DEMIFER
Demographic and Migratory Flows affecting
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Preface

This report presents the results from the ESPON 2013 project entitled 'Demographic and Migratory Flows affecting European Regions and cities (DEMIFER)'. Two main developments form the point of departure for the project: First, the ageing of the population in Europe in the next decades. A major consequence of the ageing of the population is that the working age population will decline which may have a downward effect on economic growth and competitiveness in many European regions. Second, the important challenges European regions will have to face from environmental changes, particularly climate change and limitations in the availability of energy. Even though ageing and environmental change are global developments, the consequences may be different for different regions and may affect migration flows across regions in different ways. The key objective of DEMIFER therefore was to assess the effects of demographic trends and migration flows on European regions and cities and to examine the implications for economic and social cohesion, taking into account the possible effects of climate change.

DEMIFER was carried out in the period 2008-2010 by a team of researchers from the Netherlands Interdisciplinary Demographic Institute (Netherlands, lead partner), the University of Vienna/Faculty for Geosciences, Geography and Astromony (Austria), the International Organization for Migration/Central European Forum for Migration and Population Research (Poland), the University of Leeds/School of Geography (United Kingdom), the Netherlands Environmental Assessment Agency (Netherlands), Nordregio/the Nordic Centre for Spatial Development (Sweden), and the National Research Council/Institute for Research on Population and Social Policies (Italy). This final report is the joint result of close collaboration between all researchers involved.

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List of Abbreviations

ASDR	Age-Specific Death Rate
CEC	Commission of the European Communities
CME	Challenged Market Europe
DAR	Destination Attractiveness Ratio
DEMIFER	Demographic and migratory flows affecting European regions and cities
EME	Expanding Market Europe
ESPON	European Spatial Observation Network
EU	European Union
GDP	Gross Domestic Product
GSE	Growing Social Europe
LSE	Limited Social Europe
NUTS	Nomenclature of Units for Territorial Statistics
ODR	Old Dependency Ratio
PPP	Purchasing Power Parity
SMR	Standardised Mortality Ratio
TFR	Total Fertility Rate
TPG	Transnational Project Group
VODR	Very Old Dependency Ratio

Executive summary

Today's main demographic changes across Europe - population ageing, the slowing down of population growth and the decrease in the growth rate of the working age population - are expected to remain the most important demographic challenges in the coming future. Even if life expectancy would not increase, the population aged 65+ in the ESPON area would increase by 40 per cent to 2050. If life expectancy will continue to grow, the number of persons aged 65+ will increase by 87 to 111 per cent. To address these challenges, intra and extra European migration will become increasingly important. Only under favourable economic conditions, if extra-European migration will be high and if activity rates will increase, the total size of the labour force in the ESPON area will increase until 2050. Even under these favourable conditions, however, 35 to 40 per cent of all NUTS2 regions will face a decline in the size of the labour force in this period. If economic conditions are poor, activity rates will not increase and immigration will be low, 55 to 70 per cent of the regions will experience a decline of the labour force by 10 per cent or more. In most regions in eastern and southern parts of Europe, the labour force may decrease even by more than 30 per cent. In order to attain the goals of regional competitiveness and territorial cohesion policy makers have to cope with these demographic challenges. They may develop policies to accommodate the main demographic challenges. However, as this may not be sufficient to attain the competitiveness and cohesion goals, they should also consider policies to affect the demographic and migratory trends. The levels of fertility, mortality, and internal and international migration may be affected by various policy bundles. These policies can only be successful if they are combined with policies in other areas such as education, housing, labour market, integration of migrants, and the environment.

One of the major priorities of the ESPON 2013 Programme is to observe demographic trends in Europe, to look into future demographic developments and to link these to economic, social and environmental development issues in European regions and cities. Within this Programme, ESPON initiated and funded the research project DEMIFER: Demographic and migratory flows affecting European regions and cities. The objective of DEMIFER is to assess the effects of demographic trends and migratory flows on European regions and cities and to examine the implications for regional competitiveness and cohesion. The specific aims of the project are to assess future changes in population growth, the size of the labour force and the ageing of the population and to explore policy options aiming at regional competitiveness and social cohesion.

The main demographic changes across Europe are the slowing of population growth, the ageing of the population, the decline in the growth rate of the working age population and the switch from natural growth to migration as main driver of population growth. If the size and direction of migration flows and reproductive behaviour will not change, the size of the working age population will decline in the next decades, while at the same time the number of elderly people will increase. This will be a risk for European competitiveness since the working age population in many other parts of the world is expected to continue to grow in the foreseeable future. In addition, disparities across European regions may increase. Even though population ageing will affect regions all across Europe, different types of regions will be affected in different ways. In general the level of fertility and the inflow of migrants are high in affluent regions, whereas fertility is low and there is an outflow of young migrants in poor regions. Thus whereas in some regions the effect of ageing on the size of the working age population may be mitigated

by in-migration flows either from other regions or from other countries, in other regions outflows of young migrants may reinforce the effects of ageing.

The European territorial development debate is framed within several seminal strategies and agendas to achieve regional competitiveness and territorial cohesion. These include the Lisbon Strategy, the Territorial Agenda, the Commission's Green Paper on Territorial Cohesion and most recently the Europe 2020 discussions for smart, sustainable and inclusive growth. The European policy territorial debate, while not specifically assuming that demographic changes result in altered economic performance, does repeatedly discuss how demographic changes present serious challenges for territorial development.

DEMIFER has examined which policy options are available to policy makers in order to improve both regional competitiveness and cohesion. Policy makers may follow two strategies. First, policies may be aimed to accommodate the consequences of demographic challenges. Since the demographic situation differs across different types of regions, the optimal policy mix will be different for different types of region. For that reason DEMIFER has developed a typology of regions based on demographic differences. Second, policy makers may explore policy options aimed at changing demographic and migratory trends in order to deal with demographic challenges. Thus DEMIFER has developed four demographic scenarios based on various bundles of policies. Because the effects of policies depend on the economic situation, the scenarios take into account alternative future economic developments in combination with alternative policy options.

Demographic challenges

Low population growth in many regions

The total population size of the ESPON countries equals 515 million inhabitants. During the last decades the population of Europe has been increasing slowly. At the regional level there have been significant differences in population growth. Since 2000 there has been population loss for one out of four NUTS2 regions, whereas 60 per cent of regions have experienced an average annual population growth of less than 1 per cent. In only one out of seven regions population growth has exceeded 1 per cent.

Without changes in the levels of fertility, mortality and migration the overall ESPON population will reduce by about 40 million until 2050, i.e. a decline of about 8 per cent. There are considerable regional differences: 40 per cent of the regions would experience a population increase and 60 per cent a decrease. In most of the regions with an increasing population, this is caused by extra-European migration. In those regions where the population would decline, the main cause is the negative natural change. Eleven regions would even face a decline by over 50 per cent. These regions can be found in Romania, Bulgaria, Poland and Germany. In 86 other regions population would decline by 20 per cent or more.

Differences in growth of working age population

In more than one quarter of the NUTS2 regions the size of the working age population has declined since 2000. In three out of every four German regions the working age population has decreased. Other countries where relatively many regions experience a decline in the working age population are the United Kingdom, Bulgaria, Hungary, Denmark and Sweden. On the other hand, there are more than 50 regions where the working age population has increased by more than one per cent per year. Many of these regions can be found in the eastern part of Spain, the southern part of France, in Ireland, and in Poland. Especially big cities attract labour migrants.

In most regions the main cause of changes in the size of the working age population is cohort turnover, i.e. the replacement of the outflow of older generations by the inflow of young generations. In 80 per cent of the regions the effect of cohort turnover on the size of the working age population is still positive. In one out of seven regions the size of the working age population declines despite positive cohort turnover due to outflow of active migrants. Most of the regions can be found in the UK. Moreover, in one out of five regions the working age population still grows due to positive cohort turnover but is negatively affected by out migration. These regions are typically found in Poland, Slovakia and the United Kingdom, but also in the Czech Republic and France. In contrast, in only seven per cent of regions the size of the working age population increases despite negative cohort turnover due to positive net migration. Most of these regions can be found in Italy and Germany. Thus so far in only few regions the negative effect of ageing on labour supply is compensated for by migration.

Impact of migration

The overall impact of migration on population size is considerable. Three quarters of all regions will have a larger population in 2050 if current migration flows will continue than if there would have been no migration. In one quarter of the regions, the 2050 population size will be 30 per cent higher. In one third of the regions intra-Europe migration has a larger impact on population change than extra-Europe migration. This is true in particular in the regions of Bulgaria, Poland, Romania and Slovakia, where population decreases significantly through intra-Europe migration. In the majority of regions in Western Europe, extra-Europe migration is more significant than intra-Europe migration. In these regions extra-Europe migration reduces population decline or even causes an increase. Most of the European regions will gain population due to extra-European migration. In some regions, especially in Italy, but also in Algarve and Inner London, without extra-European migration the population in 2050 would be almost one third smaller.

The impact of migration goes beyond the simple increase or decrease of population. It also affects the age structures of populations and the labour force resources. Without migration in 70 per cent of European regions the old age dependency ratio would be higher. As most migrants are in the young adult age group, their emigration raises the old age dependency ratio as it reduces the number of economically active persons. At the same time, in the regions attracting migrants the newcomers will raise the number of young adults and the economically active population will increase. In general migration would be beneficial for most affluent regions, whereas poor regions would lose population due to migration. Migration thus would reduce ageing in affluent regions and increase it in poor ones. Therefore, migration may be expected to be a strong factor increasing regional disparities.

Policies accommodating demographic challenges differ across types of region

Different types of regions

Because demographic challenges vary between different types of regions, DEMIFER has developed a new typology of regions in order to demonstrate the main differences. Seven types of regions are distinguished. They vary by the share of young adults, the share of the elder population, natural population growth and net migration. Each type has its own demographic, economic and policy challenges. This implies that the optimal policy mix to accommodate demographic challenges will vary by type of region. In order to provide a detailed insight in the characteristics and challenges of the different types, for each type case studies have been carried out. The case studies focus on the interdependence between the urban areas within these regions and their hinterland.

Regions with favourable trends

The *Euro Standard* type of region is close to the overall average of the ESPON area, but the age structure is slightly older. Overall, a stagnating natural population balance and a positive net migration rate is prevalent. This type of region has a fairly positive population development and an age structure predominantly focused on the age group 35-55 years. The total fertility rate is above the ESPON average and life expectancy is overall average. The net migration rate into the regions is largely positive, thus contributing to an overall positive population development. Low fertility is not a major problem, although ageing could be. The *Family Potentials* type has a strong population development, with a good balance between younger and older age groups. Because of high birth rates and moderate in-migration, the share of elderly is below the ESPON average, despite the relatively high life expectancy. The *Euro Standard* and *Family Potentials* types have above average GDP-PPP per capita and below average GDP-PPP growth rates. The share of migrants is above average. The education level is high as is labour force participation. Unemployment is below average. These regions are doing well by both socio-economic and demographic standards. The policy goal for these regions would then be to retain the favourable trends and focus on competitive regional development and continued pursuance of the Lisbon agenda goals and "smart growth" as advocated by Europe 2020.

An example of the *Euro Standard* type of regions is Oberbayern in Germany with Munich as main city. Munich is one of the German industrial and service centres with many jobs in research and development, and attracts especially young adults. Fertility is low, but Oberbayern is able to balance labour force shortages through migration. Some of the regions of the *Family Potentials* type demonstrate huge spatial inequalities and significant demographic diversity. An example of this is West Yorkshire in the United Kingdom. Within West Yorkshire, Leeds and Bradford provide two very contrasting sub-areas. While Leeds successfully has attracted significant investments, Bradford remains in the shadow of Leeds and continues to experience significant net out-migration through internal migration which is balanced by a large net inflow due to international migration that continues to enhance one of the largest concentrations of minority ethnic populations in the country. For West Yorkshire as well as similar regions with such diversity within its borders, a cohesive market economy, which seeks to reduce economic and demographic inequalities between sub-regions, is a challenging scenario.

Regions dealing with population decline

The *Challenge of Labour Force* type of region is characterised by a rather high share of young people, but the challenge is to bring them into the labour force. Despite a large "potential" work force, this type of region is losing population, both through a negative natural population balance and through migration. A low total fertility rate exacerbates the out-migration population decline. The *Challenge of Decline* type of regions has a negative population development, due both to low total fertility rates and negative net migration. These are some of the "shrinking" regions of Europe. The proportion of older workers (above 55 years) is significantly higher than in the rest of the ESPON space and the share of younger adults (20-39 years) is below average, thus leading to a potential problem in maintaining sufficient workforce to uphold social welfare schemes. These two types of regions are distinctive to many of the EU12 and the eastern part of Europe, as well as shrinking regions peripheral areas of Scandinavia, Southern Europe and in Germany. In general the GDP-PPP per capita is below average. The share of migrants as well as labour force participation is also below average. In most of these regions (especially the Challenge of the Labour Force) the share of highly educated people is lower than the ESPON space average. Many of these regions are lagging behind and these are the regions that the Territorial Agenda and the Green Paper on Territorial Cohesion specifically point out as challenged for territorial development. Policy goals for these regions will mainly be focused on retaining population and boosting natural

population growth, attracting immigrants (both international and non-EU) and increasing opportunities for the labour force.

Examples of the *Challenge of Labour Force* type of regions are Eastern Romania and Jihovýchod in the Czech Republic. Characteristic for these regions is the high level of poverty, the high share of youth unemployment and the high number of low educated unemployed people across all unemployed. For these regions the major challenges are in the field of education. Mecklenburg-Vorpommern in North-Eastern Germany, Thessalia in Greece and Molise in Italy are examples of the *Challenge of Decline* type of regions. The most important challenge for these regions is to avoid, or break out of a demographic spiral of decline related to the emigration of young adults with a high level of education that are not able to find work in their own region. Another challenge is the persistent low fertility reflecting the lack of faith in work prospects for those young adults that stay.

Regions challenging disparities

The *Challenge of Ageing* type of regions are experiencing positive population development driven by a positive net migration rate, but the proportion of the older age groups is significantly higher than it is in the ESPON space age structure. Life expectancy is high and the share of elderly is significant. Birth rates are low, but migration, especially from non-EU countries can partly mitigate the low fertility and ageing population to some extent. Education levels are low, but so are unemployment rates (although the gender gap is the widest in Europe). The *Young Potentials* type of regions has a young age structure and positive population development due to both national population balance and positive net migration. This is partly due to the strong inflow of migrants from non-EU countries. Disparities in education are apparent in these regions as they have simultaneously a high share of people with tertiary education and a high share with only basic education. There is also a considerable gender gap in labour market participation. These two types of regions are found mainly in the Mediterranean regions, English coastal areas, in Ireland and in some urban enclaves (such as Vienna). They constitute demographic growth regions with above average GDP-PPP per capita and average labour force participation (which does exhibit great gender and educational disparities). In the *Young Potential* regions the GDP-PPP growth rates are above average, but in the *Challenge of Ageing* regions they are below average. The unifying factors for these regions are strong net migration gains and population increases. The labour force in these regions is over-represented (relative to the ESPON space average) by fairly low-qualified, low-wage sectors such as agriculture, hotel and restaurants and construction (the *Challenge of Ageing* regions). Tourism is an important industry in many of these regions and attracts non-EU immigrants and young people into low-qualified, often seasonal work. The first challenge that these regions face is orienting their economies towards more Lisbon-flavoured goals, such as the knowledge economy and innovation to create not just more, but better jobs in the regions. The second challenge is to ensure sustainable economic, social and development in light of the increasing pressure that the growing population exerts on natural and cultural resources.

One example of the *Challenge of Ageing* type of regions is Piemonte. The Italian Piemonte region is one with a long-term ageing process affecting its population, mainly because of low fertility. Its lively economy had to face problems of insufficient labour supply because of scarce cohort turnover already in the 1950s and '60s. Massive immigration, first from other, less developed regions of northern Italy and especially from the South and more recently from abroad, filled up the labour force deficits. A large part of the immigrants settled down all over the region, but especially in the municipality of Torino, in the provinces' capital cities and around them. An important foreign offspring has begun to populate the younger cohorts in the region and also native fertility has slightly increased. Should these trends continue in future times cumulative effects would reinforce the upward process – total population increase and slowdown in population ageing. It is interesting to note, however, that population ageing is only contrasted by

such huge immigration flows, not defeated. Cataluña is an example of a Young Potential region. The rejuvenation of the Catalan population has partially endogenous origins, the growth in the birth and fertility rate of the locals, but mainly exogenous. The effect of the rejuvenation may fade away if the number of the foreign entrances is not maintained at high levels, even more so if we consider that even the immigrants who are now adults, sooner or later, will age themselves. Certainly, the eventual persistence of consistent international immigrations will have to be handled with great care in order to guarantee social sustainability and avoid the risk of a negative impact that might generate unfavourable reactions by the local population.

Policies aimed to affect demographic change

Four scenarios along two axes of policy variation: Economy-Environment and Distribution-Fairness

Without changes in the levels of fertility, mortality and migration, 60 per cent of European regions will experience population decline until 2050. However, the levels of fertility, mortality and migration may be affected by various policy bundles. In order to explore the possible effects of policies on population growth and ageing, DEMIFER has developed four alternative scenarios. The reason for developing alternative scenarios is twofold. First, the effects of policies depend on future economic developments. Therefore scenarios reflect the uncertainty on future economic developments. Second, policy makers have a choice. They may emphasize social solidarity or they may emphasize competitiveness. For that reason the DEMIFER scenarios link policy bundles to demographic effects using two axes of policy variation: a Distribution-Fairness axis and an Economy-Environment axis. At one end of the Economy-Environment dimension we envisage a situation where sustainable growth has been achieved through technical and social innovation. At the other end of the Economy-Environment dimension we envisage a situation where the environmental challenges have not been met and growth as traditionally measured has fallen. The Distribution-Fairness dimension varies from a bundle of policies designed to achieve social solidarity on the one end, to a set of policies designed to improve the operation of markets and the achievement of greater competitiveness in a global market place on the other end.

Combining the two dimensions produces four policy scenarios, which we call 'Growing Social Europe' (GSE), 'Expanding Market Europe' (EME), 'Limited Social Europe' (LSE) and 'Challenged Market Europe' (CME). Each of these scenarios is associated with a set of policies that we may expect to impact, to a greater or lesser degree, future patterns of mortality, fertility and migration. The different scenarios assess the future impact of different developments in mortality, fertility and migration on changes in population growth, particularly in the growth of the size of the working age population, and on population ageing. As the growth of the labour force does not just depend on the size of the working age population but also on the level of labour force participation rates, alternative assumptions on future changes in labour force participation rates are included in the specification of the scenarios.

The GSE scenario describes changes in population size and age structure if successful economy-environment policies result in sustainable growth and cohesion policies are effective in reducing regional disparities. Relatively large decreases in mortality are foreseen together with relatively large increases in fertility. Migration levels will increase significantly. For all components of growth, regional differences will decrease substantially. The EME scenario shows the demographic development if policies focus on competition in case of sustainable economic growth. Slightly less favourable developments in mortality and fertility are assumed to go hand in hand with large increases in migration and further diverging regional inequalities. In times of low economic growth and growing environmental problems the LSE scenario shows the

consequences of effective cohesion policies. This future is characterized by relatively small decreases in mortality, constant fertility patterns and declining migration levels. Regional inequalities in the drivers of population change are expected to decline, but not as much as in the GSE scenario. Finally, in times of low economic growth where environmental challenges are not met the CME scenario shows the demographic consequences of strong competitive goals. In terms of demographic and migratory drivers, this is the least favourable scenario with only slightly decreasing mortality, declining fertility, more or less constant migration levels and increasing regional inequalities.

By means of comparing the four scenarios we can assess to what extent competitiveness and cohesion oriented policies can help to address the main demographic challenges for Europe, viz. ageing and the decline of population growth, and more specifically the decline in the growth of the working age population, We examine both a future characterised by sustainable growth and a future with low economic growth and growing environmental problems.

Policies affecting the rate of ageing

At the regional level population ageing has three main causes: low fertility, high life expectancy and outflow of young migrants. Thus if policies will affect the future levels of fertility, mortality, and migration, they will affect the rate of ageing. In addition to affecting the levels of fertility, mortality, and migration, policies may affect differences across regions as well. Cohesion oriented policies may contribute to decrease regional disparities in fertility, life expectancy and migration flows. Competition oriented policies will have a positive impact on the levels of fertility, life expectancy and migration, but regional disparities will prevail.

Increased fertility will help to mitigate the effects of ageing, at least in the long-run. The level of fertility may be affected by family-friendly policies such as subsidized day care or paid parental leave. Extra-European migration especially from cultures that have a tradition of high fertility may have an impact on the level of fertility as well. Variations in fertility rates will be highest if policies are market oriented and economic growth is high. In the EME scenario there are pockets of regions with very high total fertility rates in the Northern and Western European countries and very low fertility rates in the southern, central and eastern regions. If policies are oriented towards regional cohesion these disparities narrow, as the GSE scenario shows, making it, from a European point of view, vital to pursue family-friendly social welfare policies that boost fertility rates in the Northern countries, also in other parts of Europe.

There is a European-wide aim to decrease mortality rates and raise life expectancy through investment in healthcare services, research into disease control and through promoting healthy lifestyles. In addition, policies may intervene with lifestyle choices, such as smoking, drinking and diet. While national regulation can have an impact on the prevalence of practices such as smoking or drinking, they also require behavioural changes to have an impact on the population. If policies are market oriented and economic growth is low there will be very large disparities between disadvantaged regions in the East and the longevity advantaged regions in the west and north, as the CME scenario shows. The disparities are less pronounced if cohesion policies prevail. Mortality rates may be more influenced by cohesion policy interventions than by market-oriented growth interventions. Yet in addition to changing trends in mortality through better healthcare etc, it is also important to be able to meet the challenges of an ageing population and this could better be achieved through a focus on cost-effective growth in the high economic growth scenarios.

Extra-European migration will become increasingly important to deal with the ageing population of the European space. If policies are market oriented and the economy grows

strongly, extra-European immigration is expected to be very high, especially in major cities such as Madrid or Paris. If economic growth is high but policies focus on cohesion, this pattern is also seen, although not quite as strong. While a great influx of extra-European immigration will help many regions address demographic and labour market challenges, it will also require social policies to integrate a large group of immigrants into society as well as greater inter-state coordination in immigration policy.

Even if life expectancy would not increase, the population aged 65+ in the ESPON area would increase by 40 per cent to 2050. If life expectancy will continue to grow, the number of persons aged 65+ will increase by 87 to 111 per cent. The effects of policies affecting the levels of fertility and migration on the rate of ageing are limited. The differences in the ageing process do not vary considerably between the different scenarios. The share of persons aged 65+ in the total population in 2050 will vary between 29 or 32 per cent depending on the levels of fertility, life expectancy and migration.

Policies affecting the growth of the labour force

The growth of the labour force is affected by changes in the size of the working age population. At the regional level changes in the working age population are affected by migration and cohort turnover (i.e. the balance between the inflow of young generations and the outflow of older generations. In addition to the size of the working age population, the level of age-specific labour force participation rates affects the size of the labour force as well. Policies aimed at affecting the size of the labour force may be supplemented by policies aimed to affect productivity growth. If the growth rate of the labour force will decline, productivity growth will become the main driver of economic growth.

Changes in fertility will have an impact on the size of the labour force in the long run only. In the short run policies aimed at an increase in fertility could have an adverse effect on labour supply if women would work less by reducing the number of working hours or by means of maternal leave schemes.

Changes in mortality at middle ages have a direct effect on the size of the labour force. In most Western European countries mortality at middle ages is very low, so that a further reduction of mortality rates would have a very small impact on the size of the labour force. However, in many eastern European regions mortality at middle ages, especially for men, is very high. Policies aimed at healthier life styles and an improvement of healthcare could result in a considerable decrease in mortality rates. Furthermore an improvement of life expectancy, more specifically of health life expectancy, could lead to an increase in the age of retirement, and thus result in an increase in labour force participation rates at older ages.

Measures already being taken to capitalise on extra-European immigration as a means of addressing gaps in the labour market are seen in the discussions towards a common European Union immigration policy which recognises that the EU needs migration in certain sectors and regions to deal with the specific economic and demographic needs of the territory. Policy makers recognize that the interconnection between migration and integration remains crucial.

While internal migration is positively related to economic growth and high economic growth increases job-related mobility, there are hardly any political actions to explicitly stimulate migration to other regions within a country. The Schengen Agreement, of course facilitates inter-state mobility and some incentive schemes encourage the migration of young academics, but in general there are few European-wide policy actions for this. International migration will be high if economic growth is high and policies are market oriented, as shown by the EME. In contrast, if economic growth is low and

policies are focusing on cohesion, international migration will be low. If high economic growth in certain areas of Europe is not checked by territorial cohesion policies the result may be greater movement of job seekers from lagging regions of Europe into the already affluent regions. If the goal is to retain people and workers in countries with higher emigration rates, such as the Eastern European countries, then territorial cohesion considerations, as expounded in the Territorial agenda are appropriate.

Migration in general will tend to benefit the already affluent regions by helping to address the problems of ageing, but migration out of the poorer regions will only increase regional disparities. Migrants move to regions that enjoy affluence, accessibility and a nice climate. Areas with a well-performing R&D sector are better able to attract more migrants. In general Eastern Europe will suffer from a loss of migration (except in the larger agglomerates). The only way to prevent the growth of regional disparities due to migration would be by policies to reduce incentives to emigrate from poor regions and policies that encourage poorer regions to attract more extra-European migration. In order to promote territorial cohesion increasing the attractiveness of regions falling behind is just as important, or more important, than boosting the competitiveness of already vibrant regions, that benefit from migration. Regional policy instruments such as the Structural Funds, Cohesion Funds and the Territorial Cooperation objective should be directed towards measures attracting and retaining younger persons in these areas and redressing the exodus from shrinking areas.

Policies can be aimed to raise labour force participation rates for young persons, women, immigrants, and older persons. Policies and attitudes towards full time, part time and self-employment will affect the size of the labour force as well. National family policy can have a fundamental influence on the labour supply of women. For example in the Nordic countries, family and labour market policies are largely organised to facilitate the reconciliation of employment and parental responsibilities for both parents, helping to solve the work-life balance. Policy considerations to keep older workers in the labour force include reform of pension systems and retraining of older workers. But policies should encompass healthcare concerns to maintain an older, but vital workforce. Policy considerations to absorb greater numbers of younger people will depend on education and training.

Effects of policies on labour force

If labour force participation rates would not change, the size of the labour force in the ESPON area will decline by 17 per cent until 2050. In 23 regions the labour force would shrink by more than 50 per cent. Only in one quarter of the regions the labour force would increase. In 90 per cent of the European regions the labour force would be smaller without extra-European migration. In all European regions, the ratio of the inactive to the active population would be higher without extra-European migration. Therefore extra-European migration would have a beneficial, albeit unequal impact on the balance between the labour force and economically inactive population.

High economic growth will lead to an increasing trend in labour force participation rates. If policies are aimed at reducing regional disparities, economically weaker regions with low activity rates will catch up and approach the higher rates of the stronger regions. If policies are market oriented, high economic growth may lead to a general strong rise in the activity rates, but regional disparities are becoming larger as stronger regions shows a higher rise. If economic growth is poor, activity rates will fall everywhere. Even though policies may ease the economic pain of the weaker regions, they will not succeed in catching up with the strong regions. If policies assume that the market has to do the work, this works fine for the economic stronger regions but not so much for the economic weaker regions. Disparities are growing as weaker regions have to face a steeper fall in activity rates than the stronger regions.

Only if activity rates will increase and if extra-European migration will be high, the total size of the labour force in the ESPON area will increase to 2050. However, even under favourable conditions, 35 to 40 per cent of the regions will face a decline in the size of the labour force until 2050. If economic conditions are poor, activity rates will not increase and immigration will be low, 55 to 70 per cent of the regions will experience a decline of the labour force by 10 per cent or more. In most regions in eastern and southern parts of Europe, the labour force may decrease even by more than 30 per cent. Also many regions in Germany and Austria will have to deal with such losses of labour supply. Market oriented policies combined with high economic growth would result in a substantially growing labour force in many regions in the western and northern part of the ESPON territory. However, the contrast with the eastern part is sharp, where a majority of the regions will have an enduring shrinking labour force. If policies focus on regional cohesion the contrast between regions with a severe decline of the labour force and those with a steep growth is much smaller.

Even though the size of the labour force may continue to grow if labour force participation rates will increase, the rate of growth will decline due to the decline in the size of the working age population. This implies that an increase in labour productivity will become the main driver of economic growth. According to the Lisbon strategy policies should not just aim to improve capital investments, but should include investments in human capital, training and capacity building. Europe 2020 asserts that labour productivity should be raised through a focus on new skills and jobs. The DEMIFER scenarios show that if productivity will not improve, the risk is that growth in GDP per capita will be negative.

Impact of climate change on migration

In addition to assessing the impact of migration flows on ageing and the size of the labour force, DEMIFER analysed the potential effect of climate change on migration. As the majority of the people expected to flee the negative effects of a changing climate will presumably stay in their own countries, DEMIFER examined intra-European migration in connection with climate change. Compared to migration for other reasons, climate change migration is expected to be very slight. While regions may be presented with additional territorial challenges, i.e. Mediterranean regions may experience water shortages, winter sport regions may lose revenues due to reduced tourism, and coastal areas may see changes in fisheries and aquaculture sectors, these challenges can partially be mitigated by a focus on new technologies. More affluent persons will be able to adapt better to extreme climates through seasonal migration and more affluent regions will have the means to restructure certain sectors that are affected by climate change. Thus climate change impacts will be an additional burden on the regions that are already affected by a diminishing labour force and an ageing population. Policy actions to help relieve affected regions from the challenges imposed by climate change and thus discourage migration away from these areas include, as Europe 2020 recounts, a focus on "green energy" technologies to help regions solve their energy needs, boost innovation and provide both low-skilled and high-skilled job opportunities.

Effectiveness of policies

If current demographic trends and migratory flows will continue the European working age population will shrink and disparities across regions will increase. This calls for policy options to improve European competitiveness and regional cohesion. Policies may be aimed to accommodate these demographic changes or policies may be aimed to directly affect the demographic trends. Growth cannot simply be enhanced and disparities cannot simply be reduced by policies aimed at directly affecting demographic developments and migratory flows since these depend on the economic situation. If young couples do not

have faith in the future they tend to have only a small number of children. Therefore, policies aiming to raise the level of fertility will not be effective if the general economic situation will not improve. Moreover, policies affecting the level of fertility will have effects on the growth of the working age population in the long run only. These policies will not help in reducing labour shortages in the next two decades or so. Policies aimed at increasing mobility between European regions and countries may reduce rather than increase cohesion since young adults tend to migrate from disadvantaged to affluent regions. Thus policies aimed to stimulate migration can be effective only if they are part of policy bundles aimed to improve living conditions in poor regions, for example by improving the availability of jobs, housing, schools and the quality of the environment. Policies which are aimed to allow economic migration from outside Europe in order to meet the needs of the labour market will be effective only if integration policies are successful. Furthermore, as migrants tend to move to economically healthy regions, regional disparities may increase, particularly as regions with a healthy economy tend to be better able to attract higher skilled migrants. Policies to address demographic challenges therefore, should not just be aimed to affect the size and direction of demographic trends and migratory flows, but should be combined with policies in other areas as well.

1   Introduction

In the near future European regions have to face four major challenges: globalisation, demographic change, climate change and sustainable energy[1]. In order to adjust to the new opportunities and consequences of globalisation, the Lisbon Agenda requires European economies to increase productivity growth, employment levels and human capital. The main demographic challenges are decreasing population growth and increasing proportions of the elderly. Ageing and declining populations strongly influence (regional) labour markets, healthcare expenditure and social security systems. Together with its proximity to some of the world's poorest and fastest growing populations, these demographic developments will continue to put a strong migration pressure on Europe. Climate change will put high demands on economic, social and environmental systems, while resource depletion, rising oil and gas prices, and a switch to bio-fuels potentially affect the competitiveness of energy intensive sectors.

The ESPON 2013 Programme supports policy development in relation to the aim of territorial cohesion. One of the major priorities of the Programme is to observe demographic trends in Europe, to look into future demographic developments and to link these to economic, social and environmental development issues in European regions and cities. Within this Programme, ESPON initiated and funded the research project DEmographic and MIgratory Flows affecting European Regions and cities (DEMIFER). The objective of DEMIFER is to assess the effects of demographic trends and migratory flows on European regions and cities and to examine the implications for regional competitiveness and European cohesion. The specific aims of the project are:
1. to determine how distinctive are current trends in migration, fertility, and mortality and how they affect differences across regions in population growth, the size of the working age population and the ageing of the population;
2. to review the extent to which the effects of internal migration, migration between European countries and migration to Europe compensate or reinforce each other;
3. to assess the effects of economy and policy options on natural growth, migration and labour force participation;
4. to forecast how future developments in migration, fertility and mortality will affect population growth and changes in the age structure in different types of regions;
5. to analyse the extent to which the labour force in different types of regions will change due to increases in natural growth, internal migration, international migration and participation rates;
6. to assess the future effects of environmental change on migration flows within, between and into countries and regions;
7. to examine the implications of demographic and migratory developments and to translate the output of the policy oriented activities into more specific regional settings.

The main demographic perspective of the DEMIFER project is the ageing of the population and its relationship with regional economic developments. In analysing the relationship between demographic and economic differences across regions it is important to note that this relationship is mutual. On the one hand the levels of fertility and mortality and the direction of migration flows are affected by economic conditions. On the other hand changes in population growth and ageing (which depend on developments in fertility, mortality and migration) affect both the supply and demand side of the economy of regions. The second basic principle is that even though climatic crises in Europe have been rare in the past, in the future environmental changes may

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[1] Commission of the European Communities (2008), Regions 2020 - An Assessment of Future Challenges for EU Regions.

affect regional developments, particularly climate change and limitations in the availability of energy.

A major consequence of the ageing of the population is that the working age population will decline which may have a downward effect on economic growth and competitiveness in many European regions. In order to achieve the Lisbon goals of long term economic growth, full employment, social cohesion and sustainable development, the ageing of the working age population asks for policies aimed at increasing the size of the (potential) labour force, raising employment rates and improving productivity growth. Furthermore, looking at the ageing of the population it is important to make a distinction between the 'young elderly' and the 'oldest old'. Increases in the number of the oldest old will have an effect on the demand of healthcare and long term care. Increases in the size of the young elderly population on the other hand, may help in bridging the gap between the increase in the demand of care caused by the increase in the number of oldest old and the decrease in the growth rate of the working age population, as many of the young elderly are still in reasonably good health and may well provide informal care. Even though population ageing will affect regions all across Europe, different types of regions may be affected in different ways.

The final report of DEMIFER provides an overview of the most important recent and future regional demographic developments in the ESPON area and the corresponding policy considerations for regional competitiveness and territorial cohesion. To serve the first aim of the project, chapter 2 reflects on the demographic territory of Europe, in particular on the countries and regions of the ESPON area[2]. The focus is on the impact of migration, mortality and ageing on the working age population. In chapter 3 the demographic regimes are synthesized to derive a summary typology of European regions at NUTS2 level[3]. Special attention is given to the main demographic challenges of low fertility levels, population ageing and the slowing down of the growth of the working age population. In the second part of this chapter the typology of demographic status is linked to socio-economic data providing to each type regional characteristics in terms of economic performance, level of educational attainment of the population, labour force status, and economic structure. Based on a number of case studies, chapter 4 studies in more spatial detail the many ways in which demographic and migratory flows may affect European regions and cities. Referring to a limited number of NUTS2 regions, these studies employ NUTS3 level data and, where possible, lower level regional areas within these NUTS2 regions as well (aim 7).

To answer questions such as 'What would be the population in the ESPON area in 2050 if there were no migration in the future?' we calculated a set of reference scenarios (answering aim 2). The first reference scenario assesses what will happen if the demographic regimes of mid-decade (2005) continue to 2050. Subsequently we explored what happens when various migration streams are turned off. Two 'no migration' scenarios were compiled. In the first we assumed no internal and international migration at all, while in the second free movement within the ESPON area was assumed, but no migration to and from the rest of the world. The main conclusions of these scenarios are given in chapter 5.

The interrelationship between ageing and migration on the one hand and economic performance and structure on the other, comes up for discussion in several chapters.

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[2] EU27 plus Iceland, Liechtenstein, Norway and Switzerland.

[3] The Nomenclature of territorial units for statistics (NUTS) is a three-level hierarchical classification of regions defined for the Member States of the European Union. For the Candidate Countries and the countries of the European Free Trade Association (EFTA), a coding of statistical regions according to similar principles as the NUTS classification, has been defined by Eurostat in agreement with the countries concerned. According to the latest review of the NUTS classification in 2006, with extension in 2008 to accommodate the accession of Bulgaria and Romania, the ESPON area covers 287 NUTS2 regions. Source: Eurostat – http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction.

Since it is uncertain to what extent territorial policies will be effective we examined a number of policy scenarios based on alternative assumptions about 1) future developments in economic trends, innovation and climate change, and 2) the implementation and effectiveness of regional cohesion policies. Scenarios in which policies will succeed in narrowing regional disparities are compared with scenarios in which well-off regions will benefit more than regions lagging behind. The ideas behind the set of policy scenarios are described in chapter 6 (aim 3).

Chapter 7 sketches the outcomes of the policy scenarios with respect to the components of population change, ageing, the relationship between migration and population redistribution as well as the relationship between population redistribution and population density (aim 4). What are the consequences of the scenarios in terms of population growth and decline and the ageing of the population? In this respect it is important to note that due to the effect of the post war baby boom in the next decades the number of young elderly will rise strongly, but that in the long run these people will become the oldest old. Thus whereas in the coming decades we may expect an increase in the supply of informal care, in the long run the gap between supply and demand of care may well increase sharply.

Chapter 8 focuses on linkages of economic developments and demographic changes through the labour market (aim 5). Since the scenarios include labour force participation rates, we could analyse the impact of demographic and migration trends on the future size of the estimated actual labour force (in addition to the future size of the estimated potential labour force).

Europe's cities and regions face several important challenges from environmental changes. Temperatures are rising, sea levels increasing and rain patterns altering. Oil and gas resources shrink, prices rise, and a switch into alternative bio-fuels occurs. Chapter 9 addresses future effects of environmental changes on migration flows within, between and into European countries and regions (aim 6).

While chapters 2 to 9 describe current and future regional demographic and migratory developments, chapter 10 discusses the key points for consideration in policies for regional competitiveness and territorial cohesion. In what way do European demographic developments contribute to positive regional developments and what parts of Europe are confronted by unfavourable territorial developments today or will most likely have to face these in the (near) future? This chapter also discusses the options for policy makers to address the demographic challenges for European countries and regions.

More detailed descriptions of the research questions and design, data issues, applied methodologies, outcomes of the scenarios, individual case studies and extensive literature lists, can be found in the scientific report of DEMIFER that is annexed to the final report. A list of the deliverables that together make up the scientific report is given in Annex 1.

2 The demographic territory of Europe

Key findings

- *More than one quarter of the NUTS2 regions in the ESPON area experience the impacts of population decline.*
- *Urban regions often face a negative internal migration balance as a result of migration to settlements outside the urban areas, but, at the same time, attract international migrants.*
- *Migration has increasingly not been sufficient to compensate the decline in the potential labour force due to cohort turnover.*

2.1 Population development in the ESPON area

The population of Europe is increasing slowly. Currently the number of inhabitants in the countries of the ESPON area is around 515 million. Since 2000 the annual average growth rate has been below 0.5 per cent per year, which is similar compared to other developed countries but modest in comparison to other world regions. Population growth is unevenly distributed across the ESPON countries. The highest growth in 2007 took place in Ireland and Spain, while most of the Eastern European countries had to face stagnating populations or population decline. Also at NUTS2 level significant differences in population growth are witnessed. Over the period 2000-2007 there was population loss for 75 of the 287 NUTS2 regions, 171 regions experienced an average annual population growth of less than 1 per cent, and in only 41 NUTS2 regions this percentage was above 1. The largest population losses were recorded in Bulgarian and German regions, while the largest gains were observed in the south of Spain. In the period since 2000 the number of NUTS3 regions with population growth dropped to less than 60 per cent. Contrary to the general trend, in Spain and Italy the number of regions with population growth increased substantially, mainly due to increasing levels of migration from outside of Europe. Splitting up the NUTS3 regions into three groups with different degrees of urbanization shows that for all groups the percentage of regions with population growth has declined since the start of this millennium. While still two-thirds of the urban regions and 62 per cent of the intermediate regions experience population growth, more than half of the rural NUTS3 regions are currently characterized by population losses[4].

The slow pace of European population growth gives rise to the major demographic challenge of population ageing. Although population ageing affects all regions of the world, it is most advanced in Europe. The old age dependency ratio serves as an indicator of the pressure placed on the working age population (age 20-64) to take care of the old (age 65+). In 2007 the vast majority of NUTS2 regions were confronted with old age dependency ratios between 20 and 35. Higher values were mainly found in Italy, Greece and Germany, while lower values were found in Iceland, Ireland and some regions in Poland and Slovenia. 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. In the whole ESPON area this 'very old dependency ratio' (VODR) increased from 11.0 in 2000 to 12.7 in 2007. The number of regions with a ratio below 10 halved (from 96 to 46), while the number of regions with a ratio above 15 more than doubled (from 30 to 70). In 21 regions there has been a decline in the VODR. Many of these regions include big cities (e.g. London, Stockholm, Brussels, Oslo, and Wien).

The driving forces of population ageing are sustained low fertility and increasing longevity. Fertility in the ESPON area is among the lowest in the world. Currently, women in the European Union on average have 1.5 children. Differences between countries

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[4] More information on demographic and migration developments in the ESPON area can be found in DEMIFER deliverable D1 'Report on effects of demographic and migratory flows on European regions' prepared by R. van der Erf, J. de Beer and N. van der Gaag, NIDI.

gradually become smaller. The highest fertility levels are observed in France and Ireland (2.0), while Slovakia, Romania and Poland have the lowest rates (1.3). In more than half of the NUTS2 regions the TFR is 1.5 or lower, while only for seven regions the TFR amounts 2 or higher. Life expectancy at birth in the ESPON area is among the highest in the world. With only a few exceptions (Lithuania and Latvia for men) longevity continues to increase in all countries. Currently, European women on average may expect to live 82 years and men 76 years. The gender gap in longevity is slowly narrowing. While life expectancy is high in Italy, Spain and most of the regions in Western and Northern European countries, it is low in Eastern Europe.

2.2 The impact of migration

Contrary to the past, natural population development (the difference between births and deaths) has only limited impact on population change. Today, by far the most important force behind European population change is international migration.

As the main driver of European population growth, in 2007 international migration amounted to 4 per thousand for the ESPON area as a whole, against only 1 per thousand through natural increase. It is estimated that more than half of the total number of international immigrants in the ESPON area arrives from outside the area, while somewhat less than half of the international emigrants departs to a country outside ESPON. These proportions vary strongly between countries. For example, only 5 per cent of all immigrants in Luxembourg arrived from a country outside the ESPON area in 2007, against around 70 per cent of the Italian immigrants.

In 21 of the 23 countries that reported population growth during 2007 this growth was mainly caused by migration. Only in France and the Netherlands natural increase dominated. In 2007, the Netherlands was the only Western European country with a negative international migration balance. In seven of the eight (mostly Eastern European) countries that reported a population decrease, the deficit was mainly caused by negative natural growth. Poland was the only country in 2007 with a population decrease mainly caused by negative net migration.

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 1). 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), followed by the combination positive total, negative internal and positive external (30 per cent). Conversely, there are hardly any 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.

Urban regions often face a negative internal migration balance as a result of migration to settlements outside the urban areas. At the same time, urban regions usually attract international migrants because of the availability of cheap housing and jobs and the presence of a resident migrant population. In more attractive regions on the other hand, the available housing tends to be occupied primarily by internal migrants, restricting the possibilities for international migrants to settle in these regions. Urban regions, especially those that encompass big cities, also often attract young populations (students, young active and foreign immigrants) and expel older active ones. A clear example is Inner London. During the period 2000-2004 the population aged 20-39 increased by 24 per cent through migration, while the population 40-64 decreased by 23 per cent through migration. On the other hand, there are regions too that either attract both young and older migrants (e.g. various regions in Spain) or expel both (e.g. various regions in Poland).

Map 1   Net migration by components, 2000-2007

Net Migration by Main Components 2000-07

Internal and international migration balance
in the NUTS2 Regions in 2000-2007*

Positive Net Migration

■ (dark teal)	Positive Internal and International Migration	(112)
■ (light blue)	Positive Internal and Negative International Migration	(10)
■ (purple)	Negative Internal and Positive International Migration	(82)
☐ (light)	No Differentation	(7)

Negative Net Migration

■ (red)	Positive Internal and Negative International Migration	(12)
■ (pink)	Negative Internal and Positive International Migration	(31)
■ (dark red)	Negative Internal and International Migration	(28)
☐ (light pink)	No Differentation	(5)

No differenciation between internal-
and international migration (Countries
with only one NUTS2 region & French
overseas regions)

(x) - number of regions per category

☐ No data

Regional level: NUTS 2
Source: ESPON 2013 Database 2010
Origin of data: Eurostat 2009, NSIs 2009, University of Leeds 2009
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Total migration: FR 2000-2006; Domestic- & international
migration: CH 01-04, DE 02-07, DK 06-07, FR 06, GR &
PT 01, IE 02-06, IT 00-05

2.3   Dynamics of the working age population

In a large majority of the ESPON countries the size of the working age population increased in the period 2000-2007. However, in more than one quarter of the NUTS2 regions the potential labour force declined (Map 2). In this context Germany is head and shoulders above the rest: the 20-64 year old population decreased in three out of every four German NUTS2 regions. Other countries with relatively many regions in which the working age population declined are the United Kingdom, Bulgaria, Hungary, Denmark and Sweden. On the other hand, there are almost 50 regions where this population increased by more than one per cent per year. Many of these regions can be found in the eastern part of Spain, the southern part of France, in Ireland, and in Poland. Here too, the proposition that big cities attract labour migrants is confirmed.

Changes over time in the working age population occur because of the simultaneous operation of cohort turnover (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 turnover as well as positive net migration (type 1 in Table 1). These regions are found in almost all countries with the exception of Germany and the Baltic States. In most Western European countries this is the dominant class of regions.[5]

Table 1   Type of growth of working age population, NUTS2 regions, 2000-2004

	1	2	3	4	5	6	7		1	2	3	4	5	6	7
AT	8	1						IT	3	4	10		1	3	
BE	11							LI	1						
BG	1	1			4			LT					1		
CH	6		1					LU	1						
CY	1							LV					1		
CZ	3	5						MT	1						
DE			7		3	24	5	NL	11				1		
DK	2				2	1		NO	5	1			1		
EE				1				PL	4	12					
ES	17	2						PT	6		1				
FI	3	1			1			RO	3	3			2		
FR	17	9						SE	5				3		
GR	12			1				SI	2						
HU	3	1			3			SK	1	3					
IE	2							UK	10	11			16		
IS	1							Total	140	54	19	2	39	28	5

1 total growth +, cohort turnover +, migration +; 2 total growth +, cohort turnover +, migration -
3 total growth +, cohort turnover -, migration +; 4 total growth -, cohort turnover +, migration +
5 total growth -, cohort turnover +, migration -; 6 total growth -, cohort turnover -, migration +
7 total growth -, cohort turnover -, migration -
UK: 2000-2003

The second largest class contains of regions with positive total growth due to positive cohort turnover that exceeds negative net migration (type 2). These regions are typically found in Poland, Slovakia and the United Kingdom, but also in the Czech Republic and France. 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 turnover. Various examples of these regions are found in the UK. In type 3 the total growth is positive due to positive net migration that exceeds negative cohort turnover.

Almost all of the regions with this type can be found in Italy and Germany. However, many more regions in Germany are of type 6: negative total growth as a result of negative turnover that is not compensated by migration. Regions where the decline of the working age population may be attributed entirely to mortality (type 4) are very few in number and are found in Estonia and Greece. Finally, in five regions in Germany all three factors of change, i.e. cohort turnover, migration and mortality, contribute to the shrinking potential labour force (type 7).

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[5] Because of different periods, the totals in Table 1 slightly deviate from those in Map 1.

Map 2   Annual change in working age population, 2000-2007 (%)

Change in Working Age Population 2000-2007
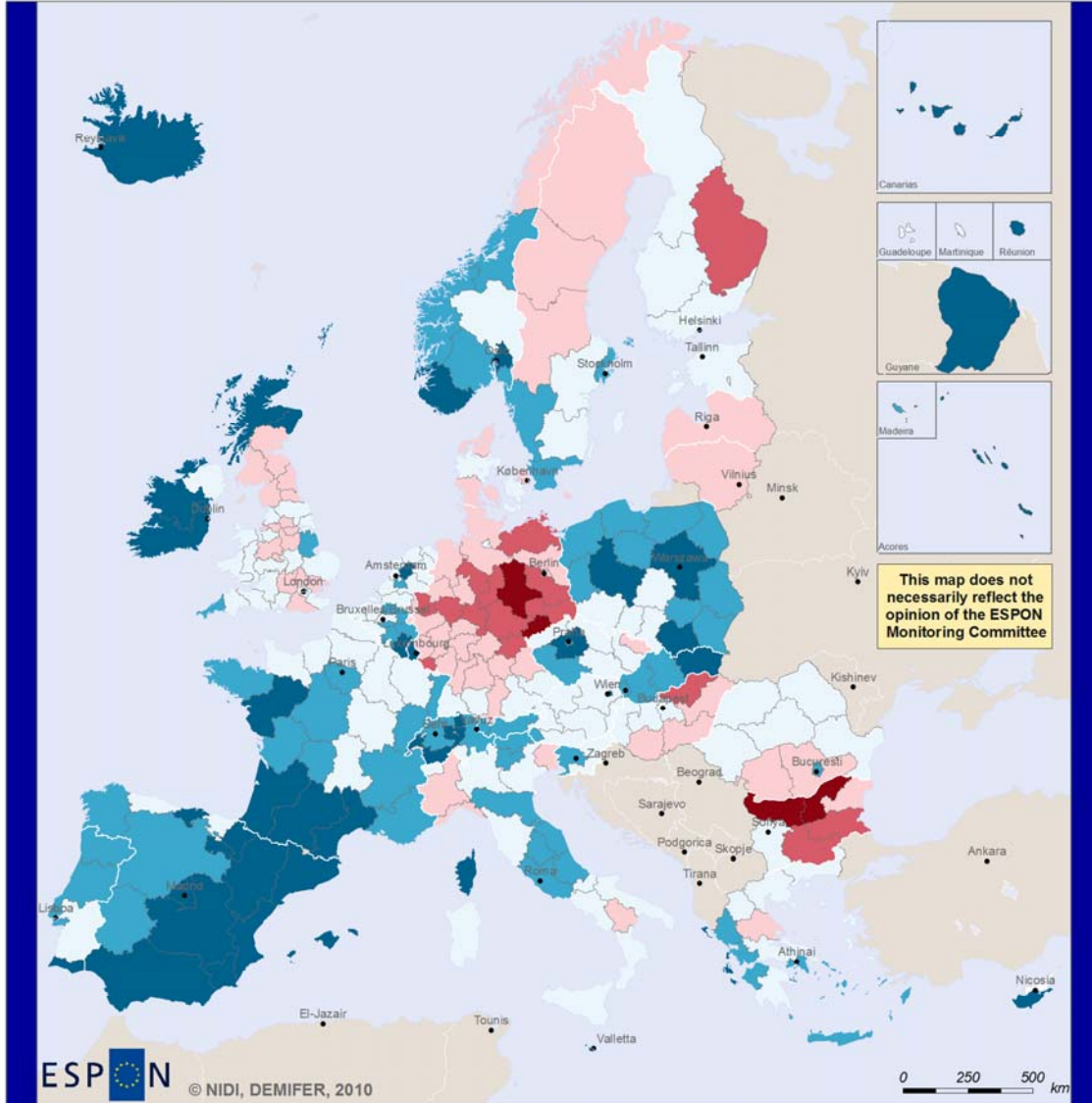
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE

Regional level: NUTS 2
Source: ESPON 2013 Database 2010
Origin of data: Eurostat, NSIs 2009-2010
© EuroGeographics Association for administrative boundaries

Annual Average Change in Population Aged 20-64, in %

■	-1.6 - -1.0 (4)
■	-1.0 - -0.5 (16)
■	-0.5 - 0.0 (58)
□	0.0 - 0.5 (98)
■	0.5 - 1.0 (65)
■	1.0 - 4.0 (46)
□	No data (1)
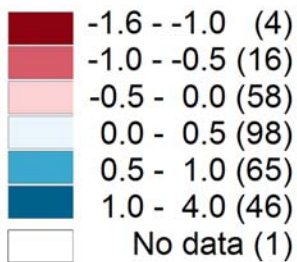
3   Typology of regions

Key findings

- *The DEMIFER typology reveals seven types of regions and sheds light on the prevailing demographic pluralism across European regions.*
- *The different types broadly reflect the geographical extent of European macro regions, highlighting demographic differences between Eastern, Southern and North-West Europe.*
- *Population ageing does not necessarily go together with population decline; in spite of low fertility and high percentages of elderly, strong influx of migrants may result in (still) rising populations.*
- *Almost all regions are confronted with labour force challenges, but the kind of challenge differs by type of region, depending on the size, age structure, or composition of the working age population.*

3.1   Regional typology of the demographic status by 2005

The DEMIFER typology of NUTS2 regions is a comprehensive classification of the demographic structure and short-term trends in the ESPON area by 2005. The typology is based on four key variables: the share of the age groups 20 to 39 years and 65 years and over in 2005, as well as the annual average natural population increase and net migration rate during the period 2001 to 2005[6]. While the age group 20-39 matches the prime reproductive age as well as the younger working age population, the share of the age group 65+ is an indicator for the stage of ageing. These two age groups also represent the peak ages of mobility. The natural population balance indicates the extent of the population increase or decrease based on the difference between births and deaths, while the net migration rate expresses the gain or loss of population due to migration. The aggregate of both refers to the total population change. The DEMIFER typology builds on the demographic typology prepared under ESPON project 1.1.4 'Spatial effects of demographic trends and migration' by not only taking into account population change, but also the age composition of the population. This combination of structural indicators (i.e. the share of certain age groups) and components of population development makes it possible to link the typology to a wide scope of policy areas with an impact on spatial development (see also Chapter 10 'Policy considerations').

The typology distinguishes between seven types of regions, which are affected differently by demographic and migratory flows (Map 3 and Figure 1). The typology enables one to capture the demographic diversity of European regions by 2005 at first glance:

- "Type 1 – *Euro Standard*" is coming close to the overall average of the ESPON area with respect to the indicators used in the cluster analysis. However, the age structure is slightly older than the average. Overall, a stagnating natural population balance and a positive net migration rate are prevalent. These regions are mainly found in Northern and Western Europe.
- "Type 2 – *Challenge of Labour Force*" features a high share of population in young working ages and a slight population decline, driven by a negative natural population development. These regions are mainly situated in Eastern Europe and in some peripheral areas in Southern Europe.

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[6] The development of the demographic typology, its illustration and the linkage of the typology with socio-economic variables are described in DEMIFER deliverable D3 'Typology of regions' prepared by R. Bauer and H. Fassmann, UNIVIE.

Map 3   Typology of the demographic status in 2005

Typology of the Demographic Status in 2005
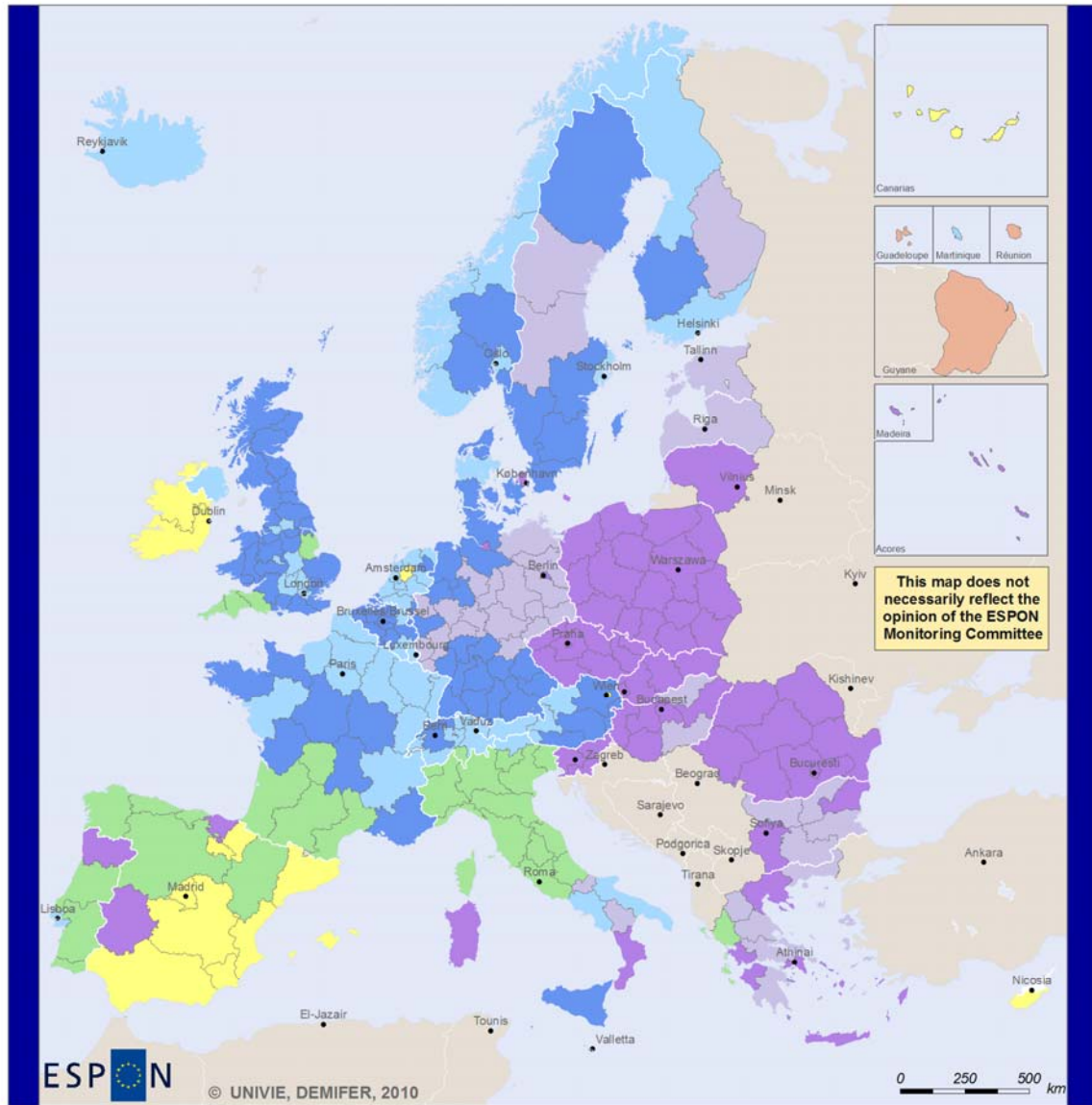
Type	Classification	Cases	Population		Age Group 20-39 (%)			Age Group 65+ (%)			Natural Population Increase (per 1000)			Net Migration (per 1000)		
					2005						average per annum 2001-2005					
					avg	min	max	avg	min	max	avg	min	max	avg	min	max
1	Euro Standard	79	127 915 217	25.41%	25.68	22.57	28.72	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
EU27+4	ESPON Space Average	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

No data

Figure 1 Profiles of types

ESPON 2013

11
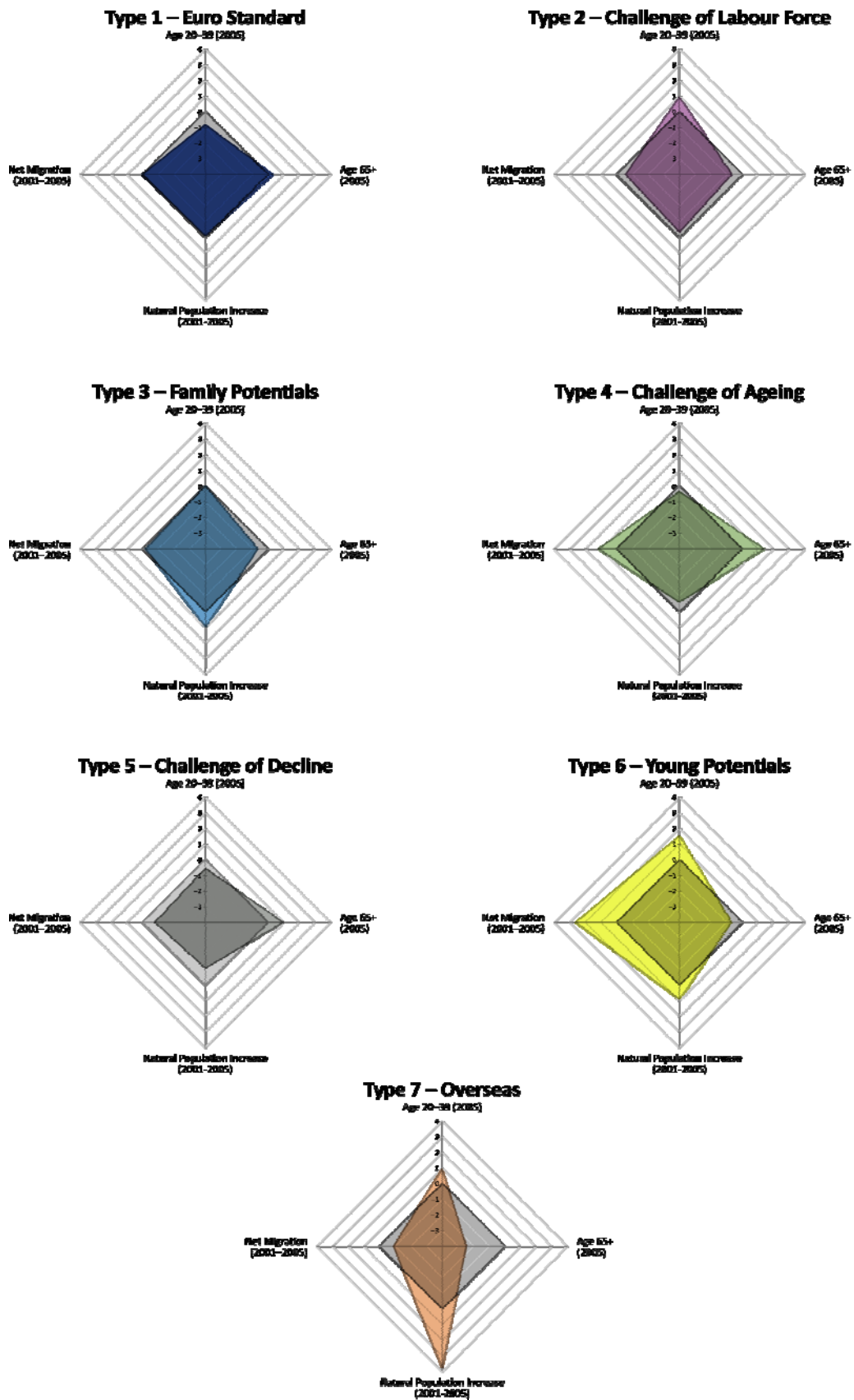
- "Type 3 – *Family Potentials*" has a slightly younger than average age structure and high natural population increases, as well as a positive net migration rate. Several regions in Northern and Western Europe belong to this type.
- "Type 4 – *Challenge of Ageing*" is characterised by older populations and natural population decreases. Nevertheless, the overall population size is still increasing due to a strong net migration surplus. This is a rather Southern European type.
- "Type 5 – *Challenge of Decline*" is shaped by a negative natural population balance, as well as a negative migratory balance. In consequence, this leads to depopulation accompanied by demographic ageing. This type of region is situated in Eastern Europe, including Eastern Germany.
- "Type 6 – *Young Potentials*" features a young age structure, a positive natural population increase, as well as a strong migratory surplus. These regions are mainly found in Spain.
- "Type 7 – *Overseas*" is featuring considerable high shares in the young ages and by far the lowest share of elder population. The strong natural population increase is more than counterbalancing the negative migratory balance. This type of regions consists of the French Overseas Territories and the Spanish exclaves of Ceuta and Melilla.

3.2   Demographic challenges per type of region

Population decline is a demographic challenge, first and foremost, for the two distinctive Eastern European types of regions of the *Challenge of Labour Force* type and even more for the *Challenge of Decline* type. All other types of regions had a positive population development during the period 2001 and 2005. These two types of regions, and also the *Challenge of Ageing* type to some extent, must be alerted by the impact of low fertility. All other types of regions have higher levels of fertility, although still below the replacement level. Only in regions of the *Overseas* type, the level of fertility is predominately around or above two children per woman. With respect to the population development, all other types of regions were able to compensate the below replacement fertility by immigration between 2001 and 2005.

Demographic ageing is measured by the share of the older age groups, most commonly by the age group 65 years and over. In the ESPON area, the age group 65+ is in general the strongest growing age group. Above average proportions of elder populations can be observed in *Euro Standard*, *Challenge of Ageing* and *Challenge of Decline* regions. The highest shares can be found in the *Challenge of Ageing* regions, which also feature the highest life expectancy of all types of regions. The impacts of demographic ageing, however, are mitigated by a strong influx of younger migrants. Although the average live expectancy in the *Challenge of Decline* regions is the one but lowest in the typology (the *Challenge of Labour Force* regions have on average the lowest life expectancy), in these regions the widespread emigration of young people is driving the already prevalent process of demographic ageing even further. In *Euro Standard* regions, the speed of ageing is rather moderate due to reasonable fertility rates and a predominately positive migratory balance. All other types of regions show below average shares of elderly people, supported either by higher levels of fertility (*Family Potentials* and *Overseas* regions), or by strong migratory surpluses (*Young Potentials* regions). By contrast, the relatively low share of elderly in *Challenge of Labour Force* regions is due to the momentum originating from the last strong birth cohorts born before 1990, and because of the lowest life expectancy of all types of regions – both characteristics are typical for Eastern European populations.

When it comes to the size and ageing of the labour force, which is almost exclusively constituted by people in the main working ages between 20 to 64 years, challenges are bound to occur in the foreseeable future in all types of regions, besides *Young Potentials*.

The share of working age population is around average in *Euro Standard, Family Potentials, Challenge of Ageing* and *Challenge of Decline* regions. Only in *Overseas* regions this proportion is clearly below average, however, if these regions can prevent emigration of high proportions of younger people, the share of the working age population will increase considerably in the coming years. In *Euro Standard*, *Family Potentials,* and *Challenge of Ageing* regions, the share of the working age population is still increasing. This growth is driven by increases in the older working age population (55 to 64 years), while the proportion of younger adults (20 to 39 years) was already decreasing during the period 2001 to 2005. Only in *Challenge of Decline* regions, the size of the entire working age population is already shrinking. Especially the decrease in the share of the younger working age population is decisive for the shrinking labour force. Although the proportion of the working age population is still well above the overall average In *Challenge of Labour Force* regions, the demographic supply of young people will fall steeply in the near future as fertility fell sharply after 1990. As a consequence, the current high share of young adults refers to the last sizeable cohorts reaching the working age and in the foreseeable future there will be a shortage of younger adults in regions of this type too. In *Young Potentials* regions, the proportion of the working age population is not only clearly above the overall average, but is even still increasing. This applies especially to the younger working age population.

3.3   Socio-economic illustration of the classification

In order to describe the socioeconomic performance of the types of regions resulting from the demographic typology, data from the ESPON 2013 Database as well as from the European Labour Force Survey 2007[7] has been linked to the typology. In the course of the analyses a special emphasis was placed on the foreign population, distinguishing between national population and immigrants with a foreign citizenship, either from another EU27 country or from outside the EU27[8].

When differentiating by economic performance, those types of regions with GDP-PPP per capita levels above the EU27 average (2005), i.e. *Euro Standard*, *Family Potentials*, *Challenge of Ageing* and *Young Potentials*, do show GDP-PPP per capita growth rates (2001-2005) below the EU27 average. Only in the *Young Potentials* type, the annual average GDP-PPP per capita growth rates are close to the EU27 average. In types of regions with below EU27 GDP-PPP per capita levels, i.e. *Challenge of Labour Force* and *Challenge of Decline*, quite the reverse is true.

Considerable stocks of foreign populations can be found in those types of regions with above average GDP-PPP per capita levels. The highest proportion of foreign population (2007) and also the strongest net migration gains (2001-2005), can be observed in regions of the *Young Potentials* type. The highest stock of foreign population (2007) by absolute numbers is found in the *Euro Standard* type. There are considerable differences with respect to the origin of the foreign population, as well as regards the length of stay. In the ESPON area, the stock of Non-EU citizens is almost twice as high as the stock of EU27 migrants. The highest proportions of immigrants from other EU27 countries can be found in *Euro Standard* and *Family Potentials* regions. Differentiated by the length of stay, *Challenge of Ageing* and *Young Potentials* regions constitute "new demographic growth regions", as the majority of the foreign population immigrated during the last ten years. By contrast, about two thirds of the foreign population of *Euro Standard* and *Family Potentials* regions is living since ten years or longer in these types of regions.

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[7] Eurostat (2008), European Labour Force Survey 2007. – Eurostat, Luxembourg.

[8] More information on linkages between migration and economy can be found in DEMIFER Deliverable 2 'Causes and impacts of migration' prepared by D. Rauhut, Nordregio.

Taking the share of tertiary educated people aged 15 years and over (2007) as an indicator for the human capital stock, this proportion is highest in *Young Potentials* and *Family Potentials* regions, followed by the *Euro Standard* type of regions. In regions of *Challenge of Decline*, the share of higher educated people is around the overall average, but not increasing in younger ages, as it does in all other types of regions. On average, the share of tertiary educated persons is lowest in regions of *Challenge of Labour Force* and *Challenge of Ageing*. With respect to the foreign population, the share of EU27 citizens with higher education is surpassing those of the national population, especially in the *Young Potentials* type, while Non-EU foreigners are in general less educated.

By far the highest unemployment rates (2007) can be observed in regions of *Challenge of Decline*, followed by *Challenge of Labour Force* and *Young Potentials*, while the unemployment is below the overall average in *Euro Standard*, *Family Potentials* and lowest in *Challenge of Ageing*. In general, the unemployment rate of the national population and EU27 citizens is about equal, while the unemployment rate of Non-EU citizens is almost twice as high. Long-term unemployment of one year and longer is prevalent in regions of *Challenge of Labour Force* and *Challenge of Decline*, while the majority of all unemployed persons in the *Challenge of Ageing* and *Young Potentials* types is jobless for less than six months. In regions of *Euro Standard* and *Family Potentials*, the distribution of long-term and short-term unemployment is quite balanced.

The labour force participation rate (2007) is highest in *Euro Standard* and lowest in *Challenge of Labour Force*. All other types of regions feature participation rates close to the overall average. When differentiating the labour force participation by age, sex and origin, distinctions are more striking. The participation of the younger (15 to 24 years) and the older (55 to 64 years) is far below the average of all ages (15 to 64 years) and there is a considerable gender gap to the disadvantage of women at all ages and in all types of regions. Focussing on the foreign labour force, the participation rate of EU27 citizens is not only above those of Non-EU citizens, but even higher than those of nationals. That proves to be true for all types of regions, except for *Challenge of Decline* regions. With respect to the *Challenge of Decline* type, the low share of foreign population might bias this result. For the *Young Potentials* regions, the labour force participation of both EU27 and Non-EU foreigners, is higher compared to the national working age population.

4 From regional to local level

Key findings

- *During the last decade international net migration is closely linked to the economic performance of the region: the economically most dynamic case study areas satisfied their labour force demand through immigration.*
- *Areas with low population density attract in general less interregional and international immigrants.*
- *Internal migration flows play in most cases a minor role, however, growth in Oberbayern is fuelled by interregional migration.*
- *Alternative forms of internal and international mobility – like commuting or various forms of temporary migrations – play an increasing role. These forms of mobility are hardly documented in official statistics.*
- *Low economic performance leads to an acceleration of population decline and demographic ageing.*
- *Economic effects of the ageing of the population and the working age population are hardly felt in the economic well-off areas.*
- *Areas with a well performing research and development sector of the economy attract more migrants. But the information available regarding the level of qualification and education of migrants is scarce.*
- *Immigrants are predominantly employed in low paying and menial jobs. This occurs independently from the level of education of the foreign employee.*
- *The observations at the local level indicate in some cases considerable geographic disparities regarding demographic and migratory structures and processes that are not only attributable to categories like urban/rural or central/peripheral, but refer to more complex patterns linked to historic trends and socio-economic differences.*
- *Demographic and migratory change has to be analysed in the context of the regional and local socio-economic structure and the situation set by the welfare state.*

4.1 Research questions focused on lower spatial level

To understand the processes at work and to study into more spatial detail the many ways in which demographic and migratory flows may affect European regions and cities, a number of case studies have been carried out that employ NUTS3 level data and, where possible, lower level regional areas as well[9]. The case studies focus on internal and international migration and the linkages with regional socio-economic dynamics.
The specific research questions and the specific aims of the case studies are:

- How are demographic and migratory flows affecting the entire case study area, its regional subdivisions and its cities?
- How do demographic change and migratory movements bring about population change – growth or decline –, population ageing and ageing of the working age population?
- What are the factors of attraction or the causes of interregional and international migration at the regional level?
- Is information regarding the skill level of interregional, intra EU and international migrants available?

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[9] More information on the case studies can be found in DEMIFER deliverable D12 'Case study reports' coordinated by F. Heins, CNR, with contributions of C. Bonifazi, M. Crisci and G. Gesano (CNR); E. Janská and Z. Čermák (Czech Republic); H. Bucher (Germany); M. Angelidis and G. Karka (Greece); C. Pauna (Romania); and P. Boden, A. Dennett, J. Stillwell and P. Rees (University of Leeds).

- What are the economic and social consequences of migratory flows in the case study area, or, more in general, what are the links between 'demography' and 'economy' in the case study areas?

The focus of the case studies is on the description of the socio-demographic structure, demographic and interregional and international migratory processes and their economic and social consequences. The sustainability of the demographic system and the migration process – migration gains and migration losses - at the sub-regional level are considered in all case studies. The interdependence in the urban areas and between the urban areas and their hinterland is highlighted.

4.2 The case study areas

In total 12 case studies were selected to cover the diversity of European regions regarding the demographic and migratory flows. Each case study describes the population and migration within the region and its interrelation with economic and social change. The selection of the case studies is based on the results of the DEMIFER regional typology of demographic status. From each of the types defined, with the exception of the type *Overseas*, at least one NUTS2 region or a combination of NUTS2 regions was selected. To be representative the case studies were chosen from the NUTS2 regions closest to the centre of the respective typology. The position of the case study areas on the indicators behind the demographic typology is given in Table 2.

Table 2 Key information of the case study areas

Case study (main city)	Demographic type	Population			Natural population change 2001-2005 ‰	Net migration 2001-2005 ‰	GDP per inhabitant, PPS 2007
		Total in 1,000	20 to 39 years 2005 (%)	65 years and older 2005 (%)			
1 Jihovýchod-CZ06 (Brno)	Challenge of Labour Force	1,640	30.4	14.5	-1.2	-0.6	17,900
2 Oberbayern-DE21 (München)	Euro Standard	4,211	28.4	17.1	0.7	4.8	41,000
3 Mecklenburg-Vorpommern-DE80 – North-Eastern Germany (Rostock)	Challenge of Decline	1,720	25.5	18.7	-2.7	-4.5	20,200
4 Arnsberg-DEA5 – South-eastern Ruhr agglomeration (Dortmund and Bochum)	Challenge of Decline	3,777	25.7	19.3	-2.5	-1.0	26,500
5 Cataluña-ES51 (Barcelona)	Young Potentials	6,784	32.2	16.9	2.0	17.7	30,700
6 Thessalia-GR14 (Larissa)	Challenge of Decline	738	27.5	20.1	-1.3	0.4	17,000
7 Piemonte-ITC1 (Torino)	Challenge of Ageing	4,330	26.9	22.1	-2.7	8.8	28,300
8 Molise-ITF2 (Campobasso)	Challenge of Decline	322	27.6	21.8	-3.0	2.1	19,400
9 Nord-Est-RO21 and Sud-Est-RO22 – Macroregion2 of Romania (Iaşi and Constanţa)	Challenge of Labour Force	6,585	31.2	14.3	-0.3	-1.3	7,400
10 Sydsverige-SE04 with reference to Hovedstaden-DK01 and Sjælland-DK02 (Malmö, Lund and Købenavn)	Euro Standard (Sydsverige)	3,749	27.2	15.9	0.9	3.3	30,800
11 West Yorkshire-UKE4 (Bradford and Leeds)	Family Potentials	2,128	28.0	15.1	2.4	1.4	25,800
12 London-UKI, UKI1 and UKI2	Family Potentials - World cities	7,435	36.3	11.9	6.7	-0.8	49,100
ESPON space – EU27+4		503,342	27.8	16.6	0.3	3.2	24,900

The case studies refer in most cases to the NUTS3 level and a more detailed regional scale where data are available. Depending on the case study, geographic homogeneity and heterogeneity regarding the demographic and migratory flows are observed. Obviously, the case studies cannot cover the entire socio-economic diversity of the European regions, since the regional types of demographic status are not homogeneous regarding socio-economic situation.

For each case study a concise review of the existing literature dealing with population, migration and its interrelation with economic and social change has been made. Although regional demographic structure and change are obviously important characteristics of a region, their impact on the economic and social situation is not straightforward but depends on the regional situation and historic context. Among the most discussed aspects are the ageing of the population and the working age population. Many studies seem to indicate a strong link between the economy and interregional and international immigration, setting in motion a virtuous circle of creating a relative less old and sometimes more qualified working age population. A synopsis of the most important results of the case studies is presented in Annex 2.

4.3   Demographic stocks and flows

The demographic ageing process touches all case study areas, with the Piemonte region, representing the *Challenge of Ageing* type, as the vanguard with 22.1 per cent of inhabitants 65 years and older, followed by the case study areas representing the *Challenge of Decline* type. The share of the young working age population is highest in Cataluña as a representative of the *Young Potentials* type and the two Eastern European case studies (the Czech region of Jihovýchod and the Romanian Macroregion 2).

Regional variations in the case study areas of demographic change and its components are observed. They are the result of the differences in the age structure, the components of natural change (fertility and mortality) and of migration processes. Several case studies show a considerable internal variability of the age structure. In many cases older inhabitants are inclined to move out of the centres, and younger populations concentrate in the urban centres. Where, like in the Italian Piemonte, regional mobility is quite low, in-migrants, especially international ones, are settling in the disadvantaged areas of the inner cities or of the suburbs. Demographic change in recent years was in most cases determined by interregional and, more importantly, by international migration processes. The case studies show that international in- and out-migration varies considerably over time and that in many cases the beginning of the new millennium was characterised by important international in-flows. As expected, urban areas seem to attract more often international immigrants, who are settling in areas of affordable housing, either in decaying central areas or in the outskirts of the cities. The analysis of the case studies experiencing considerable immigration underline the importance of changes in the ethnic composition of the population and a trend toward a multiethnic society is observed. Especially the UK case studies show the formation of ethnic enclaves.

International and long-distance interregional migration flows are usually driven by economic (work) motives. In addition, the case studies demonstrate the importance of the location of institutions of higher education (university towns) for the migration patterns of young adults and the existence of attractive areas (mountainous areas, coastal areas etc.) for the migration patterns of retired persons or the elderly in general. Oberbayern and Cataluña serve as examples.

Several case studies highlight the interdependence between the urban areas and their hinterland, through short-distance migration flows with young adults and single households migrating towards the urban centres and the other age groups, especially young families, towards suburban zones. As a consequence of these changes in residence commuter flows gain considerable importance.

4.4 Economic change and population

Economic and demographic change meet most predominantly on the labour market. The economic well-being and unemployment can vary considerably in the case study areas. Whereas the socio-economic situation influences the level and timing of fertility and the timing of mortality, the labour market and the economic situation acts upon the demographic situation through interregional and international migration processes. The analyses of most case studies show the predominance of international migration flows in recent years. The study areas with a well performing labour market (and high levels of GDP) are characterised by relative high positive net-migration, whereas, for example, Eastern Romania with a high share of working age population and few economic opportunities experiences a high temporary or permanent out-migration.

A detailed analysis of demographic flows for the working age population in Piemonte shows a sharp reduction in the number of younger employees due to smaller cohorts entering the labour market and an increase in the number of older workers due to cohort turnover, positive net-migration and an increase in labour force participation rates, especially for women (see Figure 2).

Figure 2 An example of changes in the labour force: the Piemonte region 2001-08
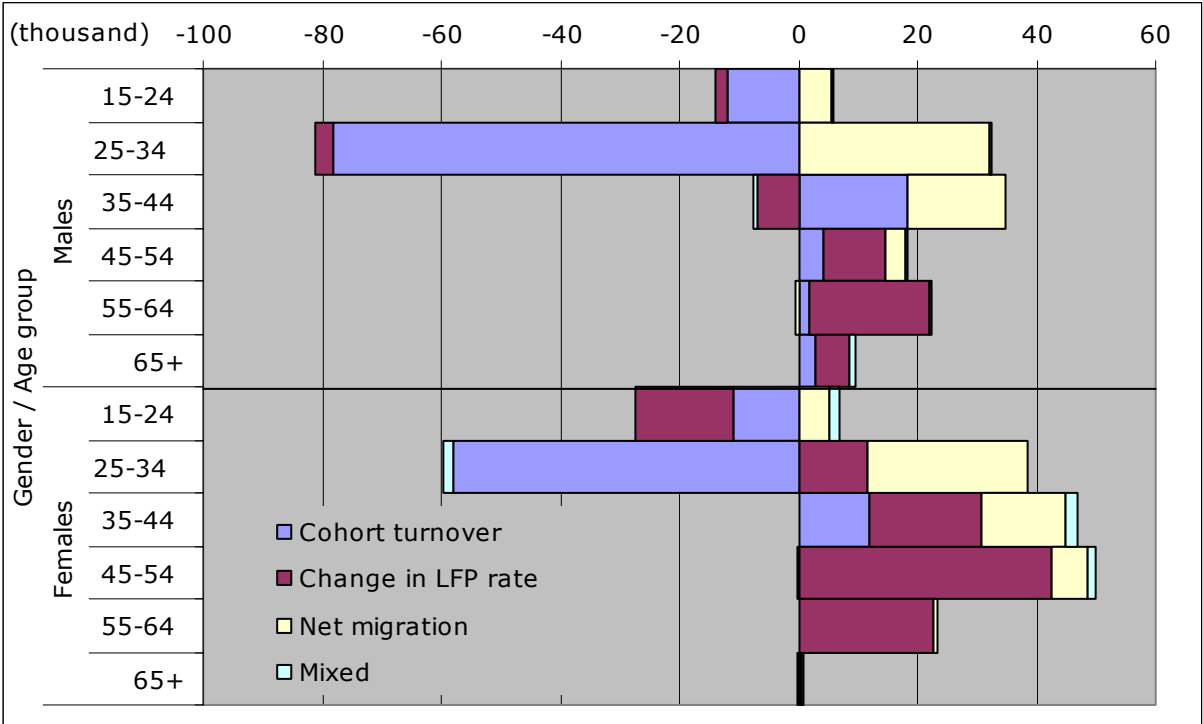
The case studies with a post-industrial employment structure with a high share of employment in research and the financial sector invest in institutions of higher education and attract highly qualified immigrants.

The case studies in Eastern Europe show that changes in the political and economic system around 1990 had a considerable impact on demographic change there – lower fertility, lower mortality and an increase in sub-urbanisation and interregional and international in- and out-migration flows.

Important great events like the Olympic games and important infrastructure projects like the Öresund Link seem to have an impact on regional development ensuing demographic change, mainly through immigration.

Not only the Cataluña and Piemonte case studies stress the importance of a long-term perspective in analysing the regional situation. In these regions, an alternation of phases of economic growth, economic slowdown and economic restructuring are observed. These long economic cycles, as well as the short economic cycles, are linked to processes of emigration and immigration. The economic system encounters a demographic system that is very slow to react through natural growth. So it is obvious that the economic system tends to call for migration as a way to satisfy the demand for labour. In fact, most case studies showed the ability of major cities and agglomerations to attract working age population and to counterbalance a shrinking and ageing working age population.

The economic and social changes of the last decade and the issuing demographic and migratory flows seem to be very favourable fin the case of the global city of London: interregional and international migration flows lead to a relative young age structure and a highly qualified labour force creating an enormous potential for the future.

4.5   Economic and social consequences of demographic change

The case studies do not allow identifying demographic change per se as an important driver of social and economic change. It seems that a well-off region is able to face demographic challenges or changes in the size and structure of the population. Regions with less economic potentials are prone to the negative effects of population change. However, this result is based on the present situation that is characterised by relative moderate demographic and migratory changes. The case studies can not offer a reply to the question how regions will be able to face intense population ageing and immigration, as DEMIFER scenarios delineate for coming decades.

It is important to underline that the more rapidly changing migratory flows show immediate economic and social consequences. For example, the boroughs of London are the most ethnically diverse in the UK and the ESPON space. One third of all London residents were born outside the UK and this share increases to over 50 per cent for Brent and Westminster. Adding the second generation of immigrants the impact of ethnic diversity increases.

However, also rural areas are increasingly affected by foreign immigration. In some rural or peripheral areas like Molise or the province of Lleida in Caluna, foreign citizens residents contribute to demographic change directly because of their relative young age structure, and indirectly through the founding of families and resulting births. Their contribution extends to the economy, because they accept low paying menial jobs, and to the social sphere, because they provide social services to the family caring for children and elderly (especially in the Mediterranean family based welfare system). Immigrants and their contribution allow rural areas to continue the, sometimes, inefficient way of production.

All case studies with a significant presence of foreign immigrants underline the importance to integrate the foreign population, including the 2nd and 3rd generations, and to prepare for the ageing of these foreign citizens. Moreover, the case studies showed that the direct and indirect rejuvenation effects of migration gains are not permanent. In the case migration inflow stop the momentum of the population structure retakes its predominant role and the demographic ageing process resumes.

5 The impact of migration on population change

Key findings

- *Migration, both extra-Europe and intra-Europe, will have a significant impact on demographic and labour force development of regions.*
- *It will benefit affluent regions, whereas poor regions will loose population due to migration. Similarly, migration will reduce ageing in affluent regions and increase in poor ones.*
- *We may expect that migration will be a strong factor increasing regional disparities.*
- *Most regions experiencing population decrease do so mainly due to natural change. Most regions gaining populations do so mainly due to extra-Europe migration.*

To assess the impact of migration on the population and labour force in the ESPON area in the period 2005-2050, we have calculated three reference scenarios. The first one (*Status Quo*) is a simulation of what would happen if the demographic regimes of mid-decade (2005) continued unchanged until 2050. In two other scenarios all or some migration streams are blocked: in the *No Migration* scenario population of the regions changes due to births and deaths only, while in the *No Extra-Europe Migration* scenario it changes also due to internal and international intra ESPON space migration. A comparison of the results of the three simulations yields estimates of the impact of migration on population change[10].

5.1 Long term consequences of existing demographic and labour market trends (*Status Quo* projection 2005-2050)

The *Status Quo* projection calculates the population and labour force under assumption that there would be no change in age, sex and region specific rates of fertility, mortality, emigration and labour force participation. Therefore, it shows the long term consequences of observed demographic and labour market patterns for future population and labour force size and structure. The overall ESPON population would reduce from 503,5 million in 2005 to 463,2 million in 2050, that is to 92 per cent of the initial population. On the regional level the differentiation is substantial: out of 287 regions, 119 (41 per cent) would experience a population increase and 168 – a decrease. An increase of population would take place in Iceland, Ireland, most of the UK, southern and western France, southern Spain, northern and central Italy, in selected (mostly southern) regions of the countries occupying the Scandinavian Peninsula and in Austria. Notably, not a single region in Central and Eastern Europe (new 8+2 EU member states) could expect a population increase. To the contrary: the highest decrease, by over 50 per cent, would be expected in all the regions of Romania, except Bucharest and its hinterland – the Sud Muntenia region. An over 50 per cent reduction in regional populations would also occur in northern Bulgaria, Opolskie and Śląskie regions in Poland and in Chemnitz (Germany). The *Status Quo* projection is not a forecast, however these results should ring alarm bells in these 11 regions as well as in 86 regions in which the population decrease would be within the range between 20 and 50 per cent.

The labour force would drop from 236.8 million in 2005 to 196.2 in 2050, that is to 83 per cent of the initial value. Regional labour force would increase in 76 (26 per cent) of regions and decrease in 211. An increase would be observed in Iceland, Ireland, Luxembourg, England, in France along the Bay of Biscay, Pyrenees and Mediterranean, in

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[10] DEMIFER deliverable D4 'Multilevel scenario model' prepared by D. Kupiszewska and M. Kupiszewski (IOM/CEFMR) contains a description of the MULTIPOLES model used to prepare the projections. A more detailed analysis of the results as well as a description of the assumptions can be found in DEMIFER deliverable D5 'Reference scenarios', prepared by M. Kupiszewski and D. Kupiszewska (IOM/CEFMR).

central and northern Italy, and in isolated regions of Spain, Sweden, Norway, the Netherlands, Belgium and Greece. More worrying are the regions with decreasing labour force. In 23 regions labour resources would shrink by 50 per cent or more. These regions are: Latvia, most regions of Romania and Bulgaria (in the case of the two latter, all but the capital cities and their immediate hinterland, in which the labour force decrease would be significant but below the 50 per cent mark), regions in the western part of the former East Germany and selected regions of Poland. Even if we put aside the extreme cases, the decrease in labour force would be almost universal in the part of Europe from the east of German western border down to the Adriatic coast and Black See. Also Portugal and northern Spain would expect a decrease in labour resources.

5.2 The impact of migration on population and labour force development and distribution

To better understand the processes of population change in individual countries and regions, it is important to look at the relative impact of natural change and the impact of various migration streams: extra-Europe migration, international migration within Europe and internal migration. This can be done in two ways. The first one is based on the analysis of the values of the components of population change. It shows that in most of the regions natural change of population (births minus deaths) has larger impact on population than migration flows. Still, in 115 regions (41 per cent) the opposite is true.

To take into account that migration has additional indirect impact by changing the natural increase and to isolate the role of different migration streams, we have compared the results of the three reference scenarios. In 32 per cent of regions intra-Europe migration has a larger impact on population change than extra-Europe migration. This is true in particular in the regions of Bulgaria, Poland, Romania and Slovakia, where population decreases significantly through intra-Europe migration. In the majority of regions in Western Europe, extra-Europe migration is more significant than intra-Europe migration and is the factor that reduces population decline or even causes an increase. Generally, out of 119 regions that would experience an increase of population, 92 would do so mainly as the result of extra-Europe migration, 22 mainly due to intra-Europe migration and 5 due to natural change. Out of 168 regions which would loose population, a majority (149) would do so mainly because of natural change and 18 (including 11 regions in France) predominantly due to intra-Europe migration.

The overall impact of migration streams on regional populations is illustrated on Map 4, which presents the differences between 2050 populations in the *Status Quo* and *No Migration* scenario, scaled to the latter. Clearly a vast majority (over 75 per cent) of the regions are gainers. In 24 per cent of the regions, 2050 population would be higher by 30 per cent or more compared to the *No Migration* scenario. In the EU15 almost all regions, except those in north-eastern France, north Portugal, north-eastern Finland and some regions in the former East Germany profit from migration. The most profound gains would take place in Italy north of Naples, western France, some south-western regions of Spain and in Algarve, all forming a broad Mediterranean crescent, and in east and south-west England. They will be "financed" from three sources: extra-Europe migration, international intra-Europe migration and internal migration. The European regions which would pay for these gains are located in the East, especially in Romania and southern Poland. Internal migration also plays a role and would fuel for example the increase of Bucharest, Mazowsze and the hinterland of Prague. In Paris, on the other hand, large internal outmigration is responsible for the negative population balance.

Overall, the divide goes along the wealth and accessibility lines: affluent regions, including large agglomerations in Central and Eastern Europe would gain on migration whereas far away and poor regions would lose. Keeping in mind that migration is a powerful component of population dynamics, we should be aware of general consequences of migration, namely two interlinked processes: (i) regional and in some

Map 4   Impact of migration on population in 2050
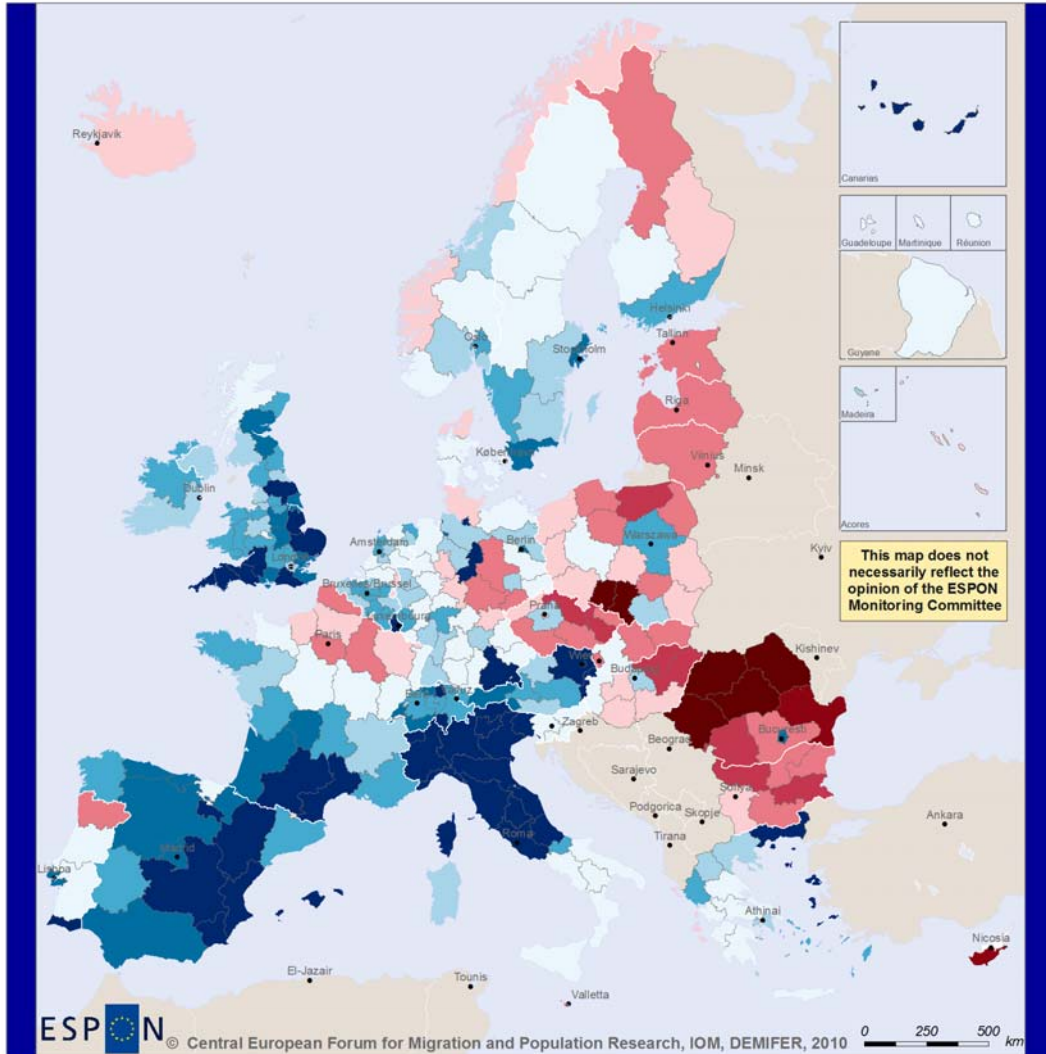
Impact of Migration on Population in 2050

Impact of Migration on Population in 2050,
Difference in Population in %

-60.0 – -40.0	(7)	
-40-0 – -30.0	(2)	
-30.0 – -20.0	(8)	
-20.0 – -10.0	(26)	
-10.0 – 0.0	(28)	
0.0 – 10.0	(63)	
10.0 – 20.0	(43)	
20.0 – 30.0	(44)	
30.0 – 40.0	(24)	
40.0 – 107.0	(44)	
no data		

Impact of migration on population
in 2050, calculated as the difference
in population between the
Status Quo and No Migration
scenarios in % of the population in the
No Migration scenario

cases even national depopulation in areas most negatively affected by migration, and (ii) concentration of population in the regions offering a combination of accessibility, affluence and nice climate. Far going decrease of population cannot be isolated from regional economic development. Therefore migration, as an important factor of depopulation, may lead to an increase in regional disparities.

The impact of migration goes beyond the simple increase or decrease of population. It affects the age structures of populations and the labour force resources. As most migrants are in the young adult age group, their emigration raises the very-old-age dependency ratio (VODR; defined as the population at the age 75+ to total economically active population aged 15+), as it reduces the number of economically active persons. At the same time, in the regions attracting migrants newcomers increase younger and more economically active population, reducing the proportion of the very old. There will be no surprise that the patterns of the decrease and increase of VODR as the result of migration (Map 5) resembles strongly the pattern of migration induced population gains and losses, respectively. 71 per cent of European regions would experience lower VODR because of migration, 35 of them by more than 30 per cent.

One of the hot topics in research and in public debate is the assessment of the impact of extra-Europe migration on population development in Europe. The first observation based on the model results is that most of the European regions gain population due to extra-European migration. This is not the case in 11 per cent of regions, mostly located in the EU10+2, especially the Czech Republic, Romania and Bulgaria. In some regions, especially in Italy, but also in Algarve and Inner London, extra-Europe migration would generate populations larger by over 40 per cent than in the scenario with no extra-Europe migration. Extra-Europe migration would also substantially reduce the value of the old-age dependency ratios (ODR; the indicator defined as the ratio of population aged 65 and more to population in the age group 15-64 years) in all European regions. In some Italian and Spanish regions this reduction exceeds 40 per cent.

Extra-European migration enhances regional labour force in 90 per cent of investigated regions. In 43 regions (15 per cent) the differences between labour force in the *Status Quo* and *No Extra-Europe Migration* simulations exceed 30 per cent. In the Baltic states, Cyprus and regions in the Czech Republic, Romania and Bulgaria extra-Europe migration would lower the labour force, however, the reduction is moderate in most cases. In all European regions, the labour market dependency ratios (LMDR; defined as the ratio of the whole economically inactive population to the whole active population) will be smaller due to extra-Europe migration. In Austria and Switzerland and a large part of the UK and Italy the difference would be within the 10 to 20 per cent bracket, therefore very significant. The difference would be smaller in the rest of Europe, especially Central and Eastern Europe. Therefore extra-European migration would have a beneficial, albeit unequal impact on the balance between the labour force and economically inactive population.

In general our research shows that migration, both extra-Europe and migration in general, would have a significant impact on demographic and labour force development of regions. Importantly, it would benefit most affluent regions, whereas poor regions would lose population due to migration. Similarly, migration would reduce ageing in affluent regions and increase in poor ones. Therefore we may expect that migration would be a strong factor increasing regional disparities. This is the aspect of regional policies which is not disputed much yet, but perhaps quite crucial for future regional developments. The only way to prevent the growth of regional disparities is to stimulate policies reducing incentives to emigrate from poor to wealthy regions and policies allowing poor regions to attract more extra-European migrants.

Map 5   Impact of migration on Very Old Age Dependency Ratio (VODR) in 2050

Impact of Migration on VODR in 2050
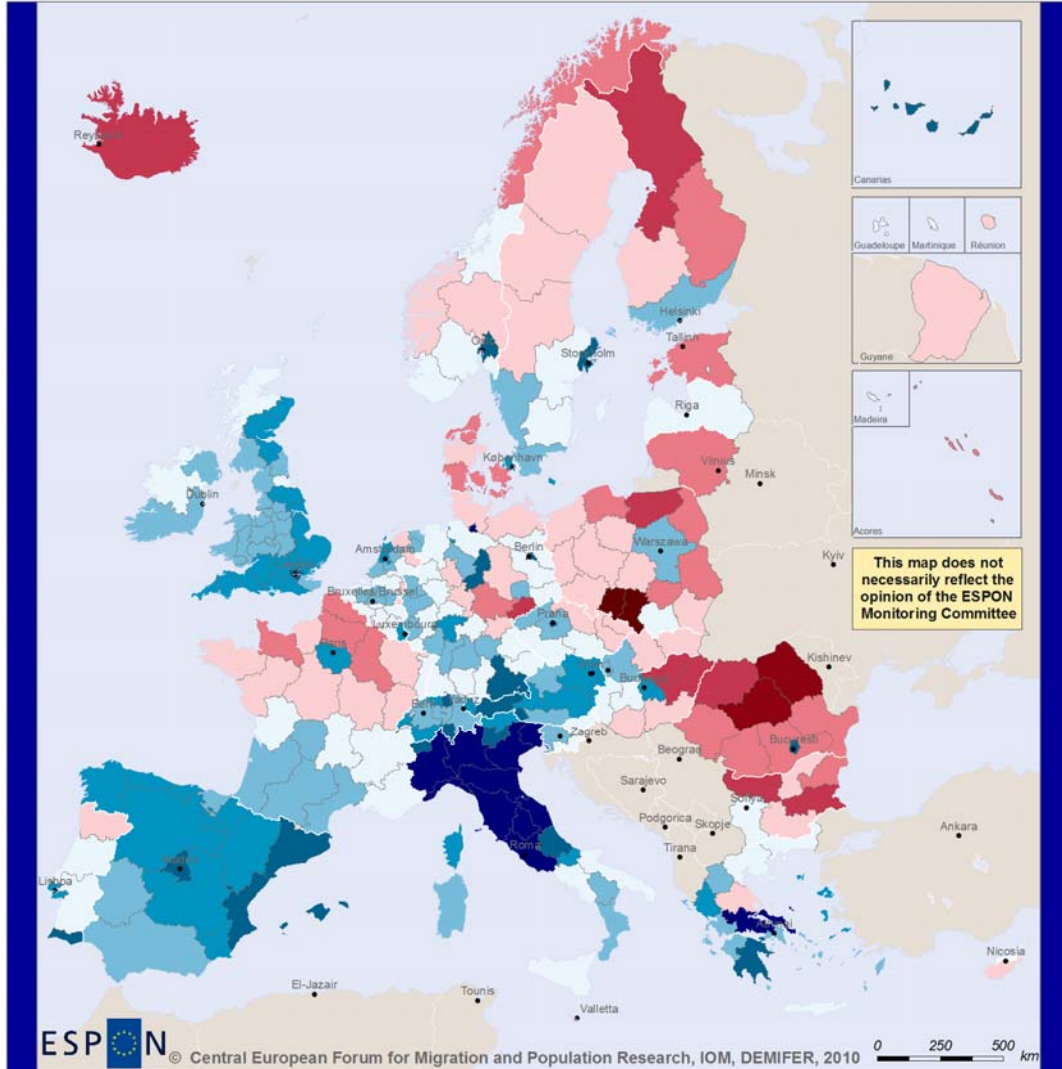
Impact of Migration on Very Old Age Dependency Ratio (VODR) in 2050, Difference in VODR in %

-58.0 – -40.0	(14)	
-40-0 – -30.0	(21)	
-30.0 – -20.0	(45)	
-20.0 – -10.0	(66)	
-10.0 – 0.0	(59)	
0.0 – 10.0	(46)	
10.0 – 20.0	(22)	
20.0 – 30.0	(10)	
30.0 – 40.0	(2)	
40.0 – 60.0	(2)	
no data		

Impact of migration on Very Old Age Dependency Ratio (VODR) in 2050, calculated as the difference in VODR between the *Status Quo and No Migration* scenarios in % of VODR in the *No Migration scenario*

6 Two dimensions of policy scenarios: the "Economy-Environment" and "Distribution-Fairness"

Key findings
- *If policies are successful in achieving sustainable growth, the levels of fertility, life expectancy and migration will increase. If environmental challenges have not been met and economic growth has fallen, the levels of fertility, life expectancy and migration will be low.*
- *If policies are oriented at stimulating market solutions to economic challenges, then differences between regions will increase.*
- *If policies are adopted that aim at fairness, involving some re-distribution of resources from rich regions to poor regions, then differences between regions will diminish.*

There is substantial evidence that adoption of specific policies can have short-term impacts on particular components of demographic change. Examples include investment in medical and health research which yields over time better treatments and preventive therapies and hence continuing increases in longevity. However, the impact of such advances is modified by socio-economic variables such as degree of poverty and degree of inequality. Poorer people benefit later than richer people from health policies and differences between countries and within countries between regions persist because of international and intra-national inequalities. There is no way of being precise about the impacts of a given set of policies on demographic behaviour. History provides a number of natural experiments in the impact of policies but these are specific to time and place. Nevertheless it is useful to put in place scenario studies that reveal the choices that European societies face. In DEMIFER, four policy scenarios of demographic development have been compiled[11].

6.1 The four DEMIFER policy scenarios of demographic development

The DEMIFER policy scenarios link policy bundles to demographic effects using two axes of policy variation: a Distribution-Fairness dichotomous axis and an Economy-Environment dichotomous axis. At the top end of the Economy-Environment dimension we envisage a situation where sustainable growth has been achieved through technical and social innovation. Problems posed by environmental challenges such as climate change and "the end of oil" have been solved through a combination of renewable technologies and resource conservation made possible by technological breakthroughs and governmental planning. At the bottom end of the Economy-Environment dimension we envisage a situation where the environmental challenges have not been met and growth as traditionally measured has fallen. Consumption has been cut back because climate change has affected production and because hydrocarbon depletion has occurred with resulting increases in energy prices. A simpler world with many features of the past is a consequence.

On the left hand side of the Distribution-Fairness dimension we imagine in operation a bundle of policies designed to achieve social solidarity. There is societal agreement that the difference between the poorest and richest people should be only moderate. Public expenditure policies include strong elements that favour more deprived places (countries and regions). Policies aim to reduce inequalities and the achievement of greater equality raises overall welfare of all (Wilkinson and Pickett, 2009[12]). On the right hand side of the

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[11] More information on the DEMIFER policy scenarios can be found in DEMIFER deliverable D6 'Report on scenarios' prepared by P. Rees, P. Boden, A. Dennett, J. Stillwell (University of Leeds) and A. De Jong and M. Ter Veer (PBL). Annexed to the report of D6 is an Excel database covering all scenario drivers.
[12] Wilkinson, R. and K. Pickett (2009), The Spirit Level: why more equal societies almost always do better. Allen Lane, London.

Distribution-Fairness dimension we imagine in operation sets of policies designed to improve the operation of markets and the achievement of greater competitiveness in a global market place. Inequality does not diminish and may well increase.

Crossing the two axes produces four Policy Scenarios (see Figure 3), which we call Growing Social Europe (GSE), Expanding Market Europe (EME), Limited Social Europe (LSE) and Challenged Market Europe (CME).

Figure 3 The four DEMIFER scenarios based on the dimensions "economy-environment" and "distribution-fairness"

ECONOMY - ENVIRONMENT	Growth enabled by technical and social innovation	GROWING SOCIAL EUROPE High Growth/Collectivism GSE	EXPANDING MARKET EUROPE High Growth/Individualism EME
	Growth limited by environmental constraints	LIMITED SOCIAL EUROPE Low Growth/Collectivism LSE	CHALLENGED MARKET EUROPE Low Growth/Individualism CME
		Collectivism	Individualism
		DISTRIBUTION-FAIRNESS	

Each of these scenarios is associated with a set of policies that we may expect to impact, to a greater or lesser degree, future patterns of mortality, fertility, migration and labour force participation.

6.2   Future paths of mortality

With respect to mortality most societies are agreed that living longer is "a good thing" that should be strived for. Preventing premature death (before a "respectable" old age) is the goal of much health sector policy and the by-product of various social and economic policies. In Table 3 we set out the factors affecting health.

Table 3   Qualitative aspects of mortality scenarios

Mortality: Trend or Policy	GSE	EME	LSE	CME
Lifestyle: Smoking	Prevalence falls	Trend continues	Prevalence falls	Trend continues
Lifestyle: Diet/Obesity	No epidemic	No epidemic	Epidemic	Epidemic
Lifestyle: Drinking & Drug Use	Prevalence falls	Trend continues	Prevalence falls	Trend continues
Medical advances	High	High-medium	Medium-low	Low
National/Regional Health Inequalities	Strong convergence	Strong divergence	Convergence	Divergence

The first three rows of the table list the life style health risks for developed country populations. Smoking is still the underlying cause of most cancers of the lung, throat and oesophagus but also implicated in other cancers and in cardio-vascular disease (heart attacks and strokes). Since the links between smoking and lung cancer were established, national health departments have run campaigns to persuade smokers to give up smoking and non-smokers not to start. National Parliaments have increased taxes on tobacco and steadily restricted the places where smoking can be carried out. A life style factor which is increasing rapidly in its prevalence is obesity. Obesity increases the risk of

a number of diseases, particularly diabetes leading to premature mortality. A third life style factor which increases mortality is excessive consumption of alcohol and a fourth factor is use of addictive drugs. Alcohol is a main cause of liver disease and a contributor to many others. Drug abuse causes mental trauma and addiction leads to rapid downward mobility, which is associated with higher mortality. All three life style factors are linked to social class and cultural attitudes which vary across countries in Europe and across regions within countries. Apart from life style factors, medical advances have been crucial to achieving decreases in age specific mortality in the past century, although societies should not take for granted continued efficacy of particular treatments (e.g. antibiotics) or listen to false claims about vaccines (e.g. about the Mumps-Rubella-Whooping Cough vaccine).

Table 3 also contains a qualitative judgement about what the trends in these factors would look like under the four policy scenarios. In the two high growth scenarios (GSE and EME) medical advances will be higher than in the other two scenarios. In the two cohesion scenarios (GSE and LME) national and regional health inequalities will decline, in the other two scenarios there will be a diverging trend. As a consequence it is expected that in the GSE scenario the decline in mortality will be large and regional differences will decline. In the EME scenario mortality will decline strongly in some regions, but not in others, so disparities will increase. The CME scenario will both have an only moderate decline in mortality and growing differences.

6.3   Future paths of fertility

National population growth is to a large extent dependent on trends in fertility, although in recent decades international migration has become ever more important. In order to sustain a population it is necessary that women give birth to just over 2 children. In current days this level is hardly attained in any European country. In fact, in several countries the average number of children per woman is far below 1.5 children. Notwithstanding this low level of fertility governments are much more reserved about implementing policies stimulating fertility, compared to policies trying to curtail mortality.

Table 4 describes the factors affecting fertility in each of the four scenarios.

Table 4   Qualitative aspects of fertility scenarios

Fertility: Trend or Policy	GSE	EME	LSE	CME
Family versus Individual Goals	Family goals, small positive impact	Individual goals, no impact	Family goals, no impact	Individual goals, strong negative impact
Family Friendly Policies	Strong positive impact	Weak, no impact	Strong positive impact	Weak, no impact
Assisted Conception	Socially supported, strong positive impact	Privately supported, small positive impact	Socially supported, small positive impact	Privately supported, no impact
Abortion Law	Permissive, small negative impact	Restrictive, small positive impact	Permissive, strong negative impact	Restrictive, no impact
Extra-Europe Migration	High, small positive impact	Low, no impact	Low, no impact	Low, no impact
National/Regional Fertility Inequalities	Strong convergence	Strong divergence	Convergence	Divergence

The first factor refers to the balance between family goals (for instance getting children) and individual goals (such as striving for a professional career). The second factor refers to family friendly policies like financial support of childcare facilities, financial allowances and/or tax reductions for families with children or special regulations to promote flexible

working hours or part-time work. Another way of raising fertility is to assist couples with fertility problems. Abortion laws may also have a profound influence on the level of fertility. Finally, migration from countries with high levels of fertility may contribute to raise fertility in host countries. Especially national inequalities in fertility are impressive, but also regional inequalities within countries do exist. To a large part these inequalities can be explained by differences in welfare.

We expect that in the GSE and LSE scenarios family friendly policies will have a strong positive impact on the level of fertility. Moreover assisting couples with fertility problems may raise the level of fertility, especially in the GSE scenario. In addition we expect that in the GSE scenarios family goals will prevail over individual goals. As a consequence the level of fertility is expected to be high in the GSE scenario. We expect that the national and regional fertility inequalities will be reduced in the two solidarity scenarios and will increase in the two market scenarios.

6.4 Future paths of inter-region migration

In several countries regional trends in population growth are clearly divergent: mostly central region are still growing, while peripheral regions are shrinking or have hardly any population growth. This disparity might be explained by the fact that capital cities are generally located in central regions. Especially, many internal migrants move from peripheral regions to central regions. To a large part, it concerns youngsters moving to the central cities, which have universities and institutions for higher education in combination with an abundance of jobs for starters on the labour market. Notwithstanding these divergent patterns, hardly any political actions are oriented at stimulating migration to other regions within a country. Although policies oriented at influencing internal migrants are in general weak, this does not apply to policies oriented at stimulating weaker regions.

Internal migration is positively related to economic growth. On the one hand, a higher income leads to more housing consumption and a higher level of residential mobility; on the other hand, high economic growth increases job mobility and hence job-related migration. The DEMIFER scenarios on internal migration are driven by adjustments to the relative attractiveness of individual destinations. The GSE and LSE scenarios assume greater cohesion between regions and a convergence in the relative attractiveness of individual NUTS2 regions as migrant destinations. Different scales of cohesion and convergence are reflected. The EME and CME scenarios assume the opposite, with expanding market economies leading to less cohesion between regions and greater divergence in the relative attractiveness.

6.5 Future paths of inter-state migration

Since the Treaty of Rome in 1957 several developments made inter-state migration within the expanding European space easier and easier over time[13]. This leads to large numbers of inter-country migrants. Regarding inter-state migration in the ESPON area, no need was signalled to stimulate permanent out-migration, although out-migration of (PhD) students is generally encouraged[14]. More political measures are expected on the attraction of skilled labour. These policies could be enhanced as a result of the ongoing globalization and competition between countries. A stronger tendency was expected of

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[13] The Treaty of Rome (1957) established the right of workers to move between European Economic Community (EEC) Member States. The Treaty of Maastricht (1992) embodied a right to circulate and reside freely in the European Community (EC). The Treaty of Amsterdam (1997) made the earlier Schengen Agreement (1985) European Union (EU) law, removing border controls between Member States (now 25 though the UK and Ireland opted out).

[14] Policies such as the Erasmus Scheme encourage higher education students to take part of their degree programmes in another EU country and this has been expanded since 2007 into the Life Long Learning Programme covering older age students. The Marie Curie programme of successive European Research Frameworks provide funding for inter-country mobility of researchers, including postgraduate students, postdoctoral researchers and established research workers.

political measures directed at the improvement of living and working conditions for immigrants. Immigration was seen as a powerful instrument to counteract declining populations.

For the DEMIFER scenarios on inter-state migration, four driving forces are identified (see Table 5): the total level of migration, inter-state out-migration, inter-state in-migration and inter-state migration policies.

Table 5   Qualitative aspects of scenarios for inter-state migration

Inter-State migration: Trend or Policy	GSE	EME	LSE	CME
Total Level of Inter-State Migration	Moderate increase	High increase	Moderate decrease	Low increase
Origins: Inter-State Out-Migration	Convergent	Divergent	Convergent	Divergent
Destinations: Inter-State In-Migrations	Convergent	Divergent	Convergent	Divergent
Explicit Inter-State Migration Policy	Some restrictions	Free migration	Some restrictions	Free migration

In three scenarios the level of inter-state migration is assumed to increase, while only in the LSE scenario a moderate decrease is expected. As convergence and divergence trends in out-migration and in-migration are often highly correlated, origin and destination assumptions are treated similarly. In the GSE and LSE scenarios converging inter-state patterns are assumed, while the EME and CME scenarios assume diverging patterns. In the final step the inter-country out-migration flows are distributed over the regions. This distribution is considered constant. The final factor refers to inter-state migration policy. Under the GSE and LSE scenario cohesion policy will aim for more equal regional developments and therefore some impact of policies is expected, mainly related to measures concerning the duration of stay of migrants. For example, labour migrants are assumed to be allowed in another country for a certain period of time only. In the EME and CME scenario competitiveness will lead to free movement in the sense of absolutely no restrictions. People may live in other countries, work in different areas and move across Europe whenever and where-ever they like.

6.6   Future paths of extra-Europe migration

The final component of migration refers to extra-Europe migration, i.e. migration from outside the ESPON area to NUTS2 regions inside the ESPON space. In the last decades the population growth in several Western countries has become more or less dependent on the influx of foreign migrants. In view of the growing importance of immigration for the population growth of countries it is no surprise that politicians give much attention to stimulating or discouraging extra-Europe migration. Also many political actions are developed on specific topics such as origin of migrants, type of migrants and duration of stay. The focus of policies trying to influence immigration is apparent in all regions of the ESPON space.

For extra-Europe migration similar forces are identified as for inter-state migration (see Table 6). In the EME scenario we expect high extra-Europe migration due to high economic growth and policies aiming at free entry. Differences across European countries will increase. In the GSE scenario economic growth is high as well, but migration policies allow selective entry only. Thus immigration will be moderate. The LSE scenario has low migration from outside Europe due to low economic growth and restrictive immigration policies. In the CME scenario economic growth is low as well, but there immigration policies are less restrictive than in the LSE scenario, and thus we expect somewhat higher immigration.

Table 6   Qualitative aspects of scenarios for extra-Europe migration

Extra-Europe migration: Trend or Policy	GSE	EME	LSE	CME
Total Level of Extra-Europe Migration	Moderate	High	Low	Moderate
Origins: Emigration	Stable origins	Divergent Origins	Stable origins	Divergent Origins
Destinations: Immigrations	Stable Destinations	Divergent Destinations	Stable Destinations	Divergent Destinations
Explicit Extra-Europe Migration Policy	Selective entry	Free entry	Restricted entry	Moderate entry

6.7   Future paths of labour force participation

In the second half of the previous century impressive changes in labour force participation were witnessed. Since 1960 all over Europe male labour force participation has been decreasing while female participation has been on the increase. Up to 1980 the decrease of male participation was much larger than the increase in female participation, while after 1980 female increase surpassed male decrease. At older ages (above 50 years) in many countries a steep fall in labour force participation was witnessed, due to the trend of early retirement. Especially in periods of rising unemployment, policy was oriented at stimulating employees to leave the labour force at early ages. Lately, this trend has been reversed in several countries, due to the rising costs related to population ageing. At younger ages contrasting trends in labour force participation applied. Prolonged educational careers had a negative effect on labour force participation. However, the increased tendency to combine education with having (a small) job had a positive effect on labour force participation.

In most countries the labour force has been growing in the past. A growing population in combination with rising labour force participation rates contributed to this growth. Nowadays, the inclination of politicians to raise labour force participation is rather prominent. This active attitude concerns not only labour force participation in general, but also participation of several groups which used to have a rather weak position on the labour market, such as women (in the phase of raising children), youngsters (combining education with small jobs), and elderly people (to counteract the negative effects of ageing). The interest of policy goes even further and extends to issues such as the discourse on working fulltime or part-time, or being self employed, increasing labour productivity and the level of investments in the education system.

How labour force participation will develop in the future, depends on trends in the determinants of labour force participation (see Table 7). In the GSW and EME scenarios high economic growth will result in high labour demand and this will result in increases in labour force participation rates. The opposite applies to the LSE and CME scenarios.

6.8   The linkage of scenarios to demographic futures

For each demographic component we made assumptions about the rate of change in the future in key demographic drivers. The assumptions varied according to the scenarios followed. For example, the greatest declines in mortality were assumed to occur in the GSE scenario and the least in the CME scenario with intermediate declines in the EME and LSE scenarios. As drivers for mortality we used ASDR decline rates (percentage reductions per annum). We use TFR changes from year to year as fertility drivers. For inter-region migration, inter-state migration and emigration, we held out-migration rates constant at their 2005-10 estimated level. We introduced scenario changes via destination attractiveness ratios. For international immigration we made different assumptions about the total volume of immigration depending on scenario.

Table 7   Qualitative aspects of scenarios for labour force participation

Labour force participation: Trend or Policy	GSE	EME	LSE	CME
Trends in Participation	Increasing	Increasing	Decreasing	Decreasing
Participation of young persons	Increasing	Increasing	Decreasing	Decreasing
Female Participation	Friendly policies	Unfriendly policies	Friendly policies	Unfriendly policies
Participation of elderly persons	Favourable	Stressful	Favourable	Stressful
Full Time/Part time/ Self Employed	High participation	High participation	Moderate participation	Low participation
National/Regional participation Inequalities	Reduced	Increased	Persistent	Increased

We then distributed the Europe level assumptions to regions using the regional structure estimated in 2005-10 and then modified the structure in the future to reflect degrees of convergence or divergence depending on scenario. The method for doing this varied across components. For mortality we used Standardized Mortality Ratios and adopted target 90/10 percentile ranges for 2050 to which SMRs were trended. For fertility we did the same but used Total Fertility Rates directly rather than Standardized Fertility Ratios. For the destination attractiveness ratios we used the maximum-minimum ranges directly as often there were only few regions involved within a country. The dispersion of these ratios was widened or narrowed according to scenario: under the GSE and LSE scenarios convergence was assumed, greater for the GSE scenario than the LSE scenario; under the EME and CME scenarios divergence was assumed, greater for the EME scenario than the LSE scenario. These procedures generated for each scenario a full set of regional rates that were input to the MULTIPOLES projection model in the form of time series multipliers. The results of our scenario projections together with status quo scenario are discussed in the next Chapter.

7 Regional population dynamics

Key findings

- *If policies are adopted that solve the current economic crisis, address long term climate change and resource depletion challenges (the Growing Social Europe and Expanding Market Europe scenarios), then the population of Europe will grow by nearly a fifth in the period to 2050.*

- *If policies are adopted which fail to stimulate economic growth and which fail to respond to environmental and resource depletion challenges (the Limited Social Europe and Challenged Market Europe scenarios), then Europe's population will stay around its current level. Europe's population does not diminish under these scenarios because life expectancy still improves, albeit at a slower pace, and people survive to older ages.*

- *In three scenarios the working age population will shrink in the period to 2050, and in the other scenario there will be hardly growth either. The population aged 65 or over will increase in all scenarios from 17 per cent to 29 to 32 per cent. There is little difference across the scenarios in the degree of ageing.*

- *The scenarios project substantial redistribution of the population from the poorest to the richest regions. This redistribution will produce a very significant improvement in collective welfare, even though the differences between the poorest and richest regions might not change. In the high growth scenario the most hot spots of growth in working ages will occur in southern England, Ireland, north and central Italy and south central Spain. Regions in Central and Eastern Europe will see declines in the working ages.*

- *Population ageing remains the most important demographic challenge and may be greater than hitherto appreciated if the mortality reductions projected in the policy scenarios, which some might judge to be optimistic, become reality.*

7.1 Total population change

While examining the impact of the policy bundles behind the four scenarios, the results of the Status Quo scenario have been used as benchmark. Under the Status Quo scenario the population of Europe declines by 40 million over the 45 years. In all of the policy scenarios the population remains steady or increases, even for the LSE and CME scenarios under which fertility remains low and immigration from the rest of the world moderate[15]. The difference is explained by the lives saved as a result of lower mortality over the forty five years. So Europe is likely to see 40 million extra old people by mid-century provided that health services do not collapse.

In terms of total population the main difference within the policy scenarios is between the "successful" and "unsuccessful" scenarios. Within each pair the social versus market orientation of policy appears not to make much difference. However, that is a product of our assumptions: what the projections do is to reveal the fuller implications of those assumptions. Natural increase is mildly positive in the GSE and EME projections but increasingly negative in the LSE and CME scenarios though not as negative as in the Status Quo scenario. The net migration is positive in all scenarios except for the CME where the European economy has become unattractive to immigrants and many have returned to their emerging country economies which are experiencing much better growth (the pattern of the last two decades). However, the EME and GSE assume much

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[15] More information on the results of the DEMIFER policy scenarios on population change and redistribution can be found in chapter 2 'Total population change' of DEMIFER deliverable D7 'Regional population dynamics: a report assessing the effects of demographic developments on regional competitiveness and cohesion', prepared by P. Rees, P. Boden, A. Dennett, J. Stillwell, M. Jasińska (University of Leeds), A. De Jong, M. Ter Veer (PBL) and M. Kupiszewski and D. Kupiszewska (IOM/CEFMR).

higher levels of immigration to supply the labour needs of successful Europe. Under the EME scenario the net immigration rises to circa 4.8 per thousand population. This level will require Europe to commit to be a world region that welcomes and integrates its immigrant population in a much more positive way than at present.

For the comparison of the scenarios at regional scale we focus on the change between the start and end years of the projection, 2005 and 2050, although we recognize that sometimes this may disguise intermediate behaviour where trends have ups and downs. Under the status quo scenario the majority of regions in Central and Eastern Europe as well as in Germany, northern France, Northern Scandinavia, Greece, southern Italy, north and west Spain and Portugal will lose population. Most of the rest of Western Europe will experience small population gains.

The patterns of future population change under the four policy scenarios resemble the status quo pattern. This is not surprising as their benchmark data inputs are closely aligned though not exactly the same. What each policy scenario does is to shift the regions across the growth classification to a lesser or greater extent from their status quo position. Map 6 shows the percentage change between 2005 and 2050 in the projected population of each region for all four scenarios.

The EME scenario lifts regions most and sees most regions in Scandinavia, the British Isles, France, north and central Italy and south and east Spain in the top growth classes of more than 25 per cent. Most of the former Iron Curtain regions are projected to lose population but in the capital city regions of Warsaw, Prague, Budapest and Bucharest this loss is small. The regions of western Germany, parts of northern France and western Spain fall in the small (0 to -25 per cent) class. The GSE map is a smoothing of the EME map with fewer regions in the top or bottom classes and thus represents a gain in terms of cohesion. In the CME scenario the majority of regions now show losses in population while the LSE scenario shrinks the variation so that there are fewer regions in the highest loss category (less than -50 per cent).

7.2   Population redistribution using density and income gradients

To understand some of the implications of the shifts in population recorded in the scenario projections, it is useful to carry out a regional gradient analysis. Here we define two gradient variables: GDP per capita and population density. GDP per capita is a reasonable proxy for household and personal income while population density serves as a continuous measure of the urban/rural continuum. We sort the regions into quintiles on the basis of their income and density and aggregate the projected regional populations to quintile classes. The populations are then converted in percentage shares in 2005 and in 2050, by scenario.

In 2005 the regional populations of Europe are concentrated in the higher density quintiles. This is simply a function of how the quintiles were defined. More interesting is the shifts by 2050 between the quintile classes (fixed at their definition in 2005). The changes are quite small and fairly uniform across density quintile. There are small falls in the lowest density quintiles (Q4 andQ5) and small gains in the highest density quintiles (Q1 and Q2). This indicates that, overall, the process of urbanization or peri-urbanization continues.

The redistribution is much stronger when we use the income quintiles. The percentages in the lowest quintile nearly halve and those in the highest quintile increase by 8-9 per cent with smaller gains in Q2 and smaller losses in Q4. The scenarios project substantial redistribution of the population from the poorest to the richest areas.

Map 6   Change in population 2005-2050 – four policy scenarios

Change in Population 2005-2050 - Scenarios
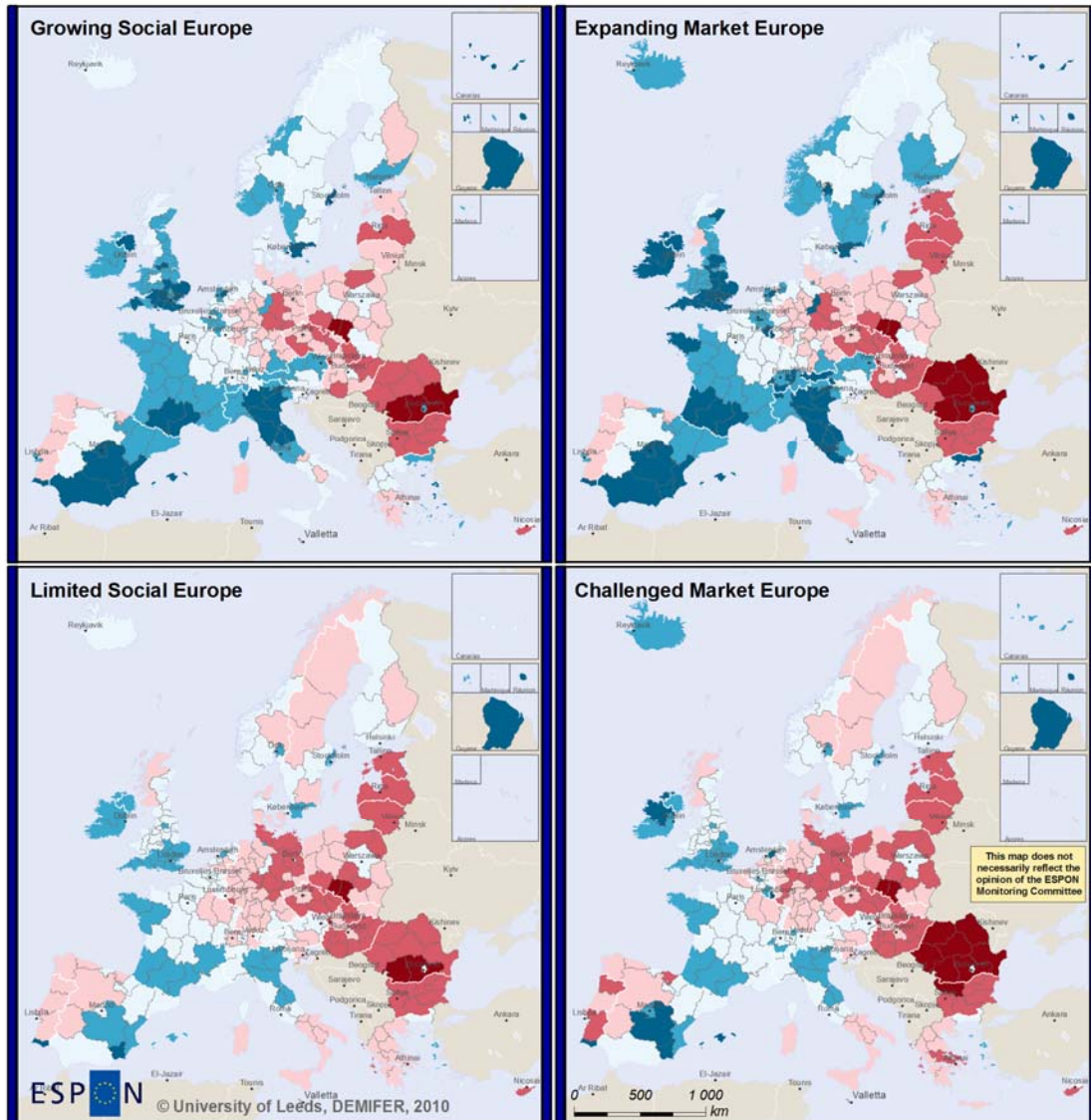
Growing Social Europe
Expanding Market Europe
Limited Social Europe
Challenged Market Europe

This map does not necessarily reflect the opinion of the ESPON Monitoring Committee

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EUROPEAN UNION
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Regional level: NUTS 2
Source: ESPON 2013 Database, 2010
Origin of data: Eurostat, NSIs, Estimations, 2010
© EuroGeographics Association for administrative boundaries

Change in population in 2005-2050, in %
after DEMIFER Policy Scenarios
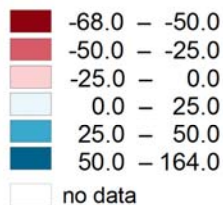
-68.0 – -50.0
-50.0 – -25.0
-25.0 – 0.0
0.0 – 25.0
25.0 – 50.0
50.0 – 164.0
no data

7.3 The ageing of Europe

The ageing of Europe's population is a longstanding process, which is a consequence of two demographic transitions: the first consisted of a mortality decline followed by fertility decline which reduced the populations of younger age groups and kept older age groups larger for longer. The second demographic transition took fertility rates in nearly all countries in Europe to new lows well below replacement total fertility rates (2.05-2.15 depending on female mortality regime). In between these transitions was a 1950s and 1960s baby boom which will precipitate "super-ageing" as the baby boomers move into the older ages from 2010 onwards. A third demographic transition is currently underway in which gaps in the populations and labour forces of Europe are being filled by new migrants, who are also contributing to natural increase as they form families.

In northern Europe a small fertility rise has occurred in several countries driven by a catch-up among native-born women of postponed births and higher contributions by foreign-born women. We can expect to see the consequences of this fertility history playing out in various ways in our projections. In this section we examine the ageing projected by the status quo and policy scenarios[16].

For the description of the results, the population is divided into three age groups, which are conventionally used with projection models employing five year age groups: 0-14, 15-64 and 65+, designated somewhat approximately as the childhood, working and retired ages respectively. In fact, the age of exit from compulsory schooling is usually higher than 15 (16, 17 or 18 depending on country). Adolescents continue in school, further education or university until age 21 or 22 taking first level qualifications and then until 25, 26 or older if taking second level qualifications or doctoral degrees. Students at these ages also work part-time. The working ages in fact hold populations who are working full-time, part-time, seeking work or being economically inactive. The same fuzziness occurs at the boundary between working ages and retirement. Large numbers of men and women have retired well before age 65 under favourable pension and social security arrangements which governments, firms and individuals are recognizing as unviable.

The working age population shrinks between 2005 and 2050 in all scenarios except the EME and then grows only by 1 per cent. The populations aged 65+ by contrast expand by 87 to 111 per cent depending on policy scenario but only by 40 per cent in the Status Quo projection. The population of children expands a little under the GSE scenario and the EME scenario but falls considerably under the LSE and CME scenarios with their lower fertility assumptions. The age composition of Europe's population changes radically over the 45 years: the working age population shrinks from 67 per cent to 56 to 57 per cent depending on policy scenario whereas the 65+ population expands from 17 per cent to 29 to 32 per cent. There is little difference across the policy scenarios in the degree of ageing though collectively they exhibit additional ageing compared with the Status Quo scenario, mainly due to increase longevity. This degree of additional ageing in the projection horizon should be regarded as a triumph of human endeavour and social organization.

The old-age dependency ratios (defined as the ratio of population aged 65 and more to population in the age group 15-64, ODR) and the very old-age dependency ratios (defined as the population aged 75+ to total economically active population aged 15+, VODR) all rise steadily, as expected but slightly more in the social scenarios (GSE, LSE)

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[16] More information on the results of the DEMIFER policy scenarios on population ageing can be found in chapter 3 'The ageing of Europe' of DEMIFER deliverable D7 'Regional population dynamics: a report assessing the effects of demographic developments on regional competitiveness and cohesion' prepared by P. Rees, P. Boden, A. Dennett, J. Stillwell, M. Jasińska (University of Leeds), A. De Jong, M. Ter Veer (PBL) and M. Kupiszewski and D. Kupiszewska (IOM/CEFMR).

than in the market scenarios (EME, CME) and much more than in the Status Quo scenario. The gap between the ODR and VODR is larger in the successful scenarios (GSE, EME) than in the unsuccessful scenarios (LSE, CME).

Looking at the regional variation of population ageing, the most hot spots of growth in working ages occur in the EME scenario in southern England, Ireland, north and central Italy and south central Spain with lesser growth in France, Austria, other regions in Spain, Austria and the southern populated parts of the Nordic countries (except Denmark). Regions in central and eastern Europe are projected to see declines in the working ages. These declines expand in extent as you move from EME scenario to GSE scenario to CME scenario to LSE scenario to Status Quo scenario.

On regional level all ODR (Map 7) and VODR variables are positive indicating increases in the dependency ratios. The successful scenarios (GSE and EME) come with higher increases in ODRs and more differences between regions. Hot spots will be in central and eastern regions, where many regions face increases in ODR and VODR of 200 per cent. By mid-century this part of Europe will be a land of the old.

7.4   The results of the DEMIFER scenarios in the case study areas

The case studies cover a wide range of possible demographic futures of the European regions with London as a fast growing global city and eastern Romania and the Italian region of Molise as regions facing population decline. Table 8 presents short term population developments for the case study areas under the four DEMIFER scenarios.

Table 8   Population change in the case study areas 1993-2025 for different policy scenarios (Population 1993=100)

Case study (main city)	2005	2025			
		Limited Social Europe	Growing Social Europe	Chal-lenged Market Europe	Ex-panding Market Europe
1 Jihovýchod-CZ06 (Brno)	98.7	84.0	84.8	81.5	82.8
2 Oberbayern-DE21 (München)	107.5	121.1	124.1	120.3	125.5
3 Mecklenburg-Vorpommern-DE80 – North-Eastern Germany (Rostock)	92.2	81.3	84.1	80.4	82.9
4 Arnsberg-DEA5 – South-eastern Ruhr agglomeration (Dortmund and Bochum)	99.7	90.0	93.0	88.7	92.4
5 Cataluña-ES51 (Barcelona)	111.4	117.8	124.2	118.5	125.3
6 Thessalia-GR14 (Larissa)	100.3	95.0	98.9	94.2	98.9
7 Piemonte-ITC1 (Torino)	101.0	107.1	115.9	108.0	117.1
8 Molise-ITF2 (Campobasso)	97.6	91.5	94.4	92.2	94.9
9 Nord-Est-RO21 and Sud-Est-RO22 (Iaşi and Constanţa)	97.8	73.6	72.1	70.1	69.1
10 Sydsverige-SE04 with reference to Hovedstaden-DK01 and Sjælland-DK02 (Malmö, Lund and København)	105.6	114.2	119.3	115.2	121.2
11 West Yorkshire-UKE4 (Bradford and Leeds)	101.5	119.8	127.0	120.2	128.8
12 London-UKI (UKI1 and UKI2)	107.6	128.1	140.0	132.6	146.1

Apart from the changes in the number of inhabitants, the DEMIFER scenarios indicate a continuous trend towards the ageing of total and working age population. Obviously, this ageing process is slower in the case study areas with population growth. The differences in the ageing process do not vary considerably between the different scenarios. The case study areas of the *Euro Standard*, *Young Potentials* and *Family Potentials* types seem to be more prone to future growth. The scenario results for London indicate the possibility of a significant population growth in an already today overcrowded metropolitan area, which raises the question of sustainability of this growth path.

Map 7   Change in old age dependency 2005-2050 – four policy scenarios

Change in Old Age Dependency 2005-2050 - Scenarios
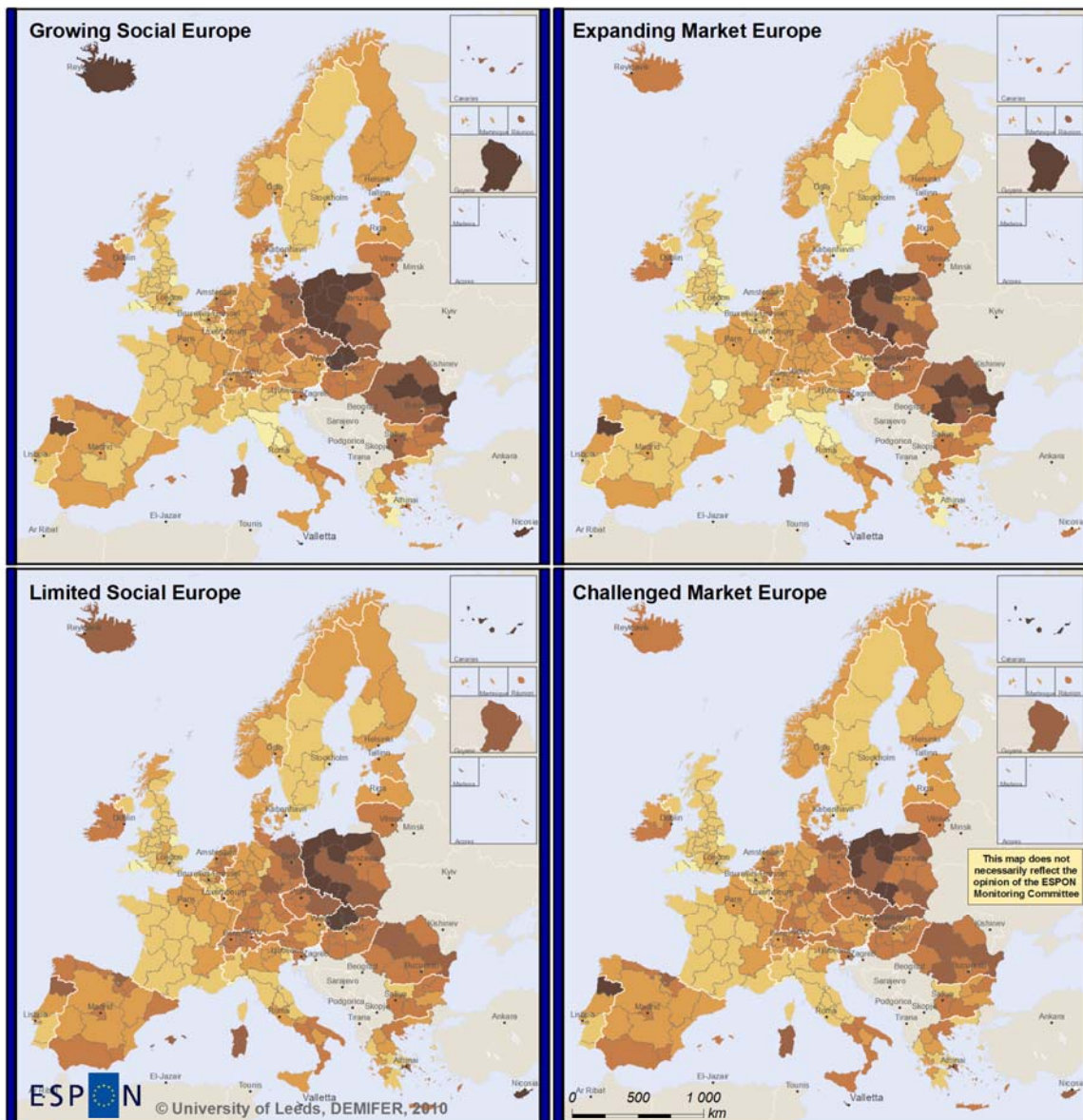
Growing Social Europe

Expanding Market Europe

Limited Social Europe

Challenged Market Europe

This map does not necessarily reflect the opinion of the ESPON Monitoring Committee

ESPON © University of Leeds, DEMIFER, 2010

0   500   1 000
km

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

Regional level: NUTS 2
Source: ESPON 2013 Database, 2010
Origin of data: Eurostat, NSIs, Estimations, 2010
© EuroGeographics Association for administrative boundaries

Change in old age dependency ratio in 2005-2050,
in % after DEMIFER Policy Scenarios
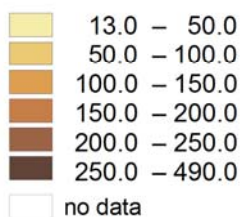
- 13.0 –   50.0
- 50.0 – 100.0
- 100.0 – 150.0
- 150.0 – 200.0
- 200.0 – 250.0
- 250.0 – 490.0
- no data

8   Future trends in the labour force

Key findings
- *If labour force participation rates would not change, the size of the labour force in the ESPON area will decline by 17 per cent until 2050. Only in one quarter of the regions the labour force would continue to grow.*
- *In the 'Young Potential' type of regions, labour force participation rates of women is low after childbirth. In the 'Challenge of Ageing' and the 'Challenge of Labour Force' types, labour force participation rates at higher ages are low. Thus there is room for an increase of labour force participation rates in several types of regions.*
- *Only under favourable economic conditions, if extra-European migration is high and if activity rates will increase, the total size of the labour force in the ESPON area will increase to 2050. However, even under these economic favourable conditions, 35 to 40 per cent of the regions will face a decline in the size of the labour force until 2050. If economic conditions are poor, activity rates will not increase and immigration will be low, 55 to 70 per cent of the regions will experience a decline of the labour force by 10 per cent or more. In most regions in eastern and southern parts of Europe, the labour force may decrease even by more than 30 per cent.*

The policy scenarios on labour force participation provide an array of possible territorial trends in the labour force in Europe based on different economic, environmental and policy hypotheses[17]. Two of these scenarios are cohesion oriented and explore the effect of policies trying to diminish regional disparities in the labour force participation. However, the economic and environmental circumstances in which these policies have to operate are contrasting. The Growing Social Europe scenario (GSE) operates in favourable economic and environmental settings while the Limited Social Europe scenario (LSE) has to deal with scant economic and environmental prospects. The trends in the age specific activity rates are diverging: going up in the first scenario and going down in the latter. Due to these contrasting trends the policies on regional cohesion have more effect on the participation rates in the first scenario. The rising trend in the GSE scenario allows economically weaker regions with low activity rates to catch up and approach the higher rates of the stronger regions. In the LSE scenario the activity rates are falling everywhere, but the economic pain of the weaker region is eased by the fact that those regions get more support from governments in order to prevent a steep fall in the activity rates.

In the two other scenarios public policies are focused on competitiveness. The philosophy of the politics belonging to these scenarios is that the economic market has to do its work, so barriers which impede its functioning are being removed. This works fine for the economic stronger regions but not so much for the economic weaker regions. Notwithstanding a general and fierce rise in the activity rates due to a rather high economic growth, regional disparities are becoming larger in the Expanding Market Europe scenario (EME) as stronger regions show a higher rise. In the Challenged Market Europe scenario (CME) activity rates are falling due to a sustained economic downturn. Disparities are growing as weaker regions have to face a steeper fall in activity rates than the stronger regions.

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[17] More information on the results of the DEMIFER policy scenarios on labour force participation can be found in chapter 4 'The future labour force of Europe' of DEMIFER deliverable D7 'Regional population dynamics: a report assessing the effects of demographic developments on regional competitiveness and cohesion' prepared by P. Rees, P. Boden, A. Dennett, J. Stillwell, M. Jasińska (University of Leeds), A. De Jong, M. Ter Veer (PBL) and M. Kupiszewski and D. Kupiszewska (IOM/CEFMR).

8.1   The labour force in the ESPON area

In 2005 the labour force of the countries of the ESPON area amounted nearly 240 million. The prospects on growth of the labour force differ considerable between the four policy scenarios. Only in the EME scenario a growing labour force is foreseen: about 20 per cent larger by 2050. This is solely due to higher activity rates as the population in the age bracket 15-65 will be stable up to 2050. According to the GSE scenario, in spite of rising labour force participation rates the size of the labour force won't grow anymore in the future, as the positive effects of more participation are kept in check by a slight negative population growth. The two other policy scenarios sketch a future with a considerable shrinking labour force. In the CME scenario the downfall is still limited to 10 per cent. As the age pattern of activity rates resemble the current pattern to a high degree, the decrease of the labour force is mainly caused by the shrinking population. In the LSE scenario the fall of the size of the labour force is impressive: a combination of falling activity rates and a negative population growth causes a decline of 20 per cent by 2050. This imposes a major financial issue as the pressure on the labour force to provide for the non working population will increase from 1.1 in 2005 to 1.7 in 2050. This increase of the so called dependency ratio, does not come as a great surprise as the demographic and economic conditions are not favourable in this scenario. However, also the flourishing economic circumstances depicted in the EME scenario cannot prevent a huge rise of the dependency ratio, namely to 1.4 by 2050. In the other two scenarios the rise is in between that of the previous two scenarios. The main contributor to this rise is the grey pressure: in all scenarios the share of the elderly in the population will rise significantly and this will put a high pressure on the labour force. In the LSE scenario the pressure is even aggravated through more people at prime working ages who keep out of the labour force because a severe lack of job have discouraged them to look for work.

What might this unfavourable change in the dependency ratio implicate for the prosperity? A tentative answer to this question might be given by looking at the expected trend in the Gross Domestic Product (GDP) per capita. In case the labour productivity will stay the same in the future, a fall in prosperity is expected according to each of the four policy scenarios. In the economic most favourable EME scenario a negative yearly growth of -0.3 per cent of GDP per capita is expected, against -0.5 per cent in the economic least favourable LSE scenario This unfavourable trend might be mitigated by raising the labour productivity. In case of a continued rise of productivity the picture of the expected prosperity looks much more desirable. Based on assumptions in line with historic figures on productivity and expert estimates on future growth - ranging from 1.0 per cent in the LSE scenario to 2.0 per cent in the EME scenario - in all four scenarios the negative growth figures of GDP per capita will turn over in positive figures, ranging from 0.5 per cent per year in the LSE scenario to 1.75 per cent per year in the EME scenario. The necessary rise in labour productivity in order to keep future GDP per capita at the current level, is considerable smaller: ranging from 0.26 per cent in the EME scenario to 0.5 per cent in the LSE scenario. It must be stressed, however, that these calculations are rather speculative, as it does not make explicit assumptions on changes in the sector composition of the economy (and their regional disparities), improvements in technology, substitution of labour by capital and changes in the sex and age composition of the labour force.

Not only the size of the labour force is going to change, but also the age structure. Just as the population, the labour force is going to be ageing to a considerable extent. Nowadays the younger part of the labour force (up to 39 years) is about the same size as the older part (40 years and higher). However, in the future the younger part will be between 10 and 20 per cent smaller than the older part. It might be assumed that the younger part of the labour force is more productive and innovative than the older part, but whether this is true is still an ongoing discussion. Due to the ageing of the labour force, the outflow of older persons will be larger than the inflow of younger persons. In case of flourishing economic prospects, as depicted by the EME and the GSE scenario,

this might imply that the opportunities for youngsters to get a job in the future will be favourable. In case of the gloomy economic prospects of the other two policy scenarios, this could mean that a lot of youngsters are not capable of acquiring a job, causing the labour force to age rapidly as the outflow of older labourers is not compensated enough by the inflow of youngsters.

8.2   Country-specific perspectives

At the country level policies oriented at cohesion or competitiveness have a large impact on the labour force. In international context policies striving for cohesion in the degree of labour force participation work out different for males and females. In the GSE scenario economic growth is high and ways have been found to cope with the risks of climate change leading to sustainable environmental conditions. Age specific activity rates are going to rise. For women, the gap between countries with a modern activity pattern and those with a traditional pattern will nearly be bridged. The traditional activity pattern is characterized by a peak in the age bracket 20-24 years, followed by falling participation rates at higher ages due to withdrawal of women from the labour market after marriage or childbirth. In contrast, the modern pattern is marked by high activity rates up to the age of 50, as having children has no effect on women's economic activity anymore. Especially in the southern countries, where the traditional pattern still dominates, this leads to rising activity rates in order to approach the activity rates of the northern countries, which take the lead in the modern pattern. For males international disparities in participation are mainly present at low and high ages. Again the northern countries stand out for their high participation rates. The combination of following education and having (small part-time) job leads to high activity at young ages. Males keep on working up to high ages; early retirement is more common in other parts of Europe. Again in the GSE scenario international differences in participation will diminish in the future. The example set by northern countries, such as Denmark, will be followed by other countries across the whole ESPON territory, which implicates a move to retirement at higher ages and a higher inclination to combine education with paid work at young ages. Also in the LSE scenario the policy strives for more international cohesion, but its efforts have less positive results due to the bleak economic growth everywhere. In the EME scenario the political focus is on global and international competitiveness. Leading countries will even strengthen their advantageous positions while the rise in labour participation will be not be met by countries lagging behind. In the CME scenario labour participation falls somewhat in line with an economic downturn. Leading countries will try to consolidate their favourable positions, but weaker regions will suffer a serious fall.

The international pattern of labour force growth deviates strongly between the four policy scenarios. In the EME scenario about half of the countries will experience a growing labour force, while the other half will have to cope with a shrinking labour force. In the other three scenarios most countries will be confronted with a more or less severe decreasing labour force. Especially in the LSE scenario the prospects are quite dramatic. Almost all countries will face a declining labour force and in nearly half of the countries the decline will amount to almost 40 per cent. For women the negative trend is even more serious than for males in this scenario.

The trends in the labour force in relation to those in the population will have strong effect on the dependency ratio. In 2005 the international dependency ratios vary between well under 1 to almost 1.5. This interval is lifted in the LSE scenario, running from 1.4 to 2.3 by 2050. The 'green pressure' (in order to provide for the population up to 15 years) is by then still roughly the same as in 2005. In contrast, the 'prime age pressure' (in order to provide for the non working part of the population in the age bracket 15 up 65 years) has increased in most countries. However, the largest contribution to the rising dependency ratio in the future is made by the eldest age group (above 65 years): the 'grey pressure' has more than doubled in most countries. In the EME scenario the

international dependency ratios are much lower, varying from 0.8 up to 1.9. In this scenario especially the prime age pressure is much lower. The rise of the grey pressure in the future is also in this scenario impressive.

A tentative estimate indicates that in case the labour productivity does not improve, the yearly growth rate of the GDP per capita will be negative in all countries according to all four policy scenarios. This is even the case in the economic most favourable EME scenario. However, a continued rise of the labour productivity in the future leads to positive figures for each country in each of the four scenarios. In the LSE scenario, with its gloomy economic development, rather meagre yearly growth figures of GDP per capita are attained, ranging from 0.1 per cent to 0.6 per cent. In the EME scenario the yearly growth figures of GDP per capita are much more positive: (nearly) all countries have growth rates ranging from 1.5 up to 1.9 per cent.

8.3   Labour force prospects in the context of the DEMIFER typology

What are the labour force implications of the policy scenarios for the different types of the DEMIFER typology? With respect to male participation the differences in the age patterns of activity rates between the distinguished seven types are rather small. Only the *Overseas* type stands out for having substantial lower participation rates. In contrast, with respect to female participation important deviations between the types in the age pattern of activity rates are visible. Again the *Overseas* type is an outlier showing much lower participation rates, but also the age pattern of the *Young Potential* type is quite different. The age pattern of activity rates of the latter type has a rather old fashioned appearance, characterised by steep falling participation rates after childbirth. In both the *Challenge of Ageing* type and the *Challenge of Labour Force* type the activity rates at higher ages are significantly lower than in the *Euro Standard* and the *Challenge of Decline* types. According to the GSE scenario, in the future a strong regional convergence between the age patterns of the different types will happen. This causes the traditional age pattern of the *Young Potential* type to be transformed into a modern age pattern, with no signs of falling activity rates after childbirth. In the LSE scenario this tendency to convergence is blocked by the meagre economic circumstances in spite of policies oriented at regional cohesion. According to the two other scenarios with strong market tendencies, the type-specific patterns of activity rates will not change significantly in the future. Policies oriented at regional competitiveness intervene with trends leading to more regional convergence.

With respect to type-specific trends in the growth of the labour force, the patterns of the CME scenario and the LSE scenario are more or less the same. The two types *Challenge of Transition* and *Challenge of Decline* will face a drastic downsizing of the labour force by 40 per cent between 2005 and 2050. In contrast, the *Overseas* type may expect a growth of 40 per cent. In the EME and GSE scenarios, the decline of the labour force in the *Challenge of Transition* and *Challenge of Decline* types is considerable lower with about -30 per cent. The *Overseas* type may count on a huge growth of the labour force with 60 per cent. Also the types *Young Potentials* and *Challenge of Ageing* are heading for a considerable growing labour force. For the *Family Potential* type too a respectable growth of the labour force is envisaged.

The disparity in the dependency ratios of the seven types is very small in 2005. The only exception consists of the *Overseas* type with a much higher dependency ratio, namely 1.7 against round 1.1 for the other six types. Both the green pressure and the prime age pressure are considerably higher in the *Overseas* type, while the grey pressure is in line with that of the other types. In the future, according to all four scenarios the gap between the dependency ratio of the *Overseas* type and the other types is going to get much smaller, although its 'leading position' will remain. Notably in the GSE scenario the *Overseas* type has no longer a significantly higher dependency ratio.

There are clear disparities between the different types of regions in the age composition of the labour force. The *Young potentials* type has by far the youngest labour force. Also in the types *Overseas*, *Challenge of Labour Force* and *Family Potentials* the balance is in favour of the younger part. In contrast, in the types *Euro Standard*,and *Challenge of Decline* the older part of the labour force surpasses the younger part, while in the type *Challenge of Ageing* the two parts have almost the same size. By 2050 the *Overseas* type is the only type where according to all four scenarios the younger part of the labour force will exceed the older part. In the type *Family Potentials* these two parts are 'in balance' in the economically favourable EME and GSE scenarios, while in the two other scenarios the older part is slightly larger than the younger part. In the *Challenge of Decline* type the ageing of the labour force will be the most intense, especially in the CME and LSE scenarios. This means that in the future in a majority of the regions of the ESPON area a considerable ageing of the labour force will happen, especially in the two economic less favourable scenarios.

8.4   Regional developments at NUTS2 level

In the future a lot of regions will be struck by a shrinking labour force. The seriousness of the decline of the labour force between 2005 and 2050 depends on the policy scenario (Map 8). In the EME scenario a minority of regions will be facing a declining labour force: only 35 per cent will have a shrinking labour force of more than 10 per cent. In the GSE scenario this percentage is slightly higher (40 per cent). In the CME scenario the percentage of regions with a shrinking labour force is much higher (55 per cent), while the LSE scenario sketches the most dramatic future. In this scenario abound 70 per cent of the regions will be confronted with a setback of the labour force of over 10 per cent. The regional pattern of labour force growth or decline differs considerable between the four policy scenarios. In the LSE scenario most regions located in the eastern part of the ESPON area, a lot of regions in the southern part as well as a lot of regions located in Germany and Austria will suffer a loss of over 30 per cent. More or less the same pattern is depicted by the CME scenario, although the number of regions with a severe decline is somewhat lower (and in the wake of it the number of regions in a considerable decline is somewhat higher). According to the EME scenario the pattern is quite different. A lot of regions located in the northern, western and southern part of the ESPON area will still have a substantially growing labour force. However, within countries differentials in growth figures are clearly visible. For example, in the UK, France, Norway, Spain and Sweden the southern part of the country exhibit the highest growth figures, while in Italy this is the case for the northern part. In general, these are regions where large cities are located, attracting labour migrants both from within the country as abroad due to their economic potential. Surprisingly, most regions in - economic booming - Germany will still face a declining labour force. Labour migration is not able to compensate for a lasting negative natural growth (leading to low entrance figures in the labour force). In this scenario a sharp contrast with the eastern part of the ESPON area is visible, where a majority of the regions will have to endure a shrinking labour force. The regional pattern of labour force growth or decline in the GSE scenario resembles that of the EME scenario, although there are less regions with high labour force growth (of over 30 per cent) and more regions with considerable growth (of between 10 between 30 per cent). This is due to the convergence assumption of this scenario: fewer regions have extreme growth figures.

Map 8   Change in labour force between 2005 and 2050, according to different DEMIFER scenarios

Change in Labour Force 2005-2050
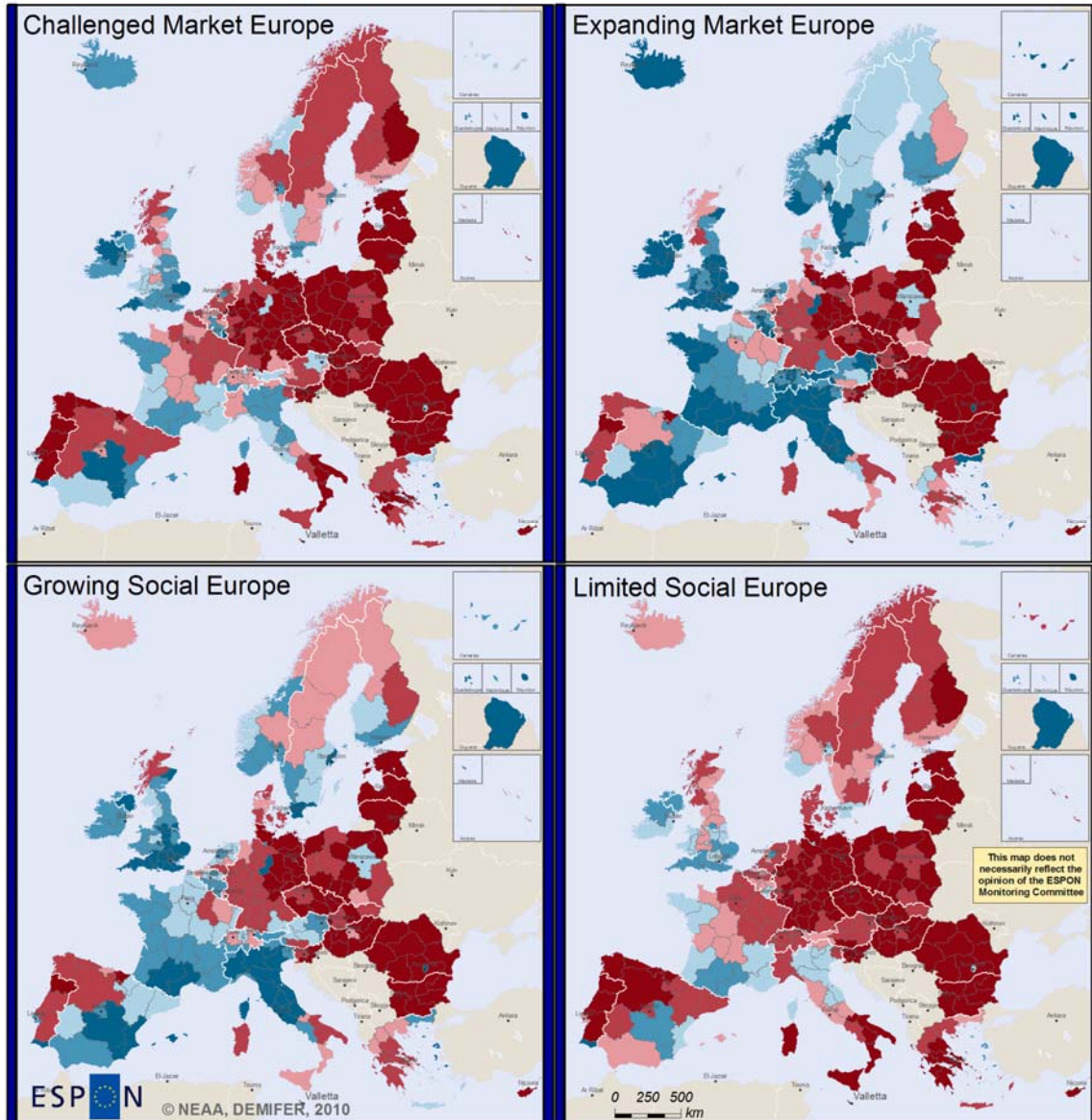
Change in number of Persons in Labour Force in 2005-2050, in % after Different DEMIFER Scenarios
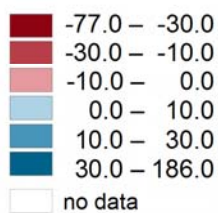
- -77.0 – -30.0
- -30.0 – -10.0
- -10.0 – 0.0
- 0.0 – 10.0
- 10.0 – 30.0
- 30.0 – 186.0
- no data

Regional level: NUTS 2
Source: ESPON 2013 Database, 2010
Origin of data: Eurostat, NSIs, Estimations, 2010
© EuroGeographics Association for administrative boundaries

9   The impact of climate change on migration

Key findings

- *Most climate driven migration will be regional rather than international in its impact as people most affected by climate change events are unlikely to have the means to move far.*
- *In the second half of this century 108 million people will live in the 'Warm temperate Mediterranean climate zone', where big rises in temperature and big falls in summer rainfall are projected. Richer people will be able to adapt through seasonal migration. The difficulties of climate change will be experienced by those unable to adopt a seasonal circulation.*
- *In the 'Cold temperate and montane climate zone' big changes are anticipated but these will affect a relatively small population of 17 million. The change in annual number of days with snow cover will have serious impact on winter resort settlements, but regional populations are small.*
- *The other climate zones will experience less extreme changes. No substantial effects on migration are expected.*

It is anticipated that climate change will affect future demographic trends in various ways, the least in regards to morbidity, mortality and migration (Lutz, 2009[18]). In DEMIFER however, we will focus on exploring the impact of climate change induced migration on the European population in the course of the 21st century[19].

Migration in Europe could be affected in two ways by the impacts of climate change. First, people from areas affected within the European space might move into other regions of Europe. Second, people affected by climate change from outside the European region will migrate into Europe. To estimate additional climate change induced migration into Europe, we would need to have good estimates on how many people will be affected by climate change to that extend that they will leave their homes to find livelihood somewhere else and in a second step we would need to establish how many people will actually enter the European region for that reason.

9.1   Climate change within Europe

IPCC (2007)[20] discusses the key challenges Europe will face from climate change: winter floods are likely to increase, sea-level rise will affect an additional 1.6 million people a year, differences in water availability between areas with water stress increasing over central and southern Europe with 35 per cent under water stress by the 2070s. Other features and threats of European climate change are given by EEA (2008)[21]. Temperature in Europe is predicted to increase between 1.0 and 5.5°C by the end of the century, higher than projected global warming. Droughts and water stress will increase, particularly in the south and in summer due lower river flows. Annual precipitation changes are already exacerbating differences between a wet northern part (an increase

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[18] Lutz, W. (2009), What can demographers contribute to understanding the link between Population and Climate Change, Population Network Newsletter, 41, online at: http://www.iiasa.ac.at/Research/POP/POPNET/popnet41.pdf.

[19] This chapter is based on DEMIFER deliverable D8 'Report on climate change and migration scenario' prepared by P. Rees, P. Wohland and P. Boden (University of Leeds).

[20] IPCC (2007), Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Core Writing Team, Pachauri, R.K. and Reisinger, A. (Eds.). IPCC, Geneva, Switzerland. pp 104, online at: http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm.

[21] EEA (2008), Impacts of Europe's changing climate - 2008 indicator-based assessment, Joint EEA-JRC-WHO report EEA Report No 4/2008 - JRC Reference Report No JRC47756, online at: http://www.eea.europa.eu/publications/eea_report_2008_4/pp1-19_CC2008Executive_Summary.pdf.

of 10 to 40 per cent during the 20th century) and a dry southern part (a decrease of up to 20 per cent in some parts of southern Europe). The report estimates that 90 per cent of all natural disasters that occurred in Europe since 1980 are directly or indirectly attributable to weather and climate, representing about 95 per cent of the economic losses caused by catastrophic events. The large number of additional deaths during the 2003 summer heat wave (more than 70 000 excess deaths reported in 12 European countries) pointed to the need for adaptation actions, such as heat health action plans.

The European Commission has funded important research on the ground where climate change impacts are being felt. EACH-FOR (2009)[22] looks at common problems within some European countries such as water shortages and desertification. The researchers indicate the problems of climate change will lead to out migration from areas within European countries as temperature increases. In Spain and Portugal rises of 5 to 7 degrees Celsius are projected, making the Iberian Peninsula the most affected area in Europe. A case study of Turkey shows the effect of development projects on migrants. Some 28 villages and 48 hamlets affected by the building of the Ataturk Dam in central Turkey were given the choice of either compensation and self relocation or relocation by the state. Relocation occurred from the S.E. of Turkey and to the West of Turkey. The Ataturk dam also affected traditional agriculture that relied on groundwater leading to seasonal migration. Whether we can classify these events as a direct effect of climate change is debatable, but they do illustrate that the displacement effects occurred within the country not to Europe.

Bogardi (2007)[23] highlights key areas of vulnerability due to climate change. His world desertification map shows a high risk in Southern Spain and a moderate risk in Greece. Maps in the report show the vulnerability of areas to sea level rise with the coasts of the Netherlands, Denmark, northern Germany and the east coast of Britain likely to be affected by a sea level rise of 1m.

9.2 Climate change from outside Europe into the ESPON area

The Refugee Studies Centre (2008)[24] has published a report entitled ´Forced Migration Review, Climate Change and Displacement´. The papers in the collection argue that climate and environmentally induced migration will become a key issue over the next century. Poverty, failing ecosystems, vulnerability to natural hazards and gradual climate-driven environmental changes are all linked to environmental migration. Warming will affect agricultural productivity, natural disaster such as floods will cause mass displacement and sea level rise will destroy productive low level lands leading to more mass displacement. The authors cite the UN prediction of 200 million migrants displaced by climate change and they identify the need to improve the predictions and to solve the problem of distinguishing the role of climate change from other environmental, economic and social factors. Climate change is likely to increase numbers that migrate to urban areas. The report highlights the need for a clearer definition of environmental migration. It is widely believed that the majority of people who flee natural disasters remain in their own country. There is the obvious need of humanitarian assistance but they do not fear persecution so cannot be termed refugees. The European Court of Human Rights ruled that governments must enact laws to mitigate the risks posed by climate change.

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[22] EACH FOR (2009), Environmental Change and Forced Migration Scenarios Synthesis report, online at: www.each-for.eu/documents/EACH-FOR_Synthesis_Report_090515.pdf.

[23] Bogardi J (2007), Environmental Refugees: the Forgotten Migrants, Environmental Migration: Flight or Choice, online at: http://www.each-for.eu/documents/BOGARDI%202007%20Environmental%20Refugees_he%20Forgotten%20Migrants.pdf.

[24] Refugee Studies Centre (2008), Forced Migration Review, Climate change and Displacement, [Marion Couldrey M and Herson M (eds)], online at: http://www.fmreview.org/FMRpdfs/FMR31/FMR31.pdf.

Warner et al. (2009)[25] studied the extent to which climate change is already contributing to displacement and migration. Environmental, economic and political factors combine to force movements. Conflicts over resources such as water influence migration, particularly in the Sahel region. Disasters lead to shorter-term displacement and migration is a survival strategy. There is a need to understand the pattern of migration as both a fast process (in response to a climatic event such as a storm) and as a slow process of adaptation to a changing environment. Seasonal migration is already a key adaptive measure used in many countries affected. Climate change is likely to lead to long term migration when it affects whole livelihoods.

Aid (2007)[26] estimates that 5 million people will flee their own countries and be accepted as refugees. Spread over 45 years and all continents suggest that the numbers likely to come to Europe will be small.

9.3   Responses to adapt to threats of climate change

Lutz (2009)[18] discusses the contribution that demographic analysis can make to the understanding of the relationships between population and climate change. He highlights the need to strengthen human capacity through education which also reduces population growth and enhances economic growth. This is seen as the most promising investment for adaptation to climate change. He cites the WHO Report on Climate Change and Human Health: "In general, countries with more 'human capital' or knowledge have greater adaptive capacity. Illiteracy increases a population's vulnerability to many problems." Research has shown that changes in population growth, age structure and spatial distribution interact closely with the environment and with development. Rapid population growth has exacerbated freshwater depletion, climate change, biodiversity loss, depletion of fisheries and other coastal resources, and degradation of agricultural lands. Fertility decline, driven in part by women's increasing participation in education at all levels, slows population growth.

The European Commission (2009)[27] highlights two kinds of responses that are needed to adapt to the threat of climate change. The first is to reduce greenhouse gas emissions and the second is to adapt to unavoidable consequences of climate change. Increasing the resilience of Europe to climate change will involve investing in renewable technologies as part of the Economic Recovery Plan. The paper highlights the most vulnerable regions as Southern Europe and the Mediterranean basin, with coastal regions being most severely affected due to failing crops, lack of access to water resources and rising temperatures. The White Paper recommends action against climate change needs to be taken at local, national and regional levels but it requires support and integration for the EU to make a coordinated approach. In their ´Action against climate change´ (European Commission, 2008[28]) the Commission highlights particular pieces of EU legislation, such as the need to manage flood risks, to help mitigate the potential effects of climate change. The document stresses the need for action at all levels from individuals to councils to regional strategies in the EU itself. EU strategy should be based on solidarity for affected member states and other countries outside of the EU. The report highlights a range of consequences of climate change from effects on natural ecosystems to climate refugees citing predictions of 1 billion people migrating due to climate change by 2050. In its ´Foresight Land Use Futures Project´ the UK Government

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[25] Warner, K., C. Erhart, A. de Sherbinin, S. Adamo (2009), In Search of Shelter: Mapping the Effects of Climate Change on Human Migration and Displacement, Cooperative for Assistance and Relief Everywhere), online at: http://www.ciesin.columbia.edu/documents/clim-migr-report-june09_media.pdf

[26] Christian Aid (2007), Human tide: The real migration crisis. Christian Aid Report. London, online at: http://www.christianaid.org.uk/Images/human-tide.pdf., Cited in Warner et al (2009).

[27] European Commission (2009), White paper - Adapting to climate change: towards a European framework for action, online at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52009DC0147:EN:NOT

[28] European Commission (2008), EU Action Against Climate Change: Adapting to climate change, online at: http://ec.europa.eu/environment/climat/pdf/brochures/adapting_en.pdf

Office for Science estimates that without any increased flood protection 800,000 homes will be at risk rather than the current 500,000.

9.4 A climate change and migration scenario design

The literature on the impact of climate change on migration is highly speculative and there are hardly any reliable statistics on past migration linked to climate change. Nevertheless it is worth assessing whether the impact of climate change on migration in the ESPON area is likely to be small or large, even if this involves a large measure of judgement. One way to do this is by integrating a climate change scenario with a selected policy scenario.

The climate change and migration scenario has two building blocks: an environmental and a demographic. First, we chose a climate change scenario design. We adopted the B1 storyline of the IPCC (2007)[20] Special Reports on Emission Scenarios (SRES) to describe the future we investigated:

> "The B1 storyline and scenario family describes a convergent world with the same global population that peaks in mid-century and declines thereafter with rapid changes in economic structures toward a service and information economy, with reductions in material intensity, and the introduction of clean and resource-efficient technologies. The emphasis is on global solutions to economic, social, and environmental sustainability, including improved equity, but without additional climate initiatives."

Second, we chose a demographic scenario. In this case we used the Limited Social Europe scenario. For this purpose the projections were extended until 2100. We have chosen the LSE scenario as the other policy scenarios to a greater or lesser degree already accounted for extra migrants generated by climate change. Then we compute the populations projected to be resident in climate change zones of different kinds, drawing heavily on the work of our colleagues responsible for the ESPON Climate change project. We do not explicitly compute the likely number of migrants but rather discuss the potential actions of the affected populations which involve either migration away from climate change affected regions or mitigation of and adaptation to the effects of climate change. We also recognize that a subtler process of migration may occur, that is, that an affected region loses its attractiveness to in-migrants, while out-migration continues as before. This process generates net out-migration and accelerates population decline.

Given that the majority of people who flee natural disasters remain in their own country, we focus in the discussion on European internal migration. Note that you need to import knowledge about the trade off applied in the different countries between mitigation and migration. The Netherlands, for example, has a long history of engineering barriers to keep out both river and sea flood waters. 26 per cent of the country is already below sea level. On the other hand the UK Environment Agency plans to protect only the most valuable part of the UK's North Sea coast (the Thames Estuary and London) and to let the processes of wave erosion and sea flooding work through elsewhere, learning from the failure of King Canute/Knut to influence the tidal rhythms of the North Sea.

To assess the impact of climate change on migration within Europe, we adopted the clusters of regions defined by the ESPON Climate Change project (Greiving *et al*. 2010[29]), but changed their descriptions from "regional" to "climatic" (Map 9) because the regional descriptions did not apply to several regions (e.g. the Alpine regions were

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[29] Greiving, S., M. Fleischhauer, C. Lindner, J. Lückenkötter, L. Peltonen, S. Juhola, P. Niemi, J. Vehmas, S. Davoudi, E. Achino, O. Langeland, B. Langset, P. Medby, D. Sauri, J. Martín-Vide, J. Olcina, E. Padilla, F. Vera, A. Holsten, B. Backman, P. Schmidt-Thomé, J. Jarva, T. Tarvainen, S. Kruse, K. Schneller, M. Csete, A. Chicos, J. Tesliar (2010), *ESPON CLIMATE - Climate Change and Territorial Effects on Regions and Local Economies.* Applied Research Project 2013/1/4. Revised Interim Report. Online at: http://www.espon.eu/main/Menu_Projects/Menu_AppliedResearch/climate.html. Accessed 21 September 2010.

labelled "Northern Europe"). Selected climate change variables were available at NUTS3 scale in Greiving *et al*. (2010)[29] and we averaged them for NUTS2 regions in order to determine what populations in 2060-2100 fell within each category of climate change. The broad changes which are predicted are set out in Table 9 while in Figure 4 we show the distribution of one of the variables across NUTS2 regions in the ESPON space, representing the variable on a population cartogram which emphasizes the demographic impact.
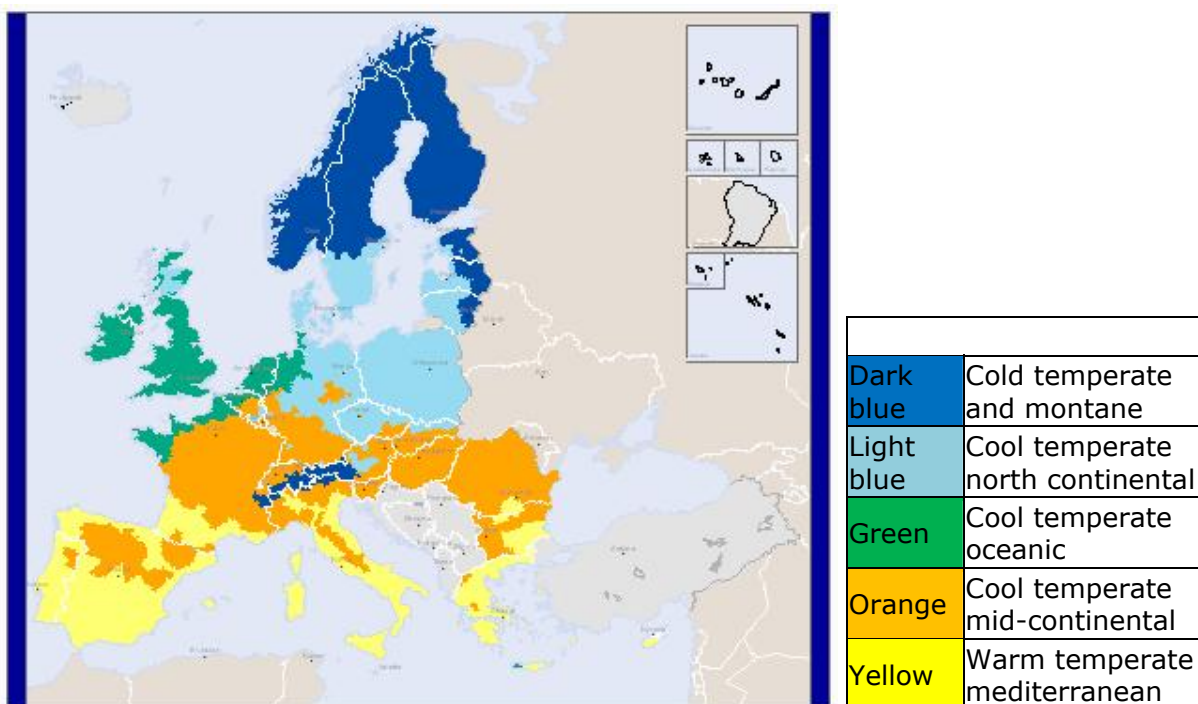
In the *Warm temperate mediterranean climate zone*, big rises are projected in mean annual temperature and big falls in summer rainfall. The rise in temperature will be substantial (Map 9), more than 3.6 degrees Celsius in most regions and more than 4 degrees Celsius in the major metropolitan areas (Madrid, Marseille, Milano, Roma, Napoli). There will be a big fall in summer rainfall which will cause difficulties for agriculture and horticulture, while the fall in winter precipitation will lead to problems in storing enough water for summer demand. In this climatic zone will reside, on average between 2060 and 2100, 108 million people. In the Warm temperate Mediterranean climate zone, the hotter climate may well encourage some return migration by retirees from northern Europe. However, there is evidence that richer people are able to adapt to hot climatic conditions through seasonal migration (wintering in the south, summering in the north). The difficulties of climate change in this zone will be experienced by those unable to adopt a seasonal circulation. Water shortages are already experienced in Mediterranean regions and schemes for transferring water by pipeline or ship from wetter areas are already in place. There is one obvious water source that is easily accessible, the sea and the energy can be supplied by the development of solar power (boiling fluid plants using solar mirrors). Spain is already a pioneer in developing such technology. Our opinion is that regions will mitigate the consequences of climate change in these ways and people will adapt through multi-locational life styles. During the British imperial occupation of India, for example, the government in New Delhi would relocate to Simla in the Himalayas during the hot season.

In the *Cool temperate oceanic climate zone*, the climate changes are relatively subdued because of the oceanic circulation. There will be challenges from lower summer rainfall and greater storminess in winter but these changes will be balanced by the extension of the growing season and the additional productivity of agriculture. This zone is densely populated and will house 120 million people in the 2060-2100 period. The greatest challenge will be along the coastal regions vulnerable to the rise in sea level. We have already discussed the likely responses, drawing on examples from the Netherlands and the United Kingdom.

In the *Cool temperate mid-continental climate zone*, there will changes similar to those in the Warm temperate Mediterranean zone though they will be a little less extreme. Figure 4 shows mean annual temperature will rise by 3.1 to 4.0 degrees, less in the west and more in the east. Summer rainfall will show a big fall. This climatic zone is inhabited by 132 million people. These changes are unlikely to cause streams of out-migration but the temperature changes may encourage seasonal movements to higher elevations, which are accessible from this zone (the Alps, the Carpathians, the mountains bordering the Czech Republic and Slovakia and the upland areas of France such as the Massif Central).

In the *Cool temperate north continental climate zone*, climate changes are important but not catastrophic. For farming they may be favourable, providing the summer water deficits can be met through suitable storage, transfer and careful use. We do not anticipate any substantial migration out of this region in addition to that already taking place for economic reasons. The population that is likely to be resident in this zone is only 61 millions and declining, so that water demand will be reducing.

Map 9   Climate change clusters/zones defined by ESPON Climate Change Project

Dark blue	Cold temperate and montane
Light blue	Cool temperate north continental
Green	Cool temperate oceanic
Orange	Cool temperate mid-continental
Yellow	Warm temperate mediterranean

Source: Greiving *et al.* (2010)[29]

Table 9   Projected changes in key climate indicators for the climate change regional clusters of Europe (adapted from Greiving *et al.* 2010, ESPON Climate Change Interim Report)

Changes in climate variables re between 1961-90 and 2061-2100 Populations are averaged between 2060 (higher) and 2100 (lower), using the Limited Social Europe scenario projections	Not classified	Climate change cluster/zone					
		Warm temperate mediterran ean	Cool temperate oceanic	Cool temperate mid-continental	Cool temperate north-conti nental	Cold temperate and montane	
Climate change variable		Mediterran ean region	Northern Western Europe	Southern Central	Northern Central	Northern Europe	Total
Change in annual mean temperature		Big rise	Rise	Big rise	Rise	Big rise	
Relative change in annual mean precipitation in winter months		Fall	Rise	Stable	Rise	Big rise	
Relative change in annual mean precipitation in summer months		Big fall	Fall	Big fall	Fall	Stable	
Change in annual mean number of days with heavy rainfall		Fall	Rise	Stable	Stable	Rise	
Change in annual number of days with snow cover		Stable	Stable	Stable	Fall	Big rise	
Population (millions)	7	108	120	132	61	17	443

Figure 4 Increase in mean annual temperature plotted on a population cartogram
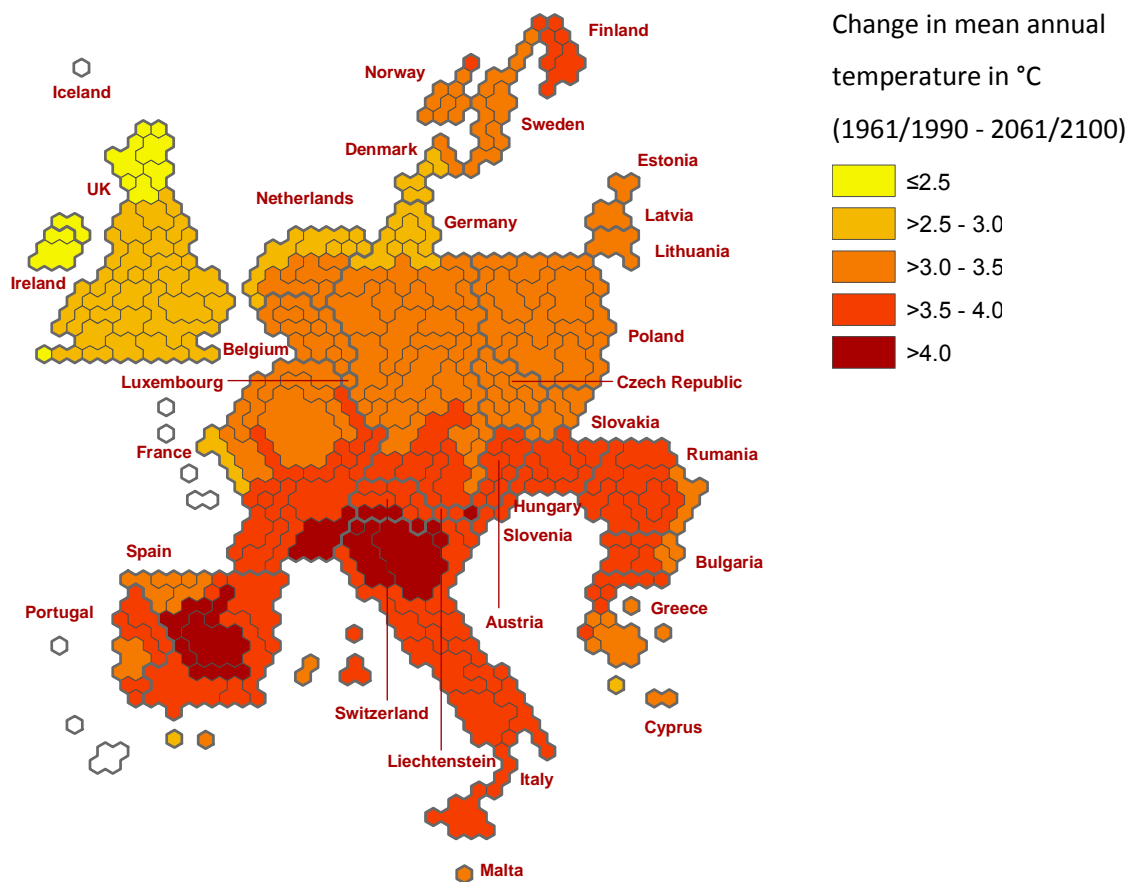
In the *Cold temperate and montane climate zone,* there are big changes anticipated but these will affect a relatively small population of 17 million. Although the geographical area covered by this zone is large (Map 9), the regional populations are small and live at low densities as indicated by the shrunken footprint of the Nordic countries in Figure 4. Mean annual temperature does rise considerably in this zone and may have impacts on the natural environment. The demographic impact will be slight. However, the change in annual number of days with snow cover will have serious impact on winter resort settlements. Mitigation measures already being used include the development of higher *pistes*, the generation of artificial snow and the development of summer tourism to cater for city dwellers at lower altitudes fleeing the summer heat.

Much of the analysis of the impact of climate change is a matter of judgement. Our judgement is that the likely migration impact will be slight noise against a background of much bigger flows that we have already included in our scenario projections. We have argued that countries, regions, businesses and households will invest in mitigation measures and will adapt to the climate change envisaged. Past experience suggests that populations exposed to climate risks will adapt, even to catastrophic events. However, careful planning of the adaptive strategies will be needed. Societies that think long term are those most likely to prosper.

10   Policy considerations

Key findings

- *Policies aimed at accommodating demographic challenges and policies aimed at changing demographic and migratory trends should be combined. Decision makers in all domains at both the national and regional level should co-operate.*
- *Demographic challenges differ by type of region. Thus the typology of regions is needed to assess the optimal mix of policy measures to cope with demographic challenges in order to attain the normative European goals of territorial cohesion and regional competitiveness for each type of region.*
- *The "shrinking" regions of Europe need policy interventions to make these regions more attractive to potential immigrants and family-friendly social policies that encourage higher fertility rates and longer careers for women on the labour market*

The main demographic trends across Europe are the decline in population growth, the ageing of the population, the shift from births to migration as main source of population growth and the reduction in the growth rate of the working age population. If the size and direction of migration flows and reproductive behaviour will not change, the size of the working age population will decline in the next decades, while at the same time the number of elderly people will increase. This will be a risk for European competitiveness since the working age population in many other parts of the world is expected to continue to growth in the foreseeable future. In addition, disparities across European regions may increase. In general the level of fertility and the inflow of migrants are high in affluent regions, whereas fertility is low and there is an outflow of young migrants in poor regions. Moreover, premature mortality is high in poor regions. This raises the question which policy options are available to policy makers in order to improve both European competitiveness and territorial cohesion.

This chapter sketches the policy considerations resulting from the DEMIFER analyses[30]. It places demographic and migratory flows into perspective with regard to their potential contributions to economic growth, sustainable development and EU policy goals of regional competitiveness and territorial cohesion. It discusses policy considerations or implications rather than direct recommendations. Across the board policy recommendations for demographic development are notoriously hard to make as they often imply changes to specific national priorities and social behaviour. The best recommendation would be for policy makers to read the report and choose the policy means and activities that are best suited for their own country or region.

This chapter makes a distinction between two types of policies. First it describes policy implications to accommodate the consequences of demographic challenges for each of the six main types of regions as delineated in the demographic typology in chapter 3. Second, it explores policy options aimed at changing demographic and migratory developments. The DEMIFER scenarios in chapters 5, 6 and 7 chronicle the implication of various bundles or combinations of policies on future demographic and migratory trends. A comparison of the scenarios shows to what extent policies affecting demographic and migration flows alleviate ageing and the decline in the labour force. But first the following section puts policy-making considerations, economic growth and territorial development into context.

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[30] This chapter is based on DEMIFER deliverable D9 ´Report on policy implications´ prepared by Lisa Van Well, Nordregio.

10.1 Policy considerations for the demography in European territorial development context

10.1.1 Demographic considerations and policy context

The European territorial development debate is framed within several seminal strategies and agendas to achieve regional competitiveness and territorial cohesion. These include the Lisbon Strategy, the Territorial Agenda, the Commission's Green Paper on Territorial Cohesion and most recently the Europe 2020 discussions for smart, sustainable and inclusive growth. The European policy territorial debate, while not specifically assuming that demographic changes result in altered economic performance, does repeatedly discuss how demographic changes present serious challenges for territorial development. Thus demographic and migratory developments are discussed within these broad policy contexts as challenges to be overcome.

Various questions with regard to demographic and migratory trends are high on the European agendas and encompass several areas of EU policy- migration/immigration and integration policy, employment and social policy, including the debates on pension reforms, maternity (and paternity) leave, and enabling the absorption of older and younger workers in the labour force. The Commission Communication of 2006, "The demographic future of Europe – from challenge to opportunity"[31] calls for an overall strategy to deal with the challenge of ageing and outlines five directions that could be taken to meet these challenges; 1) promoting an improved balance between professional and working life, 2) promoting employment, more jobs and longer working lives, 3) working towards a more productive and dynamic Europe in light of the renewed Lisbon strategy, 4) receiving and integrating immigrants in Europe, and 5) sustainable public finance. In an updated Ageing Report from 2009, "Dealing with the impact of an ageing population in the EU" [32] it is reinstated that priority to be given to these directions but with a new sense of urgency in light of the financial crisis and the priority given to the European Economic Recovery Plan.

Thus many important questions are raised concerning how Europe can deal with the current and future demographic and migratory trends. While the research produced in DEMIFER is not always explicit in providing evidence to address these questions, results do shed some implicit light on the policy considerations that are relevant in specific territories.

One major policy-related question resulting from the current and anticipated trends in demography and migratory movements, as shown from the DEMIFER results, is:

> "How can European nations and regions compensate the decline of the labour force due to ageing of the population and declining fertility rates?"

Policy considerations to change and accommodate this trend tend to take a three-pronged approach, by *increasing labour productivity, increasing labour participation rates* and/or by *boosting the rate of external immigration to the EU*.

Policy considerations for increasing labour productivity, according to the Lisbon strategy, includes not just capital investments, but also investments in human capital, training and capacity-building. Europe 2020 asserts that the growth rate in Europe was waned due to, among other things, the widening productivity gaps due to insufficient investments in

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[31] Commission of the European Communities (2006). Commission Communication. The demographic future of Europe – from challenge to opportunity. COM (2006) 571 final. Brussels, 12.10.2006.
[32] Commission of the European Communities (2009), Dealing with the impact of an ageing population in the EU (2009 Ageing Report). COM (2009) 180 final. Brussels, 29.4.2009.

R&D, innovation and ICT. One of the flagship initiatives to raise labour productivity is thus through a focus on new skills and jobs.

Some studies claim that increasing *labour productivity* may, over time, actually become the key driver of growth and a link between demography and economic performance in the EU[33]. In chapter 8 the DEMIFER results point out that rising labour productivity may help to mitigate unfavourable trends in GDP per capita. In all four of the scenarios presented, negative growth will be tempered by a rise in labour productivity. Conversely, if labour productivity does not improve there is the risk that growth rates (in GDP per capita) will be negative in all four policy scenarios.

The role that technology plays in increasing labour productivity should be emphasised, in accordance with the renewed Lisbon strategy. This includes in light of climate change adaptation and mitigation, new green technologies increasing energy efficiency, as proposed in Europe 2020.

Policy considerations for increasing labour participation include policies to keep older workers on the labour market for longer periods of time and policies to absorb greater numbers of younger people (especially women) into the labour market. In the first case policy considerations include reform of pension systems and retraining of older workers to increase the number of years they are active on labour markets. But important policies also encompass healthcare concerns to maintain an older, but vital workforce. In the second case absorption of younger people into the labour markets will depend on education and training, but also importantly on family-friendly policies that enable men and women of childbearing age to manage their work-life balance. These include policies to promote gender equality at the workplace, high quality childcare, and extension of maternal and parental leave, all of which help to encourage an increase in fertility rates and help to ensure that especially women remain connected to the labour market even in their childbearing and child-raising years.

DEMIFER results with regard to labour force participation show that growth in the labour force deviates greatly among the four policy scenarios presented. While many regions will experience dwindling labour forces, the percentage of regions with shrinking labour forces (labour force change of more than -10%) is lowest in the Expanding Market Europe (35%), slightly more in the Growing Social Europe scenario (40%), 55% in the Challenged Market Scenario and all of 70% in the Limited Social Europe scenario. In the Expanding Market Europe scenario, regions with growing labour forces are located in northern, western and the southern parts of the ESPON space and particularly within the large cities in these areas. Within all scenarios, the EU12 Member States will see enduring declines in the labour force.

Measures are already being taken at EU and national level to address the challenge of compensating the decline of the labour force. Legislation is now being enacted to raise the minimum period of parental leave to 20 weeks, recent and expected reforms of public finances are being considered in most Member States in accordance with the Stability and Growth Pact, use of the "flexicurity" system within the context of the European Employment Strategy is opening up a more fluid labour market in several countries, and a focus on capacity building for more and better jobs is being taken in all Member States with the rigorous implementation of the renewed Lisbon Strategy and National Reform Programmes. Training and adaptability of workers is part of the European Employment

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[33] Carone, G., P. Eckefeldt European Commission. DG ECFIN (2010), Making use of long-term demographic projections in multilateral policy coordination in the European Union. Joint Eurostat/UNECE Work Session on Demographic Projections (28-30 April 2010), Lisbon, Portugal.
Rauhat, D., and P. Kahila (2008), The Regional Welfare Burden in the Nordic Countries. Nordregio Working Paper 2008:6.

Strategy's long-term goals to increase competitiveness of the territory. A focus on life-long learning to promote employability, adaptability of workers and inclusion of all social groups and a priority of the European Social Fund.

A related question concerns the impact of ageing on the sustainability of public finances. The ageing population will have impacts on several aspects of public spending – public pension expenditure, healthcare and education. As the dependency ratio increase, pressure is put on the provision of age-related transfers and services. The demographic transition of an older population is the main driver behind the projected increases in Member States public pension expenditure[34]. To date almost all Member States have tightened eligibility requirements for receiving public pensions or instigated supplementary pension schemes[35] and real progress has been made, so long as the reforms are remain in place. Pension reforms and complementary structural reforms in healthcare transfers and services and education/training should be instigated in the coming period of ten years, where a "window of opportunity exists" in which labour forces will continue to strengthen somewhat before dependency ratios rise drastically. Delayed action in implementing these policies will mean that even more drastic measures may be needed.

Policy considerations for increasing extra-EU immigration include a common European Union immigration policy (now in legislation) as well as coordinated efforts to fight illegal immigration. Better management of migration flows by coordinated actions on behalf of the Member States will facilitate migration into the EU as a means to increase economic and demographic development of the Union. While immigration can only partly compensate the impacts of ageing and low fertility, it may be an important force for territorial cohesion. At the same time extra-European migration must be complemented by integration policies to avoid further labour market segmentation. Changing attitudes towards migration from being a burden to a benefit of the European territory is an important part of this.

DEMIFER results from the scenarios case studies show that the most dynamic regions generally satisfied their labour force demands through immigration. Urban areas are more able to attract international immigrants, particularly those with institutions of higher education (attracting younger people) and those that are physically attractive (mountains or coastal areas) to older people. This ability of major cities and agglomerations to attract working age population can counterbalance a shrinking and ageing working age population. At the same time the case studies which show a significant presence of foreign immigrants underline the importance of integration of this population and preparation for their future ageing (see also Annex 2, synopsis of the case studies).

Measures already being taken to capitalise on extra-European immigration as a means of addressing gaps in the labour market are seen in the discussions towards a common European Union immigration policy which recognises that the EU needs migration in certain sectors and regions to deal with the specific economic and demographic needs of the territory. The "Stockholm Programme – An open and secure Europe serving and protecting the citizens" from 2009 discusses how a well-managed migration can be beneficial to all stakeholders, particularly within the context of the long-term demographic challenges and the demand for labour that the Union is facing. But the programme also asserts that the interconnection between migration and integration remains crucial. Likewise the European Neighbourhood Policy, while originally mainly interested in helping to strengthen the capacity of Europe's neighbours to deal with migratory flows into their countries and concerted efforts through partnerships to fight illegal immigration, has discussed the possibility of opening up labour market, where

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[34] Carone, et al (2010).
[35] COM (2009) 180 final.

mutually advantageous, between the EU and its neighbours to respond to gaps in national labour markets[36].

A second question arises with regard to increased labour market mobility of persons between European regions:

> "What is the role of inter-regional and inter-EU migration in achieving territorial cohesion?"

In which regions does labour market mobility present a challenge to population dynamics and in which is it an opportunity to foster employment and growth? The DEMIFER project has examined the relationship between migration and population change with the result that migration in general will tend to benefit the already affluent regions by helping to address the problems of ageing, but that migration out of the poorer regions will only increase regional disparities. The DEMIFER results show unequivocally that migration, both extra-European and intra-European, will have a significant impact of demographic and labour force development in regions. What more, migration will benefit the richer regions, as migrants move to regions that enjoy affluence, accessibility and a nice climate. Results from the case studies show that areas with a well-performing R&D sector are better able to attract more migrants. In general Eastern Europe will suffer from a loss of migration (except in the larger agglomerates). As chapter 5 states, the only way to prevent the growth of regional disparities due to migration would be by policies to reduce incentives to emigrate from poor regions and policies that encourage poorer regions to attract more extra-European migration.

EU strategies and policies to promote territorial cohesion certainly help to address some of these challenges. In the light of demographic and labour market challenges, increasing the attractiveness of regions falling behind is just as important, or more important, than boosting the competitiveness of already vibrant regions, that benefit from migration. The Territorial Agenda[37] particularly points how the need for new forms of urban-rural partnerships and promotion of regional clusters of innovation as goals for the European territory. Regional policy instruments such as the Structural Funds, Cohesion Funds and the Territorial Cooperation objective should be directed towards measures attracting and retaining younger persons in these areas and redressing the exodus from shrinking areas. The Green Paper on Territorial Cohesion[38] recommends addressing these challenges in coordination with other EU policies such as transport, environmental and energy policy and in the CAP.

A third question concerns the impact that climate change will have on migratory patterns into and within the EU. Thus the pertinent question becomes:

> "How is global climate change and its regional impacts expected to affect migratory trends in specific territories?"

The DEMIFER scenarios do not explicitly compute the likely number of migrants due to climate change, but rather discuss the potential actions of the affected populations which involve either migration away from climate change affected regions or mitigation of and adaptation to the effects of climate change. The majority of the people expected to flee the negative effects of a changing climate will presumably stay in their own countries. Thus DEMIFER examined intra-European migration in connection with climate change.

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[36] Commission of the European Communities (2007), Communication from the Commission- A Strong European Neighbourhood Policy, COM (2007) 774 final. Brussels, 05/12/2007.

[37] Ministers responsible for Territorial Development - Informal Ministerial Meeting on Territorial Cohesion (2007). Territorial Agenda for the EU 2007 – 2010 Towards a More Competitive Europe of Diverse Regions.

[38] Commission of the European Communities (2008a), Green Paper on Territorial Cohesion - Turning territorial diversity into strength.

Compared to migration for other reasons, climate change migration is expected to be very slight. While regions may be presented with additional territorial challenges, ie in the Mediterranean regions may experience water shortages, winter sport regions may lose revenues due to reduced tourism, and coastal areas may see changes in fisheries and aquaculture sectors, these challenges can partially be mitigated by a focus on new technologies. More affluent persons will be able to adapt better to extreme climates through seasonal migration and more affluent regions will have the means to restructure certain sectors that are affected by climate change. Thus climate change impacts will be an additional burden on the regions that are already affected by a diminishing labour force and an ageing population.

Policy actions to help relieve affected regions from the challenges imposed by climate change and thus discourage migration away from these areas include, as Europe 2020 recounts, a focus on "green energy" technologies to help regions solve their energy needs, boost innovation and provide both low-skilled and high-skilled job opportunities. The EU White Paper on Adapting to Climate Change[39] discusses how regions can become more resilient to climate change through coordinated EU action in certain sectors (e.g. agriculture, water, biodiversity, fisheries, and energy networks) that are closely integrated at EU level through the single market and common policies.

10.1.2 Considering policy on multi-levels

Demographic developments in Europe are multi-faceted and no one size fits all with regard to the relationship between economic performance and demography and migratory flows. Making policy recommendations to deal with demographic developments or considering policy considerations of such developments is extremely difficult. For instance there is no clear-cut causality between a change in age structure and its economic effects. Rather it is also the institutional and organisational structural changes that take place concurrently which determine if age structure change has a negative or positive effect on economic performance. Neither is the relationship between economic performance and migration straightforward. Much has to do with the absence of homogeneous migration data in Europe and the variety of definitions used to classify an immigrant/emigrant. Even rigorous scientific exercises which are informed by established theory, such as the DEMIFER policy scenarios elaborated in this report, cannot make definite statements about the impact of various bundles of policies on demographic and migratory trends. The scenarios, however, are important intellectual devices for thinking about alternative futures.

Thus considerations for policy should also be made in accordance with the territorial diversity of the ESPON space and with consideration to scale, or the level on which policy is most viable. The multi-level, intersectoral nature of various policy options can give rise to both synergistic policies as well as conflicting policy goals. In the ESPON 2006 programme the ESPON project on Enlargement of the European Union (ESPON 1.1.3[40]) discussed the idea of policy combinations to describe the processes of coordinating coherent combinations of policies as a way to bridge the gap between policies oriented towards competitiveness of the European territory and cohesion of the territory at all levels. These *principle-based* (goal oriented, normative or top-down) policy combinations

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[39] COM (Commission of the European Communities) (2009), White Paper – Adapting to climate change: Towards a European framework for action. COM (2009) 147 final.
[40] ESPON 1.1.3 (2006), Enlargement of the European Union and the wider European perspective as regards its polycentric spatial structure, European Spatial Planning Observation Network (ESPON): Luxembourg. www.espon.eu.

as well as capacity-based (action oriented or bottom-up) were delineated (ESPON 1.1.3 final report 2006, Persson and Van Well 2005[41]).

Both of these types of policy combinations can address the goals of regional competitiveness and territorial cohesion, but principle-based considerations tend to be more focused on achieving regional competitiveness through market-based mechanisms and structural measures while capacity-based considerations often rely on cohesion-based policies that stress the social capacity and institutional learning. As such they mirror to some extent the "Distribution-Fairness" dimension of the policy scenarios. Principle-based policy considerations can characterise efforts to change demographic and migratory trends. Capacity-based considerations help regions to accommodate their demographic challenges.

In deciding a course of policy action it is important that policy combinations produce synergies rather than trade-offs. For instance pursuing a policy such as "flexicurity" to encourage greater labour participation and life-long learning can help overcome some of the impacts of an ageing society and gaps on the labour market. However in order to also encourage fertility, countries need to ensure that even under more flexible working forms that employees are offered adequate social welfare benefits, such as sick leave, and maternity and parental leave. Only then will young couples feel secure and optimistic enough about their current and future situations to start building or extending their families.

10.2 Policies accommodating demographic challenges in different types of regions

The DEMIFER typology in chapter 3 is based on current data (2005) and reflects the present differences in the ESPON area. They thus depict a snapshot of demographic, labour market and migratory developments in a generalised fashion. One of the values that spatial typologies provide is that they help to suggest what types of policy considerations are most applicable to a set of regions. Thus typologies help to design and prioritise policy measures to accommodate the challenges and potentials in Europe. This in turn provides the basis for intervention developments for improving European competitiveness and cohesion

10.2.1 Retaining favourable trends

The *Euro Standard* type of region has a fairly positive population development and an age structure predominantly focused on the age group 35-55 years. The total fertility rate is above the ESPON average and life expectancy is overall average. The net migration rate into the regions is largely positive, thus contributing to an overall positive population development. Low fertility is not a major problem, although ageing could be.

The *Family Potentials* type has a strong population development, with a good balance between younger and older age groups. Because of high birth rates and moderate in-migration, the share of elderly is below the ESPON average, despite the relatively high life expectancy.

The EU-LFS 2007 data patterns show that the Euro Standard and Family Potentials types have above average GDP-PPP per capita and below average GDP-PPP growth rates. The share of migrants is above average. The education level is high as is labour force participation. Unemployment is below average.

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[41] Persson, Lars Olof and Lisa Van Well (2005), Spatial processes at macro, meso and micro level during EU enlargement, in: T. Komornicki and K. Czapiewski, EUROPE XXI: New Spatial Relations in New Europe. Warsaw 2005.

These regions are doing well by both socio-economic and demographic standards. The *principle-based* goal for these regions would then be to retain the favourable trends and focus on competitive regional development and continued pursuance of the Lisbon agenda goals and "smart growth" as advocated by Europe 2020. If greater convergence within the regions is desired, cohesion oriented measures to ensure that intra-regional or urban-rural disparities do not become a problem should also be encouraged. Capacity-based measures such as building of social capital and networks within the INTERREG or LEADER programmes are examples. Particularly projects that strive towards greater social inclusion such as integrating immigrants, youth and/or women into local labour markets, would help to ensure a favourable regional development.

10.2.2 Dealing with population decline

The *Challenge of Labour Force* type of region is characterised by a rather high share of young people, but the challenge is to bring them into the labour force. Despite a large "potential" work force, this type of region is losing population, both through a negative natural population balance and through migration. A low total fertility rate exacerbates the out-migration population decline.

The *Challenge of Decline* type of regions have a negative population development, due both to low total fertility rates and negative net migration. These are some of the "shrinking" regions of Europe. The proportion of older workers (above 55 years) is significantly higher than in the rest of the ESPON space and the share of younger adults (20-39 years) is below average, thus leading to a potential problem in maintaining sufficient workforce to uphold social welfare schemes.

These types of regions are distinctive to many of the EU12 and the eastern part of Europe, as well as shrinking regions peripheral areas of Scandinavia, Southern Europe and in Germany. In general the GDP-PPP per capita is below average, and growth rates are above average. The share of migrants as well as labour force participation is also below average. In most of these regions the share of highly educated people is lower than the ESPON space average.

Many of the regions are lagging behind and population decline may be a major reason for this together with unemployment rates. The peripheral location of these regions in relation to the "Pentagon" may also be a contributing factor. These are the regions that the Territorial Agenda and the Green Paper on Territorial Cohesion specifically point out as challenged for territorial development. Policy goals for these regions will mainly be focused on retaining population and boosting natural population growth, attracting immigrants (both international and non-EU) and increasing opportunities for the labour force. Due to the territorial challenges it is important to coordinate, as the Green Paper on Territorial Cohesion recommends, various *principle-based* EU policies – transport and ICT infrastructure, energy and environmental policy in order to make the regions attractive for industrial location, improve the nearness to markets and increase regional competitiveness.

At the same time *capacity-based* measures are also needed to make the regions attractive places to live and work. Family-friendly policies such as subsidized childcare and generous parental leave (for both mothers and fathers) are expected to help increase fertility rates and keep a large share of women in their fertile years in employment and at the same time providing them with incentives to remain in the region. This is an important precondition in dealing with declining populations, but alone is not sufficient as witnessed by the Swedish and Finnish regions which fall into this category, despite the renowned social welfare systems in these countries. The targets of Europe 2020 are particularly important for these regions and many of the Europe 2020 flagship initiatives are pertinent, especially more digitalisation, energy efficiency

initiatives, support so that businesses and industries can compete globally capacity building for new skills to increase labour participation. These types of interventions can help attract migrants from within and without Europe.

10.2.3 Challenging the disparities

The *Challenge of Ageing* type regions are experiencing positive population development driven by a positive net migration rate, but the proportion of the older age groups is significantly higher than it is in the ESPON space age structure. Life expectancy is high and the share of elderly is significant. Birth rates are low, but migration, especially from non-EU countries can partly mitigate the low fertility and ageing population to some extent. Education levels are low, but so are unemployment rates (although the gender gap is the widest in Europe).

The *Young Potentials* type regions have a young age structure and positive population development due to both national population balance and positive net migration. This is partly due to the strong inflow of migrants from non-EU countries. Disparities in education are apparent in these regions as they have simultaneously a high share of people with tertiary education and a high share with only basic education. There is also a considerable gender gap in labour market participation.

These types of regions are found mainly in the Mediterranean regions, English coastal areas, in the former Cohesion country of Ireland and in some urban enclaves (such as Vienna). They constitute demographic growth regions with above average GDP-PPP per capita and average labour force participation (which does exhibit great gender and educational disparities). In the Young Potential regions the GDP-PPP growth rates are above average, but in the *Challenge of Ageing* regions they are below average. The unifying factors for these regions are strong net migration gains and population increases. The labour force in these regions is over-represented (relative to the ESPON space average) by fairly low-qualified, low-wage sectors such as agriculture, hotel and restaurants and construction (the *Challenge of Ageing* regions). Tourism is an important industry in many of these regions and attracts non-EU immigrants and young people into low-qualified, often seasonal work.

The first challenge that these regions face is orienting their economies towards more Lisbon-flavoured goals, such as the knowledge economy and innovation to create not just more, but *better* jobs in the regions. The second challenge of these types of regions is to ensure sustainable economic, social and development in light of the increasing pressure that the growing population exerts on natural and cultural resources. *Principle-based* policy options could thus be based on achieving sustainable and smart growth, as advocated by the Lisbon Agenda and Europe 2020 in developing synergies between economic growth, high quality job creation, environmental technologies and renewable energy provision – synergies that can be applied in the traditional sectors like agriculture, fishing, tourism and construction. This also meshes well with patterns of how regions in these countries already utilise 2007-2013 Cohesion Policy instruments in light of the Lisbon and Göteborg agendas (Nordregio, 2009[42]).

Capacity-based policy options in these regions would help to absorb migrant workers into the labour market and aid in their integration into society. This can be done by policy interventions at the national level to raise education levels, build capacity for learning new skills, and fight pockets of poverty and social exclusion, as Europe 2020 stresses in its flagship initiatives. Family-friendly policies are also essential in these regions to narrow the gender-gap and reduce disparities. Local and regional level projects within EU

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[42] Nordregio (2009), Evaluation of The Potential for regional Policy Instruments, 2007-2013, to contribute to the Lisbon and Göteborg objectives for growth, jobs and sustainable development. for DG Regio and available at: http://ec.europa.eu/regional_policy/sources/docgener/evaluation/rado_en.htm.

programmes such as INTERREG or LEADER can be useful in creating social networks, and learning from experience how to change attitudes, especially for excluded groups in labour market segments (integration or women or immigrants).

10.3 Policy bundles affecting changes in demographic and migratory developments

The previous section has detailed policy considerations that could be taken to accommodate or deal with changes in demographic and migratory developments. This section discusses the role of policy and policy bundles in impacting or changing demographic trends over time, as shown in the DEMIFER scenarios. The scenarios developed within the DEMIFER project show how various policy bundles can lead to different trajectories of demographic and migratory development. The basic hypothesis is that specific policies relating directly to health, family and migration incentives and barriers, as well as social and welfare policies will have significant impacts on demographic behaviour, at least in the short-term. However as the scenarios warn, it is difficult to be precise about the impacts of a set of policies on demography, as there may be other context-specific variables that intervene.

The overall framework for policy choices within the scenarios are depicted on two axes: *Economy/Environment* where the strategic choices in Europe are either based on sluggish growth that is linked to the existing resource base and current patterns of energy use, or growth that is de-coupled from the use of environmental assets, and has solved the coming energy needs in an innovative and sustainable way. The other strategic choice of policies is made by focusing on either *European competitiveness* driven largely by market forces, or *territorial cohesion* driven to a greater degree by social equity concerns. The four policy scenarios show what may be expected to happen if certain policy combinations are followed within the drivers of mortality, fertility, migration and labour markets.

10.3.1 Policy scenario implications for mortality

There is a European-wide aim to decrease mortality rates and raise life expectancy through investment in healthcare services, research into disease control and through promoting healthy lifestyles. The policy bundles considered when looking at future paths for mortality include policies that intervene with lifestyle choices, such as smoking, drinking and drug use or diet/obesity behaviour. While national regulation can have an impact on the prevalence of practices such as smoking or drinking, they also require behavioural changes to have an impact on the population. Also included in the qualitative aspects of the mortality scenarios are the nature of medical advances and the national/regional health inequalities are crucial for modelling mortality.

Scenario results for mortality for the Challenged Market Europe scenario display very large disparities between disadvantaged regions in the East and the longevity in advantaged regions in the west and north. The disparities are less pronounced in the Growing Social Europe scenario, the Limited Social Europe Scenario and somewhat in the Expanding Market Scenario. In this regard mortality rates may be more influenced by cohesion policy interventions than by market-oriented growth interventions. Yet in addition to changing trends in mortality through better healthcare etc, it is also important to be able to meet the challenges of an ageing population and this could better be achieved through a focus on cost-effective growth in the Growing Social Europe and the Expanding Market Europe scenarios.

10.3.2 Policy scenario implications for fertility

Increased fertility will help to mitigate the effects of ageing, at least in the long-run. The qualitative policy bundles considered in fertility scenarios include the degree of family vs

individually oriented goals in society, the impact of family-friendly policies such as subsidized day care or paid parental leave, but also legal regulations on assisted conception and abortion laws. The policy bundles also includes the impact of extra-European migration (especially from cultures that have a tradition of high fertility), as well as the inequalities of national/regional fertility.

According to the scenarios, fertility rates will be highest in the Expanding Market Europe scenario, even higher than in the Growing Social Europe scenario as might be expected, This is because in the Expanding Market Europe there are pockets of regions with very high total fertility rates in the Northern and Western European countries and very low fertility rates in the southern, central and eastern regions. Within the Growing Social Europe scenario these disparities narrow, making it, from a European point of view, vital to pursue family-friendly social welfare policies that boost fertility rates as seen in the Northern countries, also in other parts of Europe.

10.3.3 Policy scenario implications for migration

While internal migration is positively related to economic growth and high economic growth increases job-related mobility, there are hardly any political actions to explicitly stimulate migration to other regions within a country. The Schengen Agreement, of course facilitates inter-state mobility and some incentive schemes (Erasmus, Marie Curie), encourage the migration of young academics, but in general there are few European-wide policy actions for this. Thus the scenario bundles for migration include adjustments to relative attractiveness of each destination.

The policy scenarios show fairly little difference in internal migration (at least as calculated as destination attractiveness ratio, DAR) between the four scenarios. Also the evidence for many European countries suggests stability in the internal migration system: the same regions continue to be attractive and the same regions continue to be unattractive for decades.

International migration scenarios indicate that total migration is moderate in the Growing Social Europe and Challenged Market Europe, high in the Expanding Market Europe scenario and low in the Limited Social Europe scenario. Thus if high economic growth in certain areas of Europe is not checked by territorial cohesion policies the result may be greater movement of job seekers from lagging regions of Europe into the already affluent regions. If the goal is to retain people and workers in countries with higher emigration rates, such as the Eastern European countries, then territorial cohesion considerations, as expounded in the Territorial agenda are appropriate.

Extra-European migration will become increasingly important to help deal with the ageing population of the European space. In the Expanding Market Europe scenario extra-European immigration is expected to be very high, especially in major cities such as Madrid or Paris. This pattern is also seen, although not quite as strong in the Growing Social Europe scenario and is faintest in the Limited Social Europe scenario. While a great influx off extra-European Immigration will help many regions address demographic and labour market challenges, it will also require social policies to integrate a large group of immigrants into society as well as greater inter-state coordination in immigration policy.

10.3.4 Policy scenario implications for the labour force

The qualitative policy bundles implied in the labour force scenarios include trends in participation, the participation of young persons and older persons as well as female participation and policies and attitudes towards full time, part time and self-employment. National family policy can have a fundamental influence on the labour supply of women. For example in the Nordic countries, family and labour market policies are largely

organised to facilitate the reconciliation of employment and parental responsibilities for both parents, helping to solve the work-life balance.

A shrinking labour force will be a problem for many regions in the future, but this will affect fewer regions under the Expanding Market Europe scenario and to a slightly lesser extent the Growing Social Europe scenario more than in the other scenarios. Thus the labour market is expected to be much more vital in more regions of Europe under a general policy scenario axis where resources are used in such a sustainable and cost-efficient manner that the post-carbon economy as a whole continues to grow. It will be essential to reduce the number of inactive people on the labour market in order to mitigate the effects of ageing. Thus pursuing policies that can help implement the Lisbon agenda and the sustainable development strategy will have positive implications on labour market dynamics.

In conclusion, if policies are adopted that solve the current economic crisis, address long term climate change and resource depletion challenges (the Growing Social Europe and Expanding Market Europe scenarios), then the population of Europe will grow by nearly a fifth in the period to 2050.

10.4   In conclusion: Combining policy considerations

The growth rate of labour supply depends on both changes in the size and age structure of the working age population and the level of labour force participation rates. Thus the growth of labour supply can be raised by policies aimed at affecting changes in the size and age structure of the population and policies aimed at improving the dynamics of the labour market. The size and age structure of the population depend on the levels of fertility and - to a lesser extent – of mortality and on the size and direction of migration flows. Thus policies affecting demographic and migratory flows will have an affect on the growth of the labour force.

One of the main causes of the decline in the growth of the working age population is the low level of fertility. If policies aimed at increasing the level of fertility would lead to a decrease in the labour supply of women, for instance due to a reduction in the number of working hours per week or due to an increase in maternity and parental leave, the immediate effect on the size of the labour force would be negative. Thus policies should aim at improving facilities for women to combine having a paid job and the raising of children. However, providing facilities may not be enough since the level of fertility depends on the general economic situation as well. If young couples do not have faith in the future, for instance if the level of unemployment is high and income levels are low, they tend to have only a small number of children. Therefore policies aiming to raise the level of fertility will not be effective if the general economic situation will not improve. Moreover, disparities in the level of fertility across regions and countries will not be reduced if economic differences are persistent. Obviously policies affecting the level of fertility will have effects on the growth of the working age population in the long run only. These policies will not help in reducing labour shortages in the next two decades or so.

All across Europe life expectancy has been increasing during the last decades. In most countries, mortality rates at higher ages have been declining. To the extent that the additional years are spent in good health, this trend makes it possible to increase the statutory age of retirement. An increasing number of European governments has already decided or is considering raising the retirement age. There are sharp differences in the level of mortality across European regions. Especially in eastern parts of Europe there are regions where the level of premature deaths is very high. However, in western countries there are big differences between rich and poor regions as well. Reduction of premature mortality will have a positive impact on the size of the working age population. However, in order to have an impact on labour supply, it is not sufficient to increase life expectancy. The additional years alive should be spent in good health. One of the main

causes of differences in life expectancy and in health are life style factors, such as smoking, unhealthy diets and lack of exercise. Thus in order to reduce inequalities, policies aimed at increasing the age of retirement should be combined with policies stimulating healthy behaviour.

If migrants move from regions with high unemployment to regions with shortages in the labour market, that may help in solving labour market problems in the affluent regions. However, outflow of young migrants may cause a negative vicious circle in poor regions, as population size may shrink, the working age population may age strongly and the number of young families may drop which may cause a decline in economic growth and as a consequence unemployment may increase further which in turn may increase the outflow of young adults. Thus migration between regions may increase rather than decrease regional disparities. The same applies to migration between ESPON countries, as migrants tend to move from poor to rich countries. Thus policies aimed at increasing mobility between European regions and countries may reduce rather than increase cohesion. They tend not to result in win-win outcomes but rather in zero-sum results: gains for some regions imply losses for others. Policies aimed to stimulate migration should not be developed in isolation but can be effective only if they are part of policy bundles aimed to improve living conditions in poor regions, for example by improving the availability of jobs, housing, schools and the quality of the environment.

Migration from outside Europe may increase the size of the working age population without leading to decreases in labour supply in other European regions. Even though governments of many European countries have a restrictive immigration policy, shortages in the labour market due to ageing may lead to an increase in immigration from outside Europe. The European Commission has suggested that policies should be developed for allowing economic migration in order to meet the needs of the labour market. However, past experiences have shown that massive streams of migrants may cause social problems as the current cultural abilities to integrate migrants are inappropriate. There is a tension between preserving the national identity and developing multiculturalism. Thus immigration policies may be beneficial only if integration policies are successful. Furthermore, as migrants tend to move to economically healthy regions, regional disparities may increase, particularly as regions with a healthy economy tend to be better able to attract higher skilled migrants.

In addition to influencing the size of the working age population, policies may be aimed to accommodate demographic developments. One policy option is to take measures to raise labour force participation. Since in poor regions labour force participation rates tend to be lower than in affluent regions, raising labour force participation rates may be helpful in decreasing disparities across regions. However, increases in labour force participation will be effective only if the labour market performs well, otherwise it may lead to an increase in unemployment. In several regions labour force participation of women can be increased strongly. This requires policies to improve the compatibility of work and childcare and actions aimed at reducing gender discrimination in the area of career development. An increasing number of countries has been introducing policies to increase the retirement age. However, this will be effective only if employers are prepared to employ older employees, if the aged will remain healthy and if employees are able to attempt career changes. Thus policies to raise the statutory age of retirement are not sufficient.

Economic growth is not just determined by the volume of labour supply, but by labour productivity as well. Growth in labour productivity may be raised by technological progress and by investments in education and training. Increases in labour productivity are one main cause of improvements in living standards. To the extent that policies aimed to increase the size of the labour force would not be effective, increases in labour productivity will be needed to compensate for the effects of demographic ageing rather than to contribute to further improving living standards.

Afterword

Within DEMIFER we studied the impact of different sets of policies on population change and ageing, the relationship between migration and population redistribution as well as the relationship between population redistribution and population density. We focused on linkages of economic developments and demographic changes through the labour market and future effects of environmental changes on migration flows within, between and into European countries and regions. One of the findings of DEMIFER is that demographic trends in the next decades will be characterised by ageing and a decline of the labour force across many European regions and that, even though policies may affect these trends, no fundamental changes in these trends are likely to be achieved. Even if economic growth is high and policies are effective, until 2050 the labour force will decline in at least one third of European regions. DEMIFER cannot give simple policy recommendations addressing the demographic challenges, given the complex interrelationships between different goals of competitiveness and cohesion, and the varying effects of alternative policy options by economic and environmental developments. Nevertheless, the policy scenarios are important devices for thinking about alternative futures. They show what may be expected to happen if certain policy combinations are followed within the drivers of mortality, fertility, migration and labour markets in different economic environments. The outcomes of the scenarios provide a rich source of information on which several further questions may be answered.

At the same time, we have to give some comments on the bottlenecks of the project. One of the main obstacles in DEMIFER, as is in general the case for migration research, is data availability. Due to differences in definitions and measurement methods, cross-country comparisons of international migration patterns are difficult. For example, emigration numbers reported by sending countries tend to differ from the corresponding immigration numbers reported by receiving countries. For the scenarios of DEMIFER, we used the MIMOSA estimates[43] as these are the only available set of harmonised data on migration in Europe. Moreover, the MIMOSA estimates include a distinction by age, sex, and country of destination and origin which is needed as input for making scenarios. The demographic typology and description of current trends, on the other hand, are based on individual countries' data. In some (a minority of) cases, the two data sets lead to different results in terms of net migration. A striking example is the difference for Cyprus. According to the MIMOSA estimates net migration is negative, whereas the data from the NSI of Cyprus suggest that net migration is positive. The reason why the MIMOSA estimate differs from the statistics provided by Cyprus is that MIMOSA assumes that emigration is underestimated in Cyprus. This is shown by comparing emigration statistics from Cyprus with immigration statistics from receiving countries. For instance if we compare average emigration from Cyprus to Germany, the Netherlands or the United Kingdom in the period 2002-2007 as recorded by Cyprus with immigration from Cyprus to the respective countries as recorded in the countries concerned, we see huge differences (57 versus 276 in case of Germany, 10 versus 51 for the Netherlands and 371 versus 2533 for the UK). In all cases the emigration number from Cyprus is (much) lower than immigration number from the other countries. For that reason, the MIMOSA estimates for emigration flows from Cyprus are adjusted upwards.

Also in the case studies the quality of the data is discussed. Whereas population, birth and death data are easily comparable between regions, migration data pose a special challenge. The source and quality of interregional migration and regional international migration data vary considerably between countries. Especially international out-migration – in the case of in-migration countries, as well as in countries with

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[43] De Beer, J., J. Raymer, R. van der Erf and L. van Wissen (2010), Overcoming the problems of inconsistent international migration data: A new method applied to flows in Europe, to appear in European Journal of Population.

considerable outflows over the last years, like Romania – is measured with difficulties and is usually underestimated. Overall, the quantity and quality of statistical information varies considerably not only between, but also within countries. The case studies show that in some situations regional organisations, like for example the Greater London Authority, or trans-national ones, for example Ørestat, can provide additional statistical information. Finally, the case studies underlined the importance of geographical scale in studying demographic and migratory flows. It is well known that migration flows gain in importance for population change the smaller the areas of analysis are. For example, the London case study employing statistical information for 32 boroughs (LAU2) offers a very differentiated view compared to a study at the level of 5 NUTS3 regions.

As the problems with the comparability of international migration statistics are still not solved further research is needed to improve the harmonization of data. Even though for a detailed analysis of migration flows between regions, analyses on NUTS3 level are to be preferred over NUTS2 level, the scenarios of DEMIFER were calculated at the NUTS2 level because of a lack of sufficient data on the NUTS3 level. Thus improvement of data collection at NUTS 3 level is highly recommended.

As DEMIFER was based on registered migration data, types of migration not covered by this data source, like seasonal and illegal migration, were left aside. These types of migration, however, may have an impact on long-term migration. Seasonal migration for instance may have a downward effect on long-term migration as often seasonal migrants earn money in the host country but spend it in the home country. As Stark and Fan (2006)[44] note this may confer a higher net benefit than permanent migration. One well-known example is the large-scale seasonal migration from Poland to Germany for a maximum period of three months a year. On the other hand, the occurrence of seasonal migration may lead to an increase in long-term migration, if administrative constraints of international migration will be eliminated. This may result in increasing immigration of family members, which may lead to more long-term migration.

A central issue in the debate on migration policies is the link between legal and illegal migration (Jandl and Kraler, 2006[45]). Legal migration denotes the part of population movements which takes place in conformity with national and international rules and regulations, while 'illegal migration' denotes the part which is unauthorized, and hence, not documented in official records. An important question is whether more flexible immigration policies will lead to a decrease in illegal immigration – or, conversely, whether more strict policies will increase illegal migration. There is no simple answer to this question. For instance, increasing legal immigration opportunities for some groups of migrants may result in a decrease in illegal migration of these groups, but may not necessarily lead to a decrease in illegal migration of all groups of migrants. Furthermore, it may even lead to rising illegal migration levels if illegal migrants rely on networks of formerly migrated legal immigrants (Boswell and Straubhaar, 2004[46]). More or less the same applies to the possible effects of regularizations. At first this may decrease the number of illegal foreigners. Repeated regularizations, however, may attract more illegal migrants given the prospect of later obtaining a legal status relatively easily. In the last decades regularizations have been especially important for southern European countries (Italy, Spain, Portugal, Greece and France). An important question here is whether we can use regularization programs to estimate the size and composition of previously illegal migrants. This too, is not straightforward as many foreigners who are later regularized

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[44] Stark, O. and C. Fan (2006), The analytics of seasonal migration, Economics Letters 94, 304-312.

[45] Jandl, M. and A. Kraler (2006), Links Between Legal and Illegal Migration. In: Poulain, M., N. Perrin and A. Singleton (Eds.), THESIM Towards Harmonised European Statistics on International Migration. Presses universitaires de Louvain.

[46] Boswell, C. and T. Straubhaar (2004), "The Illegal Employment of Foreigners in Europe", in Intereconomics, January/February, pp. 4-7.

may have entered a country legally, for instance on a tourist visa or as a seasonal worker with a temporary work permit (Epstein et al., 1999[47]).

Another bottleneck of DEMIFER was the extensiveness of the topic. Although several aspects of demographic and migratory flows affecting European regions have been discussed, dealing with all issues in the field of demography, migration and regional population development would have make the project much too ambitious. Other interesting research topics related to DEMIFER are for instance the determinants of regional settlement patterns of immigrants (Could policies be devised to direct immigrant flows?), the impact of socio-economic conditions on fertility and natural population development, the interrelations between international and interregional migration flows of foreign and national populations and their contribution to regional demographic change, and the role of family structures for regional demographic change. Although within DEMIFER some speculative calculations have been made on the implications of the scenarios in terms of labour productivity, a quantitative inclusion of productivity in the labour force projections was not feasible. Adding a labour productivity module to the MULTIPOLES model can further improve the scenario framework.

Not discussed in DEMIFER but certainly related to the topic is replacement migration. Research in the past clearly showed that replacement migration is not a solution to declining and ageing populations[48]. For 27 European countries, Bijak *et al.* (2008) [49] showed that the numbers of migrants needed to counterbalance a declining labour force are extremely large for most countries. As Van Imhoff and Van Nimwegen already stated in 2000[50], it is not surprising that immigration is not a solution to ageing, as ageing is the result from declining fertility levels and rising life expectancies which are two processes that have nothing to do with migration. To cite Van Imhoff and Van Nimwegen:

> "It is a common fallacy to assume that in the coming decades the population is becoming extremely old; it is rather that the population in the past was extremely young. We should simply accept that this young age structure will not come back due to the modern mortality and childbearing patterns. If this will lead to social and/or economic problems, we should reorganize our society instead of starting to talk in panic about immigration."

Research on replacement migration at regional level will most likely lead to similar results. For some regions, with relatively high fertility rates, replacement migration might solve part of the problem, but for most regions, the numbers of replacement migrants would be unrealistic high. Moreover, what could be a solution for one region, might reinforce the problem in another, as many of "replacement migrants" would come from European regions. Nevertheless, replacement migration might be a partial measure to reduce some of the consequences of ageing in some regions in the short term. It would be interesting therefore to study whether migration policy aimed at partial substitution of ageing labour is feasible or not.

DEMIFER is not a project in isolation. It is part of the ESPON research programme and as such has several common grounds with other ESPON research projects. Most closely

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[47] Epstein, G.S., A.L. Hillmann and A. Weiss (1999), "Creating Illegal Immigrants", in Journal of Population Economics, vol. 12, n°1, pp. 3-21.

[48] United Nations (2000), Replacement Migration: Is it A Solution to Declining and Ageing Populations? United Nations Population Division, New York.

[49] Bijak J., D. Kupiszewska, M. Kupiszewski (2008), Replacement Migration Revisited: Simulations of the Effects of Selected Population and Labor Market Strategies for the Aging Europe, 2002-2052. Population Research and Policy Review, 27(3): 321-342.

[50] Van Imhoff, E., and N. van Nimwegen (2000), Migratie GEEN remedie tegen vergrijzing ('Migration NO remedy for ageing'), Demos, 16, 9–10.

DEMIFER follows project 1.1.4 'Spatial effects of demographic trends and migration'[51]. While project 1.1.4 assessed the effect of low fertility and net migration flows on population growth, DEMIFER analyses and projects more detailed migration patterns. It explicitly takes into account migration between regions within countries, between countries within the ESPON area and from and to the rest of the world. Similar to other ESPON projects, DEMIFER developed a typology of regions and examined several policy considerations using a scenario framework. In comparison to ESPON Project 1.1.4 the DEMIFER typology not only takes into account population growth, natural population change and net migration, but also the age composition of the population. The reason is that ageing is one main demographic challenge. Following ESPON Project 3.4.1 'Europe in the world'[52] DEMIFER analysed the socio-economic characteristics of the different types distinguished in the typology.

The scenario approach of DEMIFER builds on the scenarios produced in ESPON Project 3.2 'Spatial scenarios in relation to the ESDP and EU Cohesion Policy'[53]. As in project 3.2 the DEMIFER scenarios are based on the assumptions that the effects of policies on population growth and ageing depend on future economic developments and that policy makers have the choice to emphasize social solidarity or competitiveness. Contrary to project 3.2 in DEMIFER the scenarios are more explicitly connected to demographic developments by specifying alternate futures for fertility, mortality as well as intra-Europe and extra-Europe migrations at regional scale. Furthermore, DEMIFER builds in different futures for labour force participation and takes into account the impact of potential climate change on intra-European development and migration of climate change refugees from outside Europe. Finally, to assess the impact of climate change on migration within Europe, we adopted the climate change clusters defined by the ESPON CLIMATE project[54].

While DEMIFER took into account explicitly the results of previous ESPON studies and the ESPON CLIMATE project, it was more difficult to establish synergies with the ongoing projects FOCI ('Future Orientations for Cities')[55] and EDORA ('European Development Opportunities in Rural Areas')[56].

Both DEMIFER and FOCI study past and future demographic trends. Although ideally both projects would have used a detailed geographic scale (for instance NUTS3), in practice the analyses of demographic and migratory flows were hampered by limited data availability. Even though FOCI could use the Eurostat Urban Audit data base, geographically detailed analyses for both projects were only achieved in the case studies. The criteria to select the case studies, however, differ. Whereas in FOCI the case studies represent extreme examples of regions, in DEMIFER the case studies represent the average examples of the different types of regions. Also the study design differs. While in DEMIFER the case studies are based on detailed data analyses, the FOCI case studies are based on expert interviews. Moreover, the central theme of FOCI, the relation between cities and their regions, was studied in DEMIFER only in the case studies.

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[51] ESPON 2006 project 1.1.4, 'Spatial effects of demographic trends and migration'; http://www.espon.eu/main/Menu_Projects/Menu_ESPON2006Projects/Menu_ThematicProjects/demographictrends.html.

[52] ESPON 2006 project 3.4.1, 'Europe in the World'; http://www.espon.eu/main/Menu_Projects/Menu_ESPON2006Projects/Menu_CoordinatingCrossThematicProjects/europeintheworld.html.

[53] ESPON 2006 project 3.2 'Spatial scenarios in relation to the ESDP and EU Cohesion Policy'; http://www.espon.eu/main/Menu_Projects/Menu_ESPON2006Projects/Menu_CoordinatingCrossThematicProjects/scenarios.html.

[54] ESPON 2013 project CLIMATE, 'Climate Change and Territorial Effects on Regions and Local Economics in Europe'; http://www.espon.eu/main/Menu_Projects/Menu_AppliedResearch/climate.html.

[55] ESPON 2013 project FOCI, 'Future Orientations for Cities';http://www.espon.eu/main/Menu_Projects/Menu_AppliedResearch/foci.html.

[56] ESPON 2013 project EDORA, 'European Development Opportunities in Rural Areas';http://www.espon.eu/main/Menu_Projects/Menu_AppliedResearch/edora.html.

In DEMIFER favourable and less favourable economy-environment developments were combined with cohesion policies and policies focused on competition, resulting in four different scenarios. So far FOCI presented only two scenarios: "Green economy" and "Enhancing the European potential". The "Green economy" scenario with low economic growth and potential social tensions has some traits in common with the Limited Social Europe scenario in DEMIFER, whilst the "Enhancing the European potential" scenario has some traits in common with the Challenged Market Economies scenario in DEMIFER.

Given the different characteristics of DEMIFER and FOCI, the results of both projects are difficult to compare. Nevertheless some generalities and distinctions can be assessed. In most case studies of DEMIFER an obvious integration of cities and their regions was observed. A general trend towards increasing disparities in demographic terms between cities and their hinterland, as found in FOCI, could not be confirmed. In case study regions with a strong positive demographic balance, however, growth was concentrated in the municipalities and areas surrounding the major cities (small and large), confirming the FOCI results regarding urban sprawl. Furthermore, both studies reveal that international immigration is the most important factor of demographic growth in European metropolitan areas during the last decade.

The aim of EDORA is to develop a better understanding of the development opportunities and challenges of various types of rural areas in Europe. The fact that EDORA and DEMIFER have been carried out simultaneously hampered the exchange of results. If implemented first, EDORA could have provided some useful material for DEMIFER, in particular the scenario setting of change of rural areas along the axes of rapid/gradual climate change and regulated/deregulated market economy. However, as EDORA focuses on rural areas on NUTS3 level only, the direct transfer of findings between the two projects remains difficult.

Annex 1 List of Deliverables

D1   Report on effects of demographic and migratory flows on European regions
D2   Causes and impacts of migration
D3   Typology of regions
D4   Multilevel scenario model
D5   Reference scenarios
D6   Report on scenarios and a database of scenario drivers
D7   Regional population dynamics: a report assessing the effects of demographic developments on regional competitiveness and cohesion
D8   Report on climate change and migration scenario
D9   Report on policy implications
D10   Database
D11   Atlas of maps
D12   Case studies

Annex 2 Case studies synopsis

	Case Study (Main city)	Demographic type	Recent demographic trends	Socio-economic features and trends	Internal demographic and socio-economic diversity	Future prospects	DEMIFER 'policy' scenarios
1	Jihovýchod-CZ06 (Brno)	Challenge of Labour Force	Slight population growth (2004-09) due to positive natural population and especially international migration balance. Net internal migration negative. Slow population aging.	Former agriculture region with one industrial centre (Brno). Economic transition after 1990 – towards service economy. University and research and development sector in Brno.	Brno metropolitan area with significant importance. Small towns in rural areas. Demographic differentiation between metropolitan (urban) and rural areas.	Population ageing does not yet influence economic growth. Economic recession strong reduce international immigration.	Population decrease. Continuous ageing of the total and working age population.
2	Oberbayern-DE21 (München)	Euro Standard	Since 1990 population grew by 12.7%. Natural growth is low, but positive. Low fertility. Relative high life expectancy. Interregional migration flows are more important than international migration gains. In 2005 8.4% are foreign citizens: Turks 18.1% and Austrians 13.7%.	The study area combines economic growth for several decades with a very attractive landscape of lakes and mountains. Economic growth is driven by petrol refineries, advanced manufacturing (cars), services, an advanced agricultural sector and tourism. High GDP and low unemployment.	Munich, the centre of the study area and state capital, is one of the German industrial and service centres with many jobs in research and development, and attracts especially young adults. Elderly migration to the Pre-Alps and Alps. Regional disparities in TFR are low, but high in mortality.	Oberbayern is able to balance labour force shortages through migration. BBSR population projection indicates a continuation of the sub-urbanisation process around Munich.	Continuous population increase in the case of EME (+30.0% by 2050) and GSE (+25.3%), in the case of CME and LSE population increase until 2025-2030 and decline thereafter. Limited population ageing (30%).
3	Mecklenburg-Vorpommern-DE80 – North-Eastern Germany (Rostock)	Challenge of Decline	Since 1990 population declined by 13.0% due to rapid decline of fertility and a negative internal migration balance. Low fertility. Life expectancy at birth of women increased after unification, but men are relatively lagging. Net interregional migration (mostly young adults) negative and slightly positive net international migration. In 2005 only 1.2% foreign citizens.	MVP is characterised by agriculture and some industry in the coastal areas. Also some tourism. Largely rural with a population density of 72 inhabitants per km^2. As the entire former GDR, the area went through considerable economic, social and demographic upheavals and changes after the fall of the iron curtain and German unification. Unemployment is very high.	Regional disparities of economic and social change in the study area. Several smaller towns were able to attract investments and/or universities or public institutes were established. After unification the process of sub-urbanisation invested also the Eastern German Länder. Regional disparities in TFR are low, but relative high in the case of life expectancy at birth of men.	Depending on the ability of the region to attract investments. This might be possible in certain areas through the improvement of infrastructure. But most rural areas will continue to loose population through out-migration.	By 2050 the more pessimistic policy scenarios indicate a steep decline: CME (-31.3%) and LSE (-27.9%). The EME and GSE scenarios limit decline to 19.8 and 14.0%. Extreme population ageing exceeding 40% in 2050.
4	Arnsberg-DEA5 – South-eastern Ruhr agglomeration (Dortmund and Bochum)	Challenge of Decline	Over the last decades the population remained stable at 3.7 million. Low fertility. Relative low life expectancy at birth. In the first half of the 2000s interregional and international migration flows balanced each other, whereas in the second half internal losses were not any more compensated by international gains. In 2005 9.3% foreign citizens and 25% have a migratory background.	The economy of the study area is very heterogeneous: part was characterised by its coal based industrialisation and other by manufacturing. The process of economic restructuring was only partly successful and today unemployment continuous to be high. Public investment in universities and other initiatives do not manage to change the image of the region.	The North-eastern Kreise are part of the Ruhr agglomeration and have a high population density. The South-eastern part restructured successfully, whereas the South-western part is rural. Regional disparities in TFR and life expectancy at birth are low. The city of Dortmund is the only NUTS3 area with positive net migration in 2005-2007, and, as Bochum, attracting young adults.	The future depends on the outcome of the restructuring process of the economy. After traditional economic policies showed limits, investments in cultural events. Need of investment in human capital and improving educational level of population.	By 2050 the more pessimistic policy scenarios indicate a steep loss and population ageing: CME (-26.4%) and LSE (-21.4%). EME and GSE scenarios limit decline: 10.8 and 8.1%. BBSR projections are positioned close to GSE results with slightly divergent internal trends.

	Case Study (Main city)	Demogra-phic type	Recent demographic trends	Socio-economic features and trends	Internal demographic and socio-economic diversity	Future prospects	DEMIFER 'policy' scenarios
5	**Cataluña-ES51 (Barcelona)**	Young Potentials	Population growth due to highly positive international net migration. Significant contribution of immigrants to the increase in TFR and to the rejuvenation of age structure. Immigration of young foreign labour force and EU elders. Sub-urbanization in the metropolitan area of Barcelona.	One of the richest and most industrialised regions of Spain with a strong economic diversification (services, manufacturing, agriculture, tourism). Fast development from '90 until current crisis. Insertion of foreign labour in low-skilled jobs.	Central role of Barcelona and its wide metropolitan area, tourist coastal area, broad inner rural area. In the province of Barcelona high incidence of working age immigrants; in coastal provinces immigration of elderly.	Effects of the Spanish and global recession: increase of unemployment rate, particularly among young people and foreigners, decrease of international immigration. In prospect: ageing and decrease of young population.	Population growth due to international immigration: strong increase in high scenarios and moderate in low scenarios. Decrease of 20 to 34 years old labour force.
6	**Thessalia-GR14 (Larissa)**	Challenge of Decline	Population slightly decreasing. Decreasing fertility rate and accelerated ageing of the Greek natives, partly now opposed by foreign immigration. Migrants mainly settle in the bigger cities and the tourist coastal areas. Population decline in rural areas mainly in the mountains, shift to the bigger cities.	Foreign migrants accepting menial and low paying jobs, contributed to the delay in the decline of agriculture and industry and the development of tourism, construction and low-level services.	Growth of big cities in low-level services and construction, development of tourism in coastal areas, economic decline in rural areas mainly in the mountainous ones.	Decrease of international immigration, increase of unemployment rate. Uncertainty of economic future may limit strongly the permanent settlement of migrants and the related positive demographic effects.	Slight increase sustained by immigration, only in two of the policy scenarios; considerable decrease and ageing in other scenarios.
7	**Piemonte-ITC1 (Torino)**	Challenge of Ageing	Long-term ageing, in part now opposed by foreign immigration. Lowest-low fertility, now in slight increase, also because of migrants' contribution. Migrants mainly settle in Torino or other towns' outskirts.	Long (1970s-2000s) transition from Fordist manufacturing to service economy. Still important share of manual workers, comparatively low educational levels.	Torino prevails, but other towns have their own vitality. Important economic diversity per area and time-cycles.	Global recession is hitting the remaining industrial setting hard. The economic future rests on the shift to new technologies and R&D, and the fostering of local opportunities. Only the integration of significant numbers of immigrants can offset the ageing process.	Strong increase sustained by immigration in optimistic policy scenarios. Steady population in low scenarios. Important ageing in both cases.
8	**Molise-ITF2 (Campobasso)**	Challenge of Decline	Demographic stagnation and ageing. Very low fertility and very high life expectancy. Negative net internal migration. Positive net international immigration is a new experience for Molise. The incidence of foreign population is still low. Strong temporary emigration of young labour force.	Weak economy with low diversification of activities. Infrastructures are inadequate. Economic and social marginality. Important role of agriculture. Brain drain. Share of women among foreigners is high: «female way» of foreign immigration is tied to demand for care of the elderly.	Territory equally divided between mountainous and hilly areas. The more populated areas are the two provincial capitals and the coastal area. Numerous small and very small rural towns	Persistent population decline and ageing. Continuous decrease of young population. Foreign immigration could delay this trend.	Strong population decrease (low scenarios) or stagnation (high scenarios). Particularly severe decline in the working-age population under 45 years of age. Important population ageing.

	Case Study (Main city)	Demographic type	Recent demographic trends	Socio-economic features and trends	Internal demographic and socio-economic diversity	Future prospects	DEMIFER 'policy' scenarios
9	**Nord-Est-RO21 and Sud-Est-RO22 – Macroregion2 of Romania (Iaşi and Constanţa)**	Challenge of Labour Force	Population decrease and ageing. High infant mortality rate mainly in the rural area. Internal migration reversed from rural-urban to urban-rural. Emigration is mainly temporary work motivated migration, especially to Italy and Spain. After Romania joining the EU immigration becoming important for Nord-Est region (Republic of Moldova).	4 of the most populous 10 Romanian cities. Nord-Est region has the lowest level of GDP per capita in Romania and the EU. Unemployment is high. Major economic activities are wood processing and tourism in the mountain area. Sud-Est region has economic potential in tourism and agriculture (often limited to subsistence agriculture).	Nord-Est is facing economic difficulties (over 50% rural), while Sud-Est has a more balanced economic structure. Black Sea and Danube river allow port activities and tourism. 4 economic free zones exist in the Sud-Est region offering customs and commercial facilities.	Emigration will create a labour force shortage, e.g. as today in Sud-Est region in naval construction and building industries. Ageing is observed since 2005 when less numerous generations, born after 1990, entered the working age population.	The population is declining especially due to the negative natural growth, rather than population loss due to migration. Migration will decrease continuously until 2050. The old dependency ratio and of the economic old age dependency will increase.
10	**Sydsverige-SE04 with reference to Hovedstaden-DK01 and Sjælland-DK02 (Malmö, Lund and København)**	Euro Standard (Sydsverige)	Fast increasing population, especially in Skåne län, driven by international net migration coming partly from the Danish regions in the Öresund, partly from third countries. Important internal moves. Natural change higher in immigration areas. Ageing higher in peripheral or less developed areas.	The traditionally agriculturally rich study area has passed through industrialisation and developed important points of excellence in the knowledge economy, in food sciences and in biotechnologies. The opening of the Öresund Link between the to shores of the Sund encouraged Danes to settle in Skåne län.	Important demographic and socio-economic differences between Skåne län and Blakinge län, as well as within Skåne län; Danish immigration to Great Malmö and Southeastern shore of the Sund; immigrants from non-EU countries to Malmö and Karlskrona.	Future developments are depending on increasing integration of economy, taxation, welfare and migration policy in the cross-border Öresund area. Possible ethnic conflicts and social problems in overcrowded areas in recession times.	The population in the Öresund area is expected to increase in all the policy scenarios by 2050: 14% in the low ones and 30 to 40% in the highs. The future growth in population of Sydsverige would be only challenged in the case of no migration.
11	**West Yorkshire-UKE4 (Bradford and Leeds)**	Family Potentials	Since 2001 the population of West Yorkshire grew by 6% reaching 2.2 million in 2008. About half of this increase was due to natural growth, mainly fertility. Net migration has two contrasting components: negative internal migration, overcompensated by international migration gains.	West Yorkshire is an important commercial hub serving Northern England. West Yorkshire was characterised by textile manufacturing, metal works and coal mining, all declining in the 20th century. The economic restructuring of the area was only partly successful. The area is suffering the highest UK unemployment rates.	Leeds and Bradford provide two very contrasting sub-areas within West Yorkshire. Whereas the city centre redevelopment in Leeds succeeded. Leeds is today a financial and retail centre, and home to other service industries and a well-known university. Bradford has one of the largest concentrations of minority ethnic populations in the country.	West Yorkshire has a huge attraction for students in higher education. Its future will depend on the capacity of the region to retain this population. International migration flows and their ethnic composition will play a further role.	All DEMIFER scenarios indicate a growing population. In the EME and GSE scenarios West Yorkshire could surpass the 3.5 million inhabitants mark in 2050. This growth would be fuelled largely by a consistent natural increase.
12	**London-UKI, UKI1 and UKI2**	Family Potentials - World cities	Since 2001 the population of Inner and Outer London has increased considerably. Whereas the natural balance is positive, net internal migration remains negative for Inner and Outer London. The later trend is in contrast to the net gains from international migration. However, in 2008 these gains are not any longer offsetting losses from internal migration. 1/3 of residents born outside the UK.	London is a global economic hub and a magnet for international tourism, business and migration. It represents about 21% of the country's GVA and is the engine of economic development for the UK.has a sound economic base. The organisation of the Summer Olympics in 2012 will draw investments in a specific deprived area of the city.	Demographic and migratory indices vary considerably. Fertility is low in Inner-London West, an area of immigration of young professionals. Mortality is high in Inner London boroughs and low in the affluent areas. Through migration most Inner London boroughs lose population to Outer London (in turn loosing to the rest of the UK). International migration gains vary greatly. Ethnically diversity.	Future demographic change in London depends on the ability to recover migration flows that diminished over the last two years due to the economic crisis. The functioning of the economic and demographic system of London depends on the successful integration of immigrants.	The alterative scenarios foresee a challenging picture of growth, regardless of the degree of competitiveness or cohesiveness. The EME and GSE scenarios suggest 14 million inhabitants in London in 2050, a significant growth in an already overcrowded metropolitan area.

Note: the scenarios are abbreviated EME – 'Expanding Market Europe', CME – 'Challenged market Europe', LSE – 'Limited Social Europe', GSE – 'Growing Social Europe'

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