities of Turkey are a case of their own in regard to demographic trends. Almost every Turkish city is ranked at the top of the UDC index. The only exceptions are Kocaeli in the Marmara region, Zonguldak and Kastamonu in the Black Sea region and Kars in the North of Eastern Anatolia. An explanation for the deviant classifications of Kocaeli, Kars and Zonguldak is the shrinkage of population in these cities, while the number of inhabitants (partly extremely) increased in all other Urban Audit cities in Turkey. In contrast Kastamonu grows in inhabitants, but shows an advanced stage and high pace in terms of population ageing (highest old age dependency ratio in Turkey with an average annual increase of nearly 40 percent from 2001 to 2004).

Seven cities in the Urban Audit are located in the overseas territories of France, Portugal and Spain. Each city represents one of the so called Outermost Regions (OMR) of the European Union. The benchmark shows very divergent trends among this heterogeneous group. Funchal in Madeira (Portugal), Pointe-à-Pitre in Guadeloupe (France), and Port-de-France in Martinique (France) score low on the UDC index, while Ponta Delgada in the Açores (Portugal), and Las Palmas in the Canarias (Spain) are rated above the average, and Cayenne in Guyana (France) and Saint Denis in La Réunion (France) even reach the top positions. The two last-mentioned cities get these ranks due to high rates of population growth and a very young age structure of population.

To get more detailed information about the specific cities, the demographic trends and patterns and the ranks see Annex 1.

4 Discussion

In the following part, two major types of problems of the benchmark will be discussed: 1) problems caused by the data source and 2) problems due to the chosen benchmark conception and method. Both types are strongly interrelated.

The quality of a benchmark directly depends on the quality of the used data source. Although the Urban Audit database is a very complex data source of high quality, various problems with the available data have to be solved. A major limitation is the data coverage problem. Due to the young age of the database and the problems to coordinate the high variety of national statistical offices, data is missing for many cities, indicators and observation years. As a result of this, a balance of number of cities, observation years and indicators has to be found. The major aim of this benchmark was to include as many cities as possible. Thus, the number of included indicators was limited to two and the demand in observation years was defined as at least two. Due to those requirements there are often strong discrepancies in observation periods, even within the two dimensions of demographic change in a particular city. That is not only a problem with the dataset but also a problem in conception. Good examples are cities in Eastern Europe. For two countries (Lithuania and Estonia), data is available from 1989 on, a time before the profound social and political changes in the 1990s. Thus, period effects are covered for these cities, but not for the others, which had an influence on comparability and interpretation. The city-specific length of observation time differs extremely. For Paris in France, for example, an observation period of 16 years (1990 to 2006) can be stated, while data for Dublin in Ireland, for example, is available only for 2 years (2002 to 2004). Indicator-specific differences are even smaller (up to 5 years) and occur rarely.

A second notable problem with data is caused by choice of core cities as regional entities. Core cities are mostly very small administrative regions and consequently very sensitive to changes in boundaries. Redefinitions of cities as the amalgamation of suburban regions lead to alterations in social composition and influence indicators of almost every social sector. One example for this problem is the Belgian city of Liège. In the period from 1992 to 2004 the number of inhabitants of Liège grew from about 200.000 to over 360.000 people (an average annual increase of nearly 7 percent). However, this is an artefact caused by the expansion of the core cities of Liége from about 70 km² to nearly 180 km² in between 2001 to 2004. A possible way to handle such a problem (except from exclusion of cases/cities) would be to integrate a specific dealing with outliers done by a slightly modified maximin-procedure in this benchmark.

The range of methodological and conception problems of benchmarking is very wide. A major point of criticism is the choice of indicators. The indicators used for this benchmark must meet the requirements of high validity. That means that the indicators should measure what is planned to measure. The example of Liège showed that a change in population alone is not an indicator for changing demographic patterns, but also influenced by changed administrative definitions. The measuring method of population ageing by the old age dependency ratio could be criticized too. Alternative ageing indicators like the Ageing index, the mean or median age would possibly lead to another classification. Points of critique are furthermore obvious towards the general underlying assumption of linear demographic trends. The use of average annual rates calculated only with two observation points (years) indirectly assumes highly generalized and simplified dynamic processes. Seasonal variations or onetime outlier effects (e.g. in unemployment rate) could bias the analysis and can be replaced by using more than two observation points.

The last point of criticism concerns the calculation and interpretation of the index itself. The calculation of a multidimensional index is a rather simple and replicable way to benchmark.
But special attention should be paid e.g. to the interpretation of the indicators and their directions, to the compensatory effects of the measured dimensions (in this case population change and ageing), to the choice of weights and cutting points.

The problem of compensatory effects can be solved by a standardisation/studentisation or by a special weighting of the indicators. But the choice of weights itself has to be well-founded because weights have a direct effect on the benchmark results. The same demands are concerned by the choice of cutting points. The cutting points of the UDC index are based on the calculation of quintiles. Thus, the categories only depend on the distribution of the index values and are not chosen arbitrarily. The interpretation of the categories is limited to the included cases (cities) and not applicable to other cases. The exclusion of cities will lead to a recalculation of cutting points and a reclassification.

The urban benchmark is confronted with several problems and points of criticism. A clear documentation of the chosen benchmarking and classification methods and problems is vital for high quality benchmarks, as well as a critical discussion on limitations of interpretations.

5 Policy implications

All European societies experience substantial changes in the size and composition of their population. The processes of demographic change, like population ageing and population decline differ in pace and intensity across European countries and also across regions within the countries. Strong variations of demographic trends and patterns can be observed on all spatial levels. Over the last decades most countries experienced trends of regional bipolarisation with growing and "young" (mostly central and urban) regions on the one hand and shrinking and "old" (mostly peripheral and rural) regions on the other hand.

Because demographic trends are closely connected with a wide range of social domains (such as the economy, public health, social services and infrastructure), current and future demographic change is a challenge for authorities and decision makers on various policy levels and policy domains. European, national and local policy makers need valid information on the causes and consequences of these socio-demographic developments to reinforce the evidence base of their policies.

The Statistical Office of the European Union (EUROSTAT) in cooperation with the national statistical offices made an effort to meet these demands and offer various statistics for the regions in the European Union, EU candidate members, EFTA and OECD countries. As a result the EUROSTAT REGIO database for NUTS regions and the EUROSTAT Urban Audit database for cities were developed. Based on the covered regional statistics, EUROSTAT calculated population projections for the NUTS 2 regions and integrated the data into the EUROSTAT REGIO database. Due to the quality of data in terms of validity, comparability, update frequency, relevance and availability, the two EUROSTAT databases have become the major source for regional and urban statistics and unique tools for researchers and policy makers. For example the EUROSTAT databases are helpful tools for decisions regarding the Regional Cohesion Policy, the Regional Development Fund and the Social Fund of the European Commission.

Another use for regional statistics is social and demographic benchmarking of regions and cities. Benchmarks can be used for detecting regional disparities according to policy-relevant fields and the specific determinants of the disparities. Examples of "Good practice" (e.g. specific local policy measures or economic initiatives) can be highlighted and evaluated. Based on benchmarking results, policy advice for future regional planning strategies or policy responses can be compiled by expert assessment, as done for German municipalities and major cities in the "Wegweiser Kommune". In this benchmark, a demographic typology was developed using data from various data sources and specially calculated regional projections. Another example of a regional benchmark is the Demographic Risk Map project of the Laboratory "Demographic Change". That project evaluated NUTS 2 regions in terms of impacts of demographic change and economic location risk. Major advantages of this benchmark are the presentation of the results, by mapping and methodological aspects (such as the documentation,) the choice of data sources (e.g. the EUROSTAT REGIO database) and the complexity of covered indicators.

Benchmarks can be criticised especially for the underlying assumptions (e.g. the oversimplification of social realities) and methods, the choice of indicators and the interpretation of the results. But if these issues will be reflected on critically and limitations of interpretation will be mentioned and documented, benchmarking can be a useful policy tool.

In the last part of this Research Note, the development of an urban demographic benchmark was illustrated in detail. The main objective of this chapter was to show the steps of benchmarking from choice of data source, indicators and methods to the calculation and presentation of the benchmark index. In addition, the problems and restrictions of the selected data source, the EUROSTAT Urban Audit, and the benchmarking method, the index measure inspired by the Demographic Risk Map, were presented and discussed.

Based on statistics from regional databases, regional population projections and policy-relevant benchmarks, current and future regional demographic trends and patterns can be analysed. Also the regional divergences and their causes and consequences can be detected. One of the major objectives of regional analyses is to offer information on potential policy applications and policy responses. Due to the complexity of country specific statutory regulations, policy advise cannot easily be generalised across countries. Also regional characteristics such as geographical, historical, contextual, structural, environmental, social and local specifics differ substantially among the European regions. This further limits generalization. Policy measures which may have positive effects in one country or region may not automatically lead to the same result in other regions.

Nevertheless some general strategic responses to demographic change may be identified. The Bertelsmann Foundation (2006) developed a model of strategic policy response to the challenges of demographic change with the main objective to involve all actors of all domains. In this model five stages are distinguished: 1) the stage of preparation and sensitisation, 2) the stage of transparency of demographic challenges, 3) the stage of setting goals and foci, 4) the stage of developing and implementing strategies and 5) the stage of analysing the effects of the strategies. After the fifth stage, the first stage follows whereby the cycle is closed.

In the first and second stage, local policy authorities, the private sector, civil society organisations and citizens need to be sensitised about the challenges of demographic change and its impacts. Various organisations and institutions from all domains and on different policy levels need to closely co-operate. Research institutions and statistical offices have a role to provide information which allows the monitoring, benchmarking and evaluation of the specific trends, challenges, strengths and weaknesses. This Research Note, for example, as well as the presented benchmark projects have the objectives to do so.

An important policy response at this stage of the strategy cycle is to build interregional networks with the objective to call attention to regional challenges by national or European authorities and to exchange information on possible policy measures of good practice. In October 2006, for example, several regions in Germany, Poland and the Czech Republic published a "Joint Declaration of European Regions: Facing the demographic change as a regional challenge" with the effort to urge the European Union to consider the upcoming demographic, social and economic challenges and to develop regional strategies which are able to face these challenges.[42] Approaches which could help to deal with the demographic change are pointed out in this declaration.

Other notable examples of interregional exchange are the "Regions for economic change" and the INTEREG initiatives (both networks of regions) as well as the URBACT programme (a

[42] http://ec.europa.eu/regional_policy/conferences/demographicchallenge_jan07/doc/pdf/declaration.pdf (accessed March 2010).

network of cities; URBACT accessed 2010) of the European Commission. Both projects are "concerned with identifying, recognising, disseminating, promoting and mainstreaming good practices in EU funded regional programmes" covered by the EU cohesion policy (European Union Regional Policy 2007). The Regional Policy of the European Commission offered various projects of networking and exchange, but also monetary support by the Structural and Cohesion Funds. The European Regional Policy plays a key role in the efforts to reach regional convergence and social cohesion, and to defeat regional inequalities

Within these projects conferences of local, national and European authorities were held. One example was the conference "Regional policy responses to demographic challenges" in January 2007. In the conference proceedings several good practice strategies from various European regions were presented and experiences were described. A more recent example was the seminar on "The role of local and regional authorities in preparing for demographic change" which took place in Magdeburg in June 2010 as part of the European Commission's effort to promote appropriate policy responses to demographic change across the European Union (European Commission 2010).

Based on the information on demographic trends and experiences of other regions as well as supported by monetary subsidies from the Structural and Cohesion Funds of the European Union, the responsible national and local authorities[43] may develop specific policy measures (stage 3 and 4).

Policy responses to demographic change may be classified into 1) adaptive measures and 2) measures to change population dynamics (fertility, mortality and migration). Both measures are relevant for local and national authorities.

Adaptive measures concerning the accommodation of regional demographic trends cover numerous local policy domains. Changes in the size and composition of the population require adjustments for instance regarding social, health and care services, infrastructure and public transport, housing, childcare facilities, educational facilities, culture facilities, spatial planning or and other policy domains. Due to a changing composition of population (ageing) the promotion of social inclusion and equal opportunities (e.g. of elderly people or migrants) may be another objective for local, regional and urban policy. Policy responses may also include the local labour market and economy, social services and social security but to a large measure these domains are usually dealt with at higher levels than the local or regional.

Also *policy measures meant to change regional population dynamics* can be considered. These measures are often referred to as population policy (e.g. Daugherty & Kammeyer 1995). Of all demographic processes, migration is the most important factor of regional and urban population change (interregional and international migration). The prevention of disproportional (selective) out-migration and the promotion of in-migration usually have a key role in local population-related policy. In-migration could be stimulated by improving the regional and urban attractiveness and quality of life in terms of social, economic, educational, environmental, infrastructural, security, housing and cultural conditions. In a situation of structural population decline it will however be difficult to attract new migrants to regions or cities which are suffering from population losses and to turn the demographic trend around. Migration flows are generally directed at thriving regions or cities and not at regions which experience population

[43] These responsibilities differ by countries (e.g. in centralised or decentralised political systems).

decline. Preventing out-migration may be a more attractive option and may also include measures to improve the family friendliness of a region.

As was shown in this Research Note, there is a large diversity across the European Union in the processes of demographic change, be it in fertility, mortality or migration. As a result there is a large diversity in population dynamics at the national level for instance with respect to population ageing but also with respect to population growth and decline. This diversity increases when we look beyond the national level and focus on the sub-national, regional or local levels. The analysis is complicated further as different levels of population ageing and population growth may co-exist within the same region (Van Nimwegen & Heering 2009).

From a policy perspective, the richness and diversity of regional and local population dynamics implies that also policies need to be specific and targeted at the unique set of local or regional conditions in order to be effective: generic, "one size fits all", policies do not suffice.

Demographic differences are not only magnified at the sub-national level, but also the impacts of demographic change are directly felt at this level of government and call for a response. Also because the impacts of population change are touching on practically all domains of life, coordination of specific policy responses is important. Making use of regional and local expertise and opportunities, enhanced by regional coordination, is an option to "strengthen the strengths" of regions and cities in Europe (Bertelsmann Foundation 2006). This was also demonstrated at the EU seminar where the role of local and regional authorities in preparing for demographic change was discussed (European Commission 2010). Coordination of local and regional policy responses, such as large investments in infrastructure and housing to cope with population decline, is also needed to avoid unhealthy competition between cities and sub-regions and to diminish the risk of overinvestment (Van Nimwegen & Heering 2009).

The final step of any policy approach (and the first step for possible follow up policies) is to evaluate the efficiency of the policy measures (stage 5 of the strategic cycle). For that purpose, benchmarking and monitoring of regions and cities are useful tools for local, national and European policy makers. The main objective of this Research Note was to discuss these methods and their limitations and potentials.

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Annex 1

In this portrait regions are defined on the so-called NUTS level. NUTS stands for Nomenclature of territorial units for statistics. The NUTS nomenclature was created and developed according to the following principles (EUROSTAT, 2009).

- The NUTS favours institutional breakdowns.
  Different criteria may be used in subdividing national territory into regions. These are normally split between normative and analytical criteria:
  - normative regions are the expression of a political will; their limits are fixed according to the tasks allocated to the territorial communities, according to the sizes of population necessary to carry out these tasks efficiently and economically, and according to historical, cultural and other factors;
  - analytical (or functional) regions are defined according to analytical requirements; they group together zones using geographical criteria (e.g. altitude or type of soil) or using socio-economic criteria (e.g. homogeneity, complementarity or polarity of regional economies).

  For practical reasons to do with data availability and the implementation of regional policies, the NUTS nomenclature is based primarily on the institutional divisions currently in force in the Member States (normative criteria).
- The NUTS favours regional units of a general character.
  Territorial units specific to certain fields of activity (mining regions, rail traffic regions, farming regions, labour-market regions, etc.) may sometimes be used in certain Member States. NUTS excludes specific territorial units and local units in favour of regional units of a general nature.
- The NUTS is a three-level hierarchical classification
  Since this is a hierarchical classification, the NUTS subdivides each Member State into a whole number of NUTS1 regions, each of which is in turn subdivided into a whole number of NUTS2 regions and each of which is in turn subdivided into a whole number of NUTS3 regions.
  At a more detailed level, there are the districts and municipalities. These are called Local Administrative Units (LAU) and are not subject of the NUTS Regulation.

The latest review of the NUTS classification took place in 2006 and was extended in 2008 to accommodate the accession of Bulgaria and Romania. As far as possible the regional data refer to this 2006 classification.

The NUTS classification is defined only for the Member States of the European Union. For the candidate countries awaiting accession to the EU, for the other European Economic Area (EEA) countries and for Switzerland, a coding of Statistical Regions has been defined by EUROSTAT in agreement with the countries concerned.

This Research Note focuses on European regions at the so-called NUTS2 level in the 27 Member States of the European Union and the 4 EFTA countries. The current number of NUTS2 regions in the EU-27+4 is 287 (Table 8). The highest numbers of NUTS2 regions can be found in Germany (39), United Kingdom (37), France (26), and Italy (21).

Table 8 NUTS2 regions by country, 1 January 2006

Code	Country	NUTS2 regions	Code	Country	NUTS2 regions	Code	Country	NUTS2 regions
AT	Austria	9	FR	France	26	NL	Netherlands	12
BE	Belgium	11	GR	Greece	13	NO	Norway	7
BG	Bulgaria	6	HU	Hungary	7	PL	Poland	16
CH	Switzerland	7	IE	Ireland	2	PT	Portugal	7
CY	Cyprus	1	IS	Iceland	1	RO	Romania	8
CZ	Czech Republic	8	IT	Italy	21	SE	Sweden	8
DE	Germany	39	LI	Liechtenstein	1	SI	Slovenia	2
DK	Denmark	5	LT	Lithuania	1	SK	Slovakia	4
EE	Estonia	1	LU	Luxembourg	1	UK	United Kingdom	37
ES	Spain	19	LV	Latvia	1			
FI	Finland	5	MT	Malta	1			

Source: EUROSTAT, 2010.

In Cyprus, Luxembourg and Liechtenstein there is no distinction between the NUTS levels. For Estonia, Iceland, Latvia, Lithuania, and Malta the NUTS2 level coincides with NUTS1 and NUTS0 (country level).

Some characteristics of the NUTS2 regions are presented in Table 9.

Table 9 Characteristics of the NUTS2 regions, 1 January 2008

Population size	NUTS2		Area	NUTS2		Population density	NUTS2	
x 1000	abs	%	km^2	abs	%	per km^2	abs	%
<100	4	1	<100	2	1	<10	8	3
100-< 200	1	0	100-<500	7	2	10-<50	27	9
200-<300	8	3	500-<1 000	5	2	50-<100	77	27
300-<400	14	5	1 000-<2 000	13	5	100-<200	72	25
400-<500	12	4	2 000-<5 000	50	17	200-<500	69	24
500-<1 000	45	16	5 000-<10 000	68	24	500-<1 000	16	6
1 000-<2 000	116	40	10 000-<20 000	71	25	1 000-<2 000	6	2
2 000-<5 000	76	26	20 000-<50 000	56	20	2 000-<5 000	9	3
5 000-<10 000	10	3	50 000-<100 000	11	4	5 000-<10 000	3	1
10 000+	1	0	100 000+	4	1	10 000+	0	0
Total	287	100	Total	287	100	Total	287	100

Source: EUROSTAT, 2010.

On January 1st 2008, the population size of NUTS2 regions varies from 27 thousand in Åland (Finland) to 11.7 million in Île de France. The average size is 1.8 million inhabitants.

Looking at the size of the regions, the smallest NUTS2 is Melilla one of the two Spanish exclaves in Morocco (13 km^2). The largest NUTS2 region is Övre Norrland in Sweden (153 thousand km^2). On average a NUTS2 region is 17 thousand km^2.

The lowest population density for a NUTS2 region can be found in Guyane, one of the French overseas departments, with less than three people per square kilometre. The NUTS2 region with the highest population density is Inner London with 9.4 thousand people per km2. The average population density for NUTS2 regions is 107 per km2.

Annex 2

Figure 21 Definitions of region by EUROSTAT

What is a region?

"Region" in a general concept:

A "region" is defined as a tract of land with more or less definitely marked boundaries which often serves as an administrative unit below the level of the nation state. Regions have an identity which is made up of specific features such as their landscape (mountains, coast, forest, etc.), climate (arid or high-rainfall), language (e.g. in Belgium, Finland and Spain), ethnic origin (e.g. Wales, northern Sweden and Finland or the Basque country) or shared history. (…) The limits of a region are usually based on one of the following:

a) Natural boundaries
b) Historical boundaries
c) Administrative boundaries.

"Region" in an administrative concept:

A region is an attempt to group together populations or places with enough in common to comprise a logical unit for administrative purposes. It is a recognition that spatial differences require appropriate administrative structures. In this context, "administrative structure" means that an administrative authority has the power to take administrative, budgetary or policy decisions for the area within the legal and institutional framework of the country.

Ideal requirements for a region:

Appropriate boundaries:
1. acceptability to the people administered;
2. homogeneity of the unit;
3. suitable size.

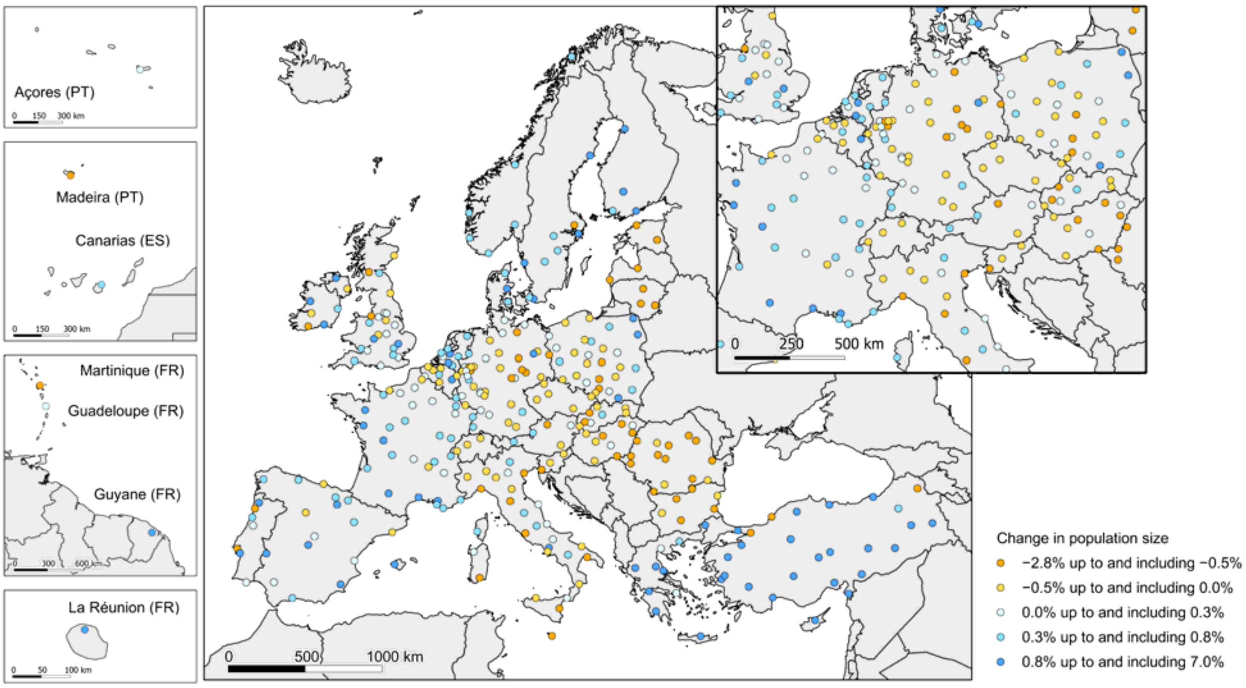
Stable boundaries:
1. permit data collection over an extended time frame (time series);
2. more meaningful units (people identify with them).

Local government reorganisation may disrupt this pattern until the new territorial arrangement, in turn, becomes accepted.

Traditionally, smaller regions have often been administered as part of larger regions which, in turn, make up the nation state. This is not necessarily the same thing as a political hierarchy. Political power may be highly centralised in the national capital or may be devolved to individual regions.

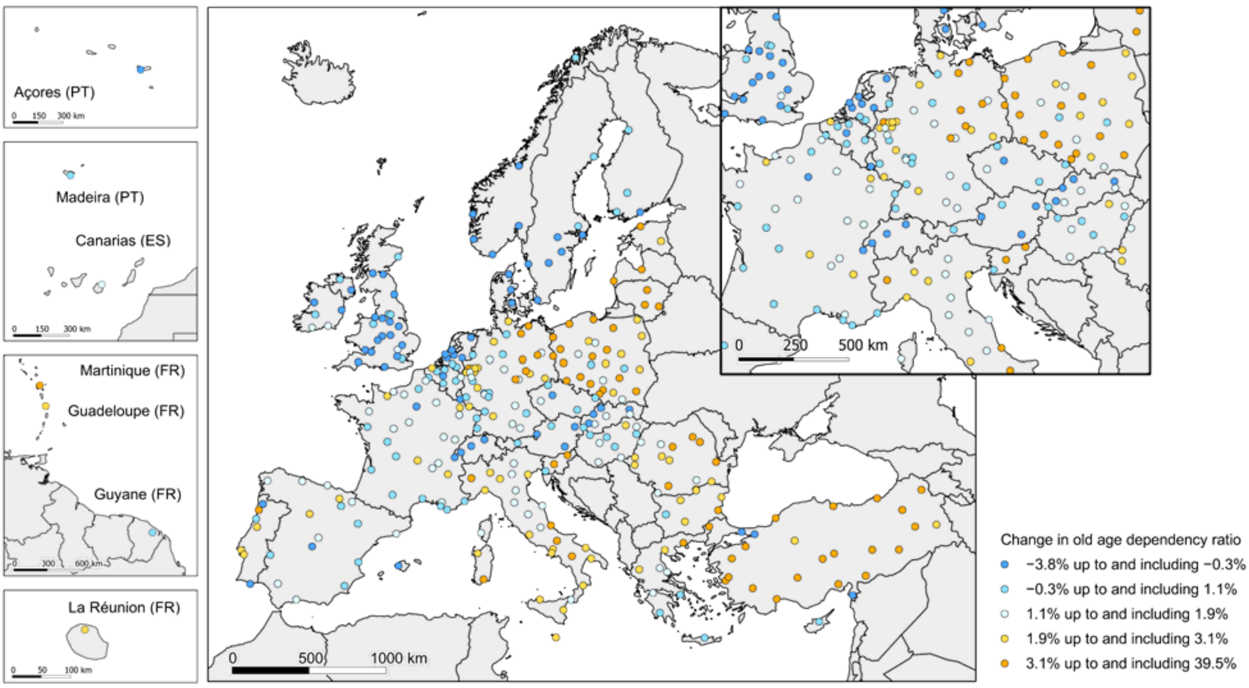
Source: EUROSTAT.
http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/regional_statistics (accessed March 2010.

Figure 22 Annual average percentage change in population size in Urban Audit cities (quintiles)



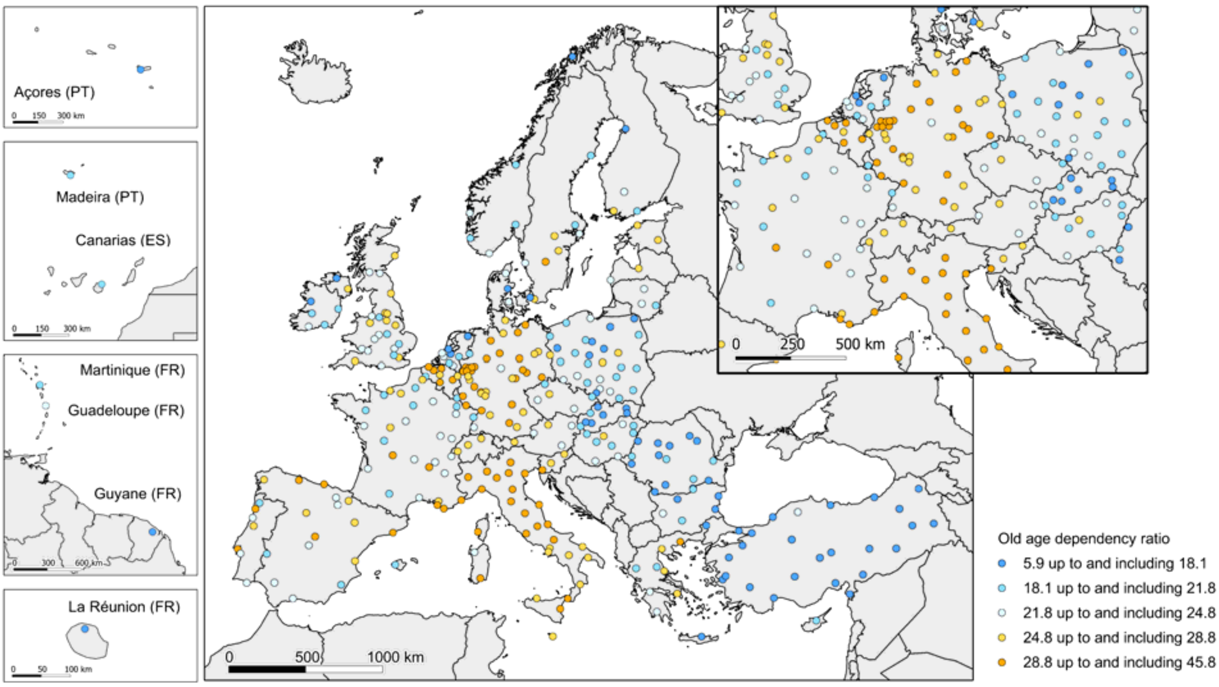
Source: EUROSTAT Urban Audit database, National Statistical Offices, own calculations and mapping. EuroGeographics for the administrative boundaries.

Figure 23 Annual average percentage change in Old Age Dependency Ratio in the Urban Audit cities (quintiles)



Source: EUROSTAT Urban Audit database, National Statistical Offices, own calculations and mapping. EuroGeographics for the administrative boundaries.

Figure 24 Old Age Dependency Ratio in the Urban Audit cities (last year available, quintiles)



Source: EUROSTAT Urban Audit database, National Statistical Offices, own calculations and mapping. EuroGeographics for the administrative boundaries.

Figure 25 Indicators and results of the Urban Demographic Change Benchmark

	Code	City	Change in Population size	Change in population age (OADR)	Age of population (OADR)	UDC Index
Belgium	BE001C	Bruxelles / Brussel	0,37%	-0,96%	25,8	0,5090
	BE002C	Antwerpen	-0,20%	0,54%	33,7	-0,0049
	BE003C	Gent	-0,03%	0,32%	29,9	0,1373
	BE004C	Charleroi	-0,21%	0,49%	29,8	0,0321
	BE005C	Liège	6,96%	0,35%	32,0	0,7719
	BE006C	Brugge	0,00%	1,92%	33,0	-0,1726
Bulgaria	BG001C	Sofia	-0,43%	1,03%	23,6	-0,0263
	BG002C	Plovdiv	-1,08%	2,33%	19,6	-0,1748
	BG003C	Varna	-0,11%	2,30%	18,1	0,1778
	BG004C	Burgas	-0,91%	3,22%	17,8	-0,1453
	BG005C	Pleven	-1,13%	2,82%	17,3	-0,1115
	BG006C	Ruse	-1,51%	2,22%	21,0	-0,2146
	BG007C	Vidin	-1,58%	1,87%	13,9	0,0000
Czech Republik	CZ001C	Praha	-0,28%	-0,34%	25,2	0,1645
	CZ002C	Brno	-0,41%	0,12%	24,6	0,0603
	CZ003C	Ostrava	-0,38%	0,37%	19,7	0,1128
	CZ004C	Plzen	-0,49%	1,30%	23,4	-0,0765
	CZ005C	Usti nad Labem	-0,34%	-0,05%	19,7	0,1522
Denmark	DK001C	København	0,61%	-3,83%	16,9	0,6146
	DK002C	Aarhus	0,86%	-0,83%	18,1	0,7200
	DK003C	Odense	0,33%	-0,45%	22,9	0,4517
	DK004C	Aalborg	0,37%	-0,54%	23,0	0,4800
Germany	DE001C	Berlin	-0,19%	1,67%	25,2	-0,0245
	DE002C	Hamburg	0,23%	0,51%	27,9	0,2493
	DE003C	München	-0,05%	1,36%	25,6	0,0609
	DE004C	Köln	0,08%	1,83%	27,2	0,0165
	DE005C	Frankfurt am Main	-0,21%	0,60%	25,4	0,0818
	DE006C	Essen	-0,52%	2,09%	35,4	-0,4308
	DE007C	Stuttgart	0,20%	2,62%	27,4	-0,0448
	DE008C	Leipzig	-0,58%	2,44%	32,2	-0,5218
	DE009C	Dresden	-0,22%	2,23%	31,7	-0,3163
	DE010C	Dortmund	-0,17%	2,31%	32,7	-0,3161
	DE011C	Düsseldorf	0,03%	1,47%	30,0	-0,0277
	DE012C	Bremen	-0,13%	1,95%	31,8	-0,2279
	DE013C	Hannover	-0,12%	0,59%	30,1	0,0488
	DE014C	Nürnberg	-0,08%	1,54%	31,4	-0,1221
	DE015C	Bochum	-0,25%	1,99%	32,1	-0,2959
	DE016C	Wuppertal	-0,58%	2,11%	33,1	-0,4615
	DE017C	Bielefeld	0,10%	1,60%	32,9	-0,0698
	DE018C	Halle an der Saale	-1,71%	4,39%	31,3	-0,9366
	DE019C	Magdeburg	-1,45%	4,80%	33,4	-1,0000
	DE020C	Wiesbaden	0,19%	0,55%	29,3	0,2050
	DE021C	Göttingen	-0,40%	1,15%	23,9	-0,0301
	DE022C	Mülheim a.d.Ruhr	-0,31%	2,88%	38,2	-0,4844
	DE023C	Moers	0,12%	4,17%	33,6	-0,5326
	DE025C	Darmstadt	-0,08%	0,35%	27,6	0,1414
	DE026C	Trier	0,10%	0,65%	30,3	0,1347
	DE027C	Freiburg im Breisgau	0,78%	0,15%	23,0	0,5938
	DE028C	Regensburg	0,30%	0,30%	28,8	0,3006
	DE029C	Frankfurt (Oder)	-1,93%	7,66%	28,6	-0,8078
	DE030C	Weimar	0,23%	1,58%	28,9	0,0734
	DE031C	Schwerin	-1,81%	7,63%	32,0	-1,0000
	DE032C	Erfurt	-0,62%	3,34%	28,3	-0,5428
	DE033C	Augsburg	-0,14%	1,25%	32,1	-0,1094
	DE034C	Bonn	0,38%	0,89%	27,9	0,2630
	DE035C	Karlsruhe	0,14%	1,09%	29,3	0,1005
	DE036C	Mönchengladbach	-0,10%	2,46%	31,6	-0,3002
	DE037C	Mainz	0,28%	1,63%	26,3	0,1566
	DE039C	Kiel	0,16%	1,98%	26,8	0,0429
	DE040C	Saarbrücken	-0,47%	2,38%	31,5	-0,4469
	DE041C	Potsdam	1,17%	3,98%	27,2	0,2053
	DE042C	Koblenz	-0,21%	2,98%	35,3	-0,4611
	DE043C	Rostock	0,00%	6,77%	30,8	-0,5844
Estonia	EE001C	Tallinn	-1,36%	3,78%	26,0	-0,5673
	EE002C	Tartu	-0,91%	2,37%	25,9	-0,3932
Ireland	IE001C	Dublin	0,43%	-1,22%	20,0	0,5368
	IE002C	Cork	-0,63%	1,88%	22,1	-0,1544
	IE003C	Limerick	-0,48%	1,01%	20,2	0,0206
	IE004C	Galway	2,92%	-1,20%	12,2	1,0000
	IE005C	Waterford	0,88%	1,65%	18,8	0,6152
Greece	GR001C	Athina	0,24%	-0,18%	25,6	0,3702
	GR002C	Thessaloniki	0,05%	2,68%	26,7	-0,0901
	GR003C	Patra	1,08%	1,83%	21,9	0,6088
	GR004C	Irakleio	1,91%	0,66%	17,7	0,9470
	GR005C	Larisa	1,66%	1,85%	19,6	0,8514
	GR006C	Volos	1,00%	1,40%	27,3	0,4755
	GR007C	Ioannina	1,93%	2,55%	21,7	0,7376
	GR008C	Kavala	0,61%	4,51%	31,1	-0,3321
	GR009C	Kalamata	2,42%	1,08%	24,3	0,7957

Figure 25 Indicators and results of the Urban Demographic Change Benchmark (continued)

	Code	City	Change in Population size	Change in population age (OADR)	Age of population (OADR)	UDC Index
Spain	ES001C	Madrid	0,20%	1,44%	29,8	0,0573
	ES002C	Barcelona	-0,26%	1,11%	33,5	-0,1379
	ES003C	Valencia	0,29%	0,69%	26,8	0,2700
	ES004C	Sevilla	0,21%	1,24%	24,2	0,2190
	ES005C	Zaragoza	0,50%	1,09%	27,8	0,2879
	ES006C	Málaga	0,33%	1,28%	22,3	0,3109
	ES007C	Murcia	1,44%	0,57%	21,7	0,8663
	ES008C	Las Palmas	0,41%	1,90%	20,3	0,3570
	ES009C	Valladolid	-0,18%	2,10%	25,5	-0,0799
	ES010C	Palma di Mallorca	1,62%	-0,58%	20,8	0,9800
	ES011C	Santiago de Compostela	0,34%	1,59%	25,4	0,2104
	ES012C	Vitoria/Gasteiz	0,57%	2,38%	23,2	0,2954
	ES013C	Oviedo	0,46%	1,12%	29,1	0,2373
	ES014C	Pamplona/Iruña	0,42%	1,26%	27,7	0,2339
	ES015C	Santander	-0,25%	1,45%	30,8	-0,1667
	ES016C	Toledo	1,53%	-0,31%	22,2	0,9535
	ES017C	Badajoz	0,92%	0,34%	20,5	0,6732
	ES018C	Logroño	1,05%	0,37%	24,5	0,6756
France	FR001C	Paris	0,08%	-0,82%	21,2	0,3791
	FR003C	Lyon	0,50%	1,14%	24,6	0,3513
	FR004C	Toulouse	1,55%	-0,09%	20,7	0,9476
	FR006C	Strasbourg	0,72%	0,92%	21,0	0,5391
	FR007C	Bordeaux	0,78%	0,22%	24,0	0,5797
	FR008C	Nantes	0,92%	0,95%	23,5	0,5739
	FR009C	Lille	0,24%	0,28%	21,3	0,3671
	FR010C	Montpellier	1,88%	0,67%	22,8	0,8630
	FR011C	Saint-Etienne	-0,47%	1,65%	33,5	-0,3292
	FR012C	Le Havre	-0,34%	1,26%	27,5	-0,0949
	FR013C	Rennes	1,31%	1,53%	18,2	0,8240
	FR014C	Amiens	0,29%	0,67%	21,0	0,3657
	FR015C	Rouen	0,14%	1,66%	25,4	0,1141
	FR016C	Nancy	0,05%	1,41%	23,4	0,1536
	FR017C	Metz	0,44%	2,25%	21,4	0,3083
	FR018C	Reims	0,11%	1,54%	22,8	0,1820
	FR019C	Orléans	0,68%	1,71%	23,3	0,4030
	FR020C	Dijon	0,32%	1,60%	23,0	0,2609
	FR021C	Poitiers	1,22%	0,44%	21,2	0,7871
	FR022C	Clermont-Ferrand	0,20%	2,18%	23,8	0,1331
	FR023C	Caen	0,56%	2,01%	21,5	0,3770
	FR024C	Limoges	0,37%	0,61%	29,3	0,2754
	FR025C	Besançon	0,53%	1,63%	23,7	0,3328
	FR026C	Grenoble	0,25%	2,36%	22,3	0,1882
	FR027C	Ajaccio	0,80%	1,52%	30,7	0,2857
	FR028C	Saint Denis	1,35%	2,43%	13,2	0,9372
	FR029C	Pointe-a-Pitre	-0,78%	3,19%	21,6	-0,3020
	FR030C	Fort-de-France	0,18%	2,72%	23,4	0,0859
	FR031C	Cayenne	4,31%	0,67%	9,3	1,0000
	FR032C	Toulon	0,37%	0,92%	38,2	0,1753
	FR035C	Tours	0,42%	1,32%	28,6	0,2019
	FR202C	Aix-en-Provence	1,09%	1,79%	25,2	0,5210
	FR203C	Marseille	0,35%	0,48%	30,9	0,2651
	FR205C	Nice	0,50%	0,46%	39,9	0,3188
	FR207C	Lens - Liévin	-0,14%	1,19%	28,1	-0,0116
Italy	IT001C	Roma	-0,53%	2,87%	31,9	-0,5769
	IT002C	Milano	-0,34%	2,39%	37,9	-0,4067
	IT003C	Napoli	-0,45%	2,17%	26,9	-0,2515
	IT004C	Torino	-0,42%	3,32%	38,5	-0,6126
	IT005C	Palermo	-0,22%	2,19%	25,9	-0,1215
	IT006C	Genova	-0,72%	2,31%	45,5	-0,5600
	IT007C	Firenze	-0,58%	1,52%	43,2	-0,3517
	IT008C	Bari	-0,27%	3,03%	28,8	-0,3636
	IT009C	Bologna	-0,49%	1,33%	44,4	-0,2792
	IT010C	Catania	-0,55%	1,91%	31,0	-0,3800
	IT011C	Venezia	-0,82%	2,86%	41,0	-0,6907
	IT012C	Verona	0,08%	1,87%	36,0	-0,1254
	IT013C	Cremona	-0,23%	2,23%	41,1	-0,3299
	IT014C	Trento	0,56%	1,60%	30,0	0,1877
	IT015C	Trieste	-0,69%	0,99%	45,8	-0,3025
	IT016C	Perugia	0,60%	1,88%	35,0	0,1014
	IT017C	Ancona	0,03%	1,86%	39,5	-0,1442
	IT018C	l'Aquila	0,46%	1,30%	29,5	0,2051
	IT019C	Pescara	0,02%	3,16%	36,7	-0,3916
	IT020C	Campobasso	0,09%	3,11%	30,2	-0,2759
	IT021C	Caserta	1,01%	2,50%	26,0	0,3775
	IT022C	Taranto	-0,96%	3,01%	28,3	-0,5682
	IT023C	Potenza	0,32%	4,02%	27,4	-0,1829
	IT024C	Catanzaro	-0,10%	3,02%	26,0	-0,1740
	IT025C	Reggio di Calabria	0,21%	1,33%	28,9	0,0999
	IT026C	Sassari	0,14%	2,52%	24,4	0,0512
	IT027C	Cagliari	-1,40%	4,01%	31,4	-0,8748

Figure 25 Indicators and results of the Urban Demographic Change Benchmark (continued)

	Code	City	Change in Population size	Change in population age (OADR)	Age of population (OADR)	UDC Index
Cyprus	CY001C	Lefkosia	1,88%	0,48%	18,4	0,9432
Latvia	LV001C	Riga	-1,41%	3,99%	27,5	-0,6711
	LV002C	Liepaja	-2,23%	5,65%	24,1	-0,5511
Lithuania	LT001C	Vilnius	-0,64%	4,54%	19,5	-0,2233
	LT002C	Kaunas	-1,09%	3,25%	22,6	-0,3549
	LT003C	Panevezys	-0,61%	4,07%	21,9	-0,3085
Luxemburg	LU001C	Luxembourg	0,65%	-0,63%	21,1	0,6141
Hungary	HU001C	Budapest	-1,14%	0,46%	28,0	-0,1916
	HU002C	Miskolc	-0,58%	1,90%	24,8	-0,2101
	HU003C	Nyíregyháza	0,28%	1,70%	19,7	0,3274
	HU004C	Pécs	-0,34%	1,76%	24,0	-0,0671
	HU005C	Debrecen	-0,80%	0,00%	20,3	-0,0545
	HU006C	Szeged	-1,03%	1,72%	23,3	-0,2430
	HU007C	Győr	-0,35%	0,71%	21,6	0,0716
	HU008C	Kecskemét	0,14%	0,74%	21,0	0,2974
	HU009C	Székesfehérvár	-0,42%	1,15%	20,5	0,0331
Malta	MT001C	Valletta	-2,78%	2,58%	25,1	-0,3887
The Netherlands	NL001C	s' Gravenhage	0,43%	-2,22%	21,9	0,5353
	NL002C	Amsterdam	0,40%	-1,81%	16,9	0,5229
	NL003C	Rotterdam	0,22%	-1,23%	23,1	0,4433
	NL004C	Utrecht	1,30%	-1,66%	16,3	0,9162
	NL005C	Eindhoven	0,60%	0,66%	24,1	0,4519
	NL006C	Tilburg	1,93%	0,08%	19,8	0,9457
	NL007C	Groningen	0,48%	-1,28%	17,1	0,5565
	NL008C	Enschede	0,34%	-0,14%	21,8	0,4383
	NL009C	Arnhem	0,58%	-1,16%	19,7	0,6004
	NL010C	Heerlen	-0,07%	1,43%	28,1	-0,0152
Austria	AT001C	Wien	0,29%	-1,30%	23,5	0,4756
	AT002C	Graz	-0,08%	-0,91%	24,7	0,3137
	AT003C	Linz	-0,66%	0,82%	28,1	-0,1891
	AT004C	Salzburg	0,71%	-0,79%	24,6	0,6465
	AT005C	Innsbruck	0,34%	-0,26%	25,0	0,4287
Poland	PL001C	Warszawa	0,17%	2,85%	25,9	-0,0272
	PL002C	Łódź	-0,72%	1,94%	25,3	-0,2935
	PL003C	Kraków	0,11%	3,00%	22,1	0,0823
	PL004C	Wrocław	-0,03%	4,91%	23,1	-0,1616
	PL005C	Poznań	-0,22%	1,25%	21,5	0,0896
	PL006C	Gdańsk	-0,09%	3,77%	21,9	-0,0568
	PL007C	Szczecin	0,03%	5,94%	21,8	-0,0602
	PL008C	Bydgoszcz	-0,19%	2,78%	21,5	-0,0108
	PL009C	Lublin	0,36%	2,82%	19,0	0,3286
	PL010C	Katowice	-0,99%	3,12%	22,2	-0,3269
	PL011C	Białystok	0,82%	2,95%	18,4	0,5484
	PL012C	Kielce	-0,05%	4,25%	19,4	0,0588
	PL013C	Toruń	0,34%	1,79%	18,0	0,3945
	PL014C	Olsztyn	0,73%	4,55%	17,5	0,4905
	PL015C	Rzeszów	0,54%	4,27%	18,2	0,3801
	PL016C	Opole	0,15%	4,39%	19,0	0,1593
	PL017C	Gorzów Wielkopolski	0,25%	4,15%	17,4	0,3016
	PL018C	Zielona Góra	0,45%	5,75%	19,4	0,2630
	PL019C	Jelenia Góra	-0,41%	5,25%	23,9	-0,3725
	PL020C	Nowy Sącz	0,95%	1,77%	18,2	0,6572
	PL021C	Suwałki	1,53%	2,39%	15,2	0,9738
	PL022C	Konin	0,24%	4,28%	16,5	0,3396
	PL023C	Żory	-0,29%	3,58%	8,5	0,2199
	PL024C	Częstochowa	-0,52%	1,15%	22,3	-0,0477
	PL025C	Radom	-0,34%	1,03%	19,9	0,0860
	PL026C	Płock	-0,13%	3,23%	16,5	0,1986
	PL027C	Kalisz	-0,27%	0,73%	20,8	0,1202
	PL028C	Koszalin	-0,25%	3,48%	20,0	-0,0175
Portugal	PT001C	Lisboa	-1,35%	2,37%	41,2	-0,6005
	PT002C	Oporto	-1,40%	8,76%	32,3	-1,0000
	PT003C	Braga	1,40%	-0,59%	18,2	0,9479
	PT004C	Funchal	-0,84%	-0,11%	20,9	-0,0527
	PT005C	Coimbra	0,16%	2,91%	27,3	-0,0970
	PT006C	Setubal	1,06%	2,12%	24,1	0,5067
	PT007C	Ponta Delgada	0,27%	-1,05%	16,4	0,4660
	PT008C	Aveiro	0,72%	1,01%	23,7	0,4778
	PT009C	Faro	0,09%	-0,40%	24,8	0,3322
Romania	RO001C	Bucuresti	-0,66%	1,74%	21,7	-0,1414
	RO002C	Cluj-Napoca	-0,32%	1,74%	16,8	0,1407
	RO003C	Timisoara	-0,80%	2,04%	17,2	-0,0849
	RO004C	Craiova	-0,18%	3,40%	15,0	0,2443
	RO005C	Braila	-0,95%	4,18%	19,3	-0,2594
	RO006C	Oradea	-0,80%	1,82%	15,7	-0,0358
	RO007C	Bacau	-0,71%	5,94%	14,0	0,0340
	RO008C	Arad	-1,14%	2,25%	19,9	-0,1801
	RO009C	Sibiu	-1,19%	2,81%	18,3	-0,1503
	RO010C	Targu Mures	-1,05%	3,32%	17,9	-0,1533
	RO011C	Piatra Neamt	-0,60%	5,66%	15,1	0,0456
	RO012C	Calarasi	-0,22%	2,75%	13,3	0,2495
	RO013C	Giurgiu	-0,20%	2,07%	17,0	0,1776
	RO014C	Alba Iulia	-0,73%	2,28%	13,1	0,0285

Figure 25 Indicators and results of the Urban Demographic Change Benchmark (continued)

	Code	City	Change in Population size	Change in population age (OADR)	Age of population (OADR)	UDC Index
Slovenia	SI001C	Ljubljana	-0,14%	3,22%	25,1	-0,1765
	SI002C	Maribor	-0,47%	3,61%	26,6	-0,4339
Slovakia	SK001C	Bratislava	-0,30%	0,21%	18,4	0,1709
	SK002C	Kosice	-0,01%	1,80%	15,3	0,3203
	SK003C	Banska Bystrica	0,40%	1,37%	15,2	0,5025
	SK004C	Nitra	0,11%	1,33%	16,3	0,3517
	SK005C	Prešov	-0,37%	-1,78%	16,0	0,1862
	SK006C	Zilina	-0,05%	-3,68%	16,9	0,3242
	SK007C	Trnava	-0,54%	-3,70%	13,6	0,1083
	SK008C	Trencin	-0,58%	-1,31%	19,6	0,0930
Finland	FI001C	Helsinki	1,05%	-0,78%	20,0	0,8015
	FI002C	Tampere	1,15%	-0,04%	22,8	0,7782
	FI003C	Turku	0,73%	0,00%	25,8	0,5632
	FI004C	Oulu	1,68%	0,62%	17,2	0,9564
Sweden	SE001C	Stockholm	1,00%	-2,56%	23,5	0,7834
	SE002C	Göteborg	0,82%	-1,83%	24,0	0,7063
	SE003C	Malmö	1,09%	-1,61%	28,8	0,8270
	SE004C	Jönköping	0,48%	-0,52%	30,6	0,4965
	SE005C	Umeå	1,27%	-0,04%	19,6	0,8569
	SE006C	Uppsala	-1,56%	0,49%	20,9	-0,0931
	SE007C	Linköping	0,77%	-0,38%	26,3	0,6197
	SE008C	Örebro	0,56%	-1,66%	26,7	0,5918
United Kingdom	UK001C	London	0,68%	-1,38%	18,8	0,6432
	UK002C	Birmingham	-0,09%	-0,58%	24,6	0,2735
	UK003C	Leeds	0,14%	-0,29%	25,5	0,3393
	UK004C	Glasgow	-0,63%	-0,82%	24,4	0,0635
	UK005C	Bradford	0,20%	-0,27%	24,9	0,3675
	UK006C	Liverpool	-0,50%	-0,63%	24,5	0,0996
	UK007C	Edinburgh	0,31%	-0,76%	23,7	0,4692
	UK008C	Manchester	0,08%	-1,80%	19,7	0,3803
	UK009C	Cardiff	0,52%	-0,99%	23,0	0,5730
	UK010C	Sheffield	-0,06%	-0,72%	27,2	0,2986
	UK011C	Bristol	0,03%	-1,41%	22,7	0,3614
	UK012C	Belfast	-0,30%	-0,43%	27,1	0,1536
	UK013C	Newcastle upon Tyne	-0,15%	-0,60%	25,8	0,2459
	UK014C	Leicester	0,10%	-1,32%	21,7	0,3899
	UK015C	Derry	1,23%	0,31%	18,1	0,8406
	UK016C	Aberdeen	-0,38%	0,59%	25,3	0,0109
	UK017C	Cambridge	0,85%	-1,79%	18,2	0,7200
	UK018C	Exeter	0,76%	-0,64%	25,2	0,6545
	UK019C	Lincoln	0,23%	-0,79%	25,3	0,4366
	UK020C	Gravesham	0,13%	1,06%	27,2	0,1431
	UK021C	Stevenage	0,34%	1,66%	24,2	0,2322
	UK022C	Wrexham	0,37%	-0,27%	27,1	0,4285
	UK023C	Portsmouth	0,07%	-1,21%	24,2	0,3775
	UK024C	Worcester	0,95%	-0,48%	24,2	0,7223
Turkey	TR001C	Ankara	1,55%	3,02%	8,8	1,0000
	TR002C	Adana	1,47%	6,73%	8,1	0,9930
	TR003C	Antalya	3,58%	8,28%	9,0	1,0000
	TR004C	Balikesir	1,67%	22,45%	16,2	0,8996
	TR005C	Bursa	2,96%	7,78%	11,1	1,0000
	TR006C	Denizli	2,23%	22,22%	12,9	1,0000
	TR007C	Diyarbakir	2,91%	6,85%	7,1	1,0000
	TR009C	Edirne	0,79%	17,24%	14,2	0,6953
	TR008C	Erzurum	3,08%	19,24%	10,0	1,0000
	TR010C	Gaziantep	2,70%	6,61%	8,1	1,0000
	TR011C	Hatay	0,86%	-1,20%	9,6	0,7259
	TR012C	Istanbul	3,11%	-0,45%	8,0	1,0000
	TR013C	Izmir	1,73%	3,99%	11,4	1,0000
	TR014C	Kars	-0,65%	21,44%	10,5	0,0598
	TR015C	Kastamonu	0,97%	39,54%	23,7	0,2423
	TR016C	Kayseri	1,50%	10,50%	10,6	1,0000
	TR017C	Kocaeli	-0,54%	-2,79%	8,1	0,1098
	TR018C	Konya	2,93%	9,35%	10,0	1,0000
	TR019C	Malatya	2,61%	12,88%	10,3	1,0000
	TR020C	Manisa	2,31%	13,31%	13,0	1,0000
	TR021C	Nevsehir	1,83%	18,65%	12,6	1,0000
	TR022C	Samsun	1,15%	14,40%	12,1	0,8527
	TR023C	Siirt	2,80%	3,85%	8,4	1,0000
	TR024C	Trabzon	1,82%	18,83%	12,8	1,0000
	TR025C	Van	4,59%	2,10%	5,9	1,0000
	TR026C	Zonguldak	-1,86%	5,73%	12,0	0,0000

Figure 25 Indicators and results of the Urban Demographic Change Benchmark (end)

	Code	City	Change in Population size	Change in population age (OADR)	Age of population (OADR)	UDC Index
Norway	NO001C	Oslo	0,52%	-1,86%	20,5	0,5738
	NO002C	Bergen	0,56%	-0,80%	24,0	0,5846
	NO003C	Trondheim	0,56%	-1,00%	21,0	0,5913
	NO004C	Stavanger	0,65%	-1,03%	20,2	0,6335
	NO005C	Kristiansand	0,60%	-0,65%	23,9	0,5866
	NO006C	Tromsø	0,60%	-0,13%	15,3	0,6044
Switzerland	CH002C	Zürich	-0,01%	-0,78%	26,1	0,3297
	CH003C	Genève	0,57%	-0,32%	23,2	0,5464
	CH004C	Bern	-0,46%	-0,82%	28,7	0,1339
	CH005C	Lausanne	-0,07%	-0,42%	25,3	0,2626