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Deliverable 6

Report on scenarios and a database of scenario drivers

Prepared by
Phil Rees, Peter Boden, Adam Dennett, John Stillwell, Martyna Jasinska
School of Geography, University of Leeds

Andries de Jong, Mark ter Veer
Netherlands Environmental Assessment Agency

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ABSTRACT

This report presents the results of research into alternative demographic futures for Europe. Our basic hypothesis is that a number of policies relating directly to health, to families and to migration incentives and barriers, along with more general social policies linked to the degree of adoption of the welfare state and economic policies that affect regional economies, taken together, will have significant impacts on demographic behaviour. 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 between regions within countries 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 involving the impact of policies but these are both time and place specific. Nevertheless, it is useful to put in place thought experiments that reveal the choices that European societies face. What we do in this report is to explore the determinants of change for the demographic components, relate those determinants to policies and bundle together policies (or the strength of those policies) in *scenarios*. Scenarios are, in effect, coalitions of policies affecting different demographic components in similar ways. We propose four scenarios (linked policy bundles-demographic effects) using two axes of policy variation: a 'Distribution-Fairness 'dichotomous axis and an 'Economy-Environment' dichotomous axis. Crossing these two axes produces four Policy Scenarios, which we call *Growing Social Europe (GSE)*, *Expanding Market Europe (EME)*, *Limited Social Europe (LSE)* and *Challenged Market Europe (CME)*.

We then develop models of likely change in the key drivers of each demographic component and vary the parameters in each of those models. The models have a variable that drives change across Europe or the member states and a distribution function that translates change to the regional scale. For example, in the Mortality Policy Scenario, we use the average annual percentage changes in age-specific mortality rates for Europe measured in 2001-2006 as the overall drivers (-2.8% for men, -2.6% for women), which result in life expectancy increasing from 76 (men) and 82 (women) in 2005-10 to 89 (men) and 92 (women) by 2045-50. In the GSE and EME Scenarios we assume higher percentage changes and in the LSE and CME Scenarios we assume lower percentage changes. The regional death rates are modelled using scenarios for regional Standardized Mortality Ratios (SMRs) (using Europe as a standard): in the GSE and LSE Scenarios, we assume convergence in regional SMRs and in the EME and CME Scenarios we assume divergence. The impact of the Mortality Policy

Scenarios on regional *competitiveness* is to decrease it because the improvements in mortality increase the old age dependency ratio, assuming no other changes in the social and economic system. The 'Social scenarios' (GSE, LSE) increase regional *cohesion* by reducing the spread of mortality experiences across regions, while the 'Market scenarios' decrease regional cohesion because the variation across regions in mortality experience increases. However, much larger than these regional changes in cohesion is the convergence of the mortality experience of men and women with the gap in life expectancy at birth for Europe shrinking from 6 years now to 3 years by mid-century.

We develop equivalent models for the other components of demographic change. So, for *Fertility*, we use changes in the Total Fertility Rate (TFR) tailored to each scenario and the range of TFR within countries to reflect convergence or divergence in regional fertility. For *Internal Migration* within the 23 countries that contain two or more NUTS2 regions, we assume no trend in the level of internal migration because the historical series (2001-2006) suggests no overall trend but rather fluctuations in response to economic conditions. We use Destination Attractiveness Ratios (DARs) to alter the direction of out-migration. For the GSE and LSE Scenarios, the range of DARs is shrunk; for the EME and CME Scenarios, it is expanded. A similar method was used to model *Inter-Country Migration* within the ESPON space. Trends in DARs are adopted which depend on the scenarios. The *Extra-Europe Migration* is governed by assumptions about the total level of immigration to Europe, which is then distributed to countries and regions using the current distribution patterns. Each of the scenarios has a different level assumption: 3.5 million per year for the GSE Scenario, 4.5 for the EME Scenario, 1.5 for the LSE Scenario and 2.5 for the CME Scenario. The hypothesis is that Europe's success in solving the economic and environmental challenges will raise or lower the number of immigrants attracted but that the attractiveness will be modified by the degree of emphasis on social welfare or market demand for labour. Emigration rates are held constant and so emigration responds to the rate of growth of the population.

The body of the report discusses the assumptions and methods used in building the component inputs to the DEMIFER Policy Scenario projections (reported on under Deliverable D7). We provide also a rich mix of graph and map illustrations of selected input variables by scenario. The full set of variables are contained the DEMIFER cenario Databases.

1. THE DESIGN OF POLICY SCENARIOS OF DEMOGRAPHIC DEVELOPMENT

1.1 The nature of scenarios

Scenarios are intellectual devices for thinking about alternative futures. They are hardly ever used as predictions of likely futures because there are so many uncertainties involved in their construction. However, they are now widely employed by governments – international, national and local – and by firms to help in planning for the future. One of the most influential of current scenario-based reports is that of the International Panel on Climate Change (IPCC, 2007). This fourth assessment of our climatic future sets out a number of scenarios for climate change dependent on input assumptions, model structure and mitigation strategies adopted. These scenarios have been used by governments to motivate programmes of investment, taxation and regulation to slow down and reduce the emission of carbon dioxide, one of the most important green house gases, which lead to global warming. The need for such mitigation policies rests on the claim, firmly rooted in evidence, that the principal driver of rising global carbon dioxide concentration in the atmosphere is human activity. Industrial, agricultural and domestic sectors emit carbon dioxide as a result of burning hydrocarbons (coal, oil, natural gas and wood). The international review work of the IPCC has led to a growing number of national reports on the consequences of global warming – its economic, social and environmental effects. These issues are discussed in Deliverable D8.

How do the scenarios we have developed in this project fit into this framework?

(1) They also are not predictions of the future but the working out of alternative futures, predicated on sets of assumptions.

(2) The scenarios are narrow in that we concentrate attention only on the demographic sector of European human activity but we assess, qualitatively, the impact of different policy bundles on demographic behaviour.

(3) The immediate drivers of the future population are the demographic components of *mortality*, *fertility* and *migration* at European, national and regional scales (NUTS2) across Europe. Migration occurs at three linked scales. The first scale is inter-regional migration within each country which we term *internal migration*. The second scale is migration between states with Europe, which we term *inter-country migration*. The third scale is migration between the countries of Europe and the countries of the rest of the world, which we refer to as *extra Europe migration*.

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We have called our alternative futures *Policy Scenarios* because we see a moderate connection between national and international policies in the economic, social and regional domains on the one hand and the direction of demographic trends on the other.

1.2 Policy scenarios for Europe

We begin the scenario preparation by defining a framework for classifying policy making in Europe. This context consists of two dimensions which are part of informed political and intellectual debate throughout Europe, as well as the rest of the world. These dimensions we call 'Economy-Environment' and 'Distribution-Fairness'. Each dimension is represented in Figure 1-1 by a dichotomy.

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	

Figure 1-1: The four DEMIFER scenarios based on the dimensions "economy-environment" and "distribution-fairness"

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 moderate. Progressive taxation of income is adopted and tax loopholes and offshore havens are shrunk. 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 the overall welfare of all (Wilkinson and Pickett, 2009). On the right hand side of the Distribution-Fairness dimension, we imagine sets of policies designed to improve the operation of markets and the achievement of greater competitiveness in a global market place. Taxation is less progressive than under the Social Europe scenarios and favours enterprise and business. Under Market Europe scenarios higher incomes are achieved but at the expense of greater inequality and higher risks of economic fluctuations. We combine the two dimensions to form a graph with four quadrants (Figure 1-1). Each quadrant is described using the dimension dichotomies and also given a general label for easy recognition. The four scenarios we propose for the DEMIFER analysis are: 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, the mortality, fertility, migration and labour force drivers that will be input to the MULTIPOLES projection model. We combine the impact of these policies with current trends to produce trajectories of key driver variables (e.g. the rate of improvement of mortality intensities). For example, fairly relaxed policies about extra-European immigration might be adopted under the EME scenario because business demands the labour needed to run the economy, while under the LSE scenario concern about 'over-population' results in more restrictions. Under the GSE scenario, policies will focus on effecting convergence at regional level within member states in well-being, while under CME, divergence in the standards of living of regional populations might occur.

To the four policy scenarios we have added additional scenarios as comparators: Reference Scenario 1, Status Quo (STQ) is a scenario in which input rates and flows are held constant over time; a Reference Scenario 2, NIM is a scenario in which no migration is allowed (i.e. natural change only) and a Reference Scenario 3, NEM, allows no extra-Europe migration. A Climate Change and Migration Scenario is also being prepared. The Reference scenarios are discussed in Deliverable D5 and the Climate Change and Migration Scenario in Deliverable D8. In that report, we use the LSE scenario extended to 2100 to match the forecasting horizon of our selected Climate Change scenario.

1.3 Outline of the report

Scenarios for the different demographic components are described in the chapters of the report as follows. Chapter 2 describes the outcomes of an *online survey* of experts who are part of the ESPON

network. The survey asked them about the nature of policies in their countries that affect demographic developments. The results of the survey inform our design of the scenarios for each component. Chapter 3 describes the *Mortality Scenarios* which were developed by the Leeds team with inputs from the CEFMR team. Chapter 4 describes the *Fertility Scenarios* produced by the NEAA team. Chapter 5 covers the *Internal Migration Scenarios* for inter-regional migration, developed by the Leeds team, within 23 out of the 31 ESPON countries. Chapter 6 outlines the *Inter-country Migration Scenarios* which were created by the NEAA and NIDI teams. Chapter 7 discusses the *Extra-Europe Migration Scenarios* developed by the NEAA team. Chapter 8 gives an account of the Labour Force Participation Scenarios, developed by the NEAA and CEFMR teams. Chapter 9 provides a short description of the *DEMIFER Policy Scenario databases*, designed to help other researchers exploit the rich resources of information they hold. Chapter 10 summarises the results of the scenario development and relates them back to the policy drivers outlined above.

1.4 Linking policies to trends for scenarios and consequences for ageing and the labour force

How do we move from the scenarios to trends and policies that affect the future path of the demographic drivers? Here we develop a framework in four tables that will enable us to make progress on this front. Table 1-1 gathers together the components input to a model for projecting the population and labour force. The table sets out what inputs are needed to power the MULTIPOLES projection model and what drivers we use in developing the scenarios. Table 1-2 outlines trends and policies specific to each demographic component and scenario. Table 1-3 translates the trends and policies into specific numbers for the demographic inputs to the MULTIPOLES projection model. What the scenario analysis does is to deliver to the population projection files containing the input variables for each European state and NUTS2 region. The information set out in Table 1-3 has been implemented for each region for each scenario for 2005 to 2050 for five-year intervals. To implement the policy scenarios for mortality we introduce the general method shown in Figure 1-2. Table 1-4 links policies to trends in demographic components and suggests the consequences for the challenges of future ageing and of a shrinking labour force.

Table 1-1: Component inputs to the projection model and drivers for the scenarios

Component	Input to MULTIPOLES	Scenario drivers
Mortality	Age-specific death rates (ASDRs) for each ESPON region and projection multipliers	Assumed rates of decline in ASDRs, specific to each scenario and varying by cluster, with regional convergence or divergence
Fertility	Total fertility rates for each ESPON region (distribution of age specific fertility rates, ASFRs, assumed constant) and projection multipliers	Assumed changes in TFRs, specific to each scenario and varying by cluster with regional convergence and divergence
Inter-regional migration (within countries)	Out-migration rates from origin regions to destination regions for each ESPON country with more than one region and projection multipliers	Assumed changes in the level of inter-regional migration specific to each scenario and varying by cluster or country (to be determined) with regional convergence or divergence in destination attractiveness
Inter-country migration (within Europe)	Out-migration rates from origin countries to destination countries for ESPON countries and projection multipliers	Assumed changes in the level of inter-country migration specific to each scenario with convergence or divergence by country of destination
Immigration (from the Rest of the World outside Europe)	Total immigration flows to each ESPON country from the Rest of the World Outside Europe and projection multipliers	Assumed levels of migration specific to each scenario with convergence or divergence by country of destination
Emigration (to the Rest of the World outside Europe)	Total emigration rates from each ESPON country from the Rest of the World Outside Europe and projection multipliers	Assumed levels of migration specific to each scenario with convergence or divergence by country of origin
Labour Force Participation	Age Specific Participation Rates (ASPRs) specific to each ESPON region and projection multipliers	Assumed directions of change specific to each scenario with convergence or divergence by region

Note: For computational convenience rates and flows are input for the base period (either 2003-2006 or 2005-10) and then time series multipliers are input for the projection periods 2005-10 to 2045-2050. In the MULTIPOLES program the rates or flows for the projection period are computed by multiplying the base period values by the multipliers.

Table 1-2: Linkage of scenarios to demographic components via trends and policies

Demographic component	Trend or Policy	GSE	EME	LSE	CME
MORTALITY	Lifestyle: Smoking	Prevalence falls	Trend continues	Prevalence falls	Trend continues
	Lifestyle: Diet/Obesity	No epidemic	No epidemic	Epidemic	Epidemic
	Lifestyle: Drinking	Prevalence falls	Trend continues	Prevalence falls	Trend continues
	Medical advances	Continue	Continue	Slow	Slow
	National Health Inequalities	Reduced	Persistent	Reduced	Persistent
	Regional Health Inequalities	Reduced	Persistent	Reduced	Persistent
FERTILITY	Family versus Individual Goals	Family goals	Individual goals	Family goals	Individual goals
	Family Friendly Policies	Strong	Weak	Strong	Weak
	Assisted Conception	Socially supported	Privately supported	Socially supported	Privately supported
	Abortion Law	Permissive	Restrictive	Permissive	Restrictive
	Extra-Europe Effect	High effect	Low effect	Low effect	Low
	National Fertility Inequalities	Reduced	Persistent	Reduced	Persistent
	Regional Fertility Inequalities	Reduced	Persistent	Reduced	Persistent
INTER-REGION MIGRATION	Total Level of Inter-Region Migration	High	Moderate level	Moderate level	Low level
	Origins: Inter-region Out-Migration	Stable	Divergent	Convergent	Divergent
	Destinations: Inter-region In-Migration	Stable	Divergent	Convergent	Divergent
	Explicit Inter-region Migration Policy	None	None	None	None
INTER-STATE MIGRATION	Total Level of Inter-State Migration	High	Moderate	Moderate	Low
	Origins: Inter-State Out-Migration	Stable	Divergent	Convergent	Divergent
	Destinations: Inter-State In-Migrations	Stable	Divergent	Convergent	Divergent
	Explicit Inter-State Migration Policy	Some restrictions	Free migration	Some restrictions	Free migration
EXTRA-EUROPE MIGRATION	Total Level of Extra-Europe Migration	High	Moderate	Moderate level	Low level
	Origins: Emigrations	Stable origins	Divergent origins	Stable origins	Divergent
	Destinations: Immigrations	Stable destinations	Divergent destinations	Stable destinations	Divergent
	Explicit Extra-Europe Migration Policy	Free entry	Selective entry	Moderate entry	Restricted entry
LABOUR FORCE PARTICIPATION	Trends in Participation	Increasing	Increasing	Decreasing	Decreasing
	Pension and Older Worker Policies	Favourable	Stressful	Favourable	Stressful
	Female Participation Policies	Friendly policies	Unfriendly policies	Friendly policies	Unfriendly policies
	FT/PT/Self Employed Policies	High participation	High participation	Moderate participation	Low participation

Table 1-3: Linkage of scenarios to demographic components: outcomes in levels and distributions (indicative trends and parameters)

Demographic component	Trend or Policy	GROWING SOCIAL EUROPE	EXPANDING MARKET EUROPE	LIMITED SOCIAL EUROPE	CHALLENGED MARKET EUROPE
MORTALITY	Lifestyle: Smoking	Mortality decrease	Mortality stable	Mortality decrease	Mortality stable
	Lifestyle: Diet/Obesity (mortality change)	Mortality increase	Strong mortality increase	Mortality increase	Strong mortality increase
	Lifestyle: Drinking	Mortality stable	Mortality increase	Mortality stable	Mortality increase
	Medical advances (mortality rate change)	Decrease by 2% pa	Decrease by 1.5% pa	Decrease by 1.0% pa	Decrease by 0.5% pa
	National Health Inequalities	Strong convergence	Strong divergence	Convergence	Divergence
	Regional Health Inequalities	Strong convergence	Strong divergence	Convergence	Divergence
FERTILITY	Family versus Individual Goals	Target TFR +0.2	Target TFR +0.1	Target TFR +0.1	Target TFR - 0.2
	Family Friendly Policies	Target TFR +0.2	Target TFR +0.0	Target TFR +0.1	Target TFR +0.0
	Assisted Conception	Target TFR +0.2	Target TFR +0.1	Target TFR +0.1	Target TFR +0.0
	Abortion Law	Target TFR +0.0	Target TFR +0.2	Target TFR +0.0	Target TFR +0.0
	Extra-Europe Effect	Target TFR +0.2	Target TFR +0.0	Target TFR +0.0	Target TFR +0.0
	National Fertility Inequalities	Convergence	Divergence	Convergence	Divergence
	Regional Fertility Inequalities	Convergence	Divergence	Convergence	Divergence
INTER-REGION MIGRATION	Total Level of Inter-Region Migration	Set levels to 2050	Set levels to 2050	Set levels to 2050	Set levels to 2050
	Origins: Inter-region Out-Migration	Set origin attraction	Set origin attraction	Set origin attraction	Set origin attraction
	Destinations: Inter-region In-Migration	Set destination. Attraction	Set destination attraction	Set destination attraction	Set destination attraction
	Explicit Inter-region Migration Policy	No explicit policy	No explicit policy	No explicit policy	No explicit policy
INTER-STATE MIGRATION	Total Level of Inter-State Migration	Set levels to 2050	Set levels to 2050	Set levels to 2050	Set levels to 2050
	Origins: Inter-State Out-Migration	Set origin attraction	Set origin attraction	Set origin attraction	Set origin attraction
	Destinations: Inter-State In-Migrations	Set destination attraction	Set destination attraction	Set destination attraction	Set destination attraction
	Explicit Inter-State Migration Policy	EU policy	EU policy	Some national policy	Some national policy
EXTRA-EUROPE MIGRATION	Total Level of Extra-Europe Migration	Set levels to 2050	Set levels to 2050	Set levels to 2050	Set levels to 2050
	Origins: Emigrations	Set origin attraction	Set origin attraction	Set origin attraction	Set origin attraction
	Destinations: Immigrations	Set destination attraction	Set destination attraction	Set destination attraction	Set destination attraction
	Explicit Extra-Europe Migration Policy	Permissive policy	Permissive policy	Restrictive policy	Restrictive policy
LABOUR FORCE PARTICIPATION	Trends in Participation	Raise rates	Raise rates	Lower rates	Lower rates
	Pension & Older Worker Policies	Raise rates	Lower rates	Lower rates	Lower rates
	Female Participation Policies	Raise rates	Lower rates	Raise rates	Lower rates
	FT/PT/Self Employed Policies	Raise rates	Raise rates	Lower rates	Lower rates

Table 1-4: The influence of policy on the demographic components and the consequences for ageing and changes in the labour force

COMPONENT	POLICIES			CONSEQUENCES FOR		
	Goals	Impact	Examples	Ageing	Labour Force	Regional inequalities
Fertility	To raise fertility towards replacement	Low	Family friendly policies (child benefits)	Reduces ageing but in the long run	Takes 20-25 years before labour supply rises	Neutral
Mortality	To lower mortality	High	Better health care, better access to all, less smoking, drinking, eating	Speeds and raises the process. See Policy scenarios	Should make young elderly healthier and so more available for working	Inequalities will rise as innovations are first adopted in richer regions
Internal migration	To remove barriers to mobility	Low	Little specific, responds to socio-economic developments	"Winners" and "losers" dependent on selective migration around retirement ages	Shifts workers to where they will be most productive but causes problems in losing regions	Regions of net in-migration become richer because of increased labour supply
Inter-country migration	To remove barriers to mobility	Moderate	Schengen Agreement, Some incentive schemes (Erasmus, Marie Curie), some temporary controls	"Winners" and "losers" dependent on selective migration at younger ages	Shifts workers to where they will be most productive but causes problems in losing countries	Regions of net in-migration become richer because of increased labour supply
Extra-Europe migration	To balance labour market demands and the need for community harmony	High	National and EU policies to select quality migrants, to restrict numbers, but many flows cannot be limited	Slows but does not stop the ageing process in immigrant "target" regions	Adds to labour force in "target" regions; subtracts from labour force in regions of emigration	Regions of net in-migration become richer because of increased labour supply
Labour Force Participation	To increase participation of the inactive (women, disabled, unemployed and elders)	Moderate but must shift to high	Reducing eligibility for benefits (e.g. pensions, disability), changing the tax system to encourage working	Should shrink the numbers of inactive old people. Vital to mitigate the effects of ageing.	Increases the labour force and hence the GDP. Needs older worker re-skilling	Richer regions are able to do increase labour force participation faster

We illustrate the way in which policies are connected to demographic drivers with some selected illustrations. We begin with examples of *policies affecting fertility*. Provision of financial support for families with children, of generous maternity leave arrangements and of pre-school and after scholl services to care for children while allowing mothers to work in countries such as France, Sweden and the United Kingdom have raised fertility by about half a child compared with countries such as Italy

and Spain (Kohler et al. 2006), where leaving home and marriage is postponed and hence fewer children are raised. Policies on international migration will have indirect effects on fertility: for example, in the UK half of the rise in the UK total fertility rate in 2001-2009 by one third of a child can be ascribed to a rising proportion of foreign born women (Tromans et al. 2009).

Policies affecting mortality are in place in all countries in ESPON space and their impact has a regional dimension. All European governments aim to decrease mortality rates and raise life expectancy through investment in health care services, research into disease control and through promoting healthy lifestyles. These policies have been remarkably successful over the past two decades, lowering age specific mortality rates by an average of 2.7% per annum. For example, in the UK the budget for the National Health Service is distributed using a formula that recognizes age-related met need and overty-related unmet need. Research has delivered new treatments for cardiovascular disease based on the statin drug class, which have reduced the incidence of cardio-vascular deaths. Public policy to persuade people not to smoke has halved the smoking prevalence rate since the 1960s with consequential lowering of lung cancer and heart disease deaths. European countries compete to achieve the best outcomes in health through continual comparison. In Europe all countries and most regions experience improving life expectancy even though socio-economic inequalities may mean persistence of differences across countries and regions. This recent history contrasts strongly with that of the United States where the life expectancies of the poorest populations and areas are falling, despite internationally high levels of health care expenditure (Ezzati *et al.* 2008)/ This contrast is a strong argument for the European social model rather than market delivered health care.

The influence of *policy on migration* depends on the spatial scale over which it operates. Migration between regions within countries is rarely influenced by policy directly because neither controls on migration nor direct incentives operate, so that it is only indirectly through policies on the social and economic development of regions that migration is affected.

Within ESPON space (EU, EEA plus Switzerland) freedom of labour migration is guaranteed under a succession of European Treaties. 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). These developments made inter-state migration within the expanding European space easier and easier over time. 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 programmes of

successive European Research Frameworks provide funding for inter-country mobility of researchers, including postgraduate students, postdoctoral researchers and established research workers. The migration of non-workers is allowed but is only feasible if they are able to port origin country benefits to a destination country. An example is the transfer of the pensions of northern country retirees to their southern country retirement locations. The labour recruitment agreements of the 1950s and 1960s have largely expired. However, there are incentive schemes for researchers (Marie Curie programmes).

Policy affects immigration from outside Europe most directly. National policy is still important in this area and sometimes conflicts with European policy and laws. Immigration is controlled by a system of visas linked to the purpose of migration. Control is influenced by changing eligibility conditions for visas or through imposing delays which stretch out the immigration process. "Points based systems" have been introduced which score applications for immigration which are based on the qualifications, skills and experience of the applicant and the match to current labour market requirements. However, control is only partial because many immigrants are returning citizens or family members of citizens who have a right to enter. There is also a continuing stream of asylum applications although the majority of these are disguised economic migrants. However, such is the delay in processing applications that there will always be a population of migrants waiting on the result of their application or associated appeals.

In Table 1-4 we include a column that identifies the potential for a policy to affect population ageing. Policies designed to increase fertility will, if successful, have an effect on ageing as the new higher birth cohorts age. In 15-25 years after the boost to births there will be an increase in young entrants to the labour force ages and so a contribution to reducing the rate of increase in old age dependency ratios. Policies designed to lower mortality will on the other hand increase the degree of ageing as more people from successive cohorts will survive to old age. Each of our policy scenarios assumes continued improvement in survival to old age and much more ageing therefore occurs in our policy scenarios than in the status quo scenario. However, if health policies also ensure that older people remain healthy or only have mild disability, then they will be able to work for longer, well beyond current retirement ages, currently in the younger sixties.
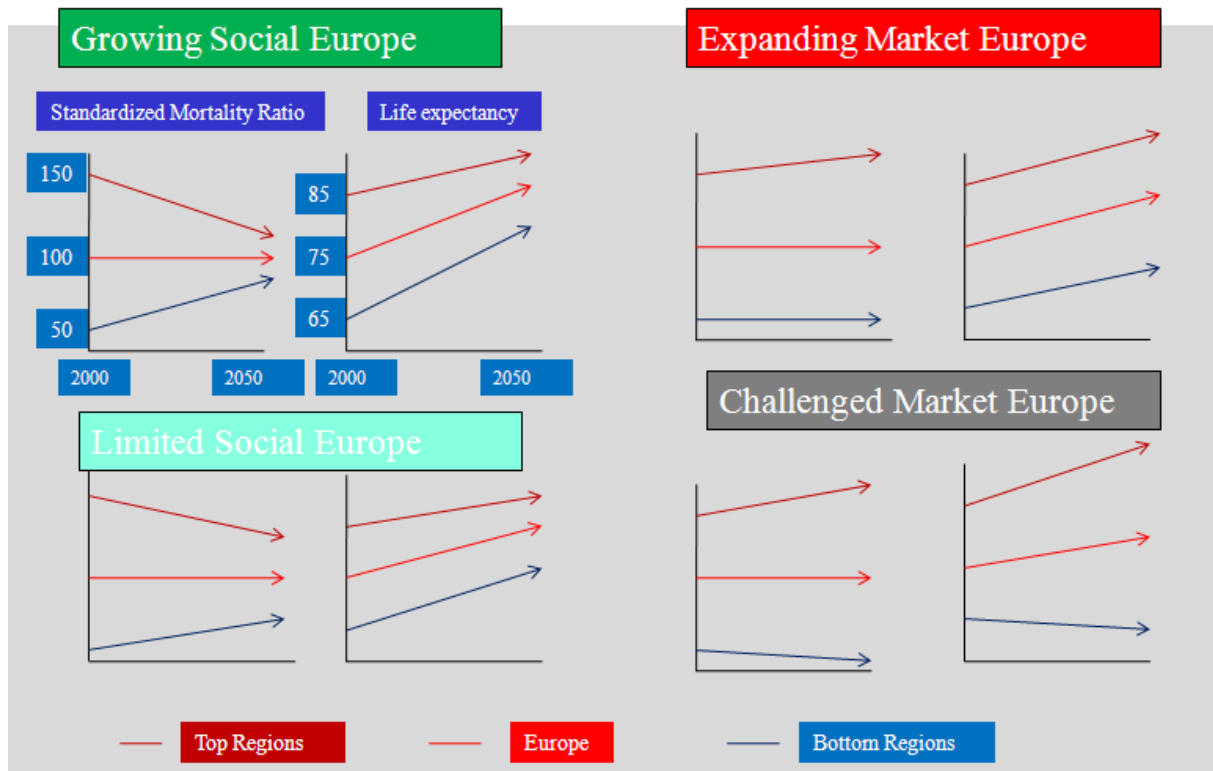
Figure 1-2: How demographic scenarios were designed for mortality

2. CONSULTATION ON AND VALIDATION OF THE SCENARIOS

2.1 Introduction

In order to validate the contents of the four policy scenarios, an online expert questionnaire has been designed. The results of this survey have been used to formulate assumptions on the kind of policies and their effectiveness to be associated with each scenario. The questionnaire was based on a demographic expert group questionnaire developed by IIASA (Prommer and Wilson, 2006) as part of the European Framework 6 MicMac project (NIDI, 2009) and adapted for use by the UK's Office for National Statistics (ONS, 2009; Shaw, 2008).

Participants of the ESPON open conference held at Prague in 2009 were invited to complete this web-based questionnaire. The primary aim of the questionnaire was to gather information on the degree to which the countries belonging to the ESPON space tried to influence the drivers on demographic components and labour force participation and to what extent that policy was successful. The specified drivers in future trends in European regions refer to demographic, social, economic and environmental factors. In the compilation of the demographic future of Europe, it is assumed that a different mix of policies on the specified drivers in combination with different degrees of effectiveness will lead to four alternate scenarios.

For each of the specified demographic components (fertility, mortality, internal and external migration) and also the labour force participation), the DEMIFER Transnational Project Group (TPG) has compiled a list of relevant drivers. In order to validate this list, the respondents of the questionnaire were invited to give their opinion on to what extent policy makers in their country tried to influence the specified drivers. Next they could state, in their opinion, how effective this policy was. Finally, in an open question, the experts could indicate how policy might change in the future (with respect to the specified demographic components).

2.2 Response and background of the respondents

During the ESPON seminar in Prague in 2009 only a small number of respondents found time to fill in the questionnaire. However, after a reminder mail by Peter Mehlbye, Head of the ESPON Co-ordination Unit, the response improved to 61 completed questionnaires. The TPG of DEMIFER thanks Peter Mehlbye for his successful intervention.

The level of expertise of the respondents on demographic issues was quite high (Figure 2-1). The majority of the respondents had some or much experience in the field of demography (about one quarter had more than 10 years' experience), although about one quarter had no experience at all. Planners, researchers and geographers made up nearly half the respondents (Figure 2-2). A large

majority of the respondents worked for the Government (Figure 2-3). With respect to the degree of experience in the field of public policy or public administration, it turned out that about half of the respondents had been working for over 10 years in this field. All these background characteristics suggest that the respondents were very capable of assessing the degree of policy relating to the specified drivers and their effectiveness.

Figure 2-2: Professions of the respondents to the online consultation
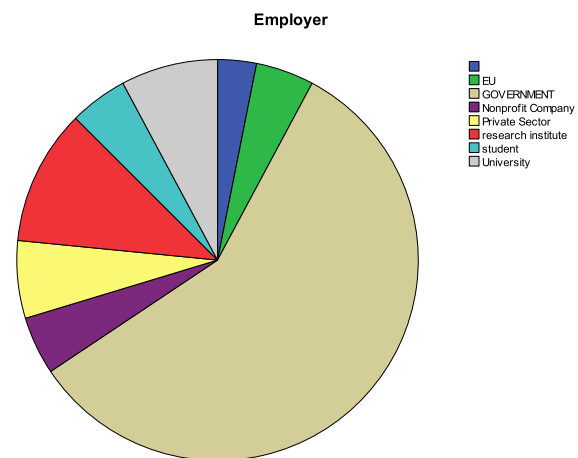
Figure 2-3: Employers of the respondents to the online consultation

Figure 2-1: Background characteristics of the respondents to the online consultation

An important background characteristic of the respondents is the country they belong to (Figure 2-4). In the process of making assumptions for the demographic components, it is very relevant to know if the importance and effectiveness of policy measures on drivers does differ between (geographic clusters of) countries. Luckily, a great variety of countries was represented in the survey. Moreover,

the respondents were more or less evenly spread over all parts of the European territory. The United Kingdom was especially well represented in the survey, with a response from 11 persons. For the sake of presentation, a geographic grouping of countries has been used, namely northern, western, southern and eastern clusters. About 30 respondents belonged to western cluster, about 15 to southern cluster and 10 to both the eastern and northern cluster. Based on these four clusters, it is expected that a reliable description of geographical differences in policy matters can be presented.
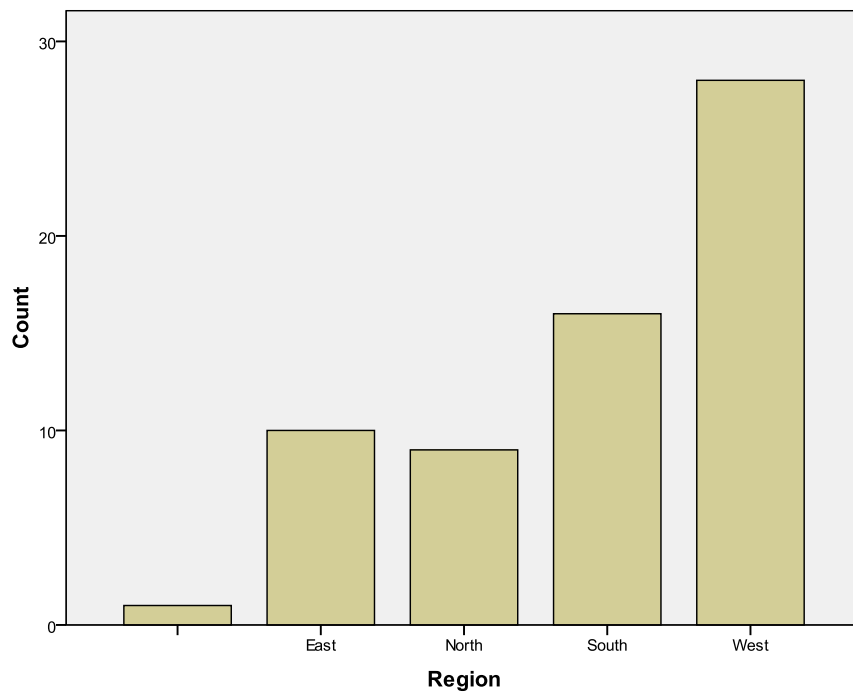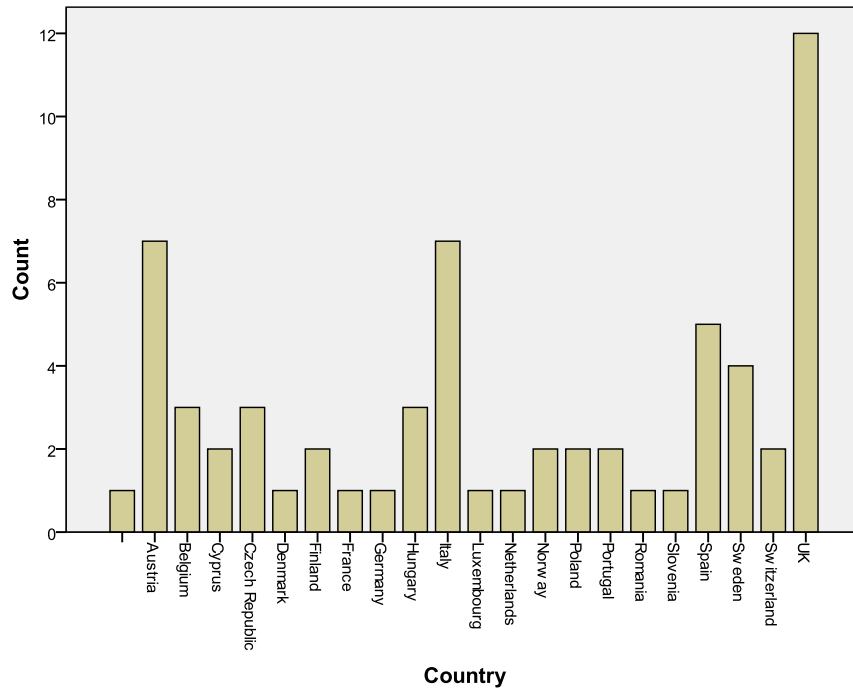
Figure 2-4: Distribution of respondents to the online consultation by country and part of Europe

West = {UK, France, Germany, Belgium, Luxembourg, Netherlands, Switzerland, Austria}
North = {Denmark, Finland, Norway, Sweden}
South = {Cyprus, Italy, Portugal, Spain}
East = {Czech Republic, Hungary, Poland, Romania, Slovenia}

2.3 Structure of the questionnaire

The questionnaire contained questions on the degree of policy on specific drivers with respect to the demographic events of mortality, fertility, international and internal migration and labour force participation. The respondent was asked to classify the strength of policies on the drivers on an ordinal scale: no policies, weak, intermediate, strong, very strong and don't know. The results for each driver are presented in graphs. However, the results are also presented in tables, in which average scores will be used. In order to calculate these average scores, the answer categories are transformed into an interval scale: 0 being no policies up to 4 being very strong; the answer 'don't know' was discarded. A similar procedure was used to present the results on the question of the degree of effectiveness of policies. Besides graphs, tables with average scores are also provided. The respondents were asked to indicate whether the effect was very negative, negative, no effect at all, positive and very positive (indicated respectively by '--', '-', '0', '+', and '++' in the graphs). In order to calculate average score the category '--' was transformed into -2, '-' into -1 etc, with '++' being transformed into +2; the answer 'don't know' was discarded.

2.4 Policy on mortality

In view of the importance of the ageing of the population in the near future, policy on (curtailing) mortality is of a great importance. If this policy was successful, then it might lead to fewer deaths and a higher life expectancy. However, this may go together with a higher (financial) 'burden' for society, depending on pension and benefit arrangements, due to a higher old age dependency rate (more elderly people, who must be sustained by people of the working ages) and higher medical costs (especially with respect to the oldest olds). Policy on mortality may be aimed at influencing behavior that impacts on major causes of deaths and/or the system of medical care.

One of the most important drivers of mortality is smoking behaviour, leading to all kinds of cancers (i.e. lung cancer) on the one hand and cardiac diseases (i.e. strokes) on the other hand. So, it might be expected that the extent of policy measures oriented to curtailing smoking is rather high. This expectation is indeed confirmed by the results of the questionnaire. The average score on the strength of policies is 2.6 (Table 2-1). In Figure 2-5, we see that about 35 respondents considered the extent of policy in their country oriented at curtailing smoking as strong to very strong and another 25 respondents thought the degree was intermediate. With respect to the assessment about whether the policy was effective, we see that more than half of the respondents thought that the policy on smoking behaviour had a positive effect and about 10 respondents thought it had a strong effect (Figure 2-5). The general score on this item was 0.8. So, the respondents clearly trust that this kind of policy does work.

Table 2-1: Drivers of mortality – response to questions on the existence of policy and its effectiveness

Mortality driver	Policy existence					Policy effect				
	Total	East	North	South	West	Total	East	North	South	West
smoking behaviour	2.6	1.8	3.6	2.3	2.6	0.8	0.0	1.7	0.6	0.8
diet/obesity	1.4	0.7	2.5	1.2	1.4	0.0	-0.7	0.4	0.0	0.0
alcohol	2.1	1.5	3.0	2.1	1.9	0.3	0.0	0.9	0.5	0.2
health care	2.7	2.1	3.4	2.5	2.9	0.8	0.2	1.4	0.9	0.8
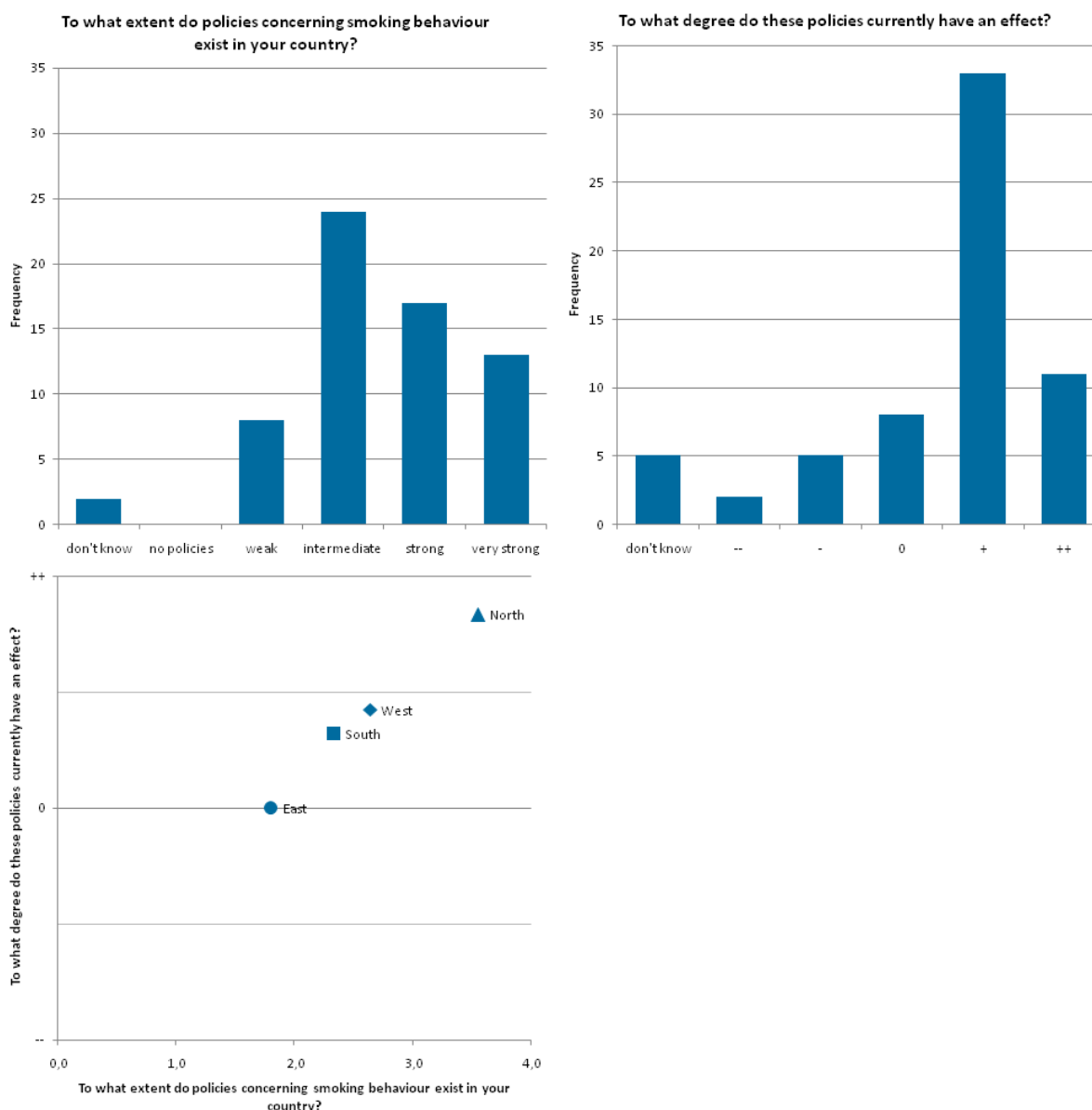
Figure 2-5: Responses to questions about policies on smoking behaviour

With respect to the regional pattern of the answers, the results show that in the northern countries the extent of policy measures on smoking is the highest while in the western countries it is considerably lower. Also, in the southern and eastern countries, policies are oriented towards curtailing smoking behaviour, although the degree is again somewhat lower. The regional distribution of the strength of

policy on smoking behaviour largely coincides with the opinion on the effectiveness of the policy measures. In the northern countries, the respondents believe the degree of success is significantly higher than in western and southern countries.

Heavy drinking of alcohol is detrimental for someone's health. For this reason, Governments might try to prevent their populations from drinking too much alcohol. So, it is prohibited to sell alcoholic drinks to youngsters in many countries. In the opinion of the respondents, the extent of policy concerning drinking alcohol is somewhat lower than the policy concerning smoking (i.e. fewer respondents have indicated that the extent of this kind of policy was strong to very strong; the average score amounted 2.1 against 2.6 for policies on smoking behaviour; see Table 2-2). Also, they expected that this kind of policy was less effective (more respondents filled in the category 'no effect' and fewer respondents filled in the category 'positive effect') (Figure 2-6). In the regional distribution of the answers, more or less the same pattern as with smoking behaviour appears: most policy on this matter exists in northern countries, followed by western countries while in the southern and eastern countries, the degree of the policy is the lowest. This pattern is repeated in the assessment of the effect of the policy.

Table 2-2: Drivers of fertility – responses to questions on the existence of policy and its effectiveness

Fertility drivers	Policy existence					Policy effect				
	Total	East	North	South	West	Total	East	North	South	West
stimulate having children	1.7	1.6	3.1	1.2	1.5	0.0	-0.5	1.0	-0.4	0.2
influence family size	1.1	1.2	1.6	0.9	1.0	-0.2	-0.2	0.4	-0.7	-0.1
assist couples with fertility problems	1.7	1.6	2.3	1.2	1.8	0.4	0.4	0.7	-0.2	0.6
abortion	2.2	1.5	2.9	1.8	2.5	0.4	-0.3	0.5	0.4	0.7
stimulate migration from counties with a high fertility level	0.6	0.3	0.9	0.8	0.7	0.0	-0.4	0.6	0.0	0.2
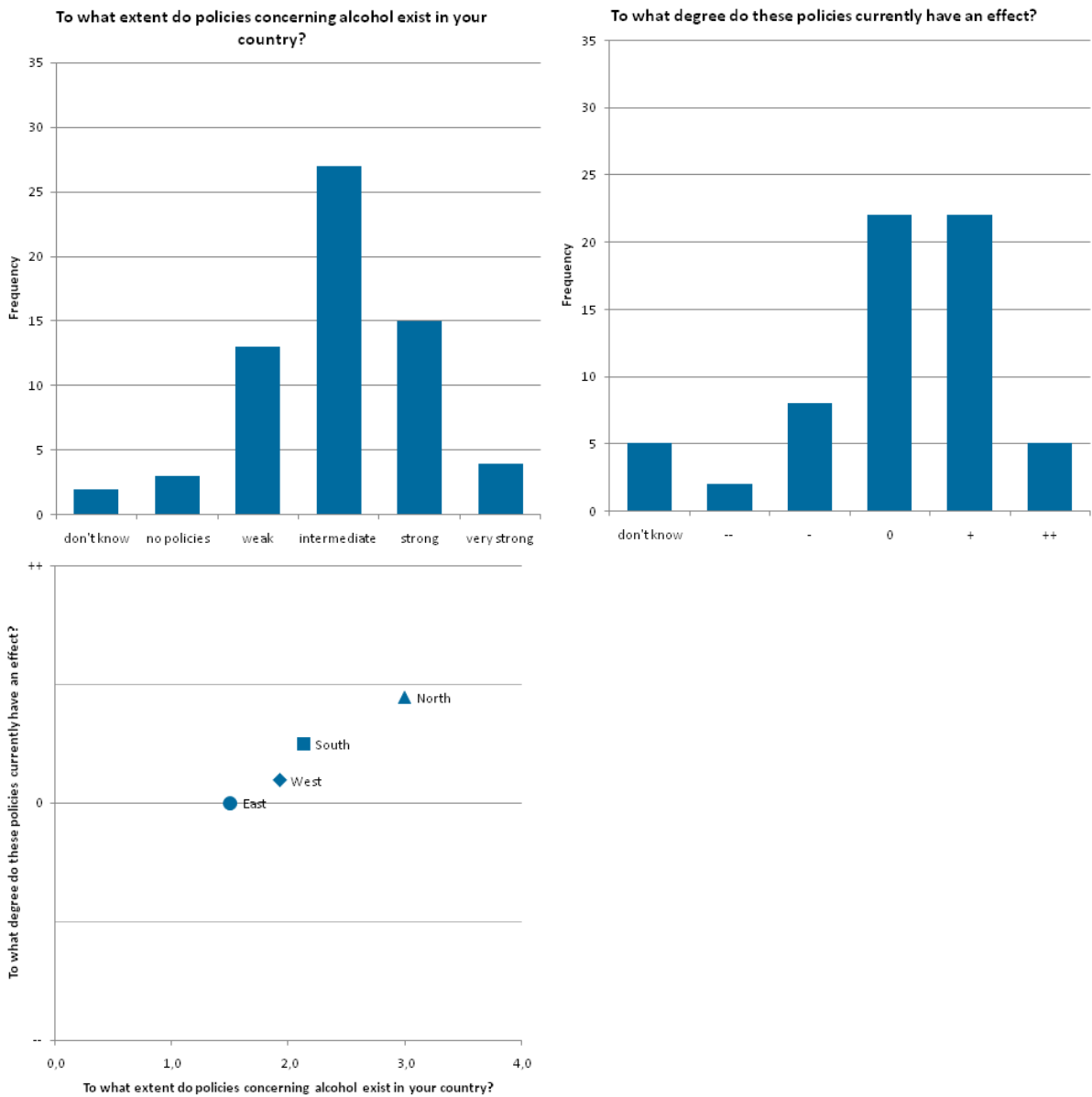
Figure 2-6: Responses to questions about on alcohol consumption

Another item of concern is the fact that people tend to eat too much, leading to obesity. Governments try to make people aware of the risks of heavy weight and suggest that people follow healthy diets. However, according to the respondents (Figure 2-7), the strength of policies on this driver of mortality is less important than that with respect to the previous two drivers (the average score is 1.4 against 2.6 for smoking behaviour). Also the opinion on the effectiveness of this policy is rather skeptical with an average score of 0.0. In the northern countries, political attention on the risks of hazardous eating patterns seems to be much higher, with a average score of 2.5 against 1.4 for the western countries.
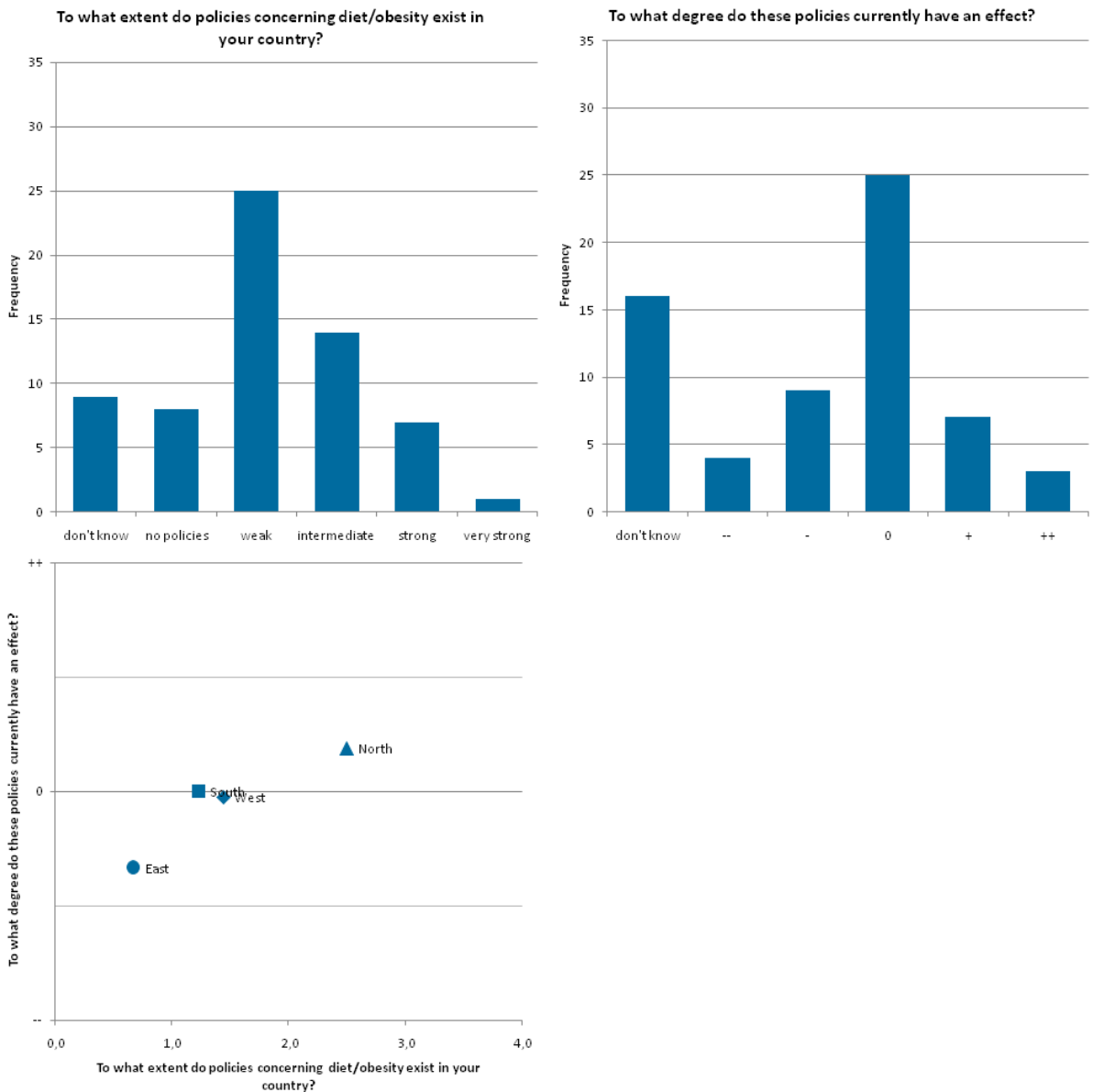
Figure 2-7: Responses to questions about on diet / obesity

Of course, an important driver for mortality is the health care system. Not only the quality of this system (the medical treatment) is of importance, but also how many people have an easy access to this system (which refers to the way health insurance is organized in each country). In the opinion of the respondents (Figure 2-8), much political attention is devoted to this issue, with an average score on the strength of policy of 2.7. Also the effectiveness of this kind of policy is rated high with an average score of 0.8. In all regions of the ESPON space, the strength of policies on health care is rather high, although in the northern countries it is the highest. This goes together with the highest rating on the effectiveness of this kind of policy.
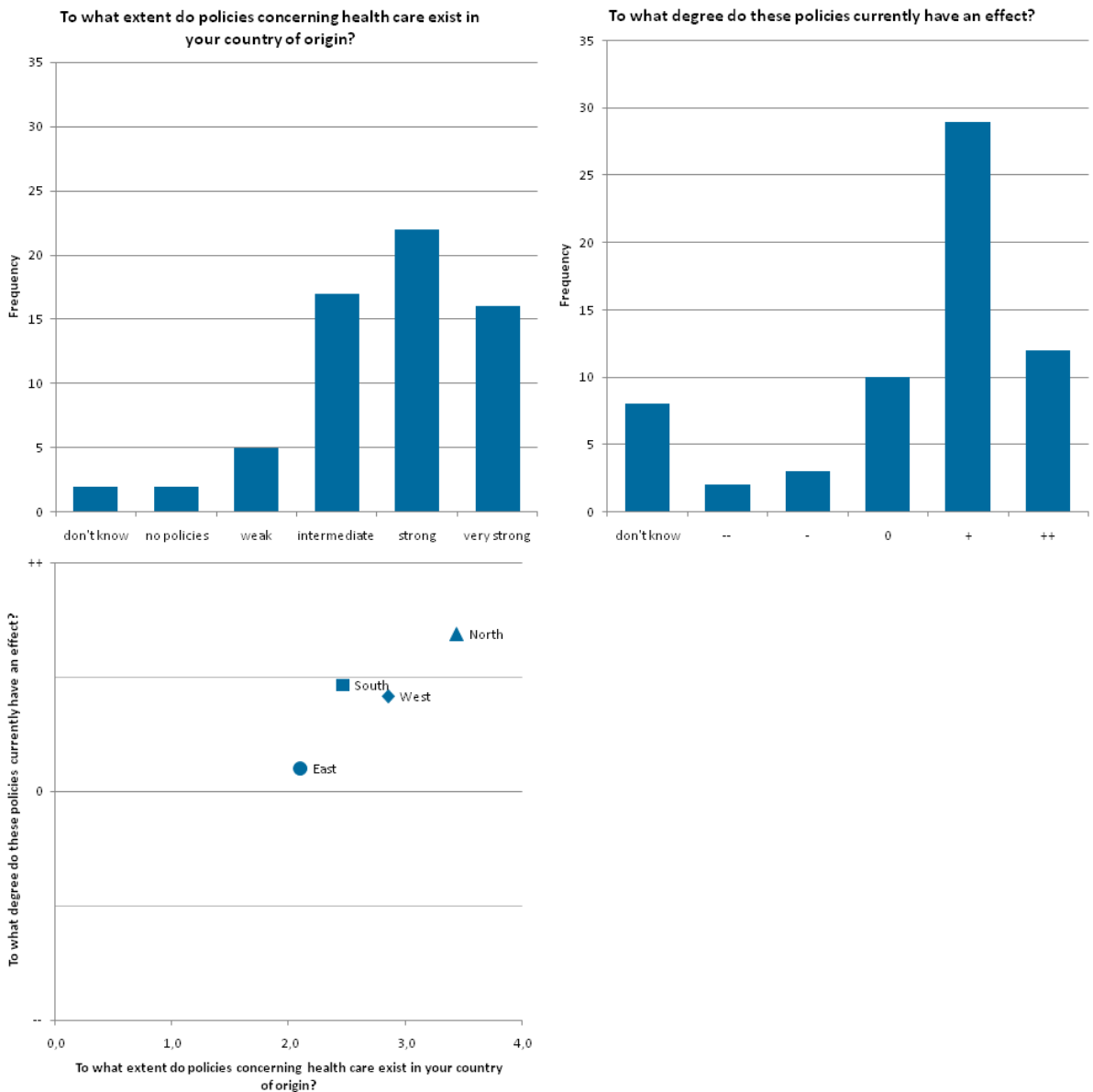
Figure 2-8: Responses to questions about on health care

The questionnaire contained an open question on the issue to what other policies could affect mortality (in the country of the respondent). The fields that required more political interference could be summarized as follows. First, social and family welfare was considered to be important, and in particular referring to issues as pensioning age, social status and social inclusion. Second, transportation was mentioned, in particular issues as promoting public transport and bike traffic, and measures to decrease car dependency. Less car use would lead to less (fatal) car accidents. However, with respect to car driving itself more attention should be paid to curtailing the use of dangerous chemicals such as drugs and alcohol. Governments could also give more attention to promote sport, e.g. its role in school education (e.g. lessons in swimming) and in urban/spatial planning, lift the lack of and prevent the erosion of sport facilities. Also more attention could be given to the safety at work, e.g. the prevention of work related accidents. In that respect also the work/private life balance is of

importance, considering the relationship with work related stress. Also the pollution of the environment was considered to be a significant field for political attention, in particular the air and water quality. Also more political attention could be directed at the elderly persons. This refers not only to giving more (medical) care, but also to promote a wealthy lifestyle.

The questionnaire also contained an open question, about how policies with respect to mortality could change in the future. Several respondents stated that regulations on smoking would increase strongly. Also more attention would be paid to restricting the use of other popular drugs. Further, regulations to prevent obesity were expected to increase although concrete policy measures still have to be implemented. Regarding the drinking of alcohol, it was expected that regulations will be directed at combating illegal use, e.g. while driving a car. Social attitudes to drinking are considered extremely important. It was not expected that alcohol accessibility will decrease by any means of regulation. Regarding health care, the respondents indicated a strong tendency to privatise the supply side.

Concluding on the topic of mortality, it is apparent that it is a matter of great concern for the Governments in nearly all the ESPON countries. In the opinion of the respondents a lot of policy is devoted to curtailing bad habits and is assessed as being quite successful. The policy measures are notably oriented towards influencing the smoking behaviour and, to a lesser extent, at influencing the drinking of alcohol. In the northern countries, a stronger policy is oriented at influencing the drivers for mortality and also the degree of success seems to be higher. However, also in the western countries, the degree of policy trying to influence the drivers of mortality is rather high. In the eastern and southern countries, the drivers for mortality are somewhat less a matter for policy intervention, although still a lot of policy measures are introduced.

2.5 Policy on fertility

National population growth is to a large extent dependent on trends in fertility, although in recent decades international migration has become more important. In order to sustain a population, it is necessary that women give birth to just over two children (in Europe, between 2.06 and 2.15 children depending on female mortality levels and the sex ratio at birth). In modern times, this level is hardly attained in any western country. In fact, in several countries such as Germany, Italy, Spain and several eastern countries, the average number of children per woman is far below 1.5 children. With such a low level of fertility (exceptionally), high numbers of migrants are necessary in order to prevent a population from shrinking at a fast pace. So, the issue of having (enough) children is very important for the sustainability of the population. Although one might say that a high life expectancy (accompanied with fewer deaths) is also helpful in preventing a population to diminish, this is accompanied by a large share of elderly people. So, nowadays, a sustainable future for a national population is, to a large extent, dependent of policies trying to raise the fertility level.

In the light of above arguments, it could be expected that Governments give a lot of attention to policies that stimulate fertility. However, looking at the results (Table 2-2, Figure 2-9), this expectation was not confirmed: a large majority of the respondents said that policy oriented at stimulating families to have children was generally weak to intermediate. The average score on this issue was 1.1, much lower than the average score for policies oriented at curtailing bad habits such as smoking, drinking too much alcohol and eating too much. Also the effectiveness of this kind of policy was assessed as rather low, with one third of the respondents indicating it had no effect, another third expecting a positive effect and only a few respondents expecting a strong positive effect. The average score on effectiveness was negative, with a value of -0.2. The geographical distribution of the answers show a pronounced pattern: the strength of policy trying to raise fertility is in the northern countries twice as high as in the other countries. Scandinavian countries have (had) a reputation as 'forerunners' in this respect, characterized by providing a large array of arrangements that make it possible for mothers to combine work with raising children. Due to this policy, the average number of children per woman has exceeded two children in Sweden during the 1980s. However, the economic downturn hereafter has led to cuts in several benefits, accompanied by a falling fertility level. It is no surprise that in the northern countries the opinion on the effectiveness of policy trying to stimulate having children is rated higher than in the other countries. The respondents of the southern and eastern countries were even pessimistic about this effort, stating it had a negative effect on fertility.
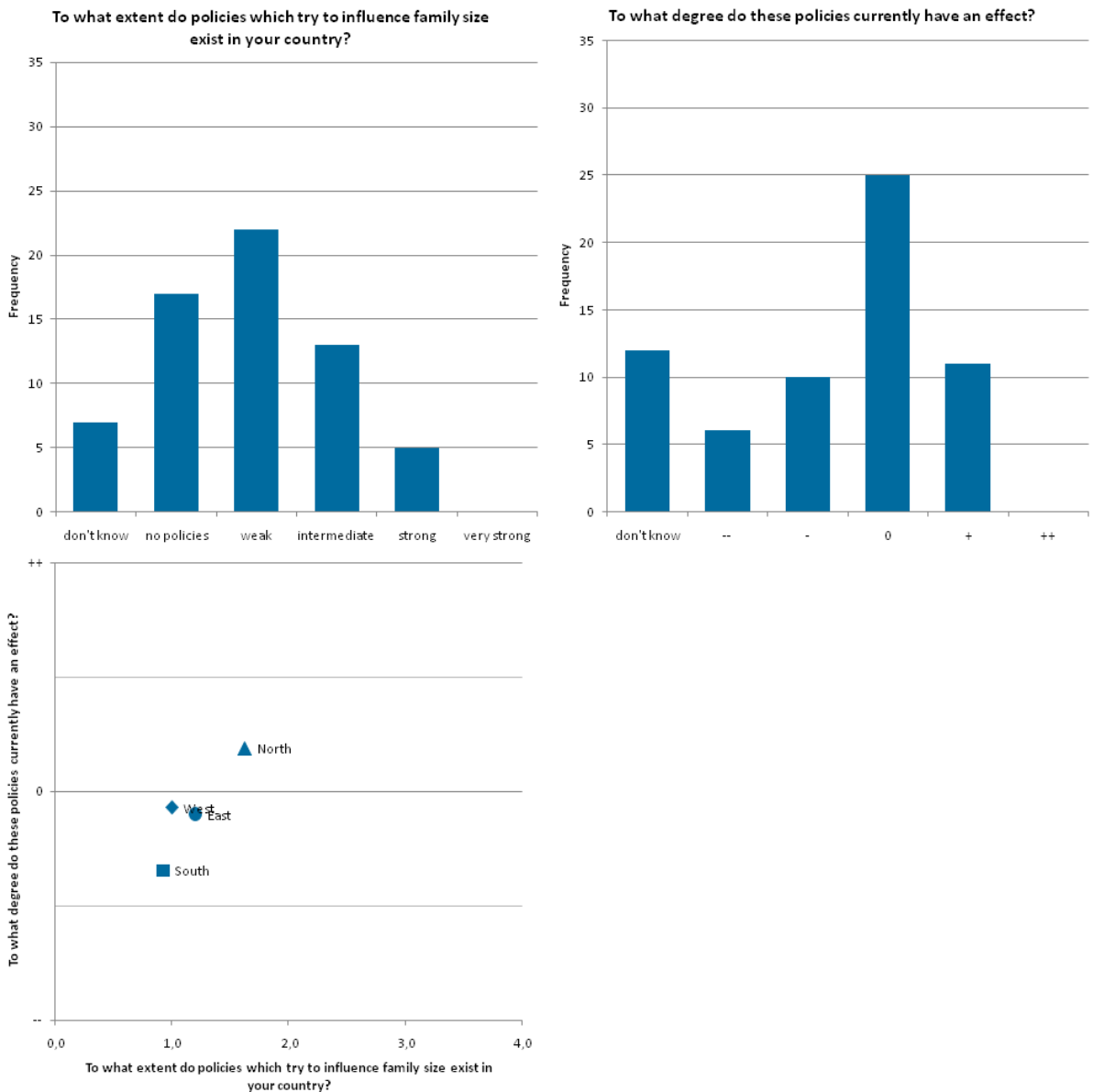
Figure 2-9: Responses to questions about policies which stimulate having children

Policies might not only be oriented towards encouraging families to have children, but also towards influencing family size (the number of children of couples). The strength of policies on this issue is considerably lower than that on policies for stimulating having children (Figure 2-10). Opinions about the effectiveness of this kind of policy are also rather negative, with an average score of -0.2.
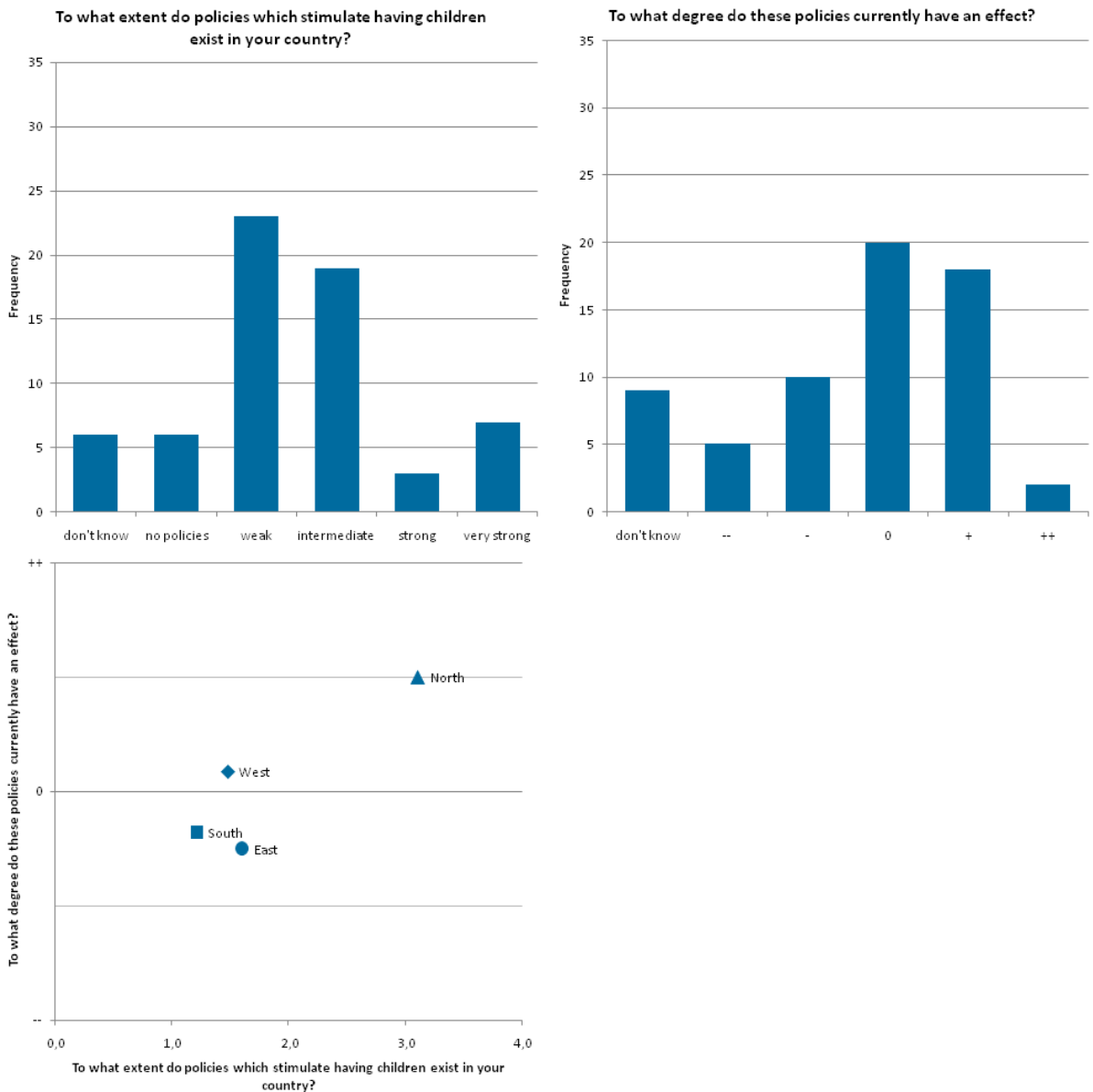
Figure 2-10: Responses to questions about policies which try to influence family size

Another way of raising fertility is to assist couples with fertility problems. The respondents indicated that the strength of policies on this driver of fertility was considered to be generally weak or intermediate and over 10 respondents did not know whether policies existed on giving help (Figure 2-11). The average score on this item of 1.7 was the same as that on policies trying to influence having children. Again the opinion on the effectiveness was generally not so positive. Only one third of the respondents though it had a positive effect. Nevertheless, with an average score of 0.4, the effectiveness was rated higher than that of policies trying to influence having children. With respect to the regional distribution of the answer on the degree of policy on this issue, southern countries had the lowest score and the northern countries had the highest.

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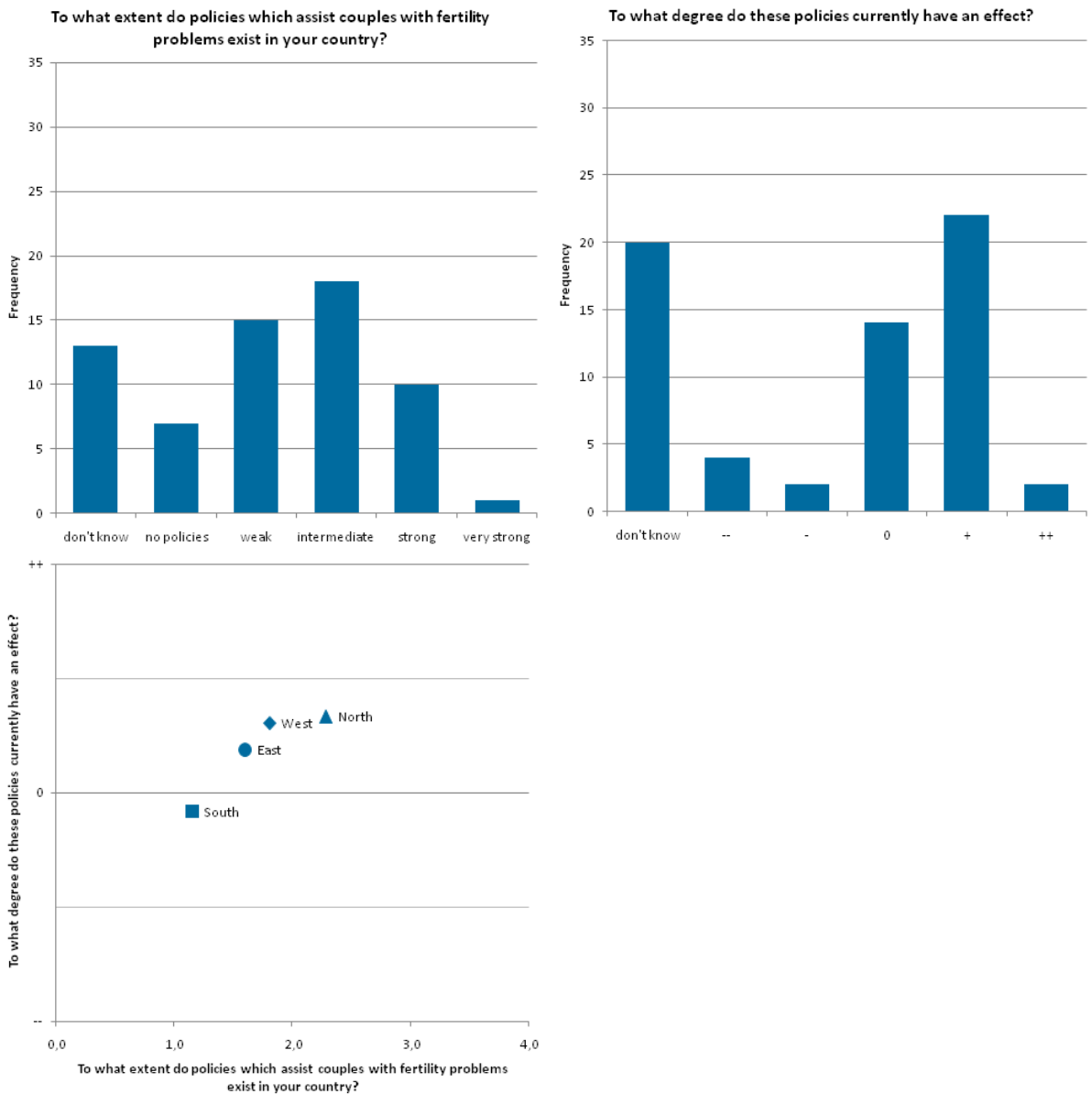
Figure 2-11: Responses to questions about policies which assist couples with fertility problems

Abortion may also have a profound influence on the level of fertility. Tolerant policies on abortion might cause a lot of public debate. Of all the drivers of fertility, this item receives the highest average score, namely, 2.2. Respondents in the northern countries and the western countries especially evaluated the strength of policies on abortion as being high, with average scores of 2.9 and 2.5 respectively. The effectiveness of policy on abortion is also rated high in these two groups of countries (Figure 2-12).

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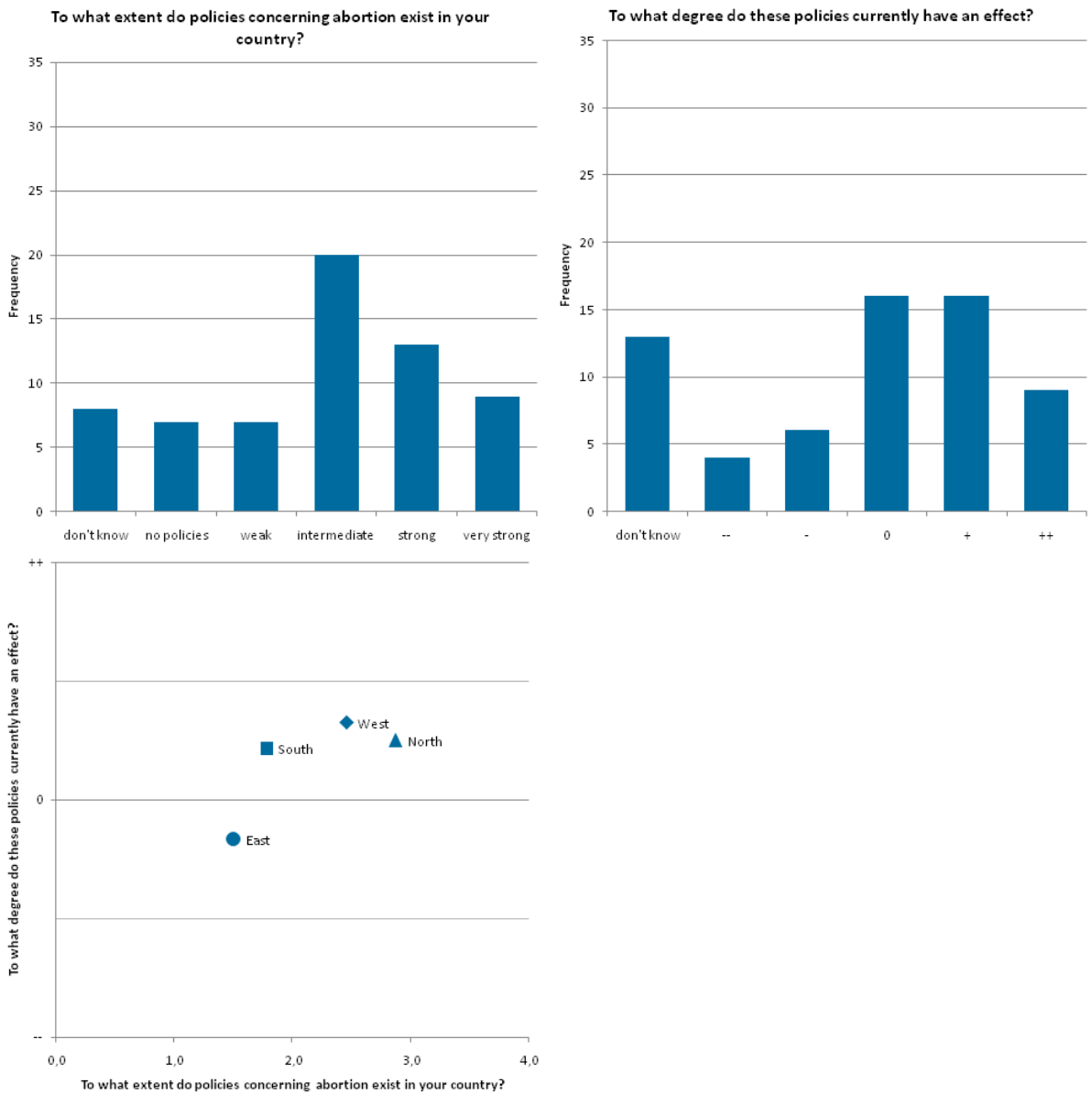
Figure 2-12: Responses to questions about policies which concern abortion

The last item on fertility concerned policies trying to stimulate migration from countries with a high fertility level. According to the respondents, not much policy was devoted to this driver (the average score was 0.6) and also the effectiveness of such a policy was considered to be very small (with an average score of 0.0) (Figure 2-13).
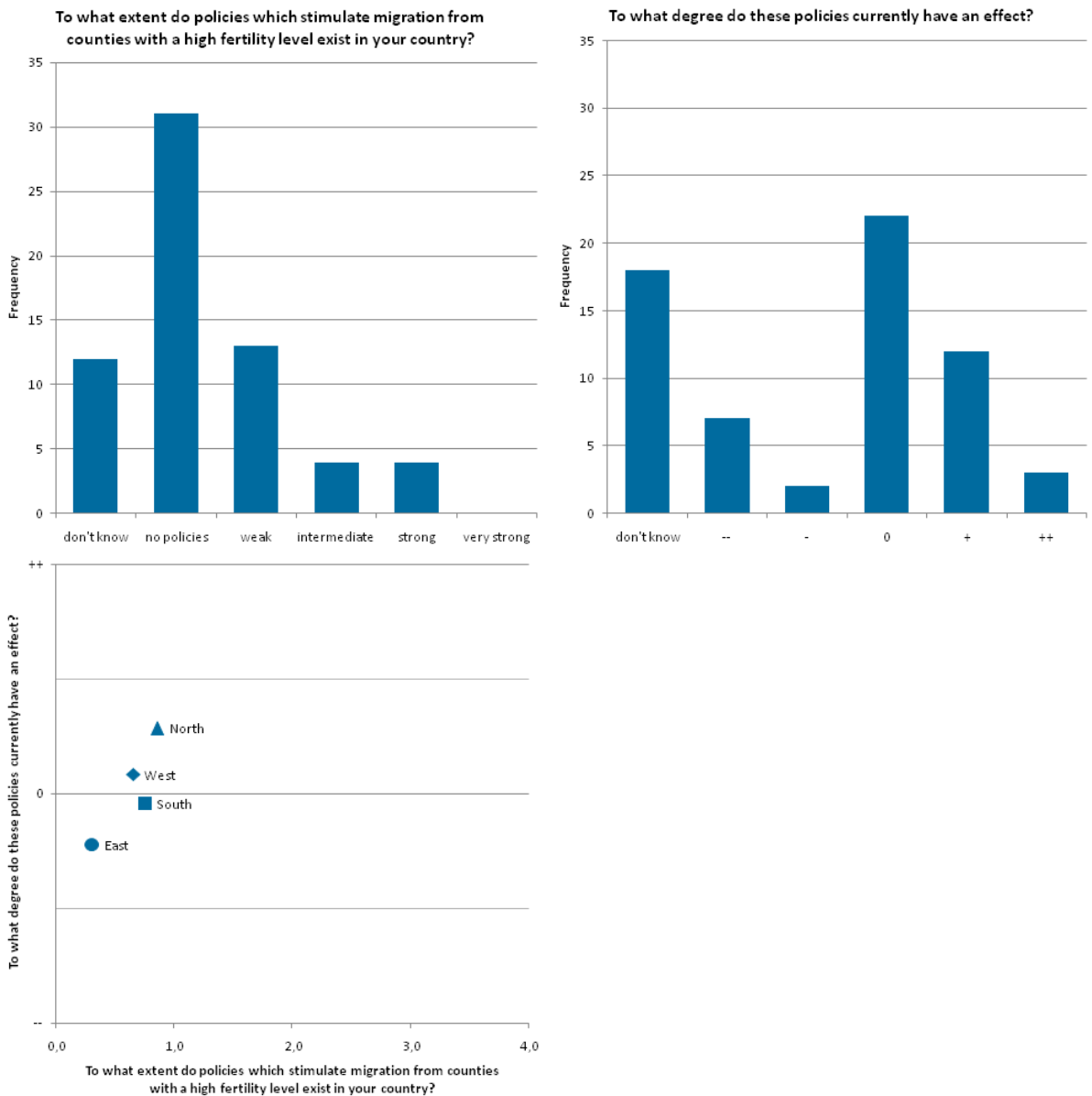
Figure 2-13: Responses to questions about policies which stimulate migration

The questionnaire contained an open question on the issue to what other policies could affect fertility (in the country of the respondent). The experts pointed at the relationship between fertility and employment: policy could give more attention to the role of part-time work, job sharing, gender equality and the availability of kinder gardens. Also attention should be given to the changing nature of families. This refers to matters as policies on the duration of maternity leave, the possibility of parental absence leave, and the cost of children. Also, the role of prolonged education and its role on fertility was stressed. In particular, the long duration of tertiary education would lead to having less children. The respondents also mentioned the role of the quality of the living environment, and in particular, political attention should be given to the impact of chemicals. Also the housing could impact on fertility, in particular for young couples on the verge of stepping into parenthood. An ample availability of single family dwelling could stimulate fertility. Further, policy could stimulate

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immigration from countries with a high level of fertility. In that respect, political attention should be given to the integration of minority groups (e.g. Roma have larger families), in particular those groups with a specific religious background (e.g. Muslims and Catholics have larger families).

The chapter on fertility also contained open questions about how policies with respect to fertility would change in the future. Many respondents expected a strengthening of measures related to family policies, e.g. housing for large families, giving tax discounts and social benefits to households with children, providing child care facilities and stimulating part-time working. Regarding assisted conception, the opinions went in different directions; some experts indicated that assisted conception should be privately funded while other experts thought it should be publicly funded. Regarding abortion, the respondents had the opinion that it does not have an effect on fertility *per se*. However, more attention could be given to psychological assistance. Regarding migration from countries with a high fertility, the respondents indicated that the issue of more regulations depends on how EU policies will develop. Politically speaking, this could become a burning issue.

Concluding, it seems that Governments are rather reserved about policies stimulating fertility, compared with policies trying to curtail mortality. It is possible that choices of having children are considered to be something for couples themselves, and it is not appropriate for Governments to interfere in this 'private matter'. This reservation is clearly less the case in northern countries where a more active policy is taken on stimulating couples to have children. The Nordic countries are more keen to provide arrangements for women to combine work with motherhood. Fertility can also be increased by giving help to couples with fertility problems. This practical kind of policy is more or less apparent in all countries of the ESPON space.

2.6 Policy on external migration

In the last decades, the population growth in several western countries has become more or less dependent on the influx of foreign migrants. Several countries in the ESPON space have a rather long tradition in receiving migrants from other countries, especially the western and northern countries. Other countries, such several southern and eastern countries functioned as 'donor' countries. In the 1960s and 1970s, labour migrants left the Mediterranean countries and went to western and northern Europe in order to work for a couple of years. As prosperity grew in the sending countries, many labour migrants returned to their countries of origin. Migrants coming from Africa and Asia took over their role as labour migrants. However, their inclination to return was weak and since the 1980s, many male labour migrants were joined with their wives and children by immigration (family reunion migration). Nowadays, the children of the labour migrants (the second generation) have grown up and seek a partner in their parents' country of origin.

In the 1990s, international instabilities such as wars have made asylum seekers a prominent phenomenon, leading to large (mass) migration flows. Also a new type of labour migrant emerged; after the fall of the Iron Curtain around 1990, many people living in the former communist countries of east Europe went to the much richer western countries. The accession of several of those countries to the European Union in 2004 lead to a boost in those migration flows. These labour migrants can be considered as a necessary addition to the ageing and shrinking labour force of several western countries. Governments of countries receiving labour migrants are aware of the fact that (highly) skilled labour migrants might stimulate economic growth and for this reason try to stimulate their arrival. However, the sending countries are faced with a shrinking labour force and disrupted families. In many western countries, the continuous large migration flows over many decades has led to large proportion of the population having a foreign origin. This might impose a threat to social cohesion due to different cultures having to live together. Especially in periods of recession, the foreign groups have been more susceptible to unemployment and policy has been oriented towards creating barriers for immigration. It is clear that international migration is a very important topic for policy making.

A rather large battery of questions in the survey dealt with external migration. From the introduction given above, it might be expected that a many policy measures are devoted to either stimulating or discouraging immigration from outside the European Union. This is indeed the case: half of the respondents stated that the strength of policies on this issue could be classified as strong to very strong (Table 2-3). The average score on the strength of policies on this issue was 2.3. However, with respect to the effectiveness of these policies, the respondents were somewhat indecisive: one third called it rather positive, one third thought it had no effect and a quarter did not know (Figure 2-14). This led to an average score of 0.4.

Table 2-3: Drivers of international migration – responses to questions on the existence of policy and its effectiveness

International migration driver	Policy existence					Policy effect				
	Total	East	North	South	West	Total	East	North	South	West
stimulate/discourage migration from outside the EU	2.3	0.9	3.1	2.3	2.4	0.4	0.0	1.1	0.2	0.4
selectivity on the origin of immigrants	1.8	1.0	2.4	1.5	2.0	0.4	-0.1	1.0	0.2	0.5
restrict the duration of stay of migrants	2.3	2.0	3.0	2.1	2.4	0.3	.7	1.2	-0.1	0.2
restrict migrant type	2.0	0.8	2.6	2.0	2.2	0.4	-0.4	0.8	0.4	0.6
stimulate migration to other EU countries	0.9	0.6	1.1	0.8	1.1	0.0	-0.4	-0.1	-0.2	0.2
stimulate return migration	1.1	0.8	1.2	1.1	1.3	-0.1	-0.5	0.1	-0.4	0.3
make your country attractive to migrants	1.5	0.8	2.1	1.4	1.7	0.5	-0.3	0.9	0.2	0.8
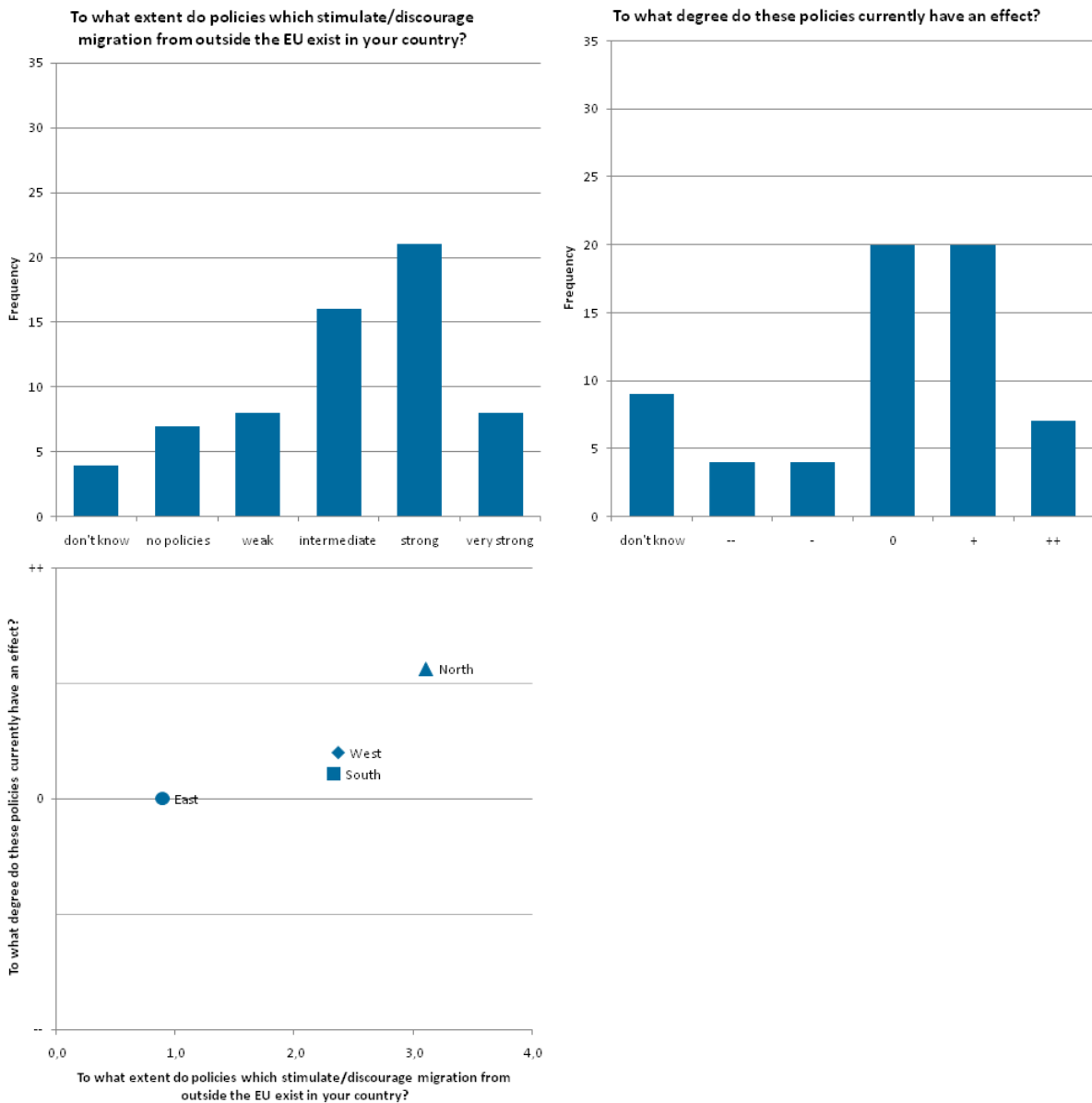
Figure 2-14: Responses to questions about policies which stimulate/discourage migration from outside the EU

The strength of policies trying to stimulate or discourage immigration is not only high in northern countries, but also western and southern countries. Remarkably, in the eastern countries, it is assessed as being rather low and the extent of policy measures is also rather small. With respect to the effectiveness of policy, the northern countries have a particularly positive impression, while in the other countries, the opinion was that it had hardly any (positive) effect.

Selectivity on the origin of the immigrants is also of importance; in particular, the difference between western and non-western migrants might have different implications for the social cohesion and the contribution to the economy. More than half of the respondents indicated that the strength of policy on this issue was intermediate or strong (Figure 2-15). So, trying to influence the origin of immigrants is also quite important for politicians, although the average score of 1.8 was somewhat lower than that

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of the previous item. Again, with respect to the effectiveness of this policy, the opinion was not clear cut: one third of the respondents could see no effect at all while another one third saw a positive effect. For northern and, to a lesser extent, western countries, the selectiveness on country of origin is more and political issue than for southern and, notably, eastern countries.
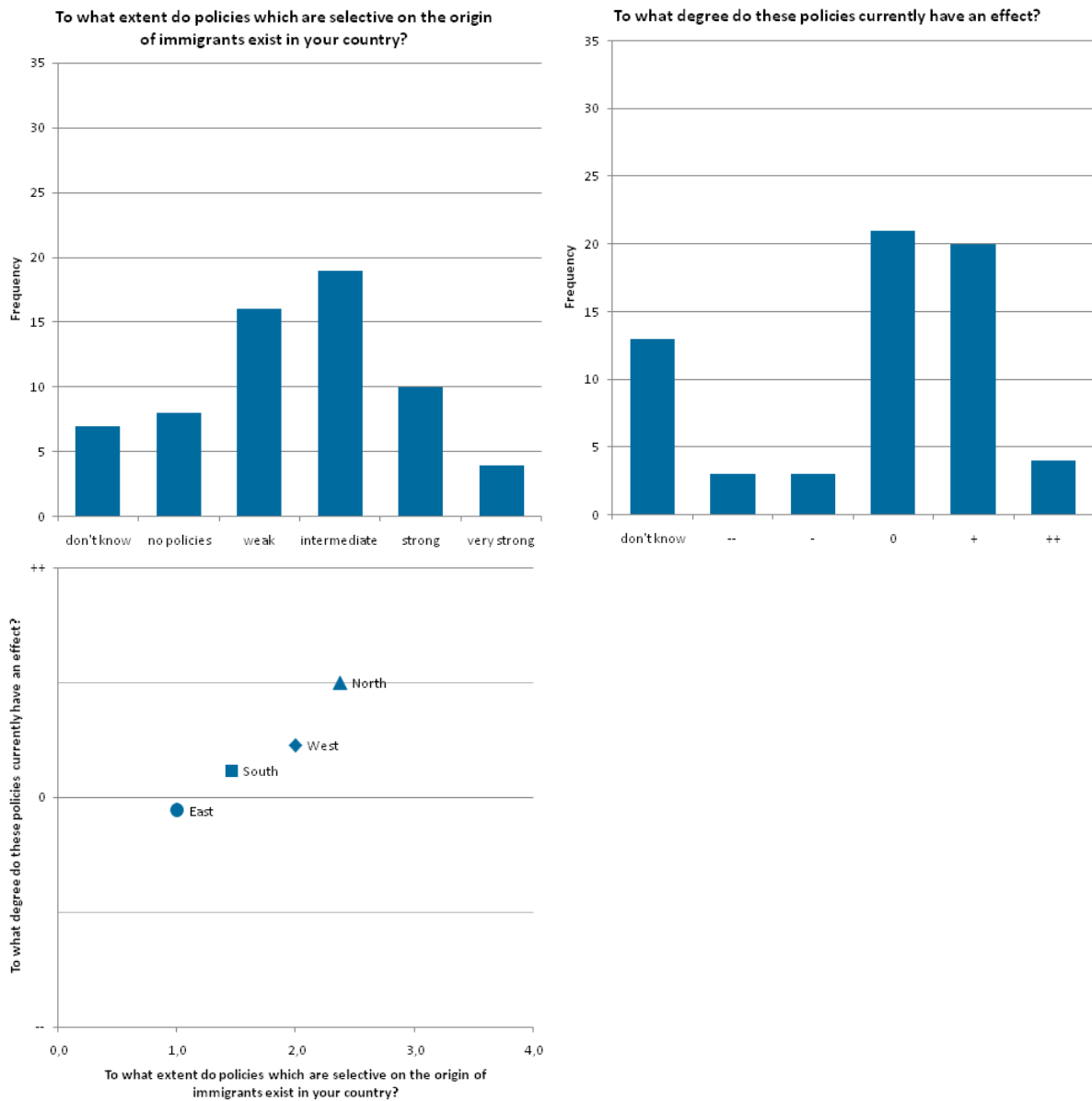
Figure 2-15: Responses to questions about policies which are selective on the origin of immigrants

With respect to the question on the degree of policy trying to restrict some migrant types, the pattern of answers is more or less the same as the question on the degree of selective policy on the origin of immigrants (Figure 2-16). It is quite obvious that a close relationship exists between certain countries of origin and certain migrant types. For example, many migrants from eastern countries are labour migrants while many migrants from unstable countries in Africa are asylum seekers.
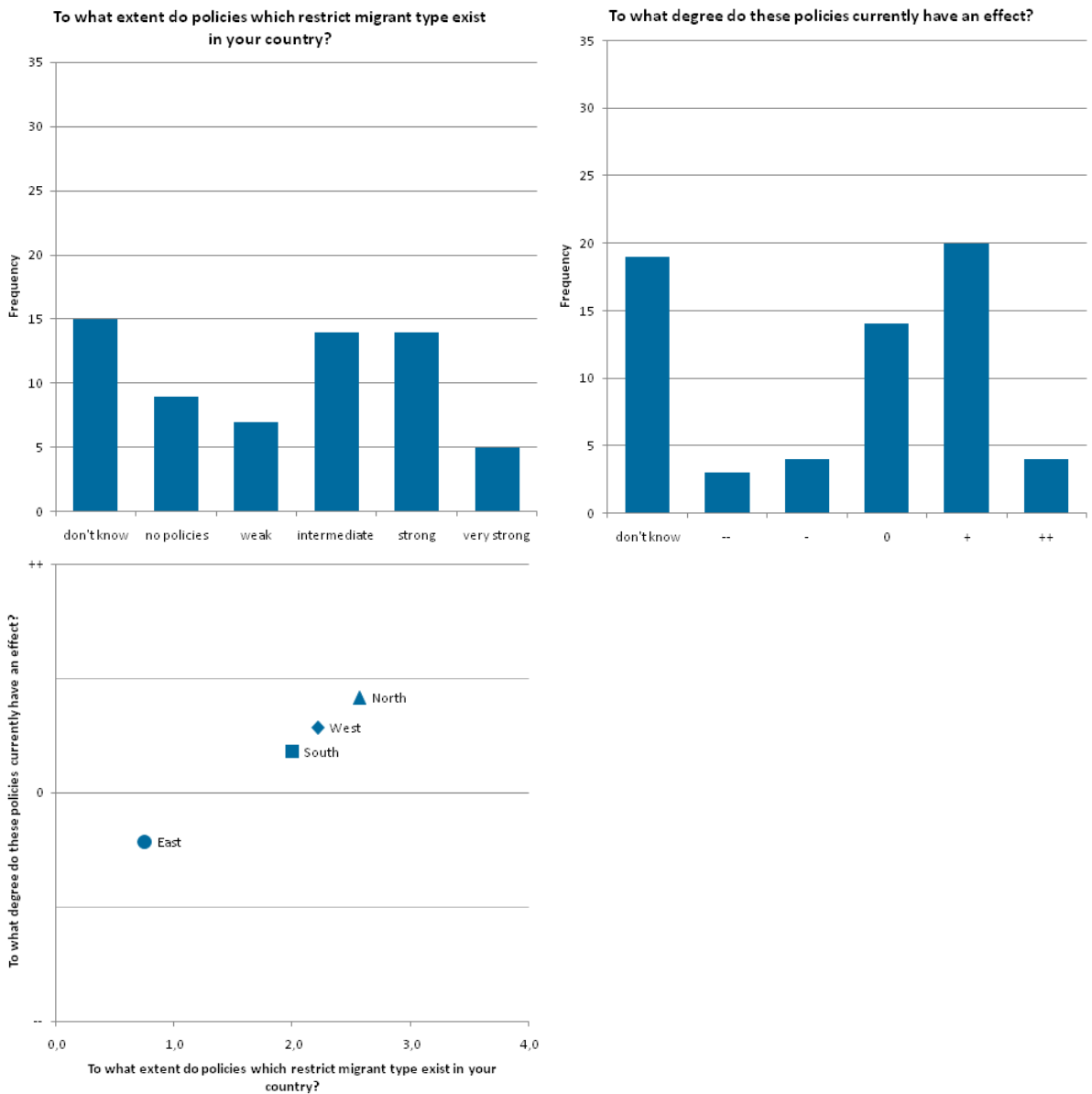
Figure 2-16: Responses to questions about policies which restrict the type of migrant

Especially with respect to labour migrants, Governments expect that they will stay for a couple of years and then return to their country of origin. However, many immigrants prefer to stay, instead of returning. A rather large gap in prosperity between the country of origin and the country of immigration might be the cause. Especially in times of recession, this could entail a financial threat as the immigrants (and their children) profit from all kinds of social provisions such as unemployment benefits or educational facilities. This might lead to policies trying to restrict the duration of stay. Over half of the respondents indicated that this was an important political issue and evaluated the strength of policies on this issue as being strong to very strong (Figure 2-17). This leads to an average score of 2.3. In all regions of the ESPON space, policy measures were taken on this issue, although the northern countries again showed the strongest inclination. With respect to the effectiveness, the

impression was that it was rather successful, with half of the respondents classifying it as being positive to very positive.
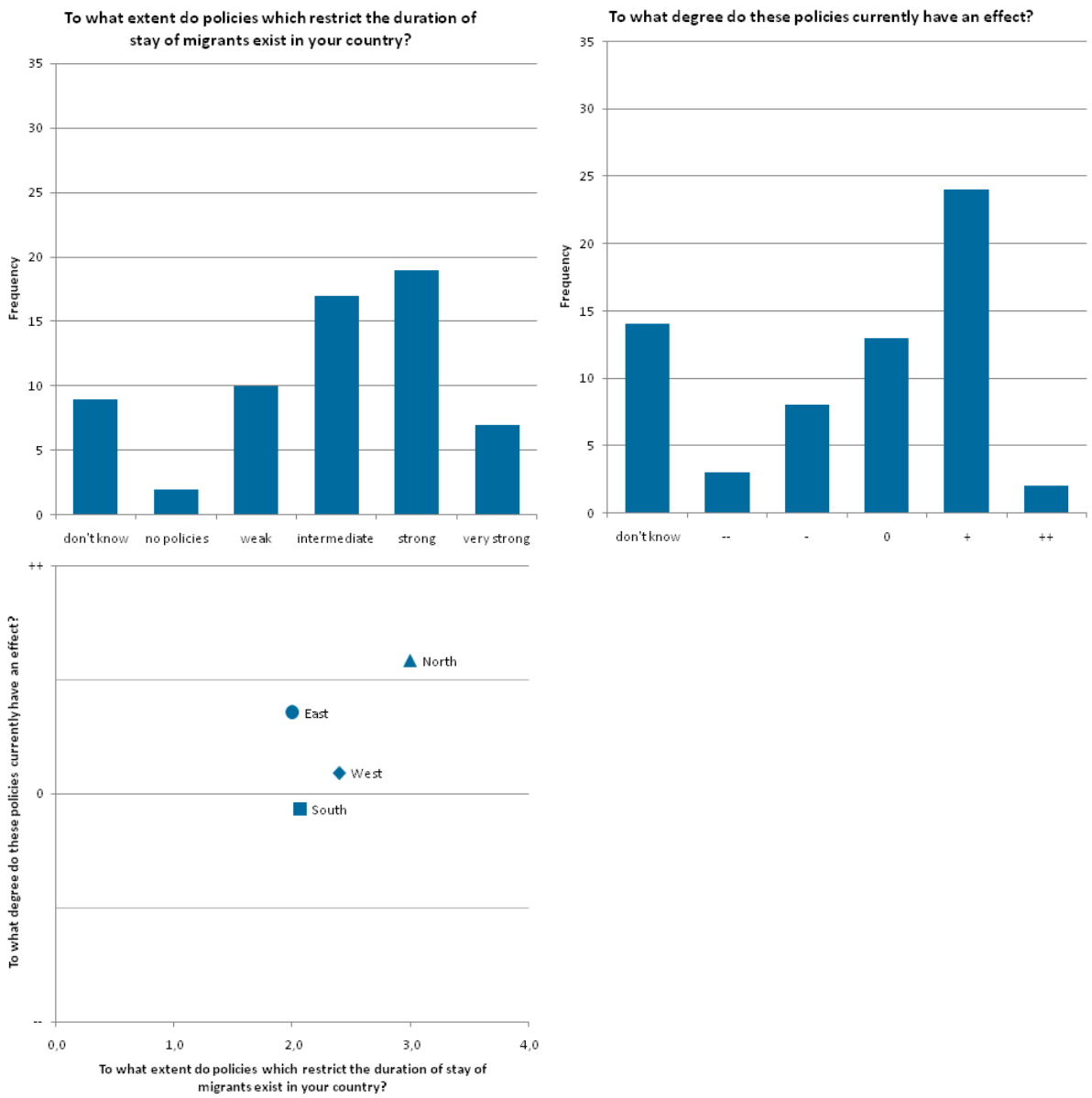
Figure 2-17: Responses to questions about policies which restrict the duration of stay of migrants

Not only might immigration be a focus for political interference, but also emigration. Financial stimuli in particular might encourage immigrants who have settled in their new countries to return to their country of origin. In contrast to policies on stimulating immigration, there are few political actions undertaken in order to stimulate migration to other EU countries. Almost two thirds of the respondents indicated that policies on this issue did not exist or the degree was weak (Figure 2-18). Compared with the scores on the other items on international migration, this item had a low score with 0.9. In all groups of countries, the degree of policy on this issue was classified as being rather low. With respect to the effectiveness of this kind of policy, the general opinion was that it had no

effect at all (the average score amounted to 0). For the respondents coming from eastern countries though, it even had a considerable negative effect.
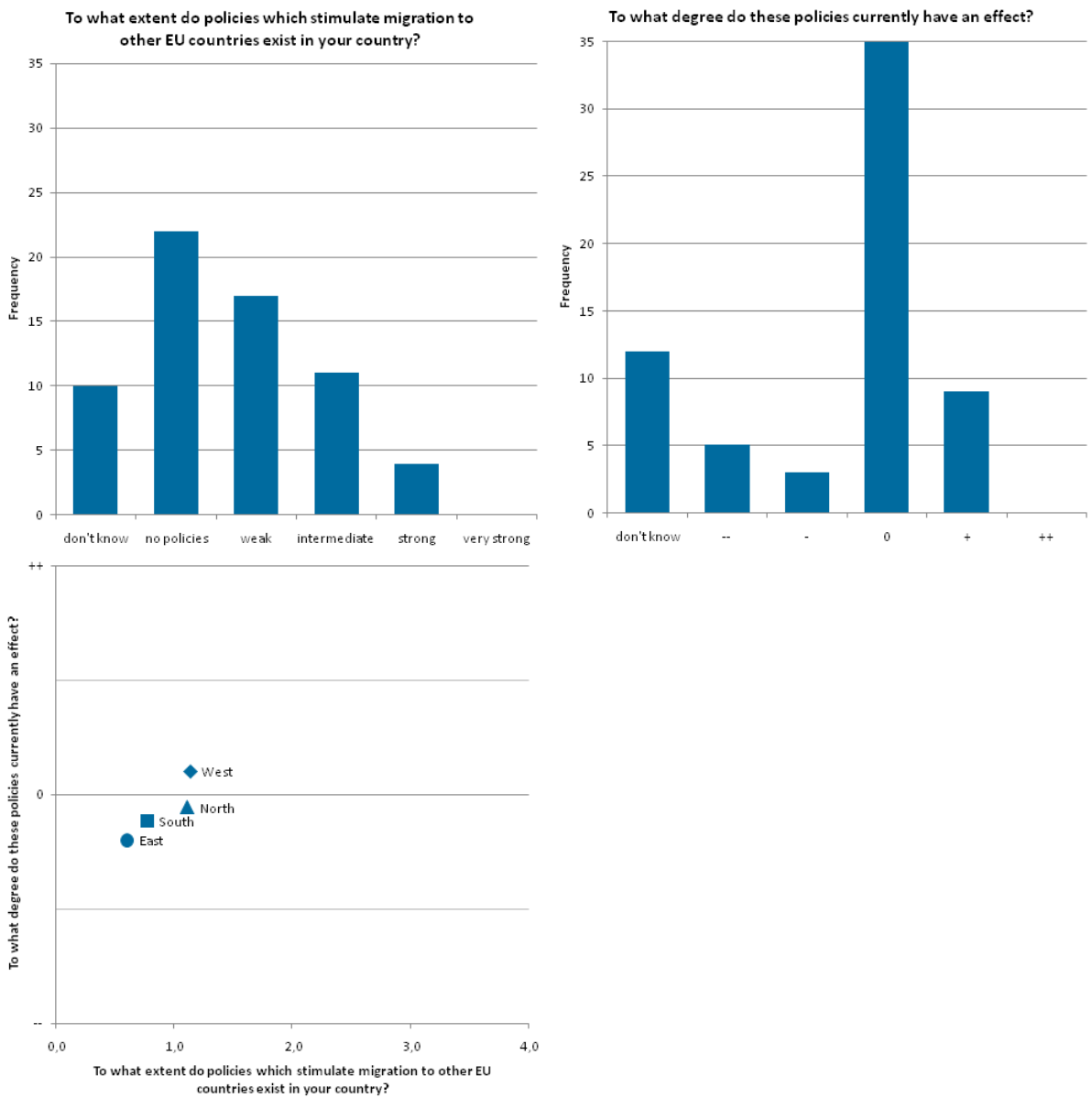
Figure 2-18: Responses to questions about policies which stimulate migration to other EU countries

Respondents judged policies on return migration (stimulating migrants to return to their origin countries) to be weak or non-existent in the main and without any effect (Figure 2-19).
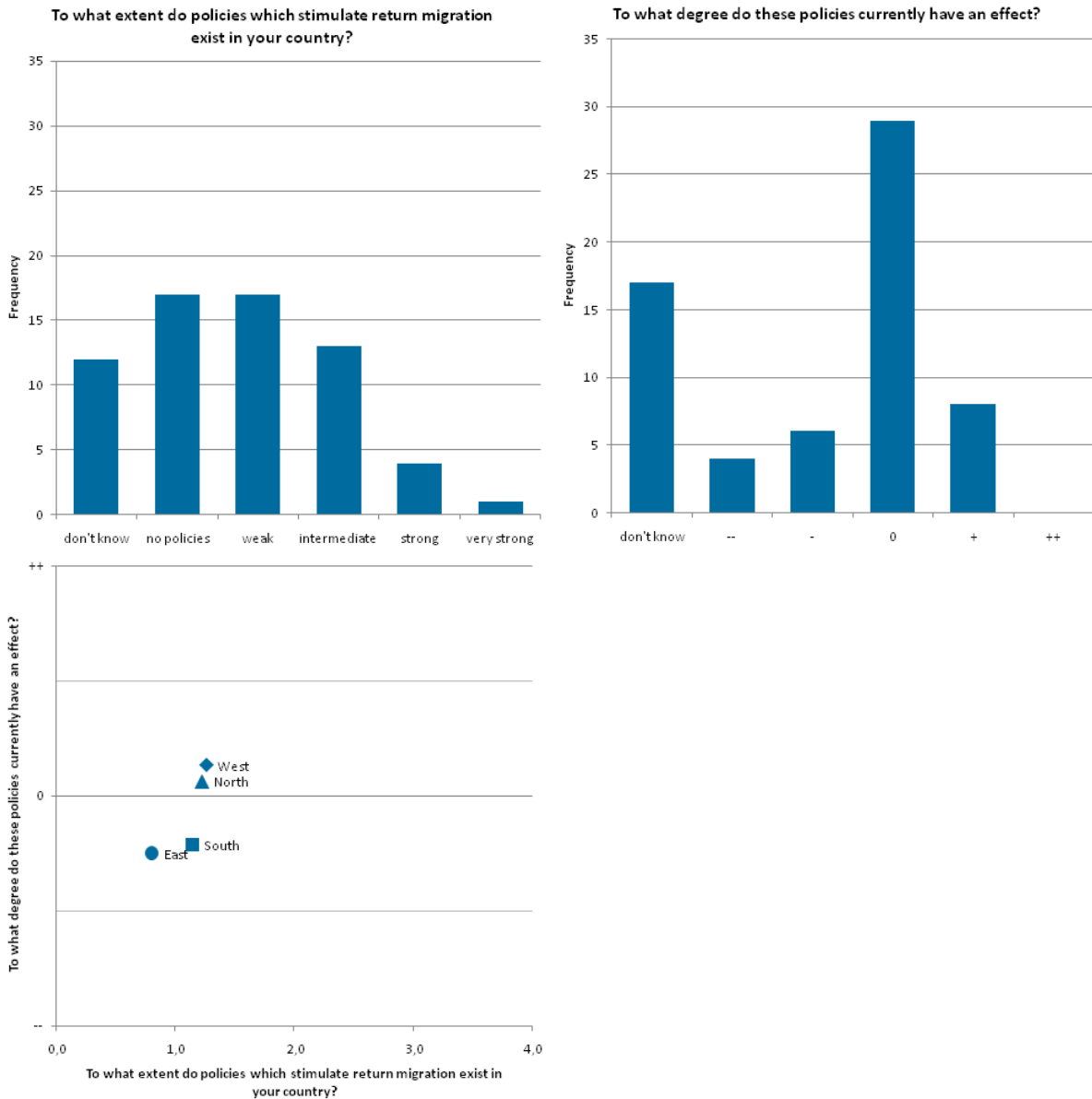
Figure 2-19: Responses to questions about policies which stiulate return migration

Finally, the respondents were asked to evaluate the strength of policies dealing with making a country attractive to migrants. With an average score of 1.5, the opinion of the respondents indicated that this degree was rather high, although lagging behind several other issues on international migration. The northern countries especially try to make their country attractive and the effectiveness of this kind of policies was evaluated as rather high, with an average score of 0.5. Again the northern countries had the highest score, namely 0.9 (Figure 2-20).

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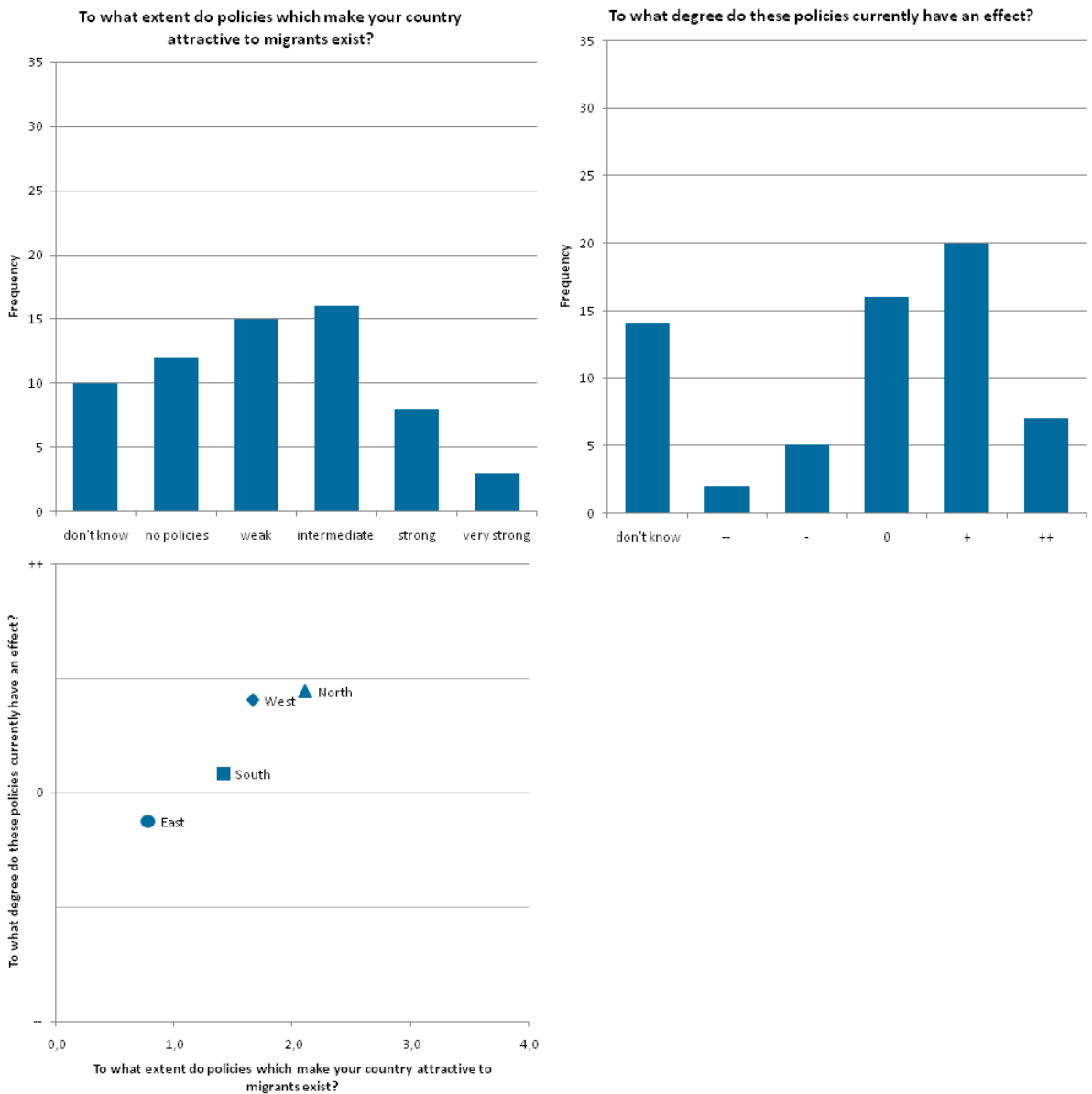
Figure 2-20: Responses to questions about policies which make countries attractive to migrants

An open question dealt with other fields of political interference with respect to the external migration. A very important political topic is the role of employment in the receiving country. This refers to issues as the access to work and the orientation on important economic sectors (which according to the respondent currently are tourism and agriculture). Also the importance of bilateral agreements were stressed by the respondents, for instance those with former colonies. Other fields for political interference that were mentioned were cultural exchange, the role of housing, the health care system, the role of ICT and technology. Also the legal system is very important, e.g. (tolerant) laws on immigration. It is noticed by the respondents that countries in the EU could learn from each other in this respect. Also national differences in the social welfare benefits could impact on immigration. At last, political attention should be given to an unbalanced economic performance between the

countries in the European Union: this has created an East-West flow and the migration flows could even increase due to less tighter labour market regulations.

The open questions of the chapter on external migration dealt with how policies could change in the future. With respect to migration policy in general, a change in orientation was foreseen by the respondents: less incentives to host refugees and more incentives to attract labour migrants. The respondents thought that regulations on entrance of the EU would increase, so that it would become more difficult for immigrants to come legally to the EU. As a result, control on clandestine entrance would become an important political issue. However, not all regulations would lead to restrictions on immigration as specific economic situations might require stimulated entrance of high-skilled workers. Issues such as the stimulation of family reunification and arrival of asylum seekers would depend on the political climate, which in turn would depend on matters such as ethnic tension and the degree of integration. Several respondents suggested that aid projects in countries of origin (outside the EU) could be launched in order to avoid excessive migration. Regarding the acceptance of immigrants, the respondent thought that bilateral agreements between the EU and third world countries could be important. Further, a political priority could entail the attraction of young and educated people. Some respondents pointed tot the tendency to increase controls in order to track down illegal migrants.

Regarding the migration between countries of the EU, no need was signaled to stimulate permanent outmigration, although outmigration of (PhD) students should be encouraged. More political measures were expected relating to the attraction of skilled people. These policies could be enhanced as a result of the ongoing globalization and competition between countries. A stronger tendency was expected for political measures directed at the improvement of living and working conditions for immigrants. Immigration was seen as a powerful instrument to counteract declining populations.

In conclusion, 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 external migration. Also many political actions are developed on specific topics such as the origin of migrants, the type of migrants and the duration of stay. However, it is remarkable that this does not apply to emigration (i.e. stimulation of migrants to go to other EU countries). The focus of policies trying to influence immigration is apparent in all regions of the ESPON space, although (again) the degree of political actions was somewhat higher in northern countries and significantly lower in eastern countries.

2.7   Policy on internal migration

In several countries, regional trends in population growth are clearly divergent: mostly central regions 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. Many internal migrants move from peripheral regions to central regions. To a large extent, this movement involves youngsters moving to the central cities where there are universities and institutions for higher education in combination with an abundance of jobs for starters on the labour market. However, this reinforces the ageing and depopulation of peripheral regions and suggests major economic implications for peripheral regions. For this reason, one would suppose that political actions will be undertaken in order to prevent peripheral regions from shrinking even further or preventing an aggravation of the imbalance of age groups. All in all, internal migration constitutes an important driver behind regional divergence trends.

Notwithstanding the reflections presented above, hardly any political actions are oriented at stimulating migration to other regions within a country. Half of the respondents indicate that no policies exist and only a quarter of the respondents could discern a weak policy in this domain (Figure 2-21). The average score reflected this tendency with a value of 0.8 (Table 2-4). This situation is visible everywhere in the ESPON space, although in the northern countries the strength of policies on this issue is a bit higher. With respect to the effectiveness of these policies, the eastern countries are rather negative while the northern countries are slightly positive.
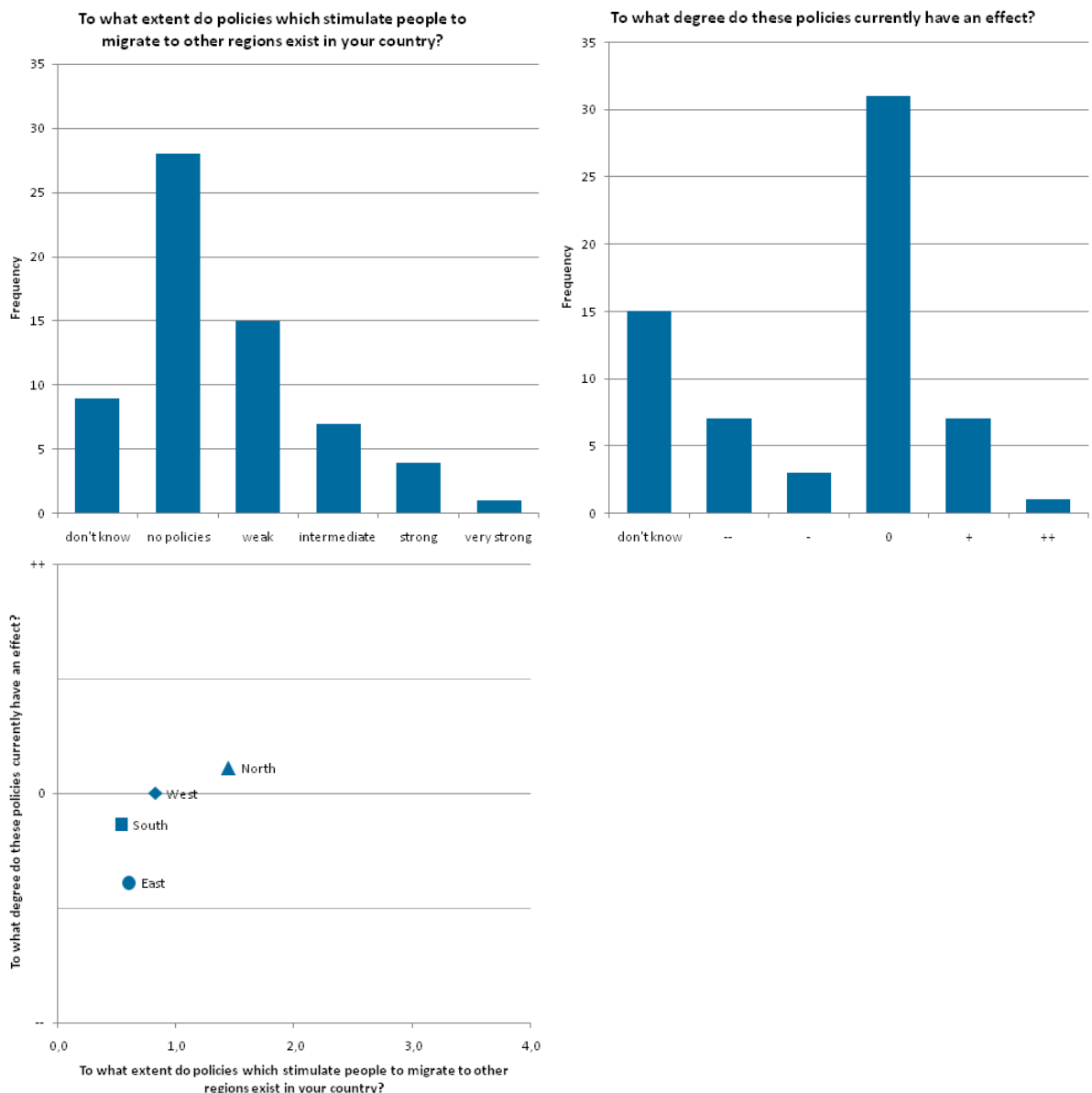
Figure 2-21: Responses to questions about policies which stimulate people to migrate to other regions

Table 2-4: Drivers of internal migration – responses to questions on the existence of policy and its effectiveness

Internal migration driver	Policy existence					Policy effect				
	Total	East	North	South	West	Total	East	North	South	West
stimulate people to migrate to other regions	0.8	0.6	1.4	0.5	0.8	-0.2	-0.8	0.2	-0.3	0.0
create provisions to attract internal migrants	1.0	0.4	1.6	0.8	1.0	0.2	-0.6	0.4	0.2	0.5
stimulate weaker regions	1.9	1.9	2.6	1.5	1.8	0.2	0.3	0.4	-0.2	0.3

With respect to policies oriented at providing provisions in order to attract internal migrants, the picture is almost the same (Figure 2-22). About one third of the respondents indicated that no policies exist and about another one third classify the extent of this kind of policy to be weak to intermediate.

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This led to a rather low average score of 1.0. Again, in the northern countries, the strength of policies trying to create provisions is more prominent than in the other regions of the ESPON space whilst eastern countries foresee a negative effect of this kind of policy.
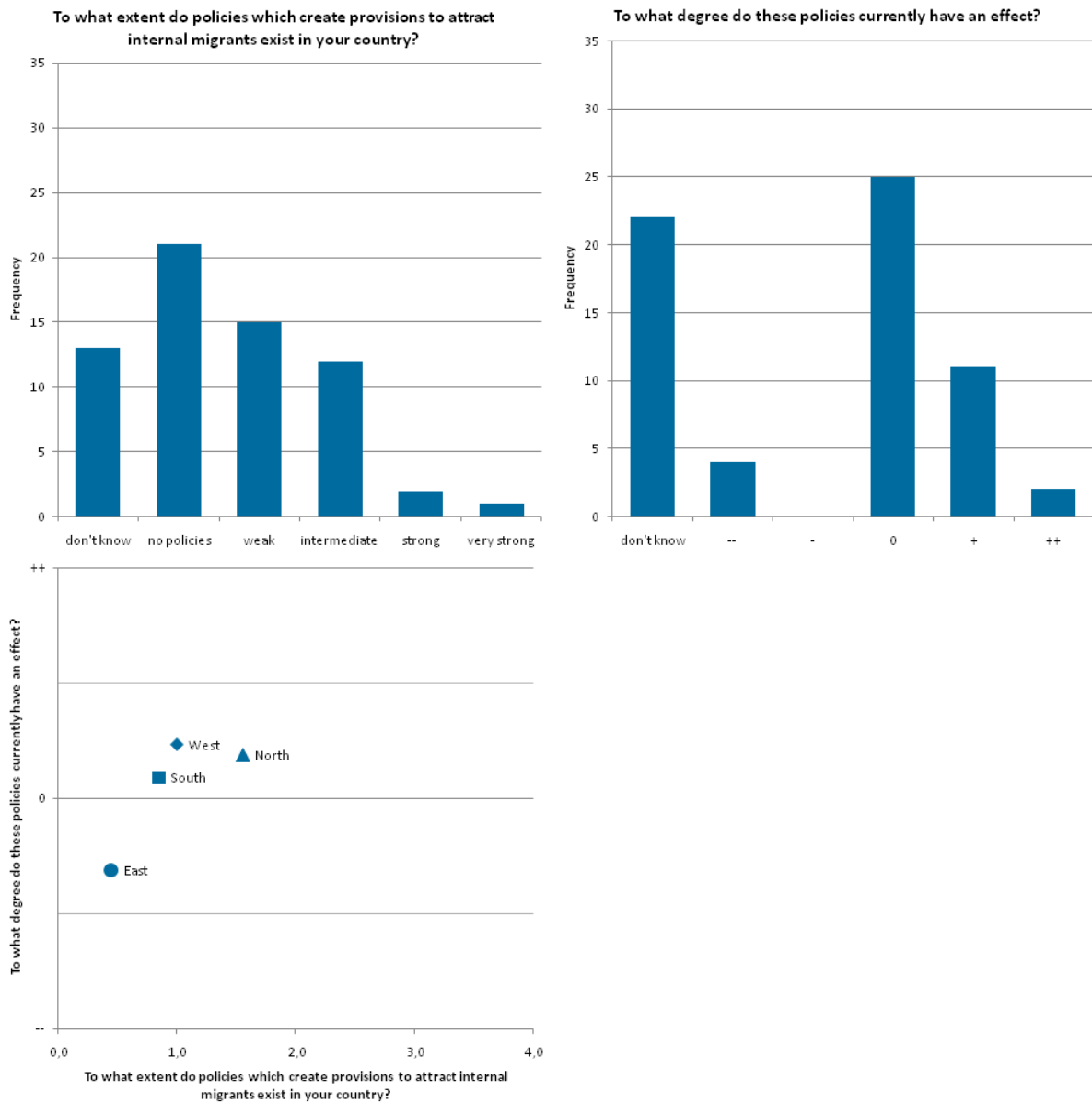
Figure 2-22: Responses to questions about policies which attract internal migrants to regions

Although policies oriented at influencing internal migrants are in general weak, this does not apply to policies oriented at stimulating weaker regions (Figure 2-23). Almost half of the respondents indicate that the degree of this kind of policy could be classified as intermediate. This brought the average score to 1.9 (almost twice as high as the average score on the previous issue). The regional differentials are not so pronounced: in all four groups of regions the degree of this kind of policy is evaluated as being intermediate. In the light of the rather high strength of policies on stimulating weaker regions, it is remarkable that the opinion on the effectiveness on these political actions is rather pessimistic; about one third of the respondents thought it had a positive effect and another one

third thought it had no effect at all. The total score was the same as that on the effectiveness of the other two issues.
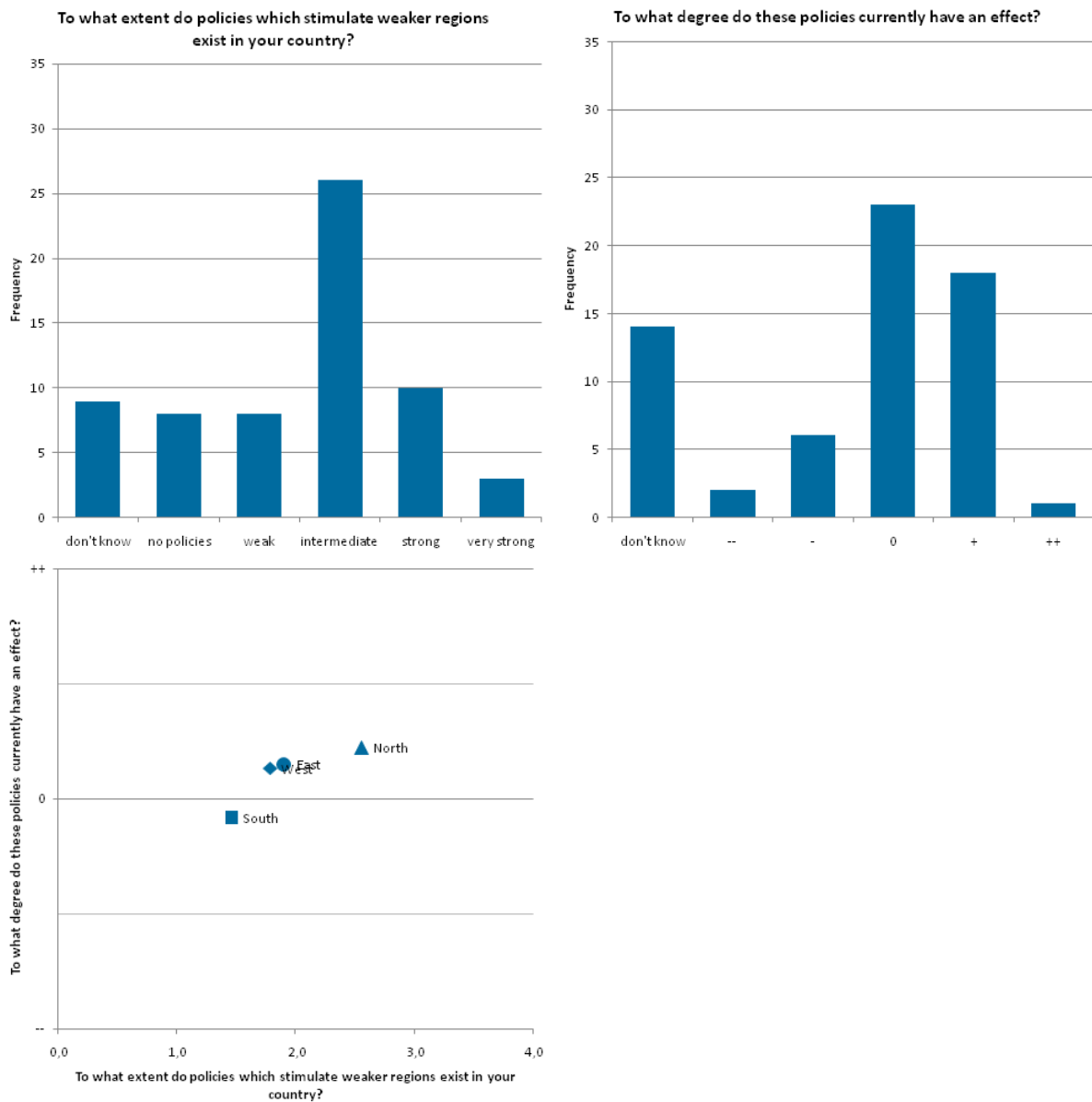
Figure 2-23: Responses to questions about policies which stimulate weaker regions

An open question learnt that other fields of political interference with respect to internal migration can be summarized as follows. The infrastructure was considered as very important, this refers to the quality of the living environment, in particular the mix of nature and culture. Moreover, more political attention could be given to the attractiveness of capitals, the role of suburbanization and education facilities. Migration pattern of young people can be influenced by the presence of universities in certain regions. Also housing conditions are very important, in particular acceptance criteria for social housing. Also the role of transportation was mentioned as a field of political interest, in particular the stimulation of public transport.

The open question on how policies with respect to internal migration could change in the future revealed that there was a clear need to develop more consistent policies on this issue. These policies should take into account that internal migration is driven by economic developments. Moreover, it should be recognised that the direction of migration flows can be influenced by policies on (de)concentration and rural development. In that respect, policies on flexible housing are needed: the current preference to live in an owner occupied house might change into a preference for (non-profit) rental housing. The experts also pointed to the fact that policies on internal migration tended to be local and did not take into account the regional context. However, in the light of shrinking regions, it could be important for local authorities to cooperate in this respect. At the national level, it would be a good idea to improve the quality of life in peripheral regions in order to attract people to these regions. More effective national regional policies are required in this respect and this could be financed by European Structural Funds.

In conclusion, the strength of policies on internal migration is rather modest. However, the number of shrinking regions will grow rapidly in the near future (due to a continuous low level of fertility). This might pose many challenges for mostly peripheral regions. The exodus of youngsters to central regions leads to diminishing levels of all kinds of provisions. It seems that awareness of these problems is growing and this might be reflected in the fact that the strength of policies on stimulating weaker regions is stronger than the strength of policies on other matters with respect to internal migration.

2.8 Policy 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. Trends in labour force participation have been different for males and females in the last decades. The participation rate of women has shown a tremendous rise in several countries in the second half of the twentieth century. The age pattern of activity rates used to be characterized by a pronounced left handed peak, due to comparatively high activity rates for non-married women aged between 20 and 25 and steep falling activity rates as most women withdrew from the labour market upon marriage or childbirth. Since the mid 1970s, drastic changes in female activity rates have taken place in most countries. The impact of having children on economic activity diminished and this led to (steep) rising activity rates at prime working ages. In Scandinavian countries, labour force participation at the middle age is almost as high as that of males.

The age pattern of activity rates of males has also changed over the last decades, although to a lesser extent. At older ages (above 50 years) in many countries a steep fall has been experienced in labour force participation 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 an earlier age. Lately, this trend has been reversed in several countries, due to the rising cost of financing a large part of the working age population who are unemployed. At younger ages, contrasting trends in labour force participation applied. In line with the rising educational attainment of the population over time, youngsters tended to stay longer in the educational system than before, with a negative effect on labour force participation. However, an increased tendency to combine education with working (in small jobs) had a positive effect on labour force participation.

According to the respondents, nowadays the inclination of politicians to increase labour force participation is quite prominent. About one third of the respondents indicated that the degree of policy on this issue is strong to very strong, and almost half of the respondents classified it as being intermediate (Table 2-5). Round half of the respondents thought this kind of policy has a positive effect on labour force participation, although another quarter thought it has no effect (Figure 2-24). This leads to an average score of 2.3. The tendency of policy to raise labour force participation is apparent in all regions of the ESPON space, although the strongest degree of policy applies to the northern countries. With respect to the effectiveness, the respondents were rather optimistic with half of them thinking it had a positive effect. However, in the eastern countries, the respondents expected no effect of this kind of policy. Again, the respondents of the northern regions were the most positive.

Table 2-5: Drivers of labour force participation – responses to questions on the existence of policy and its effectiveness

Labour force participation drivers	Policy existence					Policy effect				
	Total	East	North	South	West	Total	East	North	South	West
try to raise participation	2.3	1.9	3.0	2.1	2.4	0.6	0.0	1.1	0.6	0.6
try to raise participation of young people	2.0	1.5	2.4	1.7	2.2	0.2	-0.1	0.4	0.1	0.3
try to raise participation of women	2.1	1.6	3.0	2.1	2.1	0.6	-0.2	1.4	0.4	0.8
try to raise participation of the elderly	1.5	0.9	2.3	1.4	1.5	0.0	-0.5	0.4	0.0	-0.2
address the fulltime/part-time/self employment discourse	1.8	1.0	2.4	1.7	2.0	0.3	-0.3	0.7	0.3	0.5
try to increase labour productivity	1.9	1.2	2.6	2.0	1.9	0.4	-0.3	0.9	0.4	0.5
invest in the educational system	2.4	1.7	3.2	1.8	2.7	0.5	0.0	1.1	0.0	0.8
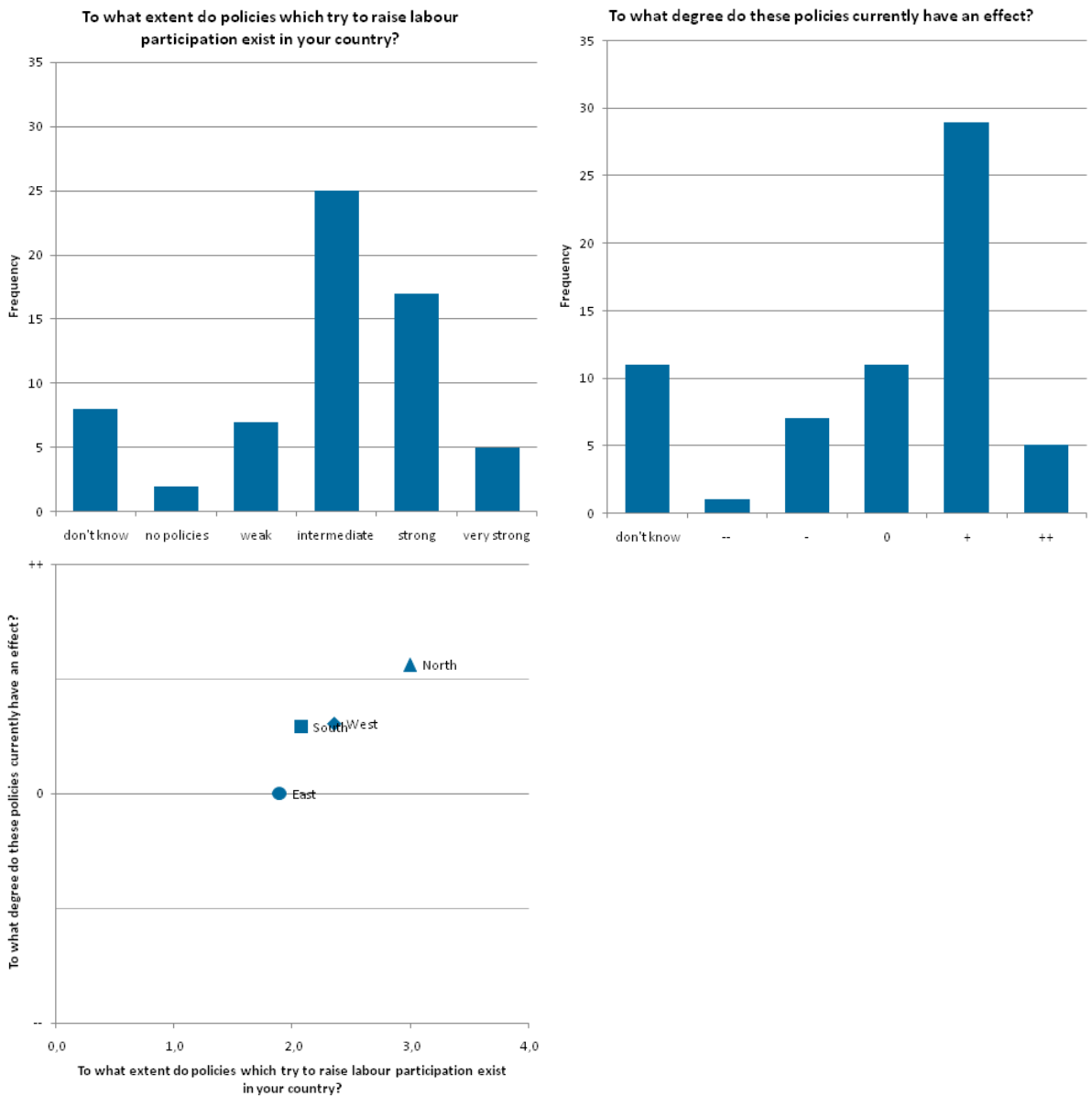
Figure 2-24: Responses to questions about policies which try to raise labour participation

Also the strength of policies aiming to raise labour force participation of young people is quite high (Figure 2-25). The general picture reflects that of policies for raising female participation, although the northern countries are less keen on it than on raising participation of youngsters. The opinion about the effectiveness of raising participation of young people is less positive than the opinion about the effectiveness of raising female participation. With an average score of 0.2, the respondents hardly expect a positive effect.

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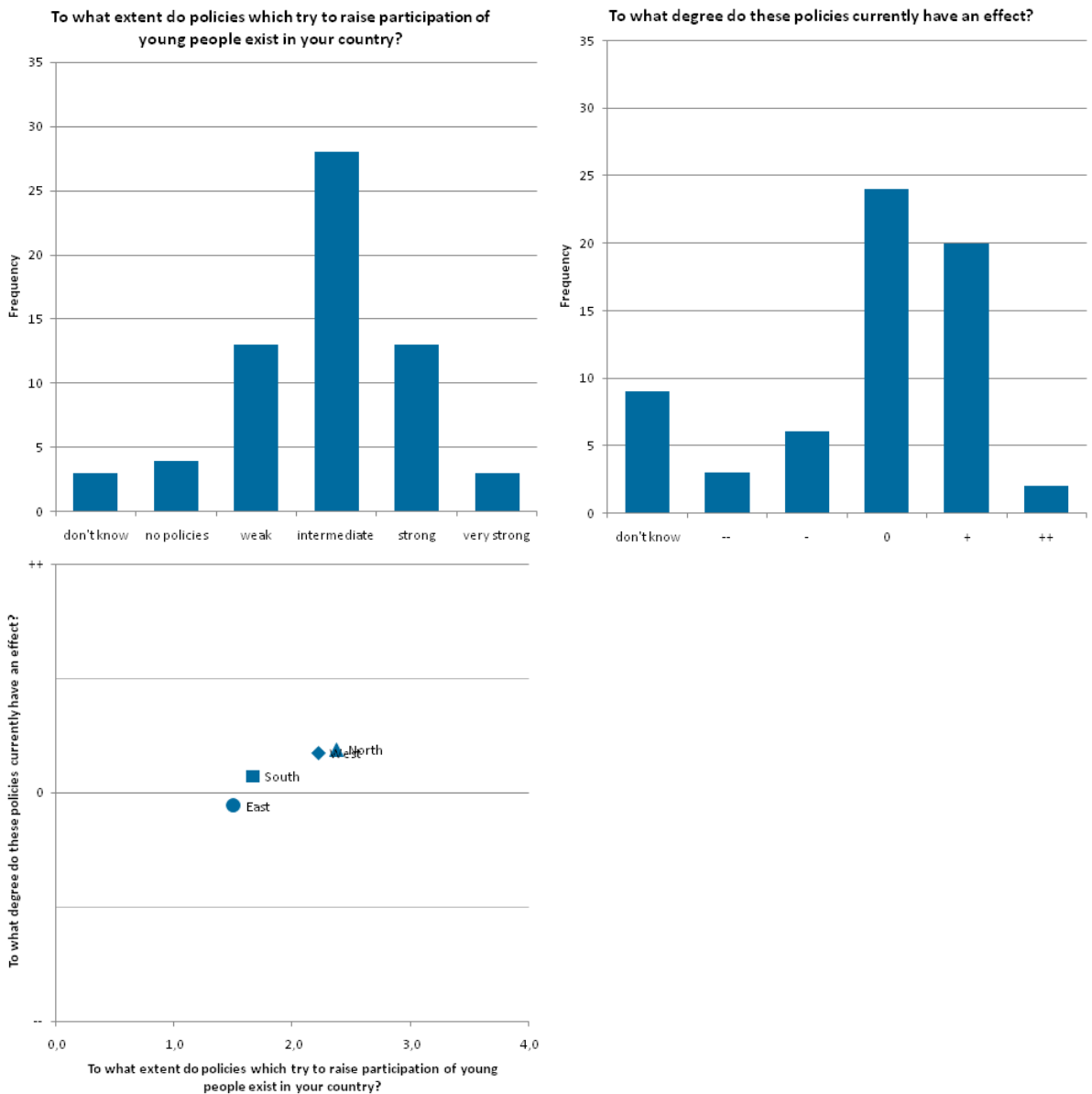
Figure 2-25: Responses to questions about policies which try to raise labour participation

As mentioned above, the increase of the labour force was to a large extent due to the rising participation of women. Nowadays, however, the rate of female participation is already quite high in several countries, so a further rise will be problematic although there are enough chances to increase the labour force in terms of full-time equivalents by converting part-time working into full-time working. The political issue of raising female participation is evaluated as being quite important: about one third of the respondents indicated that the degree of policy on this issue is intermediate and about one third indicate it is strong to very strong (Figure 2-26). This leads to an average score of 2.0. Although the issue of raising female participation is prominent in all regions of Europe, the degree of this kind of policy is by far the strongest in the northern countries, while the eastern countries have a rather low degree. With respect to the effectiveness about half of the respondents think it is positive

to very positive. This brings the total score to 0.6; with the northern countries being by far the most positive on it.
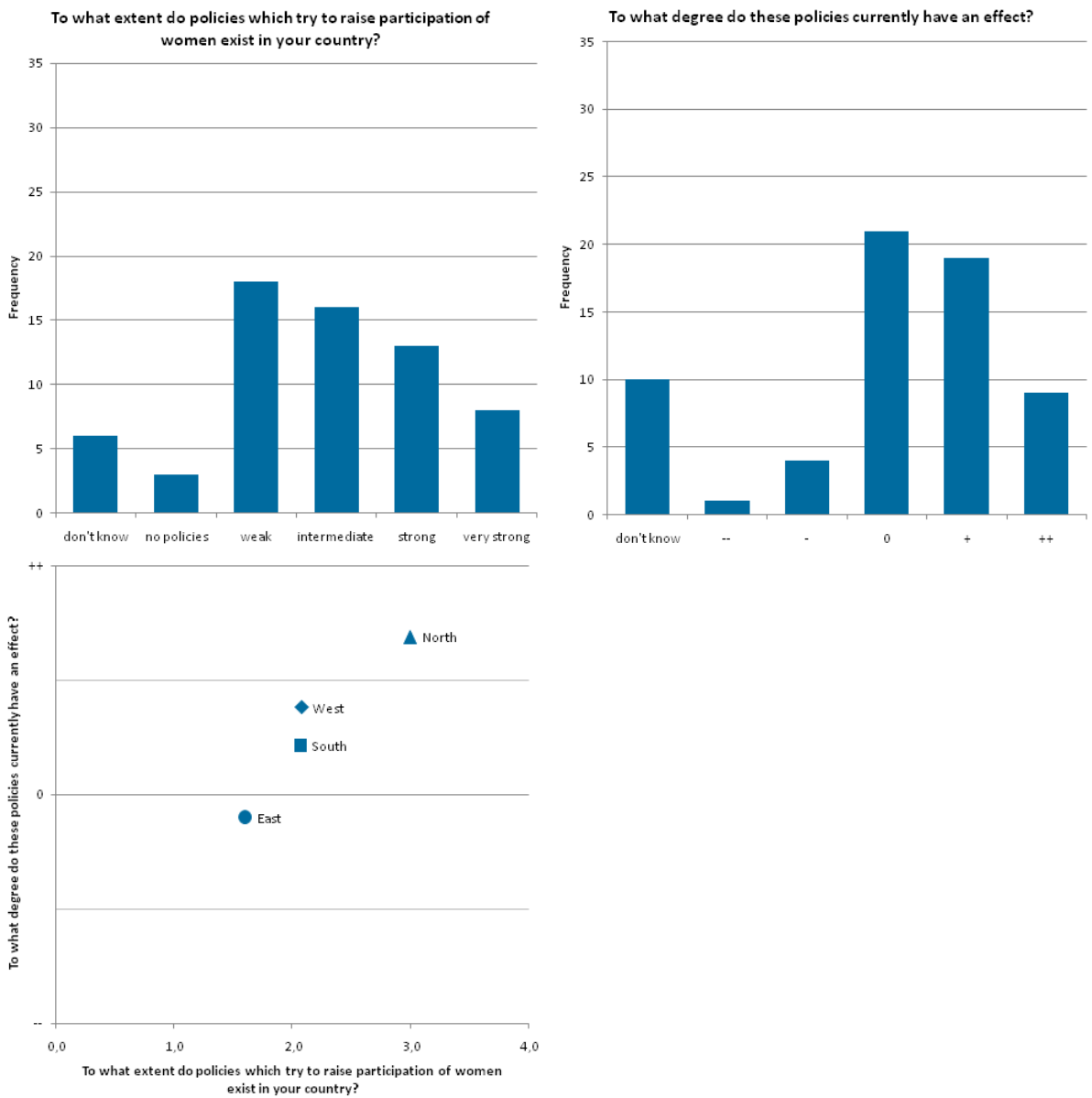
Figure 2-26: Responses to questions about policies which try to raise the labour participation of women

The strength of policies devoted to raising the participation of older people seems to be much lower, than that of raising participation of women and youngsters (Figure 2-27). The average score of 1.5 is significantly lower than that of the previous items. The eastern countries in particular lag behind in the strength of policies for raising the participation amongst the elderly. The general opinion on the effectiveness of this kind of policy is rather negative: no effect is expected considering the average score of 0; the eastern countries are skeptical and expect a negative effect.
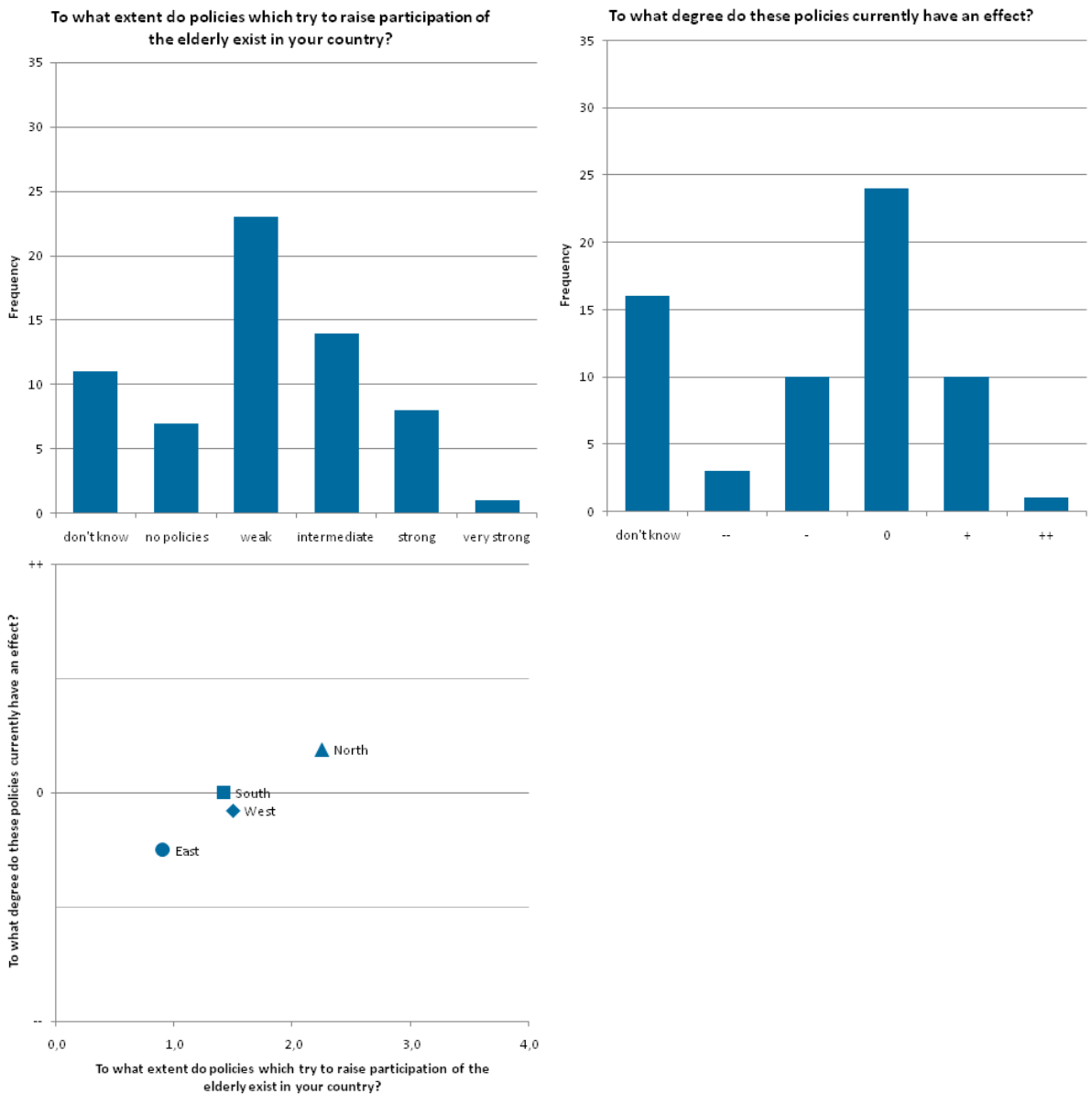
Figure 2-27: Responses to questions about policies which try to raise the labour participation of older people

The strength of policies addressing the full-time/part-time/self employment discourse is rather high, with an average score of 1.8 (Figure 2-28). Especially in the northern countries, this discourse is a matter of political interference. In the eastern countries, the strength of policies on this matter is rather low. A rather modest effect of this kind of policies is expected by the respondents, who gave it an average score of 0.3.
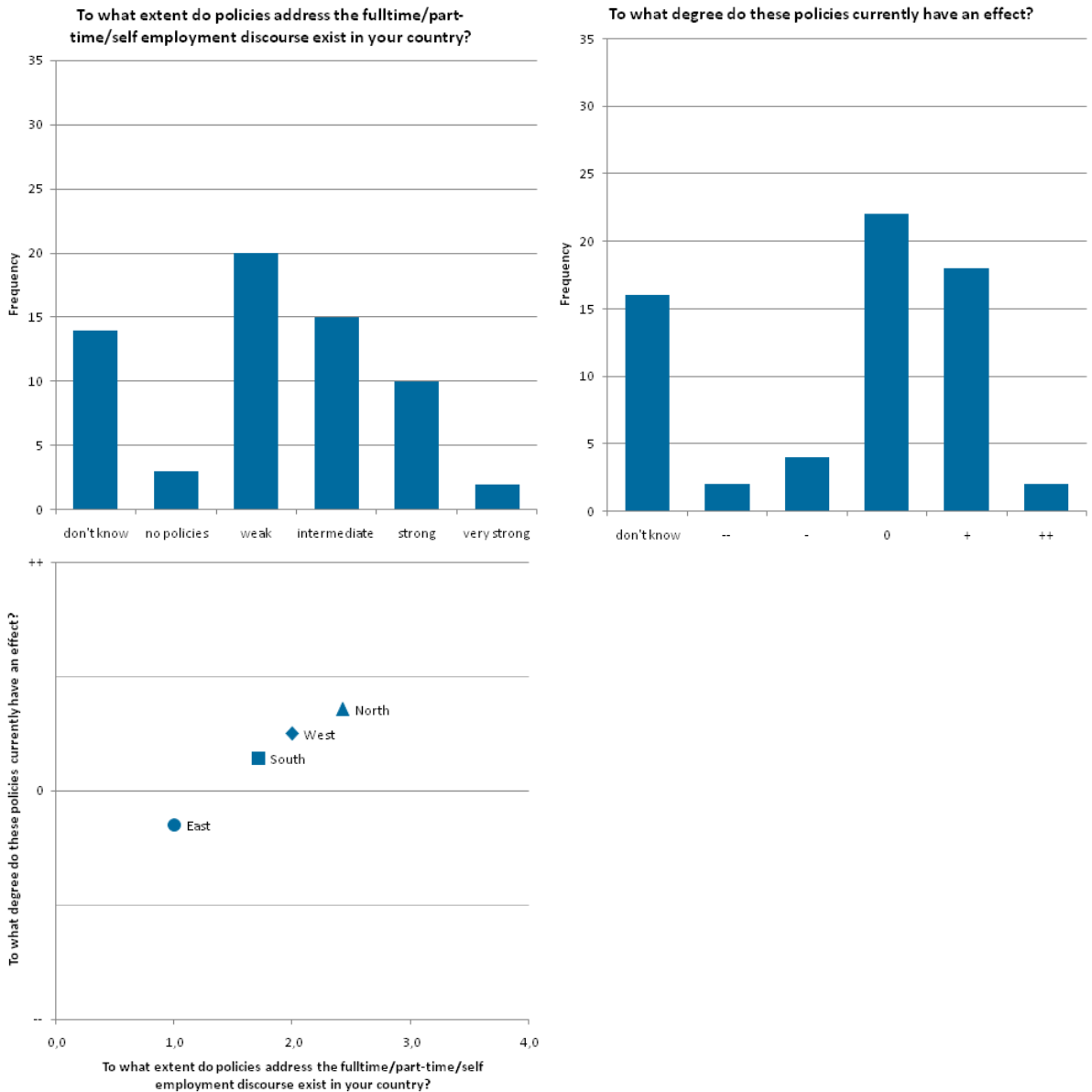
Figure 2-28: Responses to questions about policies which address full time/part time/self employment issues

Not only is the number of persons in the labour force important, but also their productivity. Policies might be oriented to raising labour force productivity in order to stimulate the competitiveness of their country. According to the respondents (Figure 2-29), the strength of policies on these matters is significant, with an average score of 1.9. In the northern countries especially, the strength is judged to be quite high. The opinion on the effectiveness is also rather positive, notably in the northern countries with an average score of 0.9.
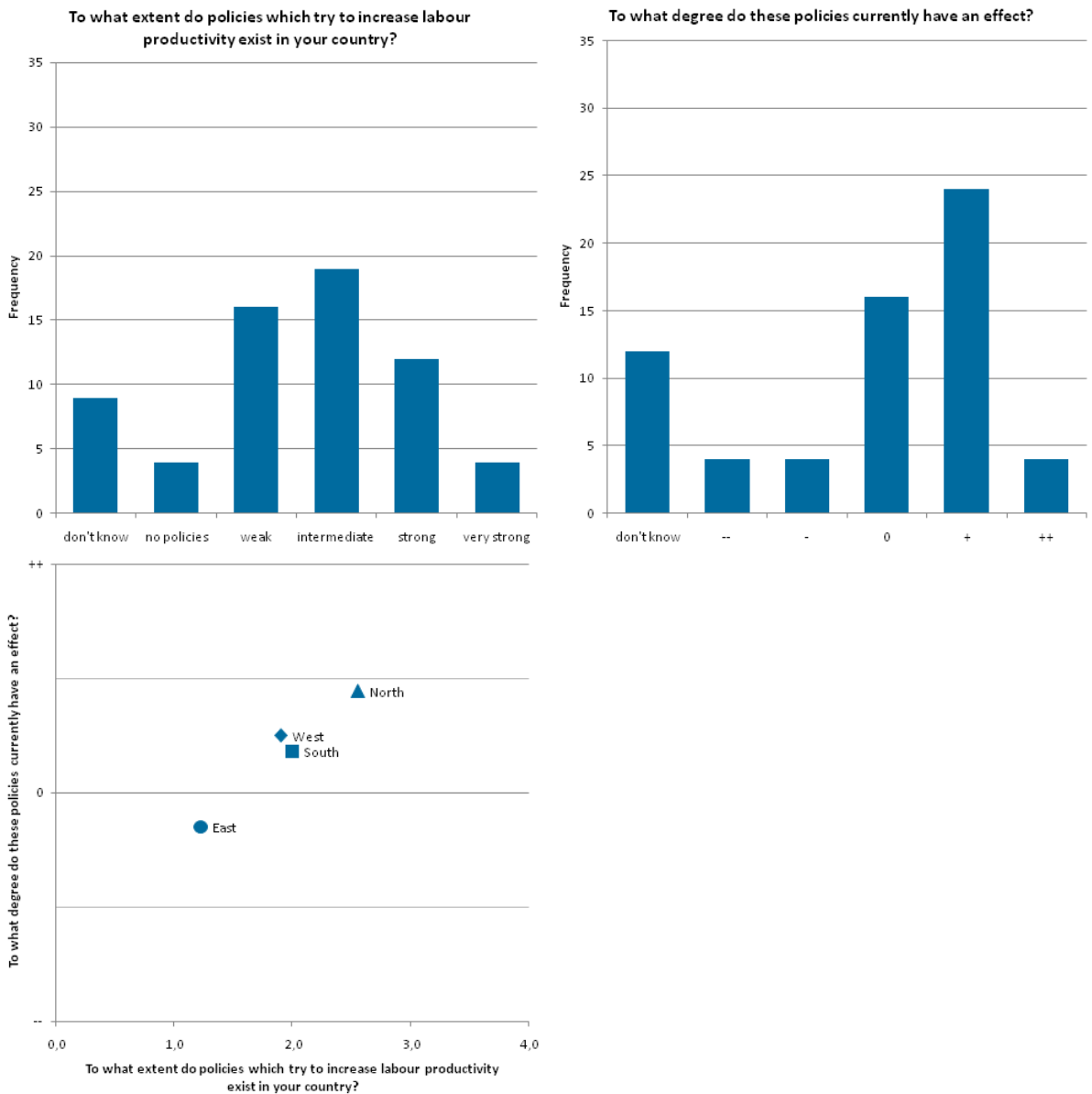
Figure 2-29: Responses to questions about policies which try to raise labour productivity

In order to meet the demands of industries and all kinds of organizations in the service sector, the employees must possess the appropriate skills. In order to warrant this, investments in the educational system are necessary. The volume of policies on this is impressive. According to the respondents, the average strength of policies is very high with an average score of 2.4 (Figure 2-30). The northern countries, but also the Western countries, show a high strength of policy activity. The effectiveness is also considered to be rather high, with an average score of 0.5. However, a clear distinction is visible between the northern and western countries, where the respondents see a rather positive effect, and the eastern and southern countries where no effect is expected by the respondents.
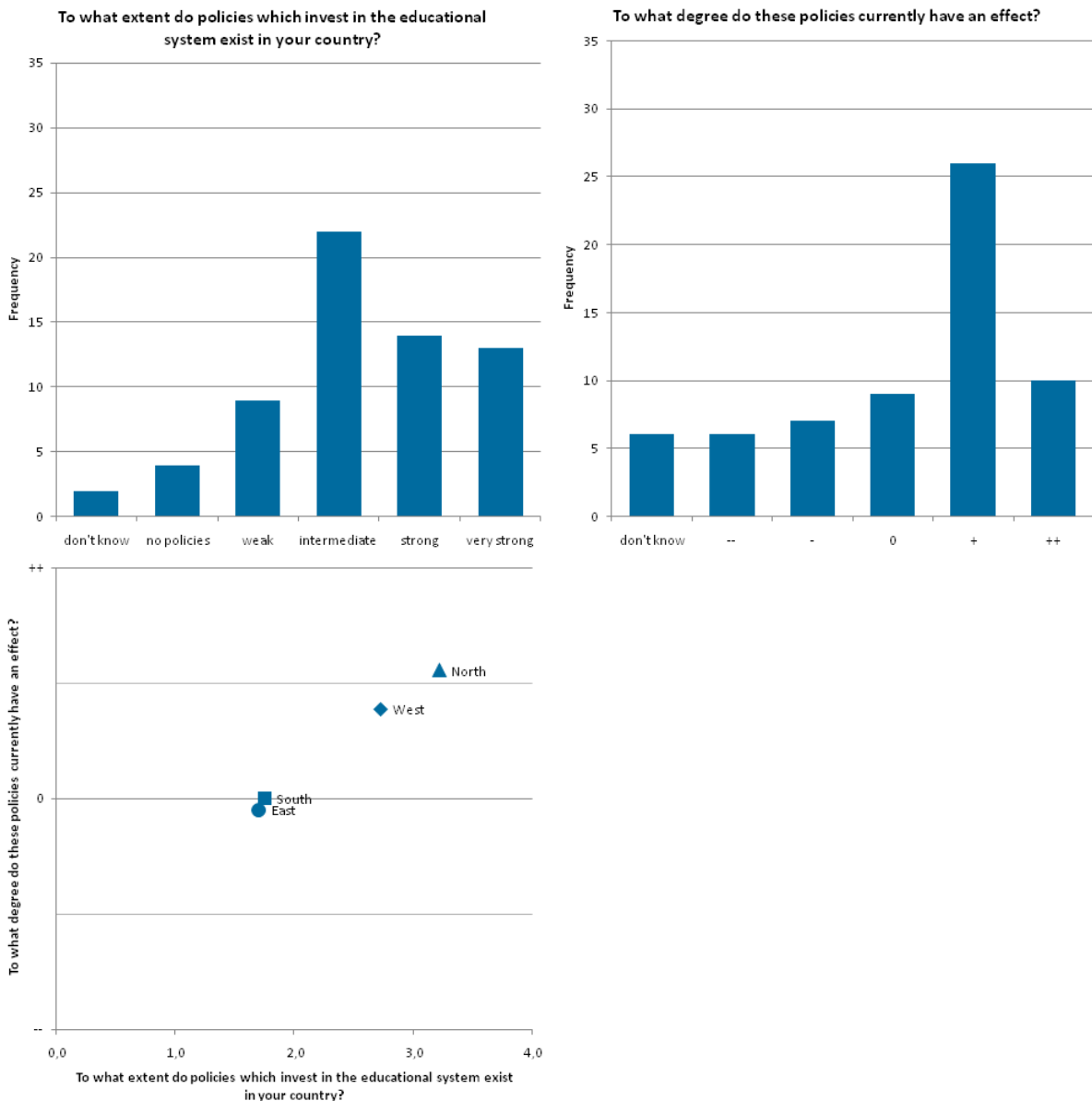
Figure 2-30: Responses to questions about policies which invest in education

According to the respondents a very important field of political interest was the educational system. The respondents mentioned that in particular more attention should be given to ICT and technology.

With respect to the open question on how policies with respect to labour market participation attracting internal migration could change in the future, the respondents expected that existing policies would be strengthened in order to achieve a better use of the potential labour force. This refers especially to unused reserves for the labour market such as women, older persons and long-duration sick people. Also the revenues of current labour force could be increased by training programmes. The respondents expected a clear need to provide more professional and specialised training. Policies should concentrate especially on training youngsters. With regard to female participation, the current focus of policy to promote the (re)entrance of women (who quit working after becoming mothers) into the labour market would be become less strong. Future policies would pay more attention to the

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combination of having a professional career and being able to rear children. When younger generations of women arrive on the labour market, they should be able to make use of child care facilities. Regarding elderly persons, policies would get more focussed on trying to delay the exit of elder workers from the labour market. In this way, the pressures on public social security systems could be relieved. In this respect, also the arrival of young migrants could make a contribution. The importance of the 'silver economy' will rise in the future, and this will require policies for a flexible labour market. Companies should be encouraged to create part-time as well as full-time jobs.

In conclusion, it can be stated that a lot of political interference concerns the matter of raising labour force participation. This active attitude concerns not only labour force participation in general, but also participation of several groups that used to have a rather weak position in the labour market, such as women in the phase of raising children combining education with small jobs and elderly people used to leaving the labour market due to early retirement. However, the interest in policy goes even further and extends to issues such as the discourse on working full-time or part-time or being self employed, increasing labour productivity and the level of investment in the education system. Investment in the educational system is considered to be a particular issue that receives a lot of political attention. In general, in the northern countries, the level of political interference is the highest and in the eastern countries it is the lowest. With respect to the effectiveness of this policy, in general a positive effect is stated by the respondent, although on the matter of raising the participation of elderly persons, the respondents were rather skeptical as they expected no effect of political measures. Especially positive effects were expected on matters of increasing labour participation in general, raising participation of women and investments in the educational system.

With respect to the effectiveness of this policy, in general a positive effect is stated by the respondent, although on the matter of raising the participation of elderly persons the respondents were rather sceptical as they expected no effect of the political measures. Especially positive effects were expected on matters of raising labour participation in general, raising participation of women and investments in the educational system.

3. MORTALITY SCENARIOS

3.1 Introduction

In this chapter of the report, we describe the methods used to develop scenarios for mortality and the outcomes of the analysis. Each mortality scenario produces the mortality inputs needed for the MULTIPOLES projection model (see Deliverable D4, Report on the multilevel scenario model). The first set of methods is used to estimate historical trends in mortality rates by country and region for the 1990s and 2000s. The second set of methods is used to project mortality rates into the future by five-year periods from 2010-15 to 2045-50. For the period 2005-10, a mix of estimated and modelled mortality rates are used. In developing the projected mortality rates for each scenario, we show how the framework explained in Chapter 1 of the report is made operational for mortality.

The mortality rates which are developed in this chapter of the report have the following properties:

- They are annual rates that use deaths as their numerator and average populations for the year as their denominator, reported as deaths per thousand.
- The average population for the year is normally computed as half of the sum of the January 1 populations of successive years, except where only the mid-interval population is available.
- The age-time plan is the period-age space (Figure 3-1). The mortality rates for period-ages are converted into period-cohort estimates in the MULTIPOLES projection model.
- The time series of observed regional mortality rates refers to calendar years 1991-2006, when a fairly full set of data on country mortality by age and sex and regional deaths by sex is available.
- The time series of projected mortality rates are annual averages for five-year periods, 2005-10 to 2045-2050.

age

x+2

x+1

Period-cohort space

Period-age space

x

t   t+1   t   t+1   time
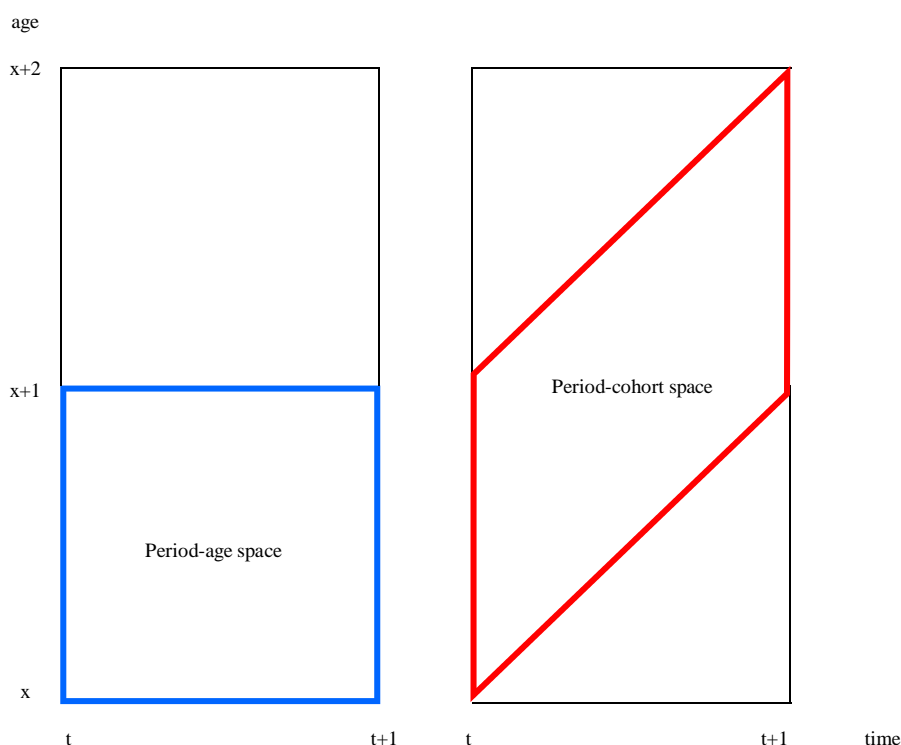
Figure 3-1: Age-time plans for recording deaths and mortality rates

3.2 Data

3.2.1   Data on deaths and populations

Data for deaths and populations by five-year ages from 0-4 to 100+ for persons, males and females were assembled for ESPON countries (31) and NUTS2 regions (287) from a DEMIFER database constructed by the Nordregio Institute, drawing on previous ESPON projects and data available directly from Eurostat. This was organized year by year in sheets from 1990 to 2007. From these sheets were constructed time series of age-specific death rates (ASDRs) for each age group 0-4 to 100+. These data were not complete in several respects. Firstly, the year 1990 was one of transition for many countries and their statistical systems could not deliver, years later, the required data to Eurostat. Secondly, many population and mortality series did not contain a full set of data disaggregated by age to 100+. At the region scale, most series had a final age group of 85+ though data for five-year ages to 95-99 and 100+ were available at national scale. Thirdly, data on mortality were not available for all countries and regions for 2007 at the time of data assembly (July-November 2009). Fourthly, changes in the administrative units for which demographic data were reported occurred in many countries and, in addition, Eurostat revised its NUTS2 regionalization of those administrative units several times during the 1990-2007 period. However, Eurostat does not require National Statistical Offices to revise their time series backward to take account of revisions in NUTS2 regional boundaries and the data are therefore often absent.

One of the data deficiencies was a lack of mortality and population information for ages 85-89, 90-94, 95-99 and 100+. Why did we decide to extend the age groups to 100+? The basic reason is that European populations are living longer. Table 3-1 shows what applying the average decline in ASDRs for 2001-2006 will produce in the period to 2050. These life expectancies imply that by 2050 about half of birth cohorts will survive to ages 90 and over. At these ages, people will have substantial needs for social and health care.

Table 3-1: Life expectancies for Europe, based on a modelled decrease of mortality rates converging on 2.7% per annum in 2025-30

Gender	2005-10	2010-15	2015-20	2020-25	2025-30	2030-35	2035-40	2040-45	2045-50
Male	76.2	77.6	79.1	80.6	82.2	83.8	85.4	87.0	88.6
Female	82.2	83.3	84.4	85.5	86.8	88.0	89.3	90.6	91.9

Note: Europe is defined as the 27 European Union member states, the 3 European Economic Area States plus Switzerland. Life expectancies are years of life expected at age 0, using the projected mortality rates for the period. Note that cohort life expectancies will be higher.

How did we fill in the data gaps? We used national shares of the population beyond the last age for which regional information was provided to decompose regional last age totals (e.g. normally 95+, 90+, 85+ or 80+ but occasionally 75+ or 70+ for extra-Europe NUTS2 regions such as the Départéments d'Outre Mer (DOM) of France. Where we did not have population or deaths information for the 2006 NUTS2 revision used in the project for a particular year, we used regional data for a later year adjusted to national data for the year with missing data. In some cases, a large body of data was missing for a country and we then used data from the country's National Statistical Office to estimate the missing information for NUTS2 regions from smaller administrative units which could be aggregated to those regions. One example of missing data in Eurostat records was for NUTS2 regions in the United Kingdom (1990-2007). The reason for the UK gap was that there was a small mismatch between local administrative areas (LAU1 in the NUTS scheme) and NUTS2 regions in Scotland. The Isle of Arran, part of the Scottish Council Area of North Ayrshire, was incorrectly placed in the NUTS2 region Highlands and Islands rather than South Western Scotland. We assembled a full set of population and deaths data for NUTS2 regions for the United Kingdom and supplied them, with the permission of the Office for National Statistics, to Eurostat.

3.2.2 *Mortality rates for countries*

Mortality rates were computed from a combination of data from the Human Mortality Database designed for the study of mortality at the oldest ages (HMD, 2009) for 25 countries and from Eurostat for the other six countries (Eurostat, 2009). Figure 3-2 displays the age-specific mortality rates for the 31 countries for 2006. There is considerable variation across Europe in the mortality rate schedules between Iceland with the best profile and Latvia with the worst. The smallest countries (Malta and Liechtenstein) show jagged profiles because of their small populations (408 and 35 thousand only).

The schedules show the universal decline from high rates in the 0-4 age group to minima in the 5-9 or 10-14 age group, followed by an exponential rise in mortality to the last two ages, interrupted by the rise in rates at ages 15-19 and 20-24. At these ages, young people take risks which raise their mortality above the biologically determined exponential trend. The slowdown in the exponential rise in the last two ages is artificial because both mortality rates are assumed to be equal to the pooled 95+ rate, a decision forced by very erratic fluctuations in the rates estimated separately. There is evidence, however, that the rise in mortality at the oldest ages does slow down at the oldest ages (Yi and Vaupel, 2003). It is likely that the departure of the Hungary schedule at ages above 85 is due to some data errors rather than a unique success in holding down the mortality of the oldest old.
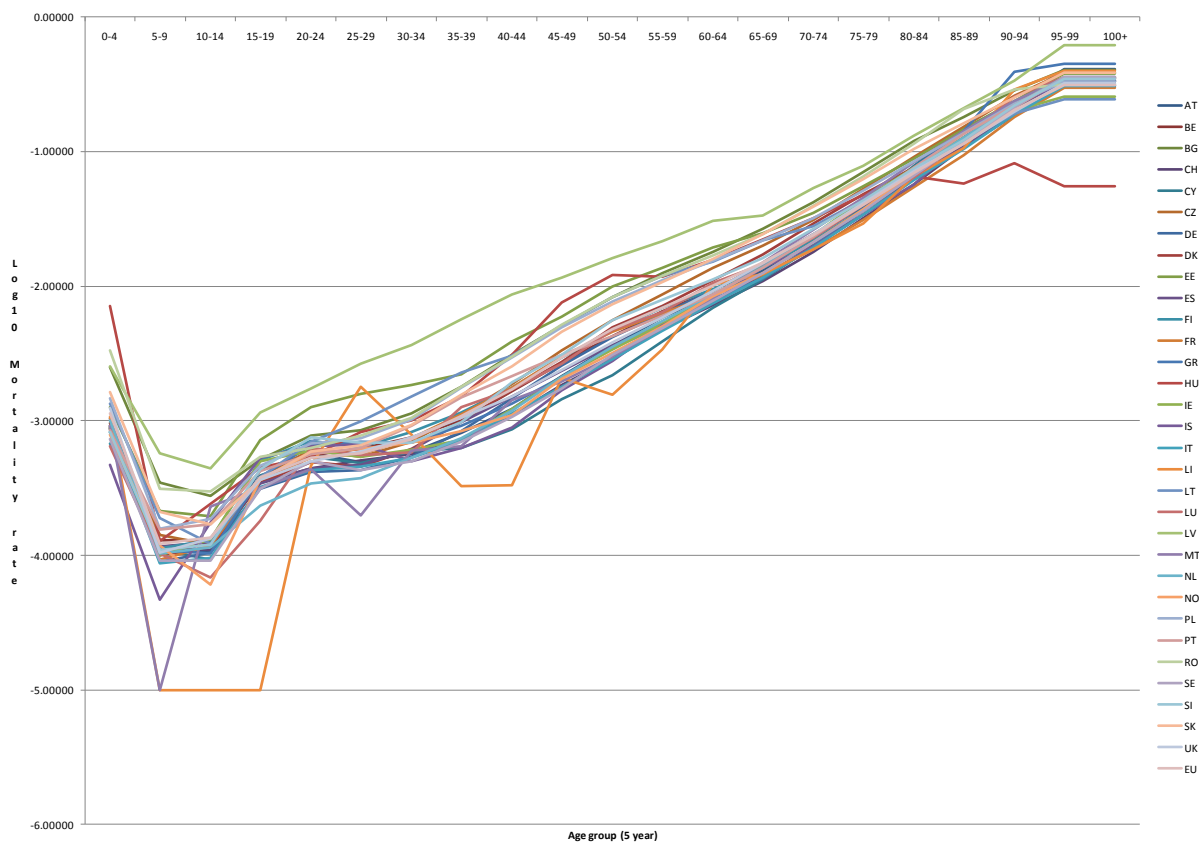
Figure 3-2: Mortality rates for countries, persons, 2006 by age group (log$_{10}$ mortality rates)

Notes: The country codes are as follows – AT=Austria, BE=Belgium, BG=Bulgaria, CH=Switzerland, CY=Cyprus, CZ=Czech Republic, DE=Germany, DK=Denmark, EE=Estonia, ES=Spain, FI=Finland, FR=France, GR=Greece, HU=Hungary, IE=Ireland, IS=Iceland, IT=Italy, LI=Liechtenstein, LT=Lithuania, LU=Luxembourg, LV=Latvia, MT=Malta, NL=Netherlands, NO=Norway, PL=Poland, PT=Portugal, RO=Romania, SE=Sweden, SI=Slovenia, SK=Slovakia, UK=United Kingdom

3.2.3 Mortality rates for HMD Europe and ESPON Europe

The mortality scenarios are contained in the following workbook files: *DEMIFER Mortality ScenariosFinal.xlsx* and *DEMIFER Mortality ScenariosFinal.xls*. These work books contain the

sheets outlined in Table 3-2, which are linked to perform the necessary computations of mortality rates under the four scenarios plus a trend projection of mortality.

Table 3-2: Structure of the DEMIFER Mortality Scenarios database – analysis of the 1991-2006 time series of country and region mortality data

Sheet in Workbook	Contents
ESPON Pop Shares	Summaries for 25 countries of older population numbers and shares
ESPON ASDRs	Summaries for 25 countries of age-sex death rates for older ages used in estimating deaths in countries or regions where information is missing.
Country Populations 1991-2007	January 1 populations for all 31 countries in the ESPON definition of the European space
Country Pop Shares	Populations and population shares for the older age groups used in estimating the older populations for regions where information is missing.
Country Deaths 1991-2006	Country deaths by age and sex for the years where there was complete information at time of assembly (July-October 2009).
Country ASDRs 1991-2006	Country age-sex death rates computed using the *Country Deaths 1991-2006* and average populations from successive January 1 *Country Populations 1991-2007*.
Europe ASDRs 1991-2010	Europe age-sex deaths rates for 31 countries combined for 1991-2006 with model extrapolation to period 2005-2010.
Europe ASDRs Transposed	The contents of the *Europe ASDRs 1991-2010* sheet transposed for later analysis.
Europe ASDR % Change 1991-2010	The percentage change from one year to the next for each age and sex for Europe for 1991-2006 (estimated) and 2005-10 (modelled).
Europe ASDR Scenario Declines	The annual percentage change for each age and sex for Europe for five year intervals 2005-10 to 2045-50 (modelled) for scenarios: TRE, GSE, EME, LSE, CME.
Europe ASDRs 2010-50	The age-sex death rates for Europe projected for five year intervals for each of the scenarios: TRE, GSE, EME, LSE, CME.
Europe Life Tables 2010-50	Abridged life tables for five year intervals for Europe for each of the scenarios: TRE, GSE, EME, LSE, CME.
Regional Deaths 1990-2007	NUTS2 Regional totals for deaths for 1990-2007 (1991-2006 are complete for persons, 1990 and 2007 partially complete).
Reg Deaths Age-Sex 2003-2006	NUTS2 Regional deaths by age and sex for 2003-2006 (compiled by Dorota Kupiszewska from the latest Eurostat statistics).
Reg ASDRs Age-Sex 2003-2006	NUTS2 Regional age-sex death rates for 2003-2006 using *Reg Deaths Age-Sex 2003-2006* and *Reg MY Pops Age-Sex 2003-2006* sheets (from Dorota Kupiszewska)
Regional Pops Age-Sex 1990-2007	NUTS2 Regional populations (1 January) by age and sex for 1990-2007 (1991-2006 are complete for persons, 1990 and 2007 partially complete).
Reg MY Pops Age-Sex 2003-2006	NUTS2 Regional populations (mid-year=30 June/1 July) for 2003-2006 (compiled by Dorota Kupiszewska from the latest Eurostat statistics).
Indirect SMR Computations	Indirect Standardized Mortality Rate computations using Europe Standard of ASDRs and NUTS2 Regional Populations
Indirect SMRs 1991-2006-2050	Indirect SMRs from *Indirect SMR Computations* sheet assembled as a time series and projected from 2005-2050 using a model.
Reg ASDRs EU mod 1991-2006	NUTS2 Regional age-sex death rates (as proportions) from model using Europe ASDRs and Regional Indirect SMRs by sex.
Reg ASDRspt EU mod 1991-2006	NUTS2 Regional age-sex death rates (per 1000 population) from model using Europe ASDRs and Regional Indirect SMRs by sex.

ESPON Pop Shares. This sheet contains data on summaries of all country populations for the older age groups, which were taken from the Country Populations 1991-2007. The Country Populations 1991-2007 are a sum for 25 of the 31 countries defined as part of the ESPON space (the 27 EU member states, the 3 EEA member states and Switzerland). These 25 countries were those for which good population data were available, mainly from the Human Mortality Database (HMD) (http://www.mortality.org/), a joint project of the Department of Demography of the University of California at Berkeley and Max Planck Institute for Demographic Research in Rostock, Germany. The population data for the 25 countries are used to compute the shares that populations in five age groups make up of the 80+, 85+, 90+ and 95+ populations for persons, males and females. These shares are used later to help disaggregate the population of the last age group provided for a country or a region population in the DEMIFER or Eurostat databases. The assumption is made where necessary that the country population distribution at the oldest ages is the same as that for the whole of Europe (ESPON definition).

ESPON ASDRS. This sheet contains the Age Specific Mortality Rates (ASMRs) computed for the 25 ESPON countries with the best information, for older age groups (80-84 to 100+) for use in estimating deaths in older ages for countries and regions when this missing.

Country Populations 1991-2007. The January 1 populations from 1991 to 2007 of all 31 ESPON countries have been extracted from three sources: the DEMIFER project initial database (mainly from Eurostat files), more recent Eurostat demographic data and HMD database. On 1 January 1991, the total population of Europe (ESPON 31 definition) was 483 millions. On 1 January 2007, the Europe population was 506 millions. The European population thus grew by a mere 4.6% over 17 years or only 0.27% per annum.

Country Pop Shares. The shares in each of the older ages are computed for countries for future use in estimating the distribution of regional populations across older ages. This has been done for a sequence of old age sums: 75+, 80+, 85+, 90+, 95+ and, for some countries, 60+ and 65+. When these shares are used to estimate the older regional populations, the assumption is made that the national share applied in each constituent region. Why was this done? The goal was to estimate populations and project them to old ages extending to 100+ because improving survival chances for European populations meant that the population numbers in older ages would grow substantially in the future. It is now common practice among national statistical offices to project populations to ages up to and including 100+. We extend this practice to regional populations.

Country Deaths 1991-2006. This sheet holds the deaths by five-year ages from 0-4 to 95-99 together those at ages 100 and over. We did seek to assemble mortality information for additional years, for 1990, 2007 and 2008 but decided that the gaps were too great to bridge. The 2007 and 2008 data will

become available to Eurostat soon and so the database can be extended in future. From this information we proceed to compute Country ASDRs and Europe ASDRs based on the sums of country deaths and populations by age and sex. We then measure the annual percentage changes in Europe ASDRs for each year from 1991-2006. Focussing on the period 2001-2006, when the data series is most reliable, we average the rates of ASDR change and then compose the alternative rates of change for the different scenarios.

3.3 Theoretical aspects of mortality change

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. There is a huge literature, for example, that establishes the links between socio-economic deprivation, poor health and premature mortality (The Marmot Review, 2010; Commission on Social Determinants of Health, 2008).

In Table 3-3, we set out the factors affecting health, following on from the discussions in Chapter 2. The first four rows of the table list the lifestyle 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). But smoking prevalence is linked to social class and cultural history. Since the links between smoking and lung cancer were established by the longitudinal cohort study of doctors in the 1950s by Doll and Peto, national health departments have run campaigns to persuade smokers to give up smoking and non-smokers not to start and national Parliaments have increased taxes on tobacco and steadily restricted the places where smoking can be carried out. The health message has been received earliest by the higher social classes so that a social gradient in smoking prevalence has emerged. Because the mix of social classes varies across regions, regional gradients in smoking and in smoking related disease have been produced.

Table 3-3: Qualitative aspects of the mortality scenarios

Demographic component	Trend or Policy	GSE	EME	LSE	CME
MORTALITY	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	Continue	Continue	Slow	Slow
	National Health Inequalities	Reduced	Persistent	Reduced	Persistent
	Regional Health Inequalities	Reduced	Persistent	Reduced	Persistent

A lifestyle factor which is increasing rapidly in its prevalence is obesity, defined as a Body Mass Index (BMI) (weight in kilograms/height in metres^2). The Foresight report on obesity (Government Office for Science, 2009) reports on increasing obesity in the UK and likely future trends, with predicted percentages obese in 2050 as 60% for men and 50% for women. Obesity increases the risk of a number of diseases, particularly diabetes leading to premature mortality. The Foresight report predicts decreases in life expectancy (below an increasing trend) of 0.51 of year for men and 0.22 for women. However, these figures look quite low compared with the relative mortality risks against BMI groups established in a very large set of cohort studies (Prospective Studies Consortium 2009).

A third lifestyle factor which increases mortality is excessive consumption of alcohol and 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. Both lifestyle factors are linked to social class and cultural attitudes which vary across countries in Europe and across regions within countries.

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). Mortality inequalities across Europe have been studied intensively: Vallin *et al.* (2001) provides a comprehensive overview. Mortality inequalities within countries have been related to the degree of inequality in societies by Wilkinson and Pickett (2009): the more unequal society is, the higher the mortality level is, controlling for average income. European countries have better life expectancies in general than the United States, for example, though income levels are lower. In Table 3-3, we make a judgement about what the trends in these factors would look like under our four policy scenarios and in Table 3-4, we attach some explicit directions to the trends and numbers to the key mortality decline parameters.

Table 3-4: Quantitative aspects of the mortality scenarios

Demographic component	Trend or Policy	GROWING SOCIAL EUROPE	EXPANDING MARKET EUROPE	LIMITED SOCIAL EUROPE	CHALLENGED MARKET EUROPE
MORTALITY	Lifestyle: Smoking	Mortality decrease	Mortality stable	Mortality decrease	Mortality stable
	Lifestyle: Diet/Obesity	Mortality increase	Strong mortality increase	Mortality increase	Strong mortality increase
	Lifestyle: Drinking	Mortality stable	Mortality increase	Mortality stable	Mortality increase
	Medical advances	High advances	High medium advances	Low medium advances	Low advances
	National Health Inequalities	Strong convergence	Strong divergence	Convergence	Divergence
	Regional Health Inequalities	Strong convergence	Strong divergence	Convergence	Divergence
ASDR change (% per annum)	Trend	GSE	EME	LSE	CME
Male	-2.8%	-3.8	-3.3	-2.3	-1.8
Female	-2.6%	-3.6	-3.1	-2.1	-1.6
% of SMR 95/5 Range assumed in 2045-50	2005-10 95/5 range	GSE	EME	LSE	CME
Male and Female	100	75	115	85	125

The trends in ASDR reduction in the years 2001 to 2006 were 2.8% for men and 2.6% for women. For the GSE Scenario, we assume a bundle of policies favourable to mortality reduction are adopted. The Marmot review 2010 provides a full review of policy recommendations, *"a framework for delivering and monitoring reductions in health inequalities along the social gradient"*. So we assume an increased rate of mortality decline of 3.8/3.6% for the GSE Scenario and of 3.3/3.1% for the EME Scenario. Where there are fewer resources to advance improvements in health under the LSE Scenario, we assume an improvement of only 2.3/2.1% and for the CME Scenario, the reductions per annum are 1.8% for men and 1.6% for women. The mortality declines are assumed to operate uniformly across all ages from 2025-30 to 2045-50. From 2005-10 to 2025-30, the rates of change are interpolated between the observed rates, which differ by age, and the target rates. This method was applied in the 2006-based national population projections by ONS (2008).

3.4 Implementing mortality scenarios for regions

Regional ASDR estimates are reliable in a majority of the ESPON space countries in the 1991-2006 period but there are a number of countries where the reported data are not believable, usually because of difficulties in geo-converting from older regional definitions to the 2006 NUTS2 regions. Therefore we made cruder estimates of regional ASDRs using the total deaths count for regions, the European standard ASDR profiles we had estimated and the regional populations by age and sex which had been assembled by Eurostat via the DEMIFER project. We computed SMRs for a region by dividing total deaths in a region by the sum of the European standard ASDRs multiplied by the estimated regional populations for each year from 1991 to 2006. We report on the findings from this time series a little later in the report. We modify the dispersion of regional SMRs across Europe to reflect the trends built into the scenarios. To measure the dispersion, we use the range between the ninety-fifth percentile and the fifth percentile because this avoids the distorting effects of extreme outliers.

This 95/5 range is reduced to 75% of its estimated 2005-10 value by 2045-50 in the GSE Scenario because we envisage policies will be in place to favour regions with a worse mortality experience. In the UK, for example, the Advisory Committee for Resource Allocation for the National Health Service in England uses an inequality indicator (disability free life expectancy) to redistribute 15% of the circa £100 billion annual expenditure across Primary Care Trusts, the lower-tier administrative units responsible for delivering health care to the English population. Under the LSE Scenario, we also envisage a narrowing of inequalities to 85% of their starting values. The EME Scenario, however, sees widening inequalities as health provision drifts towards the private sector which focuses on regions with the highest ability to pay and we assume the 95/5 range is stretched by 115%. Things become even more extreme in the CME Scenario where cuts must be made in public health expenditure which impact most on the poorest people and the poorest regions. We assume the 95/5 range expands to 125% of its 2005-10 value.

We compute age-sex-specific mortality rates for regions for future periods by multiplying the estimated ASDRs for 2005-10 (extrapolated from precise computations of the 2003-2006 ASDRs for which reliable data were available from Eurostat) by the ratio of SMR to 100. Table 3-5 lists the sheets in the DEMIFER Mortality Scenarios database where the computation results are generated. Thus the age-sex profile shifts in two ways: first through variation across scenarios in the assumed Europe wide decline rate and second through the assumed degree of convergence or divergence in the inter-regional variation. This provides a simple but powerful combination of drivers for our Policy Scenarios. We now turn to the actual and projected mortality experience of European regions.

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Table 3-5: Structure of the DEMIFER Mortality Scenarios database – modelled country and region mortality rates for 2005-10 to 2045-50 for the four scenarios

Sheet in Workbook	Contents
Reg ASDRs 2005-10	NUTS2 Regional age-sex death rates modelled from *Reg ASDRs 2003-2006* sheet
Reg ASDR Scen TRE 2005-50	NUTS2 Regional age-sex death rates (per 1000 pop) based on TRE scenario in *Europe ASDR Scenario Declines* sheet
Reg ASDR Scen GSE 2005-50	NUTS2 Regional age-sex death rates (per 1000 pop) based on GSE scenario in *Europe ASDR Scenario Declines* sheet
Reg ASDR Scen EME 2005-50	NUTS2 Regional age-sex death rates (per 1000 pop) based on EME scenario in *Europe ASDR Scenario Declines* sheet
Reg ASDR Scen LSE 2005-50	NUTS2 Regional age-sex death rates (per 1000 pop) based on LSE scenario in *Europe ASDR Scenario Declines* sheet
Reg ASDR Scen CME 2005-50	NUTS2 Regional age-sex death rates (per 1000 pop) based on CME scenario in *Europe ASDR Scenario Declines* sheet
Reg ASDR Index Scen TRE	NUTS2 Regional rolling index ASDRs (proportional multipliers) based on *Reg ASDR Scen TRE 2005-50* sheet
Reg ASDR Index Scen GSE	NUTS2 Regional rolling index ASDRs (proportional multipliers) based on *Reg ASDR Scen GSE 2005-50* sheet
Reg ASDR Index Scen EME	NUTS2 Regional rolling index ASDRs (proportional multipliers) based on *Reg ASDR Scen EME 2005-50* sheet
Reg ASDR Index Scen LSE	NUTS2 Regional rolling index ASDRs (proportional multipliers) based on *Reg ASDR Scen LSE 2005-50* sheet
Reg ASDR Index Scen CME	NUTS2 Regional rolling index ASDRs (proportional multipliers) based on *Reg ASDR Scen CME 2005-50* sheet

3.5 Policy scenario results for mortality

It would be very useful to learn from our 1991-2006 mortality database whether Europe had experienced convergence or divergence in mortality experience. The trend would indicate the extent to which the last two decades had been characterised by convergence or divergence. Figure 3-3 to Figure 3-5 assemble the evidence by plotting three different measures of the variation in SMRs across the 287 NUTS2 regions in ESPON Europe. Figure 3-3 plots the 95th/5th percentile range, within which 90% of the 287 region SMRs fall, for persons, males and females over the 15 year period. We have included persons because, on occasions, data for one or both of the sexes are less reliable. Figure 3-4 plots the inter-quartile range, the 75th/25th percentile range, within which 50% of region SMRs fall. Figure 3-5 graphs the standard deviation in which all 287 values are used. Figure 3-3 and Figure 3-5 tell a similar story. In the 1990s, the SMR variation rose from 1991 to 1994 probably because of the poor experience of transition countries immediately after the breakup of the Soviet empire (discussed in Vallin *et al.,* 2001). Then the standard deviation declines to 2000 while the 95/5 range fluctuates around a flat trend. Then, after 2000, there begins a sustained rise in both measures of variation to much higher levels than in 1991 for males and higher levels than 2000 for females. This rising inequality means that cohesion in the mortality sphere has retreated. In the middle of the distribution, something different is happening: after a steep initial fall the measure moves gently downwards indicating convergence in the middle except in the last year when 2006 values are higher than 2005.
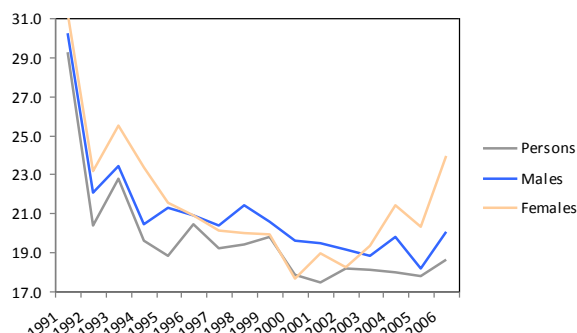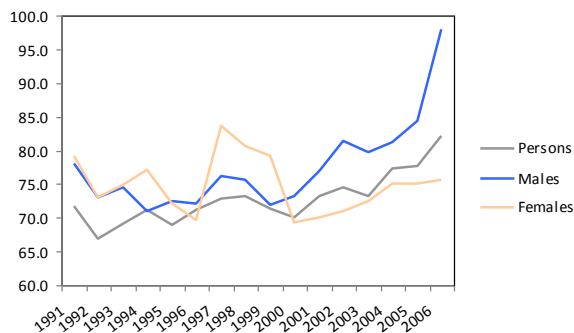
Figure 3-3: Ninety fifth/fifth percentile range, 1991-2006

Figure 3-4: Inter-quartile range, 1991-2006
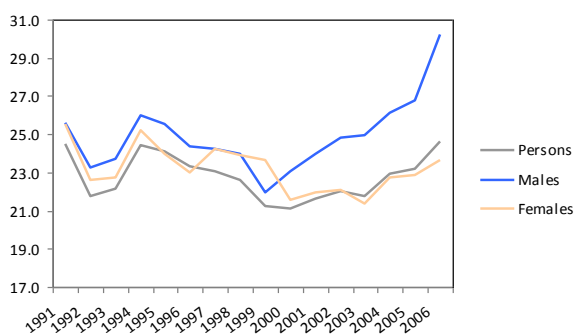
Figure 3-5: Standard deviation, 1991-2006

What has been the spatial pattern of mortality across Europe in the last 15 years? Europe standardized SMRs are helpful for comparison because the secular decline in ASDRs is screened out as each SMR is re-based to a Europe-wide average for the year in question. Figure 3-6 presents maps of the SMRs in 1992 and 2005. Overall the pattern has been very stable with lowest SMRs in a broad belt encompassing France, northern Spain, northern Italy and the Alpine countries. Also below the Europe SMR of 100 are many but not all regions in Norway, Sweden, Iceland, the Low Countries and southern England. At the other extreme, with SMRs above 115 are 2004, are Accession countries in central and south-east Europe from Estonia to Bulgaria together with south central Scotland (Glasgow and surrounding cities and towns). Note that four countries have a wide dispersal of SMR values indicating high regional inequality: Germany (south-north and west-east gradients), United Kingdom (south-north gradient), Belgium (Flanders-Wallonia contrasts) and Austria (western-eastern länder gradient). Factors which contribute to these patterns include income variations between countries and within countries, the efficacy of social welfare and health care systems and the 'Mediterranean' diet which helps people avoid early onset of cardiovascular disease.

SMRs for males and females, 1992 & 2005
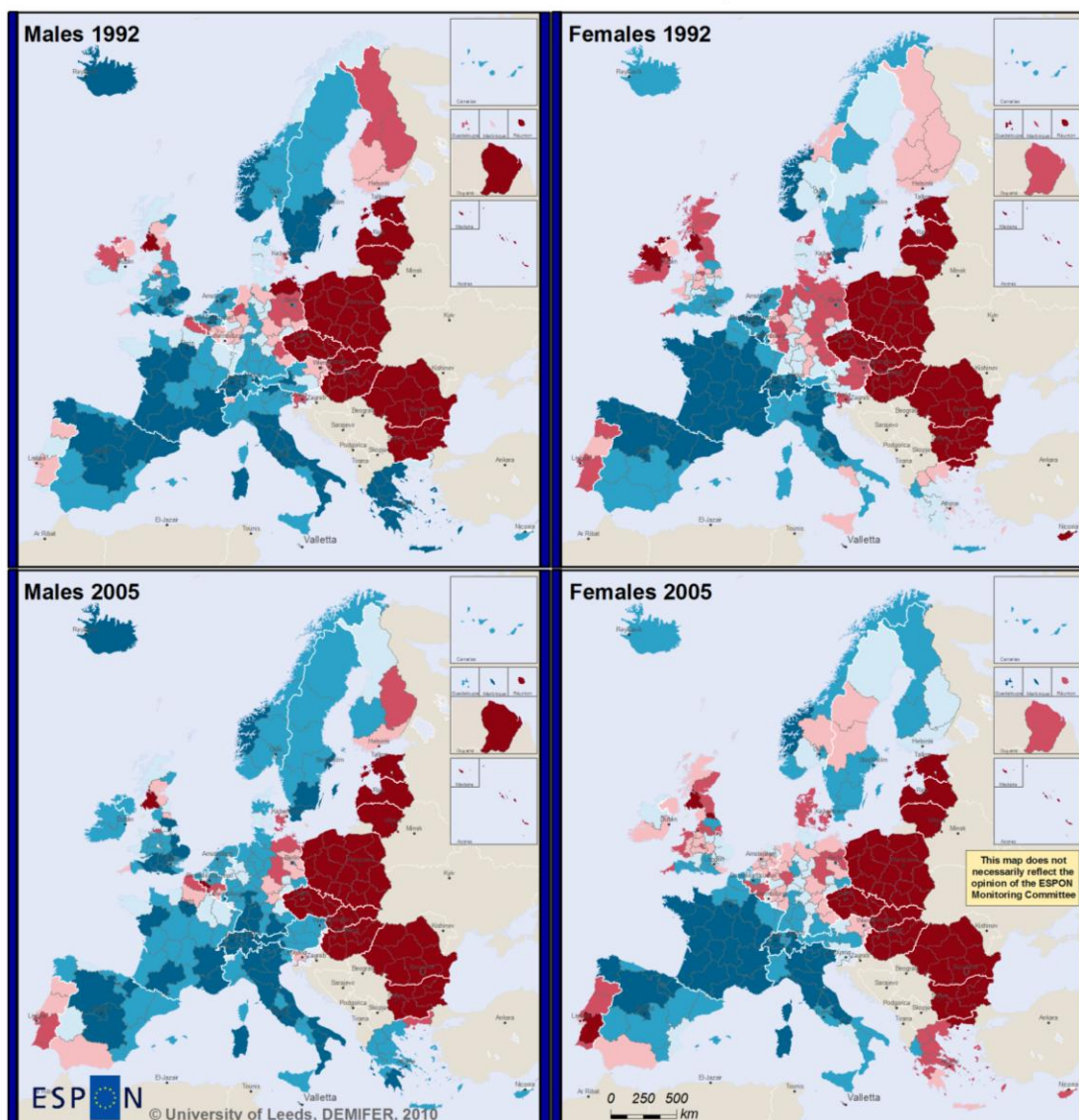
Standardised Mortality Ratios (SMR) for Males
and Females in 1992 and 2005
Index, ESPON average = 100
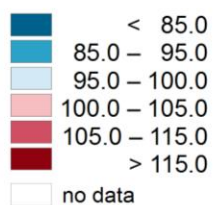
	< 85.0
	85.0 – 95.0
	95.0 – 100.0
	100.0 – 105.0
	105.0 – 115.0
	> 115.0
	no data

Figure 3-6: SMRs for males and females, 1992 and 2005

Notes: SMR = Standardised mortality ratios. SMR = 100 = Europe average for year. Years to be shifted to 2001
and 2006 when some data or formulae errors have been tracked down

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Where have the changes occurred between 1992 and 2005? The countries which have improved their position in the European mortality league include Ireland, Finland, Slovenia and the eastern länder of Germany. These are also countries which benefitted from European cohesion funds and regional funds. The countries which have slid down the league table are Denmark, the Netherlands, Greece and Portugal together with southern Spain. Regional inequality in Germany has fallen but not in the UK. Note that these changes have occurred against a background of rising life expectancy in virtually all regions. Even regions at the bottom of the league, such as Glasgow, did see male life expectancy reach 70 years by 2006. Our Mortality Scenario Database can, of course, yield time series of mortality indicators for any or all of the 287 NUTS2 regions. Figure 3-6 lists the case study regions described in Deliverable D12. Figure 3-7 to Figure 3-10 present SMR time series for these regions we have chosen for more detailed case study analysis.
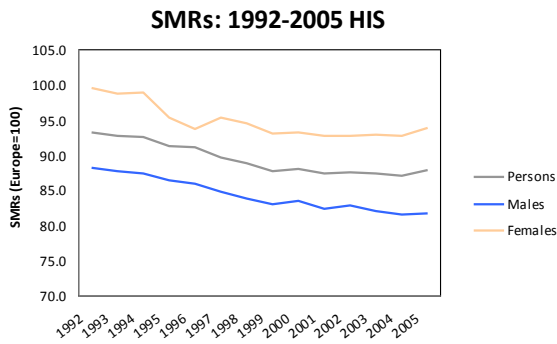
SMRs: 1992-2005 HIS

a: Overbayern (DE21)

SMRs: 1992-2005 HIS

b: Nord-Est (RO21)

SMRs: 1992-2005 HIS

c: Sydsverige (SE04)

SMRs: 1992-2005 HIS

d: West Yorkshire (UKE4)

SMRs: 1992-2005 HIS

e: Jihovýchod (CZ0

SMRs: 1992-2005 HIS
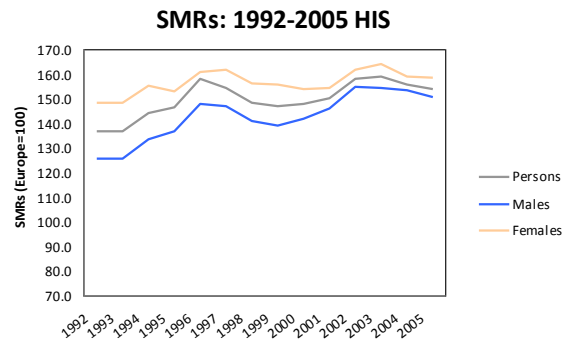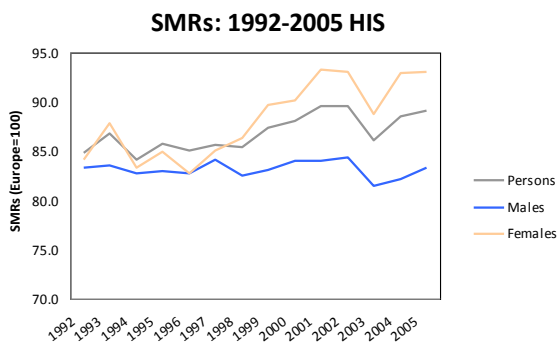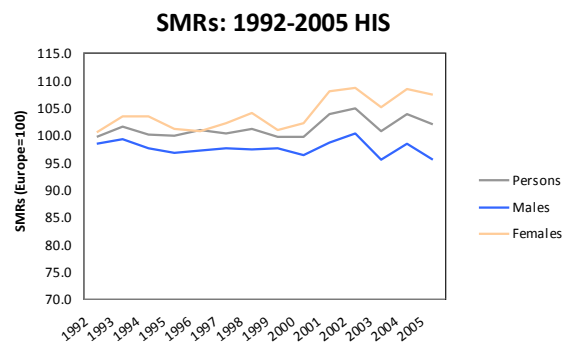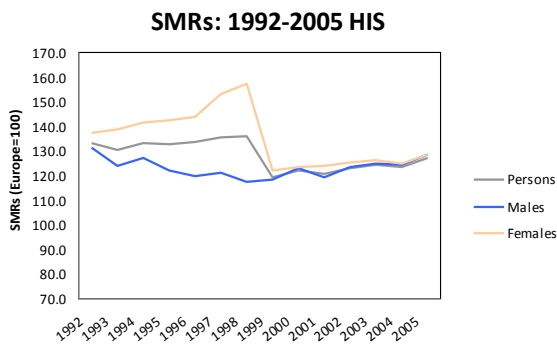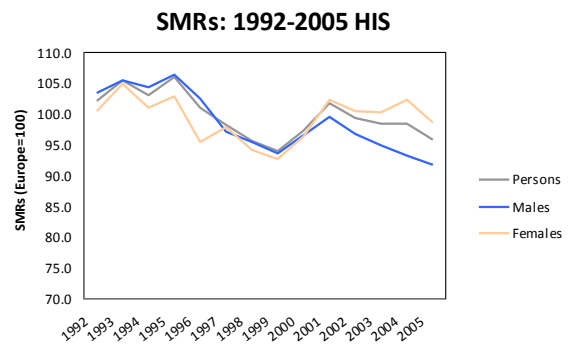
f: Inner London (UKI1)

Figure 3-7: SMRs for case study regions, 1992-2005 (1): Oberbayern (DE21), Sydsverige (SE04), Jihovýchod (CZ06)

Figure 3-8: SMRs for case study regions, 1992-2005 (2): Nord-Est (RO21), West Yorkshire (UKE4), Inner London (UKI1)
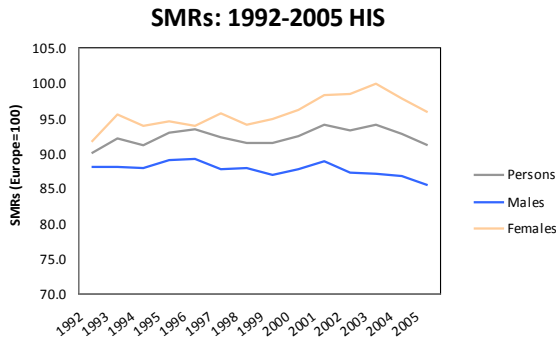
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SMRs: 1992-2005 HIS

a: Outer London (UKI2)
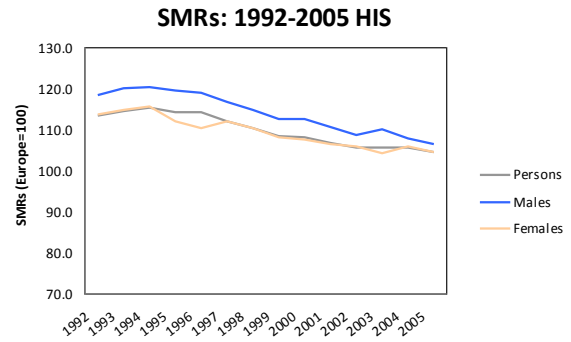
SMRs: 1992-2005 HIS

b: Mecklenburg-Vorpommern (DE80)

SMRs: 1992-2005 HIS

c: Piemonte (ITC1)

SMRs: 1992-2005 HIS

d: Molise (ITF2)

SMRs: 1992-2005 HIS

e: Arnsberg (DEA5)

SMRs: 1992-2005 HIS
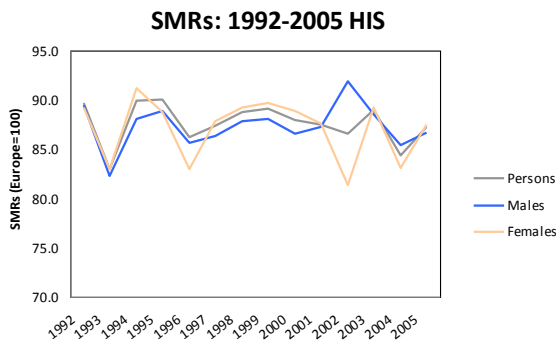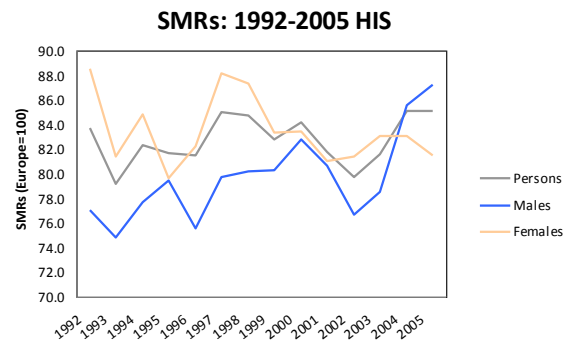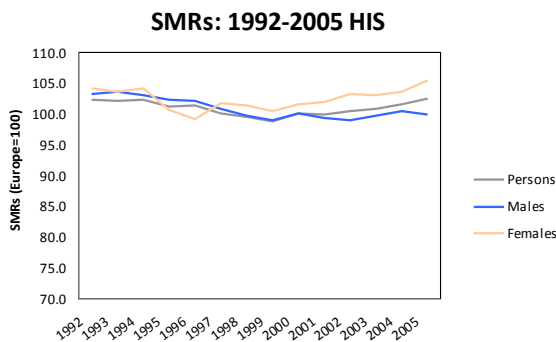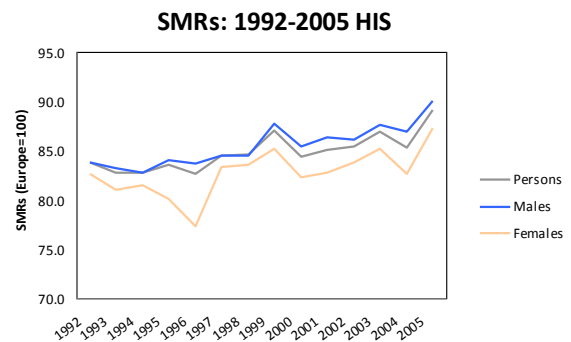
f: Cataluña (ES51)

Figure 3-9: SMRs for case study regions, 1992-2005 (3): Outer London (UKI2), Piemonte ITC1). Arnsberg (DEA5)

Figure 3-10: SMRs for case study regions, 1992-2005 (4): Mecklenburg-Vorpommern (DE80), Molise (ITF2), Cataluña (ES51)

Oberbayern experiences a fall in its SMR values until a small upturn in the last two years (Figure 3-7, top graph), although men have a better mortality experience relative to Europe than women in Munich and its hinterland. *Sydsverige* has SMRs well below the European standard throughout the 15 years

but the relative position of women becomes less favourable from 1996 onwards (Figure 3-77, middle graph). *Jihovýhod* has higher mortality than the European standard (though the differences between men and women prior to 1998 may be due to estimation errors (Figure 3-7, bottom graph). After 1998 SMRs are relatively stable.

Nord-Est Romania (Figure 3-8, top graph) also has SMRs well above the Europe standard and the first post-transition decade is characterized by worsening of this position, with stability after 1997 at a high level. *West Yorkshire* in the UK (Figure 3-8, middle graph) has a relatively stable SMR over the 15 years around the Europe average, though SMRs for women are above the Europe norm and rise after 2000 and SMRs for men are below 100. *Inner London* starts off the period with SMRs just above the European norm (Figure 3-8, bottom graph). These fall from 1996 to 2000, then rise to 2002 (effects of the previous recession perhaps) and then resume falling to 2006 (pre-crash boom perhaps). The relative positions of men and women switch around 2000. *Outer London* has SMRs below the European norm throughout the 15 year period with women's SMRs persistent above those of men (Figure 3-9, top graph). This is fairly general for the UK and is probably linked to the changing job market for men and women: men have shifted out of more dangerous jobs in heavy industry with re-structuring while women have moved out of housewife inactivity into white collar jobs but retained stressful responsibilities for housework and children.

Piemonte exhibits SMRs consistently below the European standard, fluctuating around a stable trend (Figure 3-9, middle graph). *Arnsberg*'s position slightly above the European standard reflects its industrial character (Figure 3-9, bottom graph). Small falls were experienced to 2000 followed by rises after that year. The position of *Mecklenburg-Vorpommern* above the European standard reflects its DDR history but there is a steady improvement over the 15 years, reflecting perhaps the success of Germany's unification project, involving massive investments and social transfers to the eastern *länder* (Figure 3-10, top graph). *Molise* experiences low SMRs relative to the European standard (Figure 3-10, middle graph). The fluctuations are probably a function of small population numbers and low mortality rates and there does not appear to be a trend. Finally, *Cataluña* also has SMRS significantly lower than the European standard but there is a little convergence toward the European average over the period (Figure 3-10, bottom graph).

These set of graphs show that SMRs are excellent indicators for monitoring the position of the region relative to the European average and therefore can fulfil an important role in assessing the degree to which cohesion across countries and regions is being achieved. We now turn from the recent past to the coming decades to mid-century.

In the Policy Scenarios, we make assumptions about the direction of change in regional variations in mortality. Figure 3-11 and Figure 3-12 show how these assumptions work for the GSE and EME

Scenarios. The top graph in Figure 3-11 shows the assumed linear reduction in the 95th/5th percentile range and the bottom graph shows the assumed fall in the standard deviation of SMRs. These falls are within the scope of falls exhibited by the historical series (Figure 3-5), though in the GSE Scenario the direction of change reverses the 2000-2006 experience. Under the EME Scenario, both the 95th/5th percentile range and the standard deviation rise, again within the limits of the experience of 1991-2006. This rise is in line with 2000-2006 experience in Europe. In those years we were experiencing an EME Scenario.
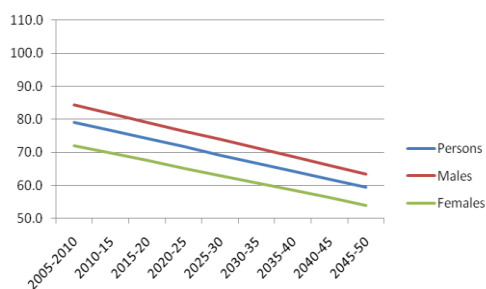
Ninety fifth/fifth percentile range (SMRs for NUTS2 287 regions)

Ninety fifth/fifth percentile range (SMRs for NUTS2 287 regions)
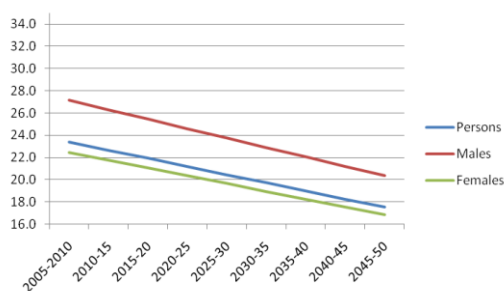
Standard deviations (SMRs for NUTS2 287 regions)

Figure 3-11: Ninety fifth/fifth percentile range and standard deviation, 2005-2050, GSE Scenario
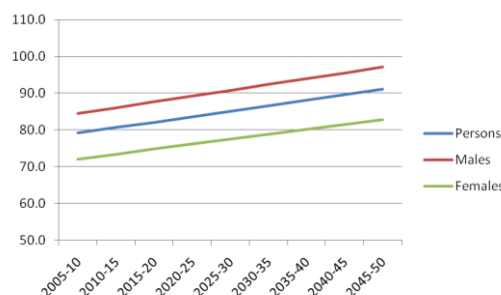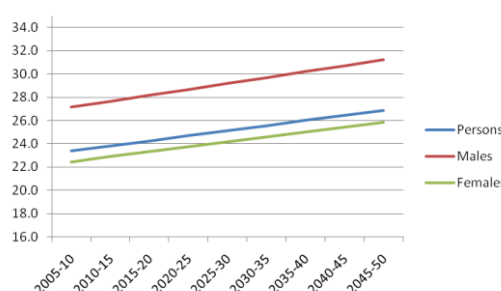
Standard deviations (SMRs for NUTS2 287 regions)

Figure 3-12: Ninety fifth/fifth percentile range and standard deviation, 2005-2050, EME Scenario

The outcome of these assumed trends in regional convergence or divergence are shown in Figure 3-13 with the GSE SMRs in 2045-50 in the upper pair of maps and the EME SMRs in 2045-50 in the lower pair of maps. We can see from the shadings on the maps that the GSE Scenario produces more regions in the middle bands than the EME Scenario. GSE, if it comes to be, would be a more equal Europe in which the laggard regions have moved towards the average and the advanced regions have less advantage than at present. The EME Scenario moves regions further apart. Note that, even under the favourable trends assumed for the GSE Scenario there are still unacceptable differences across Europe in the mortality experience of regional populations.

SMRs for Males & Females for 2045-50, GSE & EME Scenarios
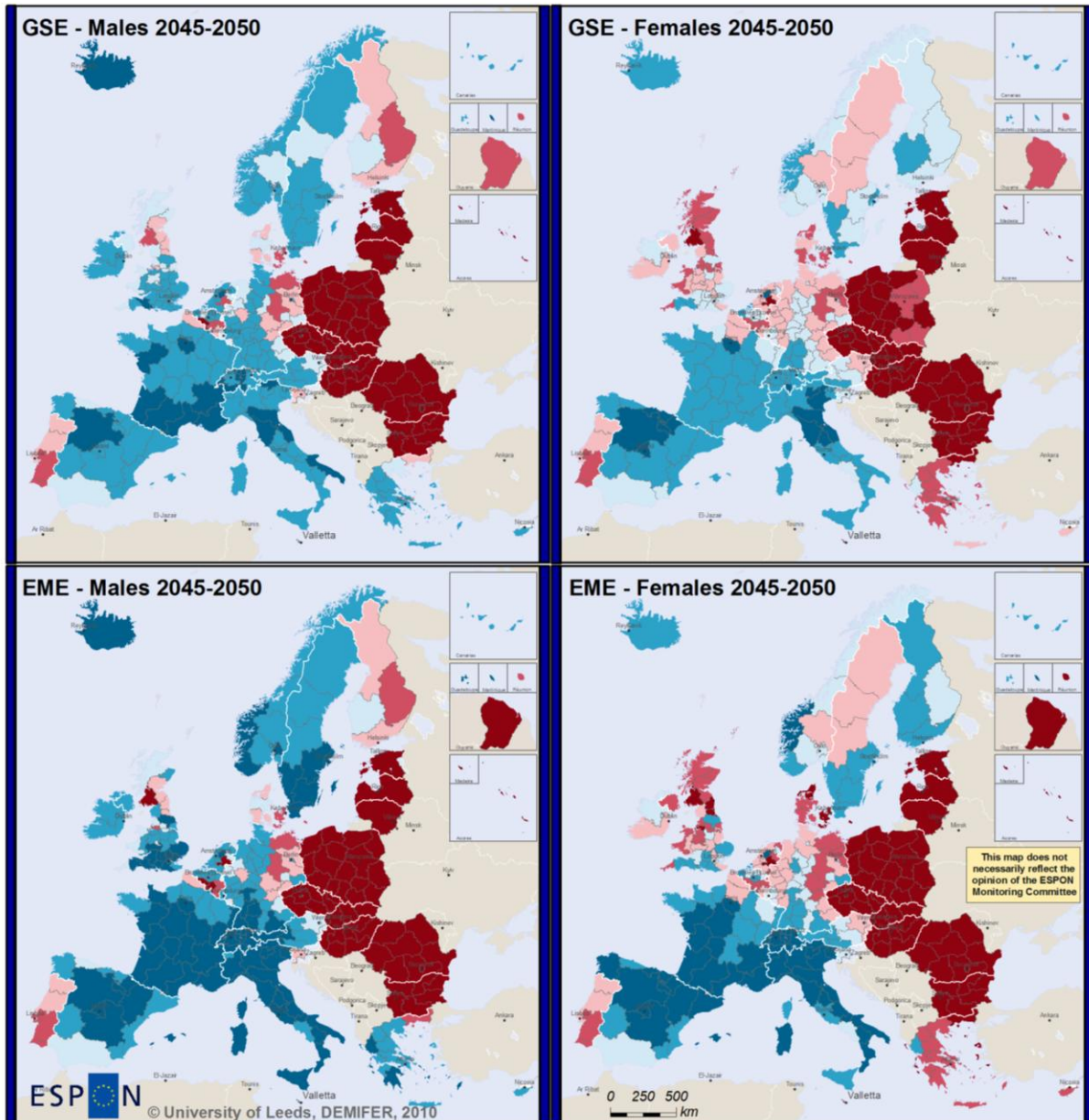
Standardised Mortality Ratios (SMR) for Males &
Females for 2045-50, Growing Social Europe (GSE)
& Expanding Market Europe (EME) Scenarios
Index, ESPON average = 100

■ (dark blue)	< 85.0
■ (blue)	85.0 – 95.0
■ (light blue)	95.0 – 100.0
■ (pink)	100.0 – 105.0
■ (red)	105.0 – 115.0
■ (dark red)	> 115.0
□	no data
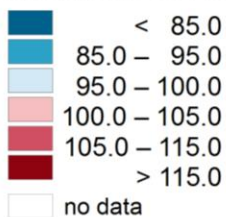
Figure 3-13: SMRs for males and females for 2045-50, GSE and EME scenarios

Figure 3-14 and Figure 3-15 show the trajectories of SMRs assumed for the LSE and CME Scenarios. The convergence of the LSE Scenario is lower than in the GSE Scenario, while the divergence in the CME graphs is greater than in the EME Scenario. The SMR outcomes for 2045-50 are mapped in Figure 3-16 and show these results in colour. The CME Scenario shows in particular a deepening of the gulf between disadvantaged eastern regions and advantaged regions in the belt of regions running from Galicia to the west, Île de France in the north and Calabria in the south east. In the mortality sphere, this is Europe's longevity advantaged super-region.
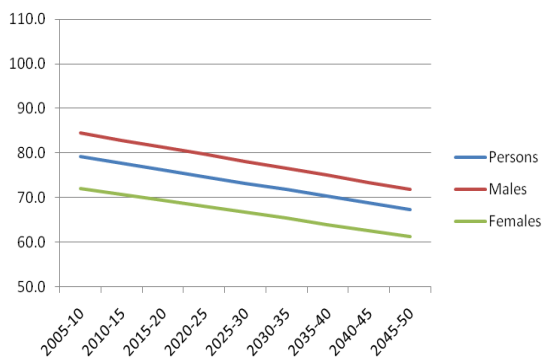
Ninety fifth/fifth percentile range (SMRs for NUTS2 287 regions)

Ninety fifth/fifth percentile range (SMRs for NUTS2 287 regions)

Standard deviations (SMRs for NUTS2 287 regions)
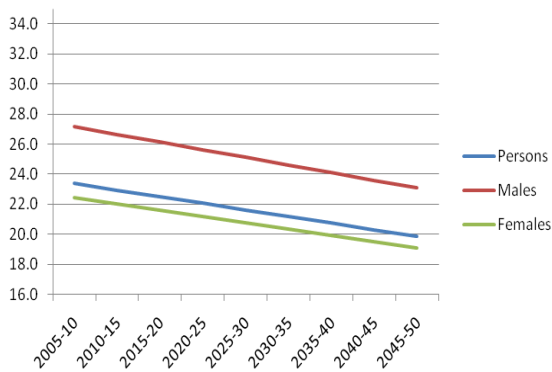
Standard deviations (SMRs for NUTS2 287 regions)

Figure 3-14: Ninety fifth/fifth percentile range and standard deviation, 2005-2050, LSE Scenario
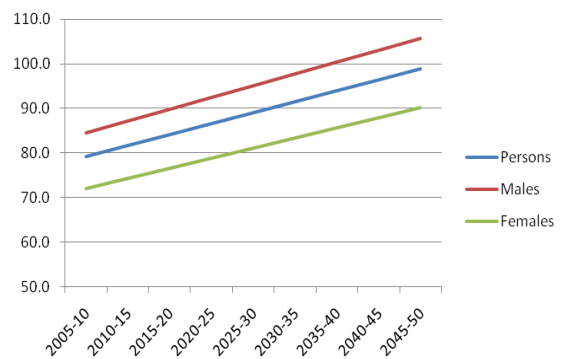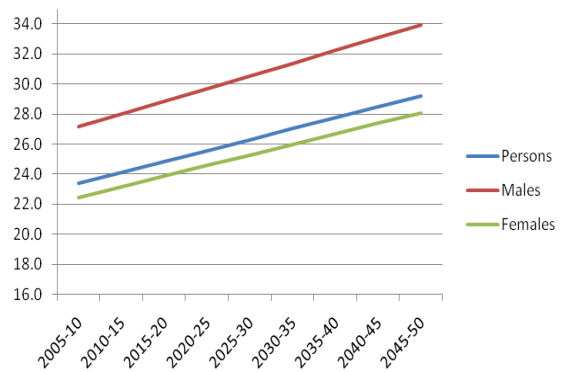
Figure 3-15: Ninety fifth/fifth percentile range and standard deviation, 2005-2050, CME Scenario

SMRs for Males & Females for 2045-50, LSE & CME Scenarios
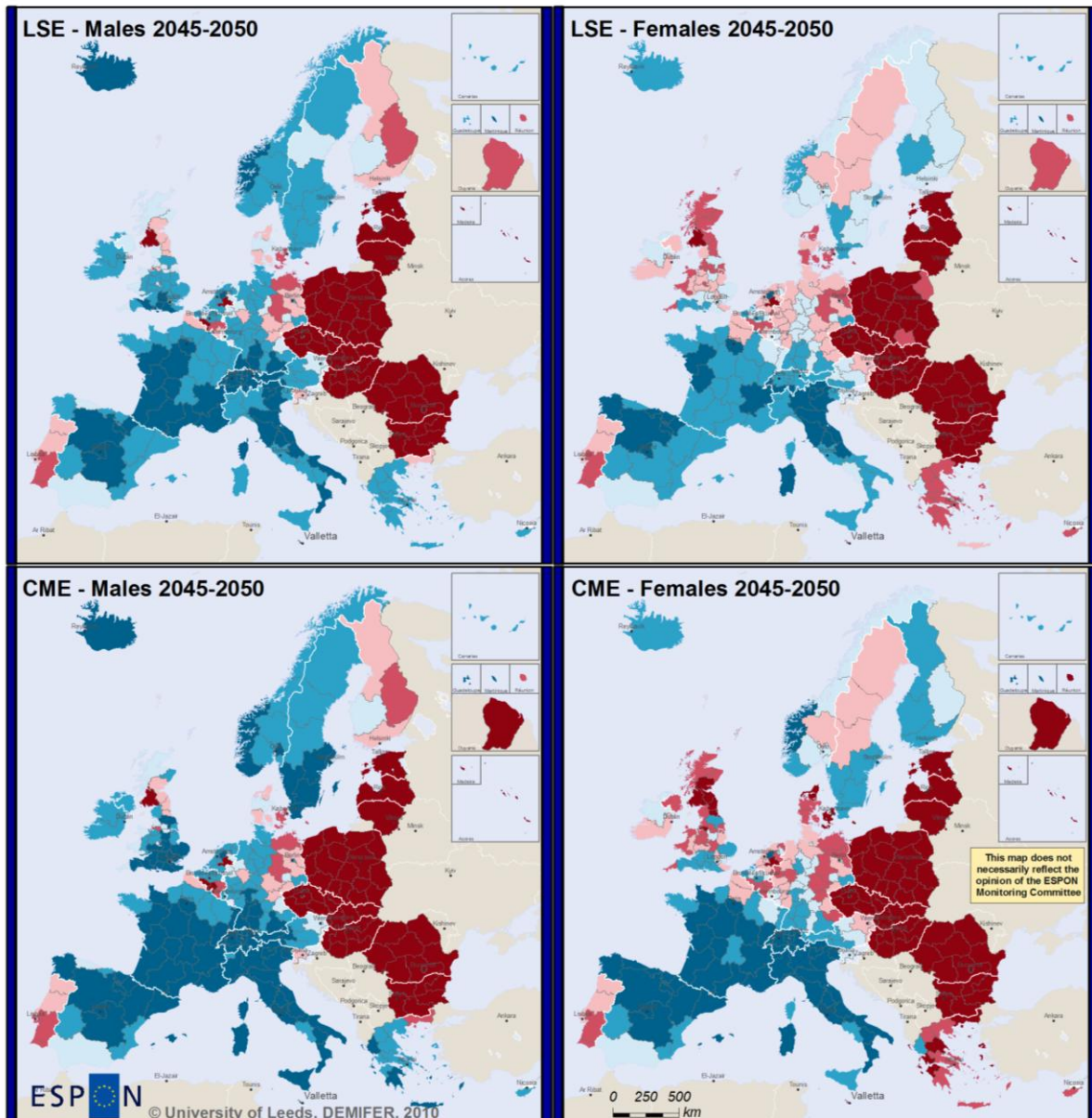
LSE - Males 2045-2050

LSE - Females 2045-2050

CME - Males 2045-2050

CME - Females 2045-2050

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

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0 250 500 km

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Standardised Mortality Ratios (SMR) for Males &
Females for 2045-50, Limited Social Europe (LSE)
& Challenged Market Europe (CME) Scenarios
Index, ESPON average = 100
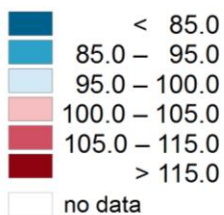
- < 85.0
- 85.0 – 95.0
- 95.0 – 100.0
- 100.0 – 105.0
- 105.0 – 115.0
- > 115.0
- no data

Regional level: NUTS 2
Source: ESPON 2013 Database, 2010
Origin of data: Eurostat, NSIs, Estimations, 2010
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Figure 3-16: SMRs for males and females for 2045-50, LSE and CME scenarios

SMRs make possible an analysis of relative advantage and disadvantage. But we should not forget that our scenarios assume continuance of the mortality rate reduction of this decade (which have also been characteristic of non-Communist Europe for at least four decades and for transition countries since the mid-1990s. To monitor this absolute shift in mortality experience, we have computed abridged life tables for each of the 287 NUTS2 regions under the four Policy Scenarios. The results for two indicators from the life tables, life expectancies at birth for men and women, are mapped in Figure 3-17 to Figure 3-19.

Life Expectancies at Birth for Males & Females, 2005-10 & 2045-50, Trended

Males 2005-2010

Females 2005-2010

Males 2045-2050

Females 2045-2050

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

ESP●N
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0   250 500
km

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Regional level: NUTS 2
Source: ESPON 2013 Database, 2010
Origin of data: Eurostat, NSIs, Estimations, 2010
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Life Expectancies at Birth for Males and Females,
2005-2010 and 2045-2050, Trended Mortality
in Years
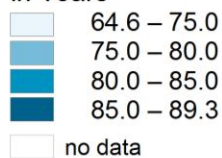
- 64.6 – 75.0
- 75.0 – 80.0
- 80.0 – 85.0
- 85.0 – 89.3
- no data

Figure 3-17: Life expectancies at birth for males and females, 2005-10 and 2045-50, trended mortality

Life Expectancies at Birth for Males & Females, 2045-50 - GSE & EME Scenarios
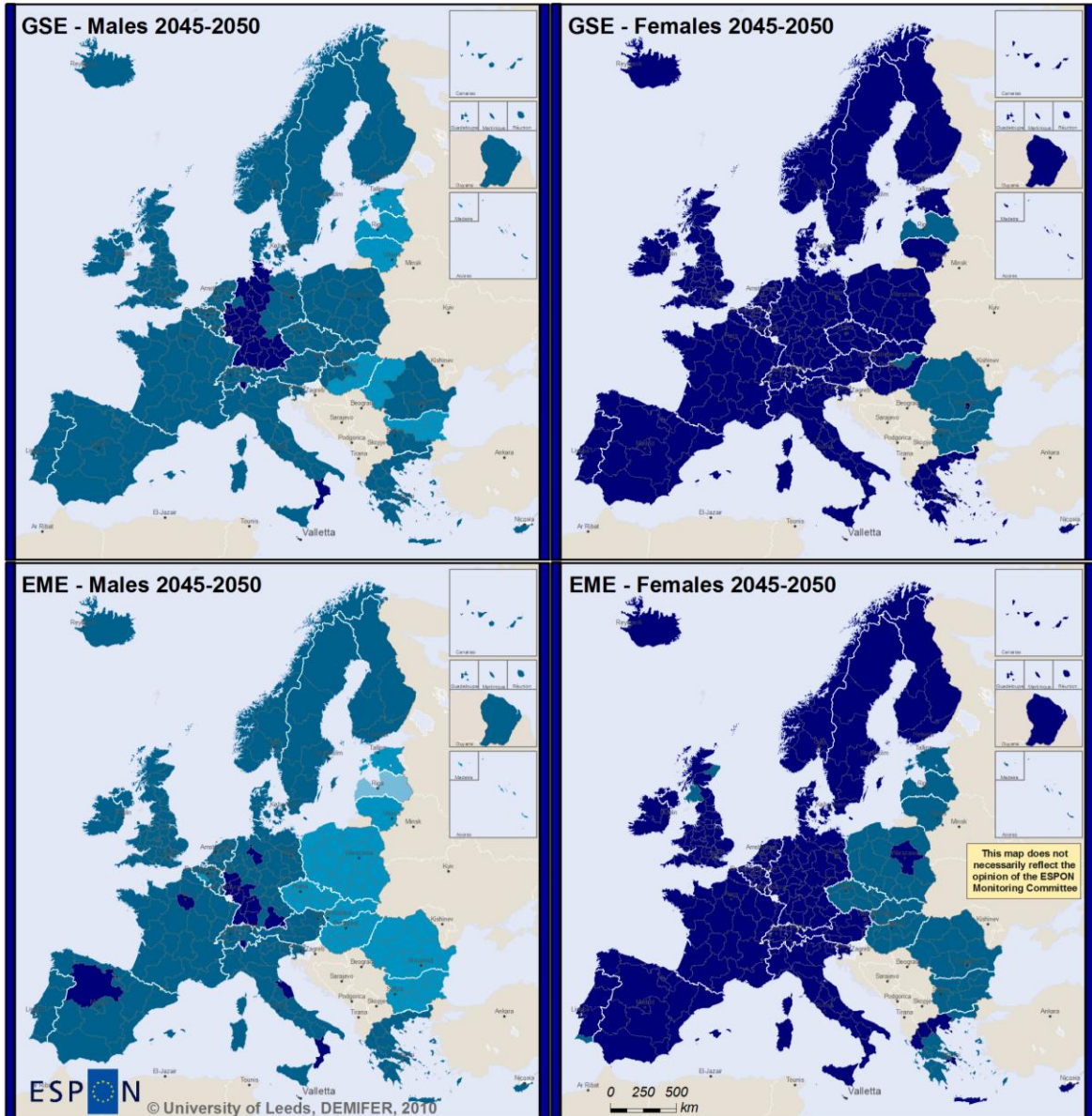
GSE - Males 2045-2050

GSE - Females 2045-2050

EME - Males 2045-2050

EME - Females 2045-2050

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Life Expectancies at Birth for Males and Females
for 2045-2050, Growing Social Europe (GSE)
& Expanding Market Europe (EME) Scenarios,
in Years
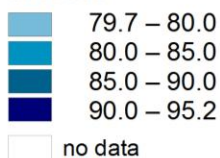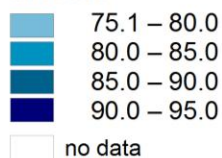
- 79.7 – 80.0
- 80.0 – 85.0
- 85.0 – 90.0
- 90.0 – 95.2
- no data

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

Regional level: NUTS 2
Source: ESPON 2013 Database, 2010
Origin of data: Eurostat, NSIs, Estimations, 2010
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Figure 3-18: Life expectancies at birth for males and females, 2045-50, GSE and EME scenarios

Life Expectancies at Birth for Males & Females, 2045-50 - LSE & CME Scenarios

Figure 3-19: Life expectancies at birth for males and females, 2045-50, LSE and CME scenarios

Figure 3-17 maps the assumed underlying trend in life expectancy from which the four Policy Scenarios deviate. We define classes using values in 2005-10 and 2045-50 across this Trend Scenario

and the Policy Scenarios to capture the dramatic changes in prospect for Europeans through the transformation in the map colours. The male life expectancy map in 2005-10 (Figure 3-17, top left) is coloured uniformly beige and yellow: all regions fall in the classes 64 to 75 or 75 to 80 years. For women, all regions are coloured uniformly yellow (75 to 80) or red (80 to 85). Contrast this with the situation 45 years later under the GSE Scenario, where there are no beige or yellow regions on the male map (Figure 3-17, top left map) and only a few reds. Everywhere regional life expectancies are above 80 years for men and most are above 85. For women, all regional life expectancies are above 85 and most are above 90. You may object that this is optimistic and say that most official statistical agencies assume that the improvement slows down after a couple of decades, but if you had bet on this slowdown in mortality reduction happening in the past 40 years in Europe, you would have been mostly wrong. Of course, such dramatic improvements depend on success of all the policies included in the GSE bundle. If the position was less favourable and the CME Scenario came about (Figure 3-17, bottom left and bottom right maps), substantial progress has been made although men in the majority of eastern regions will still be in the 75-80 class. Is this what we want?

3.6 Impact of mortality on cohesion and competitiveness

In this chapter of report we have developed mortality outcomes for our four Policy Scenarios, building on a knowledge base of the decade and a half prior to our projection period. We have shown how SMRs can be used as a very useful indicator of the degree to which cohesion (in the face of death) has been achieved. We have also shown how considerable increases in longevity could occur on relatively conservative assumptions about reductions in mortality rates. The increases in life expectancy mean additional ageing of the population, which will have implications for regional competitiveness, which we explore in Deliverable D7. However, the increases in prospect do represent a considerable triumph for European society, which we should celebrate. The challenges of the additional ageing can be met if we achieve the conditions of the GSE or EME Scenarios.

4. FERTILITY SCENARIOS

4.1 Introduction

Fertility is still the most important component of population change. Although yearly fluctuations in net migration may be quite impressive, (large) changes in the number of live born children have a more profound effect on population growth (or decrease) in the long run. This chapter describes the assumptions on fertility underlying the four policy scenarios.

After the Second World War, substantial changes in the average number of children per woman have occurred and also the average age at which women give birth to the first child has changed impressively. In the southern European countries, fertility falls to an all-time low, reaching extremely low levels. Also, in the eastern countries, a tremendous fall in fertility could be witnessed after the fall of the Iron Curtain in the 1990s. In the light of these profound changes in the past, it seems very difficult to foresee what will happen in the long-term future. It is a real challenge to make sense of the complex relationships between fertility changes on the one hand and socio-cultural and socio-economic changes on the other. New cohorts of couples may make other choices with respect to fertility than present couples. All these considerations lead us to the conclusion that plausible scenarios of fertility trends can only be made if justice is done to the large variety of fertility behaviour of individuals in combination with wide array of social, economic and political developments. In the four scenarios, possible future developments in fertility are laid down.

This part of the report will start with a brief overview of fertility theories. These theories have been used in the formulation of the qualitative assumptions of the Policy Scenarios. The quantitative assumptions are to a large part inspired by the results of the expert opinion survey. To conclude this part, the results for the fertility in the regions of the ESPON space will be presented.

4.2 Theoretical aspects of fertility change

One of the first fertility theories is that of the so-called 'first demographic transition'. This theory can be summarized as follows (see Van de Kaa, 1996, for a comprehensive description). A process of modernization has led to higher standards of living in western countries in the second half of the nineteenth century. Populations started to grow rapidly, in the beginning due to a decrease in mortality. Later on, fertility figures also started to fall, as couples began to practice birth control in order to limit the number of children. The reason behind the wish to curtail family size was a huge reduction in infant mortality: if more children survive, a reduction in the number of births is necessary if couples aspire to have a limited number of children. This theory is outdated when it comes to the explanation of modern fertility trends. However, the recognition that modification processes of society lead to a changing level of fertility is also an important ingredient of modern fertility theories.

According to the 'theory of new home economics' (Becker, 1991 and 1993), the rapid fall in fertility in most western countries since the mid-1960s can be a rise in 'opportunity costs' of children. These costs can be considered as forfeited income, in case the woman becomes a full-time mother after childbirth instead of participating (or continuing to participate) in the labour market. In the 1960s, the opportunity costs of women rose rapidly, due to their stronger earning power. A higher level of female educational attainment in combination with a higher rate of labour market participation had resulted in a higher actual or potential income. Given the situation that many women do not prefer or are not capable of combining raising children with working outdoors, higher earning power leads to an increase in the opportunity costs. However, it might be argued that more and more substitutes for domestic chores can be acquired on the market, and it has also become more common to 'buy' child care. In this way, income can be used for the acquisition of these substitutes and as a result, negative effects of opportunity costs on the number of children can be mitigated.

The 'human capital theory' (Mineer and Polachek, 1974; Becker, 1975) is another important economic theory. Human capital consists of knowledge, experience and health, i.e. a person's skills, faculties and abilities. The quantity of human capital is decisive for a person's income. The amount of human capital is influenced by the accretion of new capital, due to investments like schooling and getting more work or educational experience. However, a reduction of existing capital may occur in periods when a person does not participate on the labour market or does not follow education. Human capital theory states that fertility trends are linked to developments in the educational level. Women with a high educational attainment have compiled a large quantity of human capital and want to increase their human capital further by obtaining work experience. By means of a professional career, a high potential income can be realized. However, this will lead to the postponement of motherhood eventually to involuntary childlessness, as fertility decreases at higher ages. One implication might be a reduction in the number of children.

Easterlin (1996 and 1975) relates fertility trends to the (relative) income situation in the future. While the low income prospects of youngsters, in comparison to their parents, will lead to a small number of children, high income prospects will have the opposite effect. This hypothesis is based on the fact that, in the past, relatively large numbers of children were born and raised in periods of high economic growth. These children, who grew up in relatively prosperous families, developed a high level of consumption aspirations. However, at the time they started to work, these aspirations could not be met by their earnings, due to the large numbers of young people entering the labour market at the same time. As a result, the 'investment' in children was delayed or even cancelled. According to Easterlin, the post-war 'babyboom' in the United States originated from the generation born during the Great Depression, having low consumption aspirations and high earnings. In contrast, the 'babybust'

originated from the next generation, born in the 1950s and 1960s, having high consumption aspirations and being confronted with low economic growth.

These theories are more or less economic orientated explanations of fertility trends. Also several socio-cultural theories have been developed. Van de Kaa (1988) and Lesthaeghe and Verleye (1992) point to the connection between the evolution of the social system and fertility trends. Their theory of the 'second demographic transition' describes the demographic developments after 1965, which might be seen as a turning point in demographic history. The rapid social and economic changes of European societies during the last three decades of the twentieth century were the result of a process of modernization. This process involved a shift from a manufacturing and goods producing economy to a service economy. In such an economy, information, automation and computerization play an increasingly important role. The resulting 'post-industrial society' or welfare state offers opportunities for high living standards to families and individuals. Women remain longer in full-time education and participate more often in the labour market. Many of them have to face a difficult choice between 'career' and 'family'. According to Van de Kaa, the choice for a first child is more likely to be taken when it will contribute to the self-fulfilment of the woman and her partner. All these developments lead to decreasing fertility rates at young ages, causing a delay of motherhood. Lesthaeghe and Verleye focus on the sequence of socio-cultural developments. The second demographic transition started with an increase of divorces, followed by postponement of both marriage and having children. Marriage became less common, as cohabitation became more and more accepted, not only as a union ('paperless marriage') between men and women, but also as the proper social union for childbearing. In the final stage of the second demographic transition, the decrease of fertility figures at young ages comes to an end while fertility rates at higher ages start to rise due to a process of catching up. According to the two authors, these new trends had their origin in a number of vanguard countries (such as Denmark and Sweden), and from there it spread to other countries of Europe.

The decline in fertility, observed in almost all western countries, can also be explained in the context of norms favouring smaller families (see the United Nations, 1992). However, the emergence of these norms can be related to economic trends, such as the industrialization after the World War II. Rebuilding activities led to an increased participation of women in the labour force. Technological progress required more skills to be acquired by longer education and training. This facilitated the expansion of female education. The desire of women to take a greater part in social life led to the wish to have increased access to birth regulation. This stimulated the diffusion of contraceptive knowledge and practice. In the post-war years, new societal conditions emerged and cultural values and social norms were changing. A tendency developed to satisfy individual, more material aspirations and the importance for couples to have children diminished. Motherhood was no longer the major goal for women in their life. For women social rewards and individual satisfaction could be also be achieved

by working outside the household and the additional income gained could provide a more fulfilling lifestyle than that found in rearing a lot of children.

Some authors think that young generations are more materialistic and less altruistic (Cruijsen, 1991). This opinion seems to be confirmed by the results of 'The European Comparative Survey on the Acceptance of Population-related Policies' (Moors and Palomba, 1995). In several countries, the most frequently mentioned reason for not having children was the wish to maintain the current standard of living. Another important reason was the perceived impossibility to combine motherhood with labour participation.

All theories mentioned above are intended to explain the decline in fertility. Most theories stress the financial costs of children to parents and the opportunity costs children impose by inhibiting women to participate in the labour market. Nevertheless, in most industrialized countries only a small minority of adults intend to stay childless. According to Schoen *et al.* (1997), an explanation why couples still want to have children, despite widespread female labour force participation and high costs of children, are the (in economic terms) the 'utilities' provided by children. Firstly, children can be considered as a source of intrinsic, non-substitutable pleasure. Secondly, children can also be considered as social capital; the ability of children to create access to critical resources through ties of kinship and other personal relationships (among e.g. parents, grandparents and friends). In this way fertility can play a positive, status-enhancing role in industrialized societies.

4.3 Policy scenarios on fertility

4.3.1 Qualitative assumptions

The Policy Scenarios of the DEMIFER project are based on two underlying dimensions (namely 'Economy-Environment' and 'Distribution-Fairness') which, in combination, lead to four scenarios. Each of these scenarios is associated with a set of policies which are assumed to impact, to a greater or lesser degree on the level of fertility. However, this impact is not direct but indirect, as it leads specific effects on the driving forces behind each demographic component. In Table 4-1 the assumed impact of each scenario on the distinguished driving forces of fertility are shown.

Table 4-1: Linkage of scenarios to fertility via trends and policies

Demographic component	Trend or Policy	GSE	EME	LSE	CME
FERTILITY	Family versus Individual Goals	Family goals	Individual goals	Family goals	Individual goals
	Family Friendly Policies	Strong	Weak	Strong	Weak
	Assisted Conception	Socially supported	Privately supported	Socially supported	Privately supported
	Abortion Law	Permissive	Restrictive	Permissive	Restrictive
	Extra-Europe Effect	High effect	Low effect	Low effect	Low
	National Fertility Inequalities	Reduced	Persistent	Reduced	Persistent
	Regional Fertility Inequalities	Reduced	Persistent	Reduced	Persistent

In the GSE Scenario, the policy context stems from the combination of high economic growth/sustainable environment with a political orientation focused at social and regional cohesion. In such a political context, women try to become mothers and have at least two children. So women prefer to achieve family goals above pure individual goals, such as having a career. However, a difficult choice between these two goals can be avoided, as Governments promote the combination of motherhood and working outside the home. This results in financing all kinds of child care facilities and financial allowances and/or tax reductions for families with children. However, these economic conditions might not be sufficient. Also a more equal distribution of responsibilities between husband and wife is necessary and both partners will have to participate in the task of raising their children. For this reason, the policy tries to support trends of emancipation. This can be done by promoting flexible working hours but also practical support is offered to couples with fertility problems. Assisted conception through *in vitro* fertilization is supported financially by the Government. On the other hand, a liberal standpoint is taken on the issue of abortion law. It is legal for women to have an abortion. Although this might lead to a reduction of fertility, it has hardly any influence as the Ggovernment also promotes and subsidizes the use of birth contraceptives. In this way, couples can have their children at a point in their lives when they are ready for parenthood, and disappointments of having to undergo an abortion can be prevented (as this can have negative effects on future fertility).

The policy with respect to the arrival of immigrants from countries with a high level of fertility is also permissive. No legal barriers are raised to prevent the arrival of immigrants from non-western countries. This leads to the phenomena as family reunion (wives and children being joined with the husband who arrived earlier as a labour migrant) and family formation migration (persons from the second generation who seek a partner in the country of origin of the parents). Also asylum seekers

from all over the world, and especially countries where fertility is still high, are welcomed. In sum, all these migration flows lead to a substantial increase in fertility.

National inequalities in fertility are rather impressive. In the southern and eastern countries of Europe, fertility is well under 1.5 children per women, while in the western and northern countries, figures up to 2 children per woman are reached. To a large extent, these inequalities can be explained by differences in welfare. In the former communist countries, fertility plummeted after the fall of the Iron Curtain due to a severe economic recession and a cutting back on the family friendly policies (of the communist regimes). Couples postponed having children and waited for better times. Also a lot of facilities for child care were cut short. Also, in the southern countries, a lack of financial support may have caused a low inclination to have large families (here one child families are rather common). In the GSE Scenarios, the combination of high economic growth with policies trying to reduce national inequalities leads to smaller differences in welfare between the countries of the ESPON space. In particular, southern and eastern countries are confronted with a rise in fertility. Also, within countries, regional differences become smaller. More perspectives for economic lagging regions prevent an exodus of young couples on the verge of starting a family. Due to the success of this policy, these mostly peripheral regions enjoy a higher increase in fertility than the other, more prosperous, regions.

In the EME Scenario the economic circumstances are also good, and even better than in the GSE Scenario, and a market philosophy colours the political climate. The focus is on individuals rather than on couples, striving to achieve their rather material goals. Given this focus, family goals are less important than individual goals, such as making a professional carrier. To a certain extent, this has a negative effect on fertility, although having children can, to a certain extent, be seen as an indicator of personal success and leading to more status. In this way, children are more or less treated as consumer goods. In such a political climate, family friendly policies are not well developed. However, due to the high economic growth, it is no substantial financial offer to buy child care on the market. The same applies to assisted conception: as having children is seen as a personal choice, the Government is not willing to support assisted conception. Again, this is not necessary as couples are capable of financing it privately. On the matter of abortion, a rather restrictive point of view is taken: individual persons are responsible for using birth contraceptives and ought to plan their fertility career very carefully. In this way abortion should not be necessary. The political climate reinforces this point of view by making abortion illegal.

Also with respect to immigration, a restrictive political climate prevails; only migrants who have essential assets that can be used in the labour market are welcome. This goes together with strict restriction on the duration of the stay of these migrants. For fertility this means that a quite low effect is generated by these migrants; they consist mostly of singles who are coming for work reasons for only a couple of years without having enough time to find a partner and start a family.

Economic trends tend by nature to reinforce existing national inequalities. In a political climate which paves the way for market oriented measures, it is surely the case that difference in wealth between the ESPON countries will not diminish. The large existing fertility differences between the eastern and southern countries on the one hand and the western and northern countries on the other are not only kept intact but are even growing as economic disparities between these groups of countries increase. More or less the same applies to regional fertility inequalities. Peripheral region are lagging in welfare compared with the central regions. This leads to growing flows of youngsters migrating to more central regions. Here they find jobs and partners, and they wont come back when the phase of family formation starts (possibly they migrate to regions adjacent to the central regions). As a result, existing regional inequalities are persistent in this scenario.

In the LSE Scenario, the political climate resembles that of the GSE Scenario, but the economic prospects are more gloomy. The challenges of climate change have not been met and due to the 'end of oil', energy prices have risen. Couples have severe troubles to cope with their daily financial obligations. The costs of housing in particular have risen (due to high energy costs) and so the monthly budget leaves little space for having children. Although several costs of having children have become high as more mouths have to be filled, a family friendly policy tries to mitigate this by reducing costs of education (e.g. school books for free), public supported child care, financial allowances for families with children, etc. Also giving financial support to couples with fertility problems is still possible, although the number of trials for *in vitro* fertilization is curtailed to a limited number. The net effect of this policy intervention for the level of fertility is that negative effects of the economic trends are more or less offset by these policy measures. Although the political climate is still permissive with respect to the arrival of all kind of migrants, the flows of migrants coming from high fertility countries are rather modest. This is due to the meagre economic prospects; the system of social security is less abundant for newcomers due to financial cuts in all kinds of provisions. National and regional inequalities are reduced to some extent. On a European level, the policy of striving for international cohesion is still active, although due to lower economic growth, the financial space for all kinds of political is limited. Less economic disparities go together with less fertility differences.

Also in the CME Scenario, economic growth has slackened and environmental problems have put a large footprint on society and economy. The risks of climate change have been ignored but its negative effects are becoming noticeable. Due an awkward financial situation, no large-scale investments have been made in order to mitigate the arising problems. The political climate is rather harsh and there is no consideration for couples having to struggle to cope with the costs of daily life. There is no policy trying to stimulate couples to have children and, instead, the necessity of preparing for the labour market (e.g. following education) is stressed. In combination with the fact that there is no budget for family friendly policies and assisted conception, all these matters have a negative

influence on fertility. The attitude towards abortion law is rather restrictive, because a tolerant climate towards sexuality is not approved. It is no wonder that national and regional inequalities in fertility are rather persistent and get even larger as the economic weaker nations and regions suffer the most economic setbacks. In these regions, couples are hesitant to start a family and postpone having children and in a lot of cases abstain from parenthood.

4.3.2 Quantitative assumptions

The quantitative assumptions of the four policy scenarios refer to trends in a common used key-indicator of the level of fertility, namely the Total (period) Fertility Rate (TFR). This indicator is computed as the sum of age-specific fertility rates (ASFRs) over all fertile ages of a women (the age bracket 15 up to 50 years is used), measured in a specific calendar year. This indicator gives an impression of the average number of children per woman. Although this measure is usually interpreted as an indicator of the level of fertility, also some elements of the timing of fertility are present in this measure. This means that changes in the TFR are not only due to changes in the average number of children per woman, but also due to changes in the average age at childbirth. This tempo effect may be explained as follows. Given a constant average number of children per birth cohort of women, the TFR will first decrease during several calendar years in periods when (young) women postpone having children (the delay of motherhood). However, the TFR will increase again once the decline of fertility of young women is levelling off and older women, having delayed motherhood, start having their children (and in this way catch up the loss of fertility at younger ages).

In Europe, this process of delay of motherhood followed by a process of catching up could be witnessed in the last decades. Nowadays, in several countries, both processes have come to an end and as a result the level of fertility is fairly stable. In the Policy Scenarios, it is assumed that no (major) trends in the timing of fertility will happen in the future. For this reason the distribution of SFRs is assumed to be constant. In the construction of the Policy Scenarios, the assumptions refer to changes in the TFRs. In each scenario, specific changes in the TFR are assumed, which are applied to each region. However, within each country, a scenario specific degree of regional convergence and divergence is assumed, leading to varying changes in the regional TFR.

In the making of the quantitative scenarios, it is assumed that the level of the TFR will continue to change up to 2032. Hereafter, a stable level is assumed. The reason for assuming a levelling off of the rate of change, is that society and couples in particular become accustomed to a changed economic situation and political climate. So, couples who start their fertility career around 2032 take the new economic and political context into account and have 'translated' this in their desired number of children.

In the conversion of qualitative into quantitative assumptions, the results from the expert opinion survey described in Chapter 2 play an important role. The result of this survey showed that Governments are somewhat reserved about stimulating fertility in general, considering this as being a decision for couples to take themselves. They also thought that the efficiency of political actions on this issue was quite low. However, a more active policy consists of giving help to couples with fertility problems. This practical kind of policy was visible in almost all the countries of the ESPON space. And even more important, the experts thought it was an effective method to raise fertility. The experts also thought that abortion was a very important issue to influence fertility and, moreover, abortion law was considered as a very effective policy instrument. Based on the mix of perceived political actions in each scenario and the expected effectiveness of political measures, the following translation of qualitative assumptions into quantitative assumptions could be made.

Table 4-2: Linkage of scenarios to fertility: outcomes in levels and regional distributions

Demographic component	Trend or Policy	GROWING SOCIAL EUROPE	EXPANDING MARKET EUROPE	LIMITED SOCIAL EUROPE	CHALLENGED MARKET EUROPE
FERTILITY	Family versus Individual Goals	Target TFR +0.1	Target TFR +0.0	Target TFR +0.0	Target TFR -0.2
	Family Friendly Policies	Target TFR +0.1	Target TFR +0.0	Target TFR +0.1	Target TFR +0.0
	Assisted Conception	Target TFR +0.2	Target TFR +0.1	Target TFR +0.1	Target TFR +0.0
	Abortion Law	Target TFR -0.1	Target TFR +0.1	Target TFR -0.2	Target TFR +0.0
	Extra-Europe Effect	Target TFR +0.1	Target TFR +0.0	Target TFR +0.0	Target TFR +0.0
	National Fertility Inequalities	Reduce by 25%	Increase by 25%	Reduce by 15%	Increase by 15%e
	Regional Fertility Inequalities	Reduce by 25%	Increase by 25%	Reduce by 15%e	Increase by 15%

From Table 4-2 it is clear that in the GSE Scenario the TFR will increase by 0.4 up to 2027. This stems from the combination of an active policy to raise fertility, not only by promoting a family friendly political climate but also by giving practical help to couples with fertility problems. This has a positive effect on fertility, although a permissive point of view on abortion leads to a considerable negative effect. National and regional inequalities decrease substantially, namely by 25%.

In the EME Scenario, the TFR will also rise, but with a smaller increase of 0.2 children. Due to the absence of a policy to stimulate fertility in general and only a modest financial contribution to help couples with fertility problems, a small positive effect on the TFR is apparent in this scenario. Also a modest positive contribution to fertility is generated by the restrictive abortion law. National and

regional inequalities increase substantially, namely by 25%. It is expected that stronger regions profit most of the rather favourable economic and political situation.

In the LSE Scenario, the TFR will not change in the coming half century. This is due to mix of positive and negative effects on fertility. Family friendly policies and giving help to couples with fertility problems leads to an increase of 0.2 children but this is offset by the liberal abortion law leading to a decrease of 0.2 children. National and regional inequalities decrease somewhat, namely by 15%. The policy oriented at regional cohesion has effects, but they are not so strong compared with the GSE Scenario.

In the CME Scenario, the negative effect of the harsh economic and political climate leads to a decrease in fertility: up to 0.2 children. Especially the orientation on individual goals of couples and policy leads to a smaller family size. The other driving forces have neither a positive or negative effect on fertility; partly due to the fact that no policies are taken in order to stimulate having children in combination with a restrictive abortion law. National and regional inequalities increase slightly, namely by 15%. Although the weaker nations and regions suffer the most from the gloomy economic situation, also the stronger regions cannot escape from the negative effects on fertility.

4.4 Results

Figure 4-1gives an impression of the recent pattern of the fertility in the ESPON space, based on the NUTS 2 classification. Fertility levels are rather low in most European regions. In nearly half of the regions, the TFR is 1.5 or lower and only about 10% of European regions have a total fertility rate of 2 or higher. TFRs are relatively high in northern regions, and in most regions of France, Ireland and the UK. Low levels of fertility can be observed in most southern, central and eastern regions

Total Fertility Rate in 2005

Total Fertility Rate (TFR) in 2005, in number of children

< 1.25	(37)
1.25 – 1.50	(122)
1.50 – 1.75	(48)
1.75 – 2.00	(71)
> 2.00	(9)
No data	

(X) = number of regions per category
TFR - The average number of chidren that
would born to a woman over her lifetime;
calculated for female aged 15-49 years

ESPON space average 1.53
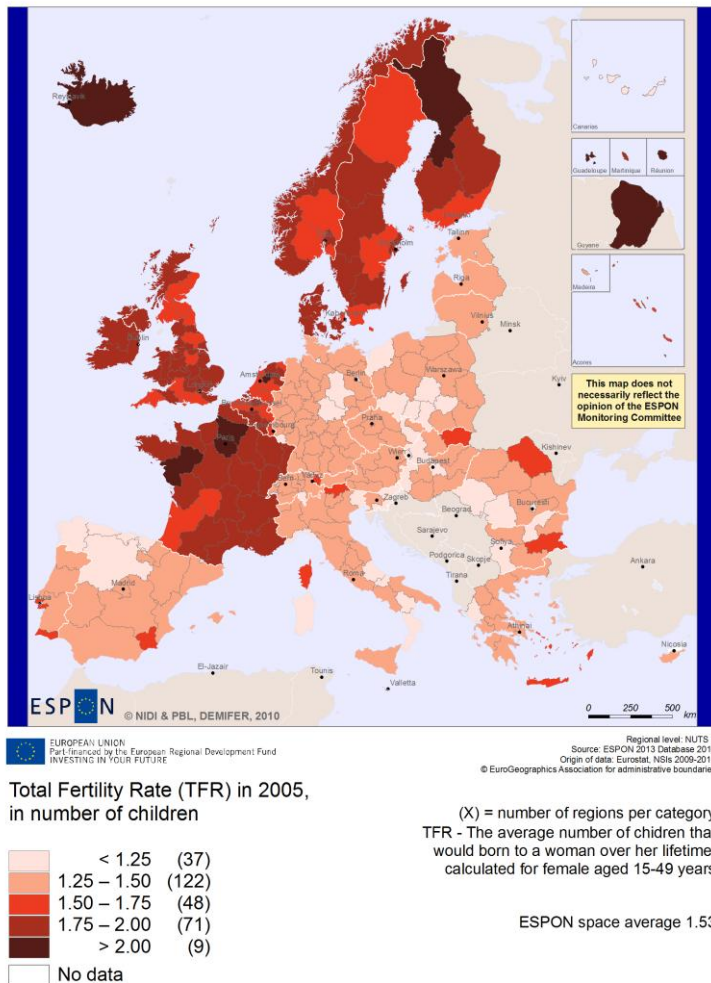
Figure 4-1: TFRs in the NUTS 2 region in the ESPON space, 2005

Figure 4-2 (top, left) gives an impression of the level of fertility in the ESPON space, according to the GSE Scenario. Fertility levels are much higher compared with 1995; now only 5% of the regions have a TFR of 1.5 or lower and about 30% of the European regions have a total fertility rate of 2 or higher. TFRs are particular high in northern regions, and in most regions of France, Ireland and the UK. In the large majority of the region in the eastern, central and southern countries, fertility has surpassed the dramatic low level of 1.5.

Total Fertility Rate (TFR) in 2050 - Scenarios
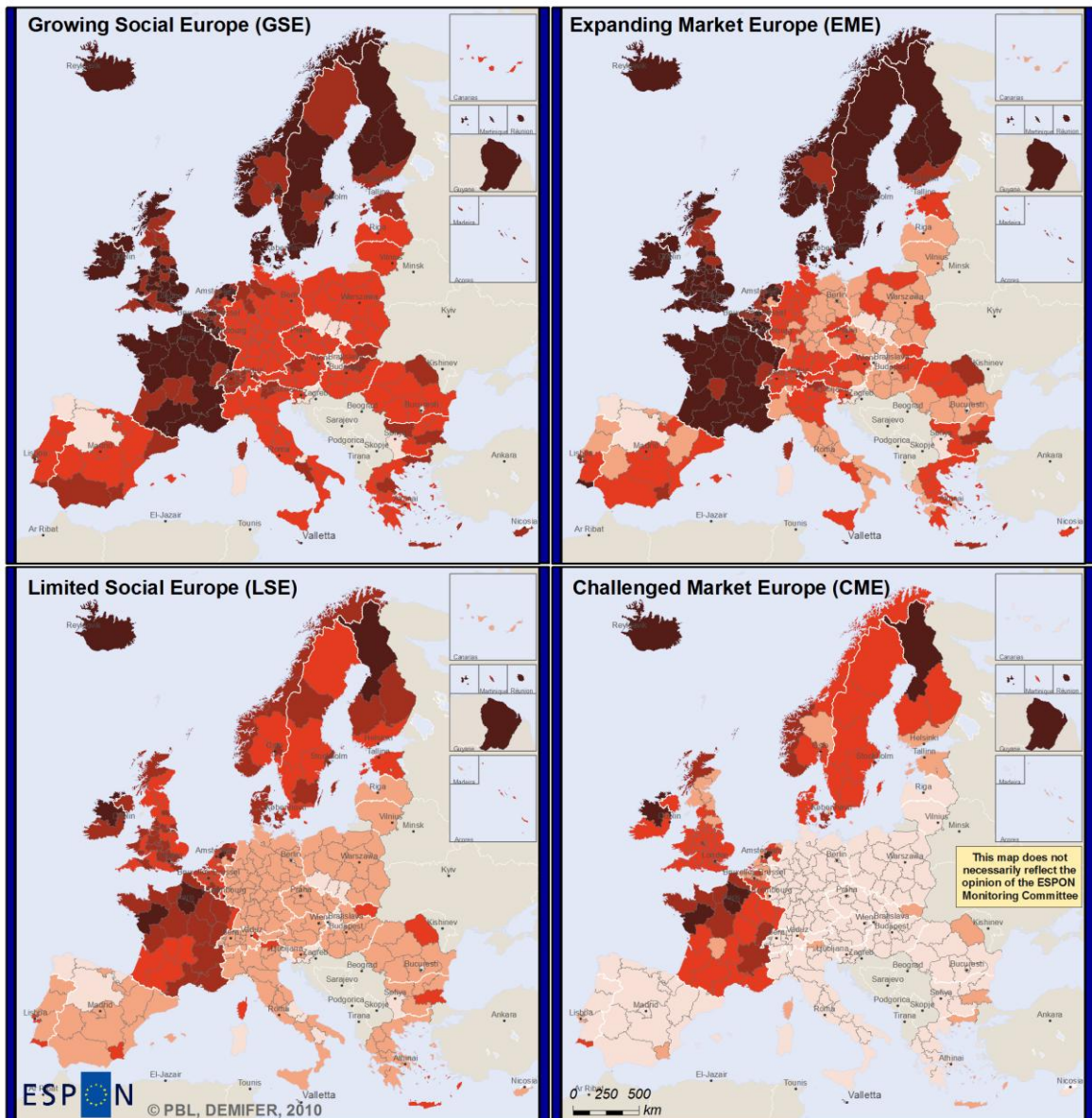
Growing Social Europe (GSE)

Expanding Market Europe (EME)

Limited Social Europe (LSE)

Challenged Market Europe (CME)

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0 250 500 km

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Regional level: NUTS 2
Source: ESPON 2013 Database, 2010
Origin of data: Eurostat, NSIs, Estimations, 2010
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Total Fertility Rate (TFR) in 2050 -
after 4 DEMIFER scenarios
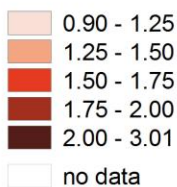
- 0.90 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 3.01
- no data

TFR - The average number of children that
would be born to a woman over her lifetime;
calculated for female aged 15-49 years

Figure 4-2: TFRs in the NUTS 2 region in the ESPON space, GSE, EME, LSE, and CME scenarios, 2050

Figure 4-2 (top, right) gives an impression of the pattern of the fertility in the ESPON space, according to the EME Scenario. Although fertility is generally higher than in 1995, nearly 30% of the regions have a low level of 1.5 or lower. This percentage is much higher than in the GSE Scenario. It is remarkable that the percentage of regions with a fertility level over 2 is also higher, at nearly 35%. Although the general increase of the TFR with 0.2 is half as large at that in the GSE Scenario, the divergence assumptions lead to a much higher number of regions with a very high TFR. Fertility is especially high in northern regions, and almost all regions of France, Ireland and the UK. Like the previous scenario, regions with a low level of fertility can again be found in most southern, central and eastern regions although the number of those regions here is now much higher.

Figure 4-2 (bottom, left) gives an impression of the pattern of the fertility in the ESPON space, according to the LSE Scenario. The pattern is more or less the same as the situation in 1995; that is no surprise because no increase of decrease in fertility is expected in the future. However, the percentage of regions with a TFR of 1.5 or lower (55%) is somewhat higher. In contrast, the percentage of those with a TFR 2 or higher (5%) is much lower. These differences with the situation of 1995 are due to the convergence assumptions of this scenario. Only a few regions in the northern countries, in France, Ireland and the UK now show a level of 2 and over.

Figure 4-2 (bottom, right) gives an impression of the pattern of the fertility in the ESPON space, according to the CME Scenario. Fertility has dropped by 0.2 in general. This leads to two out of three regions with a TFR of 1.5 or lower. However, the percentage of regions with a TFR of 2.0 and higher is the same as in the previous scenario. This is due to the divergence assumption of this scenario: so some isolated regions are capable of maintaining their high fertility levels. These regions can again be found in the northern countries of France, Ireland and the UK. In the eastern, central and southern countries, almost all regions have a fertility of 1.5 or lower.

Our maps and projections use the NUTS2 region as a base. However, there will always be variation within these relatively large populations (1.7 million on average). Here we illustrate the sub-regional variation in fertility within a NUTS2 region, taken from the West Yorkshire Case Study (Rees et al. 2010b). The increasing contribution of natural increase to population growth in West Yorkshire since 2001 has been driven by a reversal in the downward trend in fertility rates that were experienced throughout the UK to 2000. The NUTS2 region of West Yorkshire has a Total Fertility Rate (TFR) that has risen from low point of 1.7 in 2001 to 1.9 in 2007. However, when we graph total fertility rates at NUTS3 scale, we observe interesting local variation. Despite a rise in fertility for all the LAU1 regions there are clear differences between the three curves. The NUTS3 region with the highest TFR is Bradford which has kept a TFR above-replacement fertility of 2.07 since the 1990s, rising to almost 2.4 in 2007. This is a product of a large ethnic minority community from Pakistan,

who have higher birth rates. Despite the Leeds NUTS3 region having a TFR trend which parallels Bradford, the rise in TFR has remained much lower, rising from 1.4 in 2001 to 1.6 in 2007.

Total Fertility Rate
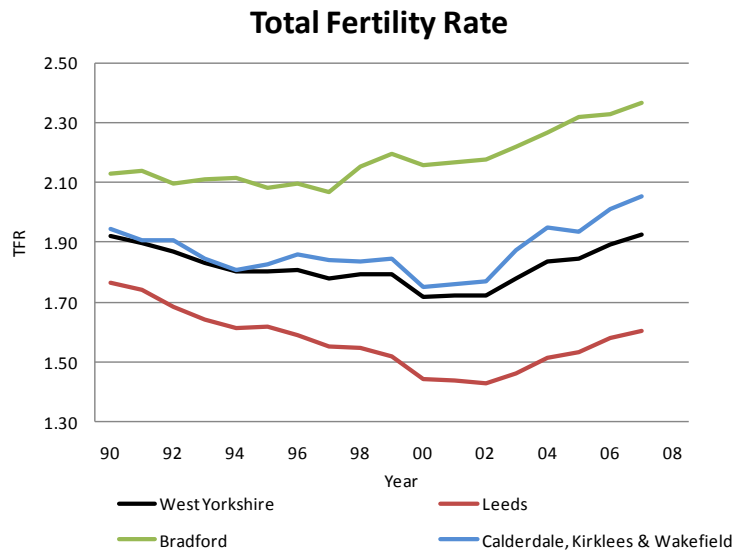
Figure 4-3: Total fertility rate changes at NUTS3 level within the West Yorkshire NUTS2 region, 1990-2007

5.   INTERNAL MIGRATION SCENARIOS

5.1   Introduction

This chapter details the data and estimation methods used to derive the internal migration assumptions for the MULTIPOLES projection model. The objective has been to derive the following: (1) out-migration rates for a base period (2005-10) for each combination of origin (O), destination (D), age (A) and sex (S) within a single country, and (2) a series of assumptions to modify these base-period out-migration rates over the full projection horizon (2005-10 to 2045-50) for each of five alternative scenarios. These five scenarios have been defined as a generic framework applicable to each component of demographic change (fertility, mortality, internal migration and international migration). The scenarios are summarized again in Table 5-1. The colour codes refer to the database workbook in which the numerical computations are implemented.

Table 5-1: The five policy scenarios

Scenario colour code	Definition
Trend	Continuation of base-period
GSE	Growing Social Europe
LSE	Limited Social Europe
EME	Expanding Market Europe
CME	Challenged Market Europe

Internal migration is defined as the movement of population between NUTS2 regions within a single country. Of the 31 countries in the DEMIFER study area, eight are 'single-region' countries (Cyprus, Estonia, Iceland, Latvia, Liechtenstein, Lithuania, Luxembourg and Malta) and therefore have no internal, inter-NUTS2 migration. The remaining 23 countries have internal migration for between 2 and 39 NUTS2 regions. The migration concept used in most European countries is the 'movement' definition in which all residential relocations in a time interval are counted (Courgeau, 1973; Ledent and Rees, 1980; Ledent and Rees, 1986; Rees, 1985; Rees and Willekens, 1986). In some countries (France, Greece, Portugal), only 'transition' data on migrants were available. Strictly speaking, migration rates based on census data (transitions) are different from migration rates based on registered relocations (moves). However, in terms of 'net' relocations between the start and end of time intervals, movement and transition migrations yield the same result because 'surplus''' inter-regional moves cancel out.

Section 5.2 provides a summary of the data collected for each of the 23 countries for which internal migration is a driver of population change in the MULTIPOLES model. Section 5.3 describes how out-migration rates have been derived for the full ODAS array for each country and illustrates the variation in the level and rate of internal migration between countries in the study area. Section 5.4

introduces the concept of the 'destination attractiveness ratio' (DAR) − the relationship between a region's share of population and its share of the total in-migration flow for a country. The DAR is used as the basis for modelling the impact of the five alternative scenarios. Section 5.5 illustrates how these scenario assumptions have been derived.

5.2 Data development

To facilitate the derivation of the internal migration assumptions, a comprehensive database of statistics for the 23 countries of interest has been produced. This database has been created from EUROSTAT sources (via the DEMIFER shared datasets), from a number of individual National Statistical Offices (NSO) and in some cases through estimation. The availability and quality of the data were not consistent across the study area. Figure 5-1 summarises the content of the final database of internal migration data used in the DEMIFER project. Of the 31 countries, eight have no NUTS2 geographical disaggregation. Of the remaining 23, 16 had OD internal migration matrices for each year 2001-2006. Italy had data for 2001-2005, Norway for 2002-2003 and 2005-2006. Denmark and France had OD migration data for 2006 only, whereas Ireland had both 2002 and 2006. For Greece and Portugal data could only be made available for 2001.

	OD Migration data available
	Single NUTS2 region
	OD migration data not available

Code	Country	NUTS2 regions	2001	2002	2003	2004	2005	2006
AT	Austria	9						
BE	Belgium	11						
BG	Bulgaria	6						
CY	Cyprus	1						
CZ	Czech Republic	8						
DK	Denmark	5						
EE	Estonia	1						
FI	Finland	5						
FR	France	26						
DE	Germany	39						
GR	Greece	13						
HU	Hungary	7						
IS	Iceland	1						
IE	Ireland	2						
IT	Italy	21						
LV	Latvia	1						
LI	Liechtenstein	1						
LT	Lithuania	1						
LU	Luxembourg	1						
MT	Malta	1						
NL	Netherlands	12						
NO	Norway	7						
PL	Poland	16						
PT	Portugal	7						
RO	Romania	8						
SK	Slovakia	4						
SI	Slovenia	2						
ES	Spain	19						
SE	Sweden	8						
CH	Switzerland	7						
UK	United Kingdom	37						

Figure 5-1: OD Internal Migration data

Wherever possible, migration data by origin, age and sex (OAS) have also been captured to facilitate the estimation of a full ODAS array of flows for each country. In addition, population data by age and sex has been captured for each NUTS2 region to enable the calculation of out-migration rates for the base period 2005-2010 (see next chapter). In the UK, a substantial process of data estimation was required to produced a consistent set of inter-NUTS2 flows that aligned data from Scottish NUTS2 regions with those from and to elsewhere within the UK. This innovative methodology has produced a unique set of migration statistics for the UK which has been provided to the Office for National Statistics (ONS) and subsequently to Eurostat (Dennett and Rees, 2010).

5.3 Calculating out-migration rates

A direct comparison of the level and pattern of internal migration in each country in the DEMIFER study area is difficult because of the different number, size and shape of NUTS regions in each country and because of the variety of drivers of migration in each. The issues in comparing internal migration between countries have been reviewed and analyzed in an Australia-Britain project by Bell *et al.,* 2000; Bell and Rees, 2006. Internal migration differs between countries because of differences in concept, time reference, spatial reference, distances moved, impact and connectivity. However, for purposes of scenario development and population projection, these issues are not critical. An illustration of the differences is interesting nevertheless. Figure 5-2 presents a comparison of the level of internal migration by country. Data are drawn largely from 2006, with the exception of Greece and Portugal (2001) and Italy (2005). Germany and the UK stand out with their 40-zone and 37-zone NUTS2 geographical systems producing very high internal migration flows. The UK is especially high, with the importance of 'student migration' likely to be a dominant factor explaining its position. Students entering higher education (HE) in England within the UK have a strong tradition of inter-regional migration, reflecting a desire to establish adult independence. In other countries, the majority of HE students attend their local or nearest institutions.
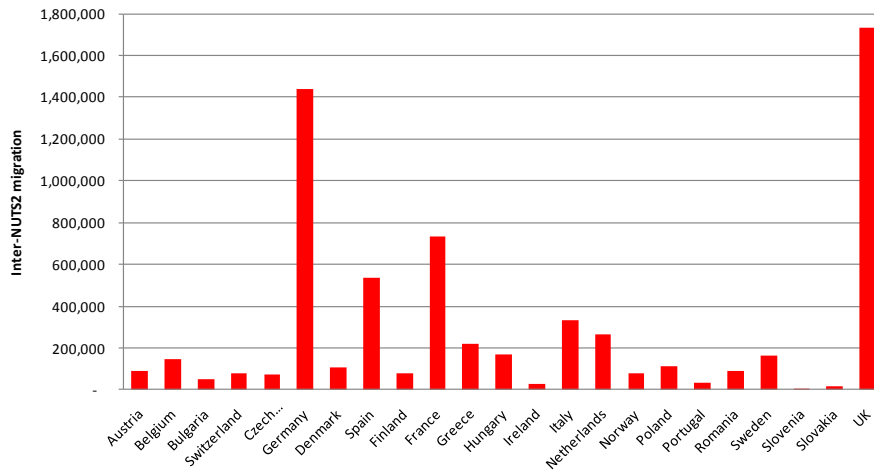
Figure 5-2: Internal migration flows by country

The conversion of these migration levels to migration rates (total internal migration/total population) provides a more comparable illustration of the importance of internal migration to NUTS2 population change (Figure 5-3). The UK remains dominant with an overall internal migration rate approaching 30 per 1,000 head of population. Germany's internal migration rate is exceeded by a number of countries, including Denmark, Greece, Norway and Sweden. Amongst the larger countries, with a relatively large number of NUTS2 regions, Italy stands out as having a relatively low level of internal migration rate as does Poland.
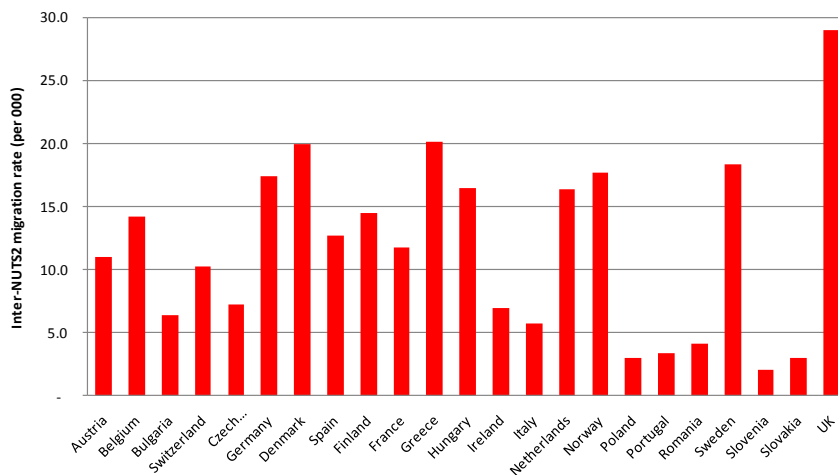
Figure 5-3: Internal migration rates by country

Within each country's NUTS2 geographical system, there are significant spatial differences between the rates of migration being experienced. This variation and its potential to change over time due to social, economic, political and climatic conditions is a key component of the DEMIFER analysis. Figure 5-4 disaggregates the internal migration rates of Figure 5-3 into a 'range' of values

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representing the minimum and maximum out-migration rates experienced by NUTS2 regions in each country. There are some large differences between the highest and lowest rates of out-migration, in some cases reflecting small numbers associated with non-contiguous, NUTS2 regions (e.g. Spain), in other cases reflecting the importance of a dominant region (e.g. London in the UK).
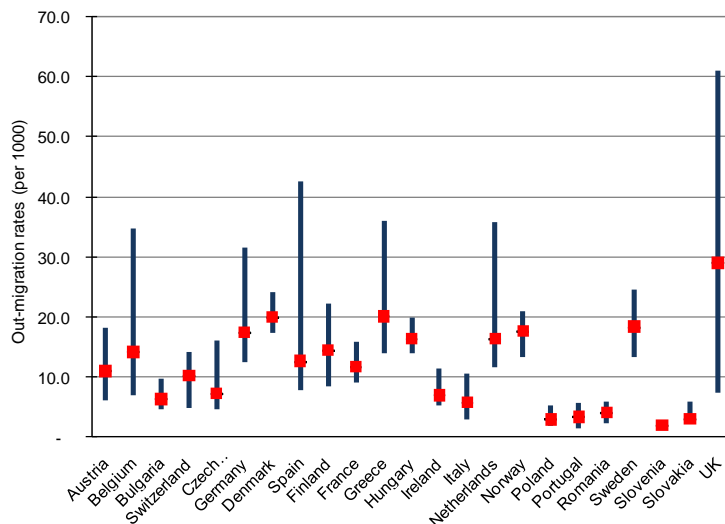
Figure 5-4: Out-migration rates: NUTS2 average, maximum and minimum by country

A complete array of ODAS out-migration rates has been produced for each of the 23 countries. These provide the base-period migration rates from which each of the five scenarios is run. A number of stages have been required to derive these rates, as follows:

(i)   Wherever possible, an origin-destination array of inter-NUTS migration flows for 2006 has provided the starting point for out-migration rate estimation. Where 2006 information has not been available, data have been taken from the nearest available year (2005 in the case of Italy, 2001 in the case of Portugal and Greece).

(ii)   Using the available time series of OD migration data for each country the most recent trend in both migration flows and migration rates has been examined. This has enabled a weighted estimate of the 'average' migration rate for 2005-2010 to be derived. Figure 5-5, for example, illustrates the time series of total internal migration flows and the corresponding rates for NUTS2 regions in the Netherlands. The trend for 2004-2006 has been extrapolated to 2007-20008 and then an average of the migration rate over the 2004-2008 period has been used as a 'differential' to apply to subsequent 2006 estimates − producing the 2005-2010 base period rates.

(iii)   Migration flow data by origin, age and sex (OAS) has been used in combination with the corresponding OD matrix to derive a full ODAS array of internal migration flows.

(iv)   Population data by NUTS2 region, age and sex (OAS) has then been combined with the ODAS migration array to produce a corresponding array of ODAS out-migration rates.   With population data only available to age 85+, migration rates for older age-groups (85-89, 90-94, 95-99 and 100+) have been set at the 85+ age-group level. The 'differential' detailed in (ii) above has been applied to these '2006-based' rates to produce an estimated equivalent for the base-period 2005-2010.

(v)   The full ODAS array of out-migration rates has been provided as direct input to the MULTIPOLES model.
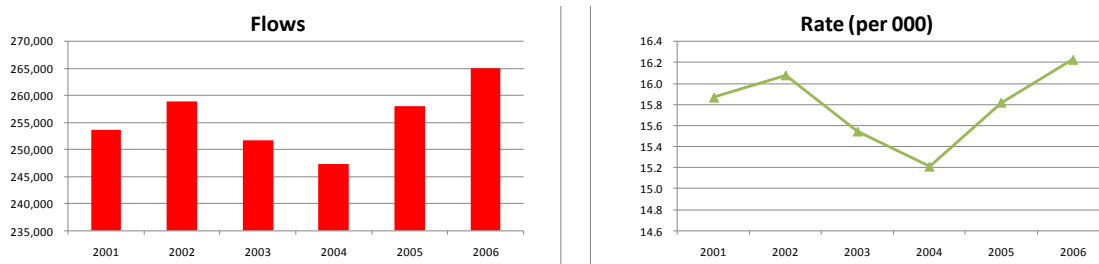
Figure 5-5: Internal migration flows and rate, Netherlands, 2001-2006

An illustration of the nature of the data being produced is illustrated below. In Figure 5-6, the age profile of out-migration rates for males in Közép-Magyarország is presented with alternative profiles for each of the remaining 6 NUTS2 regions in Hungary. Similarly, in Figure 5-7, out-migration profiles for Burgenland to all other NUTS2 regions in Austria are presented.
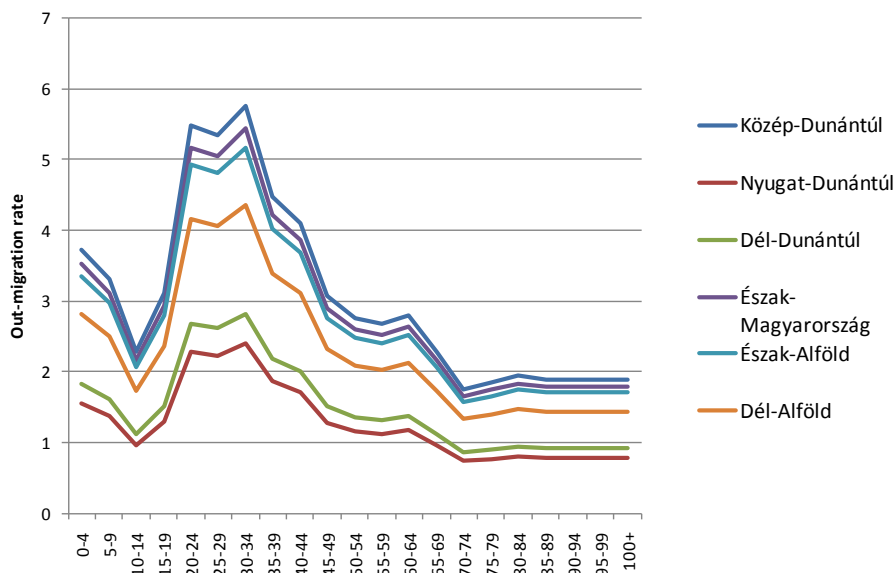
Figure 5-6: Out-migration rate profiles, Közép-Magyarország, Hungary

98
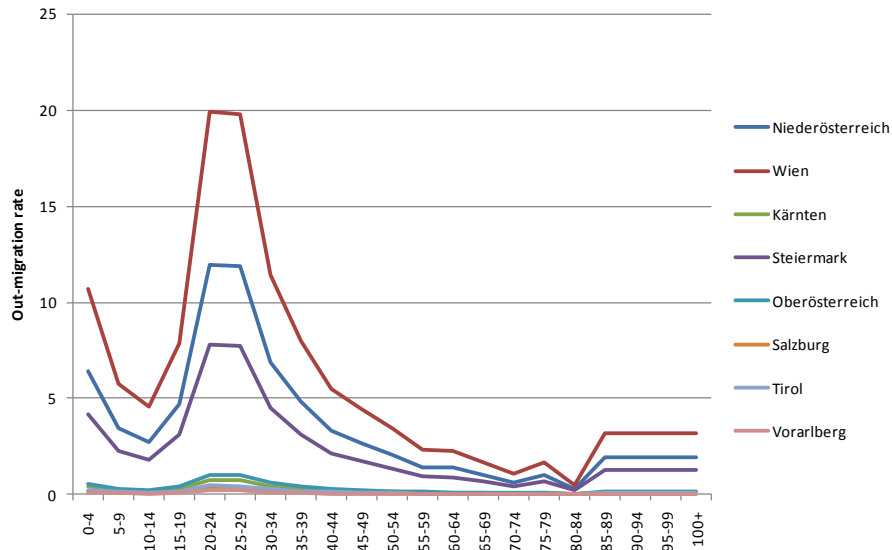
Figure 5-7: Out-migration rate profiles, Burgenland, Austria

5.4 NUTS2 destination attractiveness

In the case of inter-NUTS2 internal migration, the Policy Scenarios implemented by the MULTIPOLES model are driven by adjustments to the relative attractiveness of individual destinations under varying assumptions. The attractiveness of an individual NUTS2 region is measured using a destination attractiveness ratio (DAR), which is calculated as:

DAR = Share of migration inflow/Share of population   (5.1)

Within each country there is significant variation between the DAR values for NUTS2 regions. Figure 5-8 illustrates this variation. Again, outlying values comprise a mixture of relatively small areas plus dominant destinations within a country.
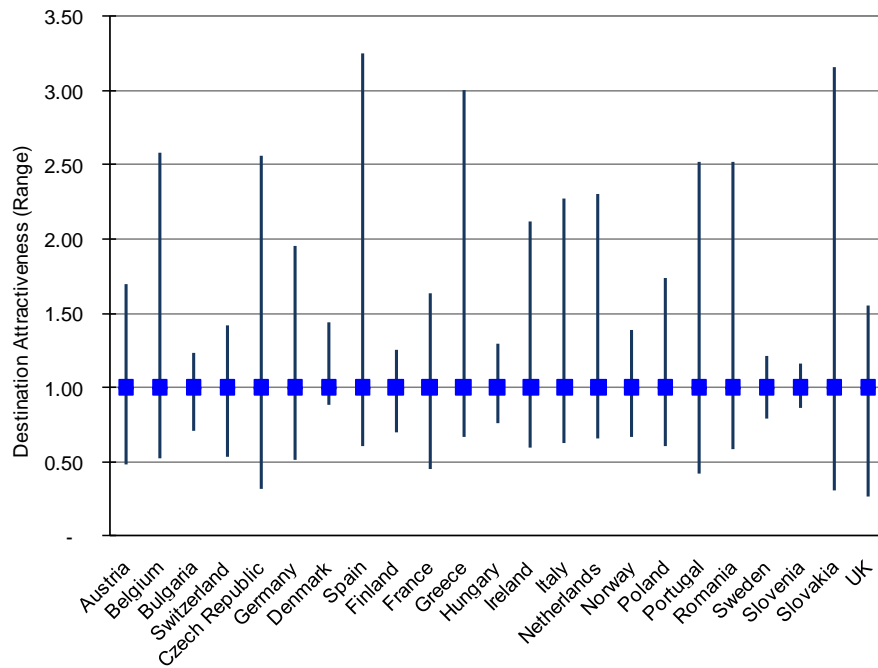
Figure 5-8: Destination Attractiveness Ratios – minimum and maximum by country

5.5 Scenario development

The policy framework for the DEMIFER scenarios consists of a Status Quo (STQ) Scenario plus four alternative scenarios which replicate different trajectories for the development of Europe's market and social structure. Two scenarios, Growing Social Europe (GSE) and Limited Social Europe (LSE) 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 in the two scenarios. A further two scenarios assume the opposite, with expanding market economies leading to less cohesion between regions and greater divergence in the relative attractiveness of NUTS2 regions as migrant destinations. Figure 5-9 provides an illustration of how the 'range' of DAR values is affected by the alternative scenarios, converging in the first two, diverging in the second.

Figure 5-9: Scenario development – internal migration

For MULTIPOLES, the base period DAR value for each NUTS2 region is modified over the projection period (2005-10 to 2045-50) leading to greater convergence or divergence in country-wide DAR values. These modified DAR values apply appropriate weights to the ODAS migration rate arrays to change the pattern and distribution of migration flows between NUTS2 regions in each country. At present, the 'level' of migration remains unchanged, with scenarios modifying only the range of values and not the scale.

A series of maps show the DAR values for the benchmark period, 2005-10 (Figure 5-10), and for the scenarios in 2045-50. Figure 5-11a presents the DARs for the GSE Scenario. Figure 5-11b presents the DARs for the EME Scenario. Figure 5-11c presents the DARs for the LSE Scenario. Figure 5-11d presents the DARs for the CME Scenario. Detailed inspection of the maps reveals how the DAR geography varies across the scenarios in the planned fashion.

Regional destination attractiveness for 2005-2010
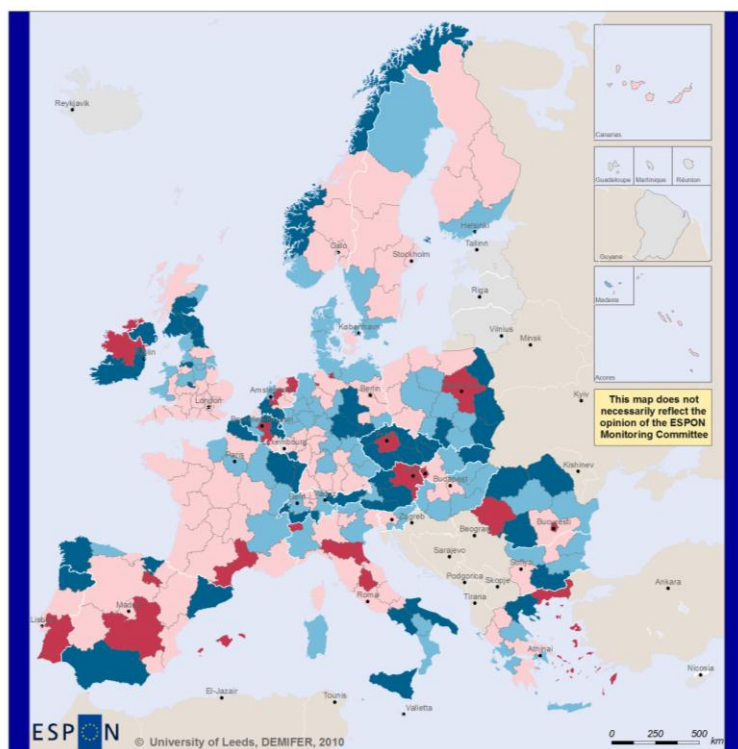
Figure 5-10: Regional destination attractiveness for 2005-10

Regional destination attractiveness for 2045-2050 - Scenarios
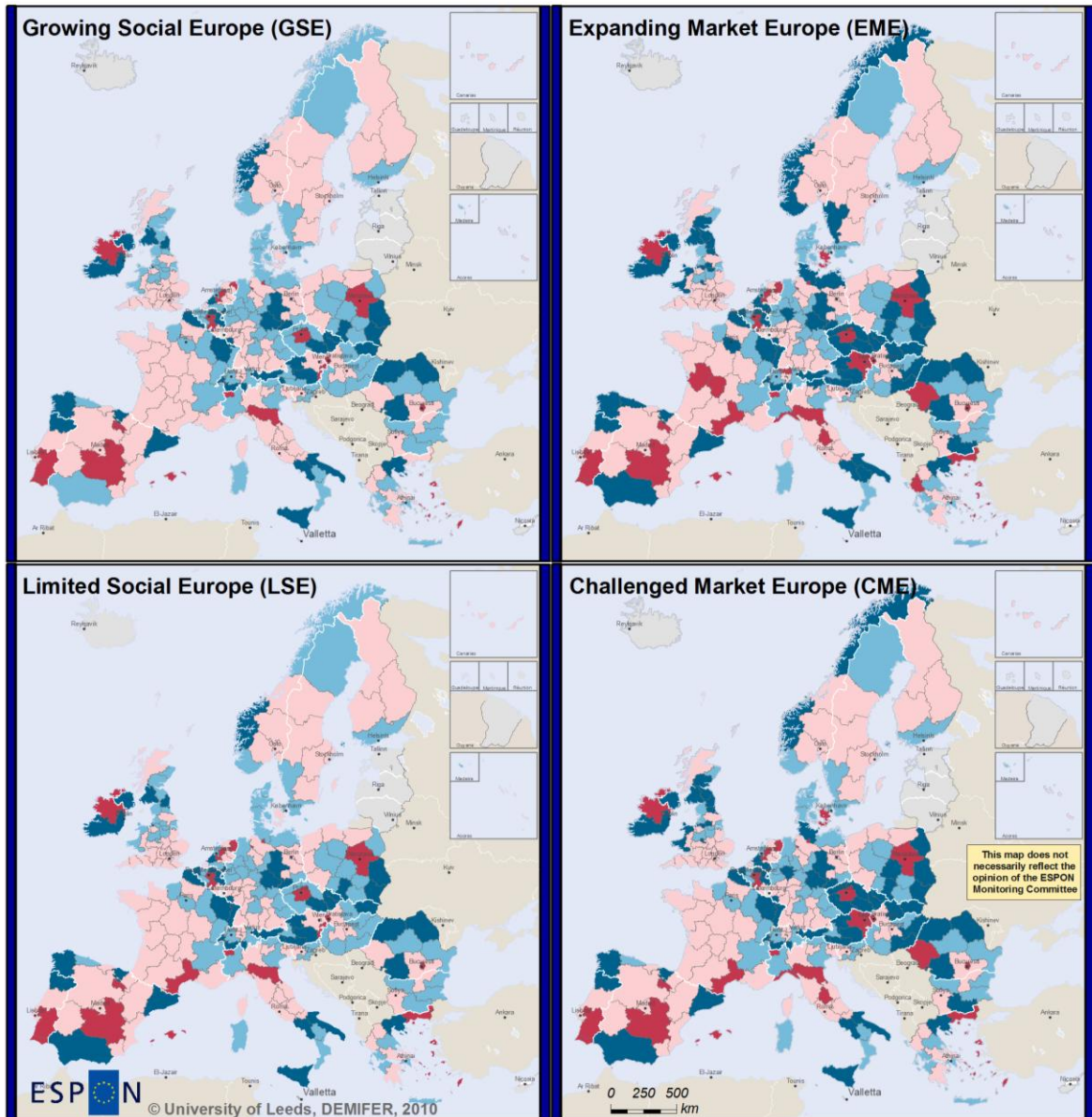
Growing Social Europe (GSE)

Expanding Market Europe (EME)

Limited Social Europe (LSE)

Challenged Market Europe (CME)

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

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Regional level: NUTS 2
Source: ESPON 2013 Database, 2010
Origin of data: Eurostat, NSIs, Estimations, 2010
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Regional Destination Attractiveness Ratios (DAR)*
for 2045-2050 after DEMIFER Policy Scenarios
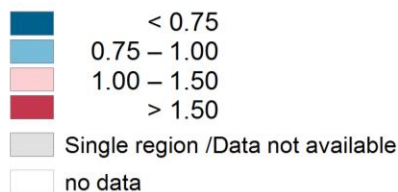
- < 0.75
- 0.75 – 1.00
- 1.00 – 1.50
- > 1.50
- Single region /Data not available
- no data

* DAR = Share of Migration Inflow
as a Share of Population

Single region = Countries with
only one NUTS2 region

Figure 5-11: Regional destination attractiveness for 2045-50: GSE, EME, LSE, and CME scenarios

6. INTERNATIONAL MIGRATION SCENARIOS

6.1 Introduction

Since the Schengen agreement of 1985 (which effectively started in 1995) people are allowed to move freely inside the container of Schengen countries. Working in Germany, living in Belgium and family visits in Luxembourg: it is all possible. With the exception of Romania and Bulgaria, people can migrate between the countries of the ESPON space with a minimum of regulations. However, with respect to the migration between the ESPON space and the rest of the world legal constraints play an important role. Especial in situations of economic recession the European countries are inclined the tighten the rules on entrance (notably of asylum seekers), while in times of a booming economy (labour) migrants are given a hearty welcome. Given the fact that these two types of international migration happen in a completely differential judicial context, having major consequences on the amount and direction of migration flows, the assumptions on these two types of migration has been made separately (and in the wake of it also the methodology of modelling).

The section on international migration starts with a brief overview of theories on international migration. These theories will be used in the formulation of the qualitative assumptions of the policy scenarios. In the next paragraph the migration between the countries of ESPON space is presented. The last paragraph elaborates on the migration between the ESPON space and the rest of the world. The qualitative and quantitative assumptions are to a large part inspired by the results of the expert opinion survey.

6.2 Theoretical aspects of inter-country migration

Several theories have been adopted to explain migration over time. Some of these theories will be briefly discussed in this chapter, but in their book Massey *et al.* (1993) provide a more detailed description.

The *neoclassical economical theory* states that international migration, like its internal counterpart, is caused by geographic differences in the supply of and demand for labour. Todaro (1969) explains migration in terms of cost and benefit calculations. Migrants want to maximize their income, so differences in income levels between sending and receiving countries are an important explanatory variable. This theory is not only applicable for the individual level, but also on the household level, according to Stark and Taylor (1991). This theory generally deals with the macro level of countries, but similar micro level neoclassical economical theories have been developed where people choose to move to sub-country regions where they can be most productive, given their skills; working there leads to the highest wages.

According to the *new economic theory*, migration decisions are primarily made in the context of families, households or some other group of related persons, which try to reduce feelings of relative deprivation and to diversify risks. By allocating members to a foreign labour market the economic position of this group will be strengthened due to the stream of remittances.

Dual market theories see migration flows as the consequence of labour demands of low skilled workers in market economies. Jobs at the bottom of the ladder, with the lowest payment and unpleasant conditions, are characterised by a structural shortage of workers. The native population in countries with a dual labour market refuses to work in such conditions, so immigrants are put in as the solution to this problem. According to Chiswick (1978) primary jobs can only be acquired by the indigenous workers. Due to a lack of human capital foreigners have to orientate on the secondary jobs and to compete with indigenous workers for those lower paid jobs.

In the *World systems theory* international migration is placed in the context of the structure and expansion of a capitalist world market. The intrinsic nature of capitalist market economy leads to existence of low paid jobs e.g. in mining areas and low level industries. This causes social disintegration and segregation. In such conditions, people consider international migration as a means to a better life and future. In the process of the expansion of capitalist markets, cultural / historical bounds develop between certain countries leading to migration flows between these countries.

Migration is not an ending story, it is a perpetual phenomena, supported by *networks*. These networks are a set of interpersonal ties that connect migrants, former migrants and non-migrants in the sending and receiving countries. These connections lower the costs and risks of migration by not only finding migrants new jobs, but also with finding them new houses or supporting them through the psychological impact of migration. Networks provide a framework in which the migrant is able to expand a new social circle. Other factors at play in the sending countries are the accustomisation to migration and appreciation of migrants and the depletion and social disintegration of the local communities because of loss of human capital. Furthermore, in the receiving countries, employment needs in 'immigrants jobs' in particular can be held responsible for continuing to encourage migrant flows.

Wage differences between countries are not the only motivation for migration. The *theory of planned behaviour*, as founded by Fishbein and Ajzen (1975), ascribes high importance to the reasoning and intentions of migration. Their model shows that attitudes, norms and perceived behavioural control influences behaviour through intention. Attitudes are steered by behavioural beliefs: the 'subjective' probability that behaviour will lead to a certain outcome. Norms are steered by the social pressure to engage (or not) in a specific kind of behaviour. The perceived behavioural controls refer to the perception of people on their ability to perform a given behaviour. Mainly based on this theory, De

Jong (1981, 2000) constructed a general model of migration decision making (Figure 6-1). The model comprises six factors that determine the intention and behaviour of migration, namely migrant networks, family migration norms, gender roles, values/expectancies, residential satisfactions and behavioural constraints/facilitators. These six factors in turn are influenced by individual, household and community characteristics. According to De Jong migration intentions can be seen as a proximate determinant of migration.
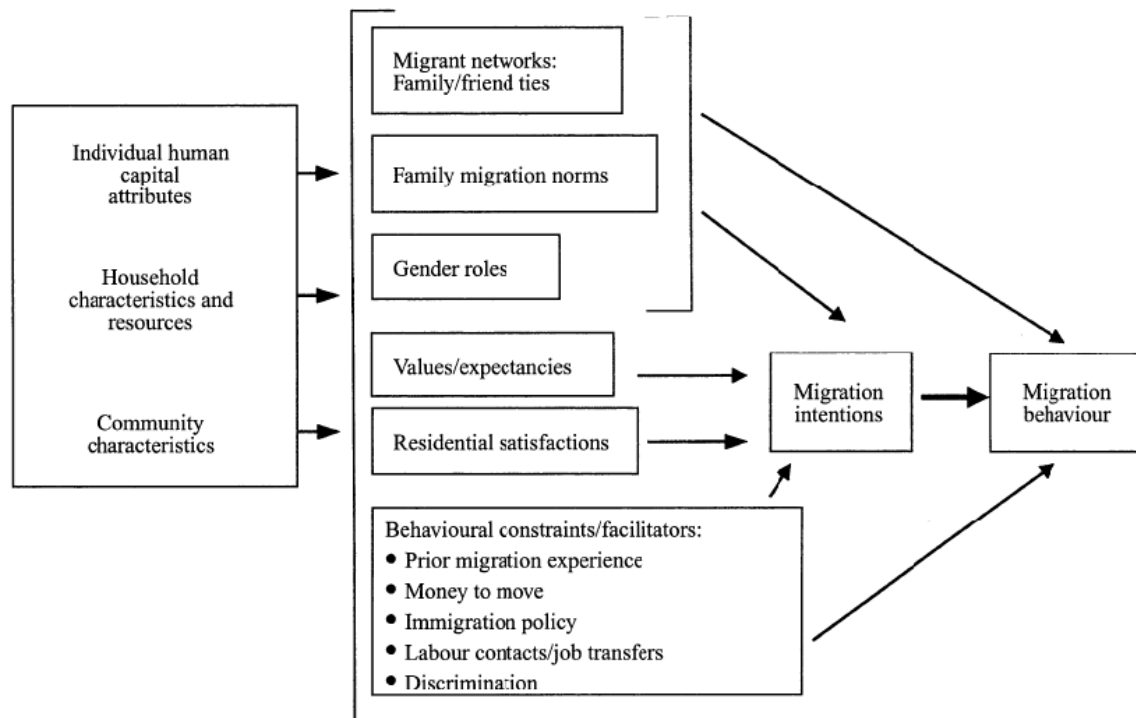
Figure 6-1: General model of migration decision making (De Jong, 2000)

Key elements in the migration process are the *push* and *pull* factors. Wage differences provide both push and pull factors. Although migration flows are invoked by these wage differences, migration carries the potential to strengthen those differences. It is possible that migration flows cause a labour surplus in the receiving country, which can negatively influence the (high) wages in this country. As a result, the gap in wages between the sending and receiving countries can narrow. An important push factor is the dissatisfaction of people in the sending country. In this dissatisfaction political, social and environmental elements can be identified. Pull factors are mainly of a social or environmental nature, pulling migrants to a better life and future.
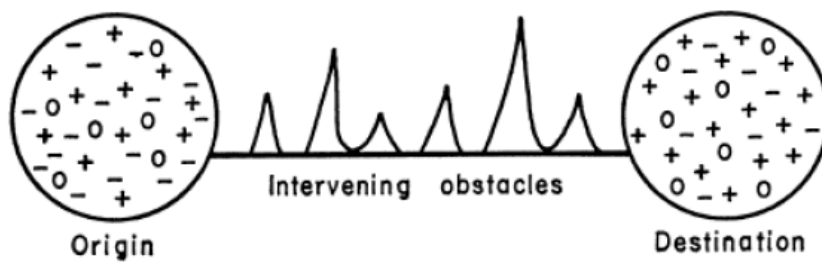
Figure 6-2: A theory of migration (Lee, 1966)

Lee (1966) points to the fact that between the push and pull factors and between the origin and destination, a set of intervening obstacles might occur (Figure 6-2). These obstacles stem from the *distance constraint*. This refers not only to physical distance, but also to distance in the terms of financial and psychological costs. A person will only migrate if the revenues from migration are enough to overcome the *distance constraint*. For example, if the profits of migration, i.e. higher wages, are large enough, potential migrants will move to other countries. Networks play an important role, as they provide valuable information that may shift the balance of revenues and costs.

Van de Kaa (1996) stated that the process of migration process is influenced by policies. Treaties, agreements, and other regulations have an effect on the amount of migrants and their destinations. So, the intervention of governments and other institutions, trying to steer international migration, must be taken into account when projecting international migration in the future.

With respect to the spatial distribution of migration, Borjas et al. (1992) state that migration is orientated at the larger cities. The reason is that cities offer better job opportunities and higher wages. In due time the concentration on cities might become weaker according to Card and Lewis (2005): although the arrival of immigrants is spatially very selective, migrants tend to spread across the 'new' country after a few years.

6.3 Policy Scenarios on migration between the countries of the ESPON space

In this section the inter-country migration between the 31 ESPON countries is described. It will elaborate on the data and methods used to derive the qualitative and quantitative assumptions.

6.3.1 Qualitative assumptions

The policy scenarios stem from the combination of two underlying dimensions (namely "Economy-Environment" and "Distribution-Fairness"), which leads to four scenario's. With respect to inter-country migration four elements of international migration are identified, each leading to different assumptions in the four policy scenarios, as shown in Table 6-1.

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Table 6-1: Qualitative assumptions for inter-country migration (1)

Trend or Policy	GSE	EME	LSE	CME
Total Level of Inter-State Migration	Moderate	High	Low	Moderate
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

The GSE Scenario gives the combination of high economic growth and a political orientation towards social and regional cohesion. High economic growth will lead to an increase of the GDP per capita. With the increase in household income, one of the major constraints for migration, money, will be reduced. Potential migrants have the opportunity to sell their homes, take their possessions and move across country borders. They seek new job opportunities or they want to seek a place for retirement. There is also a proportion of migrants who are dissatisfied in their home country and seek a new life elsewhere. Therefore, in GSE, the total amount of migration between the ESPON countries will increase. However, the amount of inter-country migrants will not reach the same level as in the EME Scenario, due to the social and regional cohesion policies in existence. People are able to benefit from the economic prospects in more than a few specific regions or countries.

The inclination of potential migrants to go to other countries is stimulated by explicit inter-country migration policies. In general legal restrictions to settle down in another country will be reduced, although some restrictions will remain. For example, the regulations on the type of migrants and the duration of stay will remain, for example in order to protect natives working in the lower segment of the labour market, the number of labour migrants is curtailed as large flows might lead to lower wages.

The economic and political situation in the EME scenario is quite different. Just as in the GSE scenario, the economic prospects for the ESPON space as a whole are very good. However, on a regional scale heterogeneity exists in the economic situation. This is not the same across the regions in Europe because some regions benefit more from the economic growth than others. Potential migrants are aware of better possibilities in some regions compared with other regions. This disparity makes it more profitable to migrate to those flourishing regions. In general, the large differentials in regional economic prospects in the ESPON territory have a stimulating on the total amount of international migration.

Policies oriented at regional competitiveness have a strong influence on origin and destination patterns. In contrast with the GSE scenario there is no convergence on the economic prospects of regions. On the one hand, migrants are attracted to regions with the highest economic growth. On the

other hand, regions that are now performing well do it even better in the future. As a result, migration between those booming regions will increase in the future, while migration between lagging regions will be tempered. This will lead to a divergence in both the origin and destination patterns of international migration. For the UK, for example, the share of international migrants moving to Inner London will increase in the future. Migrants will 'shop' between regions, comparing the opportunities offered by each, before decided on the one which suits their needs best.

In the political field the orientation on competitiveness will promote free movement which is made possible by a minimum of regulations. For example, absolutely no restrictions apply for people who want to work in different countries. In fact, free movement is already common in the Schengen countries and so in this scenario only remnants of regulations will be removed.

The future according to the LSE scenario is a completely different story. Although the social and regional cohesion policy still exists, like in GSE, the economic prospects are strongly tempered. The challenges of the climate change have not been met and the 'end of oil' energy problems arise more and more. The regional cohesion policy makes sure that although every region of the ESPON space has its share of the problems, policies are developed in order to support the most vulnerable regions by all kinds of measures. Due to the effectiveness of these policies on regional cohesion, the economic differences between the regions will be smaller than now. All this has a negative effect on migration: a lack of economic opportunities in general in combination with the absence of specific regions who outperform most other regions. So, people have more trouble selling their houses, do not have enough money to start a new life in another country and do not see a better future in other regions.

The patterns of origin and destination of international migration between the countries of the ESPON space will show a tendency towards convergence. The policy oriented at cohesion makes the regions economically more equal. Therefore, the non-existence of large differentials between regions leads to the absence of motives to move to another region over the border. Of course, some regions will still attract more migrants, so the economic differences will not disappear completely.

As in the GSE scenario policies on international migration are, more-or-less, restrictive. These restrictions stem from a protection of the national labour market, so the scarce jobs will be allocated to the native population. Due to legal barriers, people are no longer free to move across the ESPON space. Regulations especially apply to the duration of stay in a foreign country: labour migrants are only allowed to work here for a few years.

In the CME scenario the economic situation is again gloomy, as environmental problems have grown and obstruct economic growth. The economy has major trouble coping with climate change and the

lack of natural resources. People have less money and therefore face financial constraints in the migration process. Due to policies trying to increase regional competitiveness, the economic differences between the regions will increase. In contrast to the LSE scenario, the heterogeneity of regions makes it profitable to migrate to those regions with high economic growth and an abundance of jobs, therefore, the number of migrants will be somewhat higher than in that scenario. However, compared with the other economic market oriented scenario (the EME scenario), the profits of migration are much lower and consequently the flows much smaller. As in that scenario, the origin and destination patterns of international migration show signs of divergence over time. Regions with a strong economy will attract more migrants. Certain regions will be more exposed to the general deterioration of the economic situation in the ESPON space, and the decreasing attractiveness of these regions lead to a decrease in the number of international migrants. Other regions, with a more stable economy, will profit from these developments.

With the focus of policy on competiveness, explicit inter-country migration policies will be reduced to a minimum. So, regions and countries will have to compete with each other in order to attract migrants. The lack of restrictive policies reducing migration flows creates a stimulus for people to live in other counties, to work in different regions and move all across Europe.

6.3.2 Quantitative assumptions

The qualitative assumptions described above have to be transformed into quantitative assumptions on international migration for the projection period (2005 up to 2050) for each of the four policy scenarios. In order to quantify the assumptions, outmigration rates have been computed which equate to the 'risk' of the population living in a specific region within the ESPON space migrating to another region in another country within the ESPON space, distinguished by 5-year age group and sex.

In order to be able to make quantitative assumptions on trends in outmigration rates, it is necessary to have these rates for the base period (i.e. 2005). However, migration statistics proved to be one of the most unreliable and unstable statistics. Two main factors contribute to this situation: Firstly the definition of migrants is different between countries. Some countries will define a migrant if they stay a couple of months in another country, others only mention migrants if they move indefinitely. Secondly, some national statistical offices proved to be more reliable than others. The differences between emigration from (country/region) A to B and immigration from B to A can therefore be large. The calculation of a reliable set of migration data is therefore a huge assignment.

Eurostat has funded a project called Mimosa (modelling migration and migrant populations), carried out by the Netherlands Interdisciplinary Demographic Institute, Central European Forum for Migration and Population Research, the Southampton Statistical Sciences Research Institute and the Université Catholique de Louvain. This project looked at the available data and definition of

migration statistics in the 31 ESPON countries. The project created matrices of migration flows and population, specified by sex, citizenship, age and country of birth. The DEMIFER team would like to thank the Mimosa team for sharing these data. From the Mimosa project, data were received for the time period 2002-2008. These data contain migration flows between all the 31 ESPON countries that are age and sex specific. For the calculation of the base year, an average of the years 2004, 2005 and 2006 was made. In such a way, the ASOD matrices (age-sex-origin-destination) matrices where constructed. Table 6-2 shows the Mimosa total migration data, averaged for 2004, 2005 and 2006.

Table 6-2: Total migration data, Mimosa 2004 - 2006

From \ To	AT	BE	BG	CH	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IS	IT	LI	LT	LU	LV	MT	NL	NO	PL	PT	RO	SE	SI	SK	UK	EU27+4	Rest	Total
AT		299	1367	1651	40	568	11303	210	33	580	128	824	481	3001	147	23	963	61	50	53	27	11	568	99	2616	302	4688	276	532	2289	1627	34817	34799	69616
BE	353		88	417	45	126	3431	371	16	2474	229	7938	231	111	270	24	2014	2	75	3964	43	16	5929	164	1250	193	210	400	62	228	4003	34674	21938	56613
BG	1753	223		219	532	1467	7616	85	12	13522	50	981	983	96	97	12	4537	1	76	11	3	17	447	85	496	63	1707	113	5	1179	2722	39106	24118	63223
CH	2088	502	174		64	335	14066	709	22	5792	469	9077	376	199	407	34	13212	26	74	256	48	24	1378	262	1323	456	347	812	592	1071	7522	61716	21629	83345
CY	24	66	1566	65		23	217	14	17	18	24	184	3131	181	75	1	54	0	9	2	4	41	58	12	102	9	1262	57	15	24	2955	10211	24972	35183
CZ	1680	386	4658	603	114		7396	195	18	624	64	1528	320	181	204	21	1041	0	74	25	24	14	597	97	655	106	1837	154	26	10796	4792	38230	150001	188231
DE	19826	3281	6183	18877	322	2493		2759	432	11980	1115	13380	12543	11639	1622	180	19580	57	1367	2568	563	87	9824	1716	72779	5523	14387	3330	1376	4916	22205	266910	176552	443461
DK	259	322	52	543	24	84	2132		89	722	427	952	145	134	192	1018	370	4	174	58	147	17	475	2334	488	92	111	5371	11	234	2186	19165	12592	31757
EE	61	33	10	33	31	16	607	133		94	2627	108	11	19	43	20	158	0	54	16	294	5	117	165	29	11	19	437	0	20	1315	6486	4165	10651
ES	855	3546	1921	7369	43	130	11488	1278	30		770	11222	279	260	2101	50	2883	60	701	122	46	19	3161	637	1729	4346	7623	1296	46	393	17005	81411	130171	211582
FI	339	243	17	410	21	70	1720	290	772	632		405	76	99	204	34	316	1	76	22	149	6	371	493	89	38	12	3136	5	68	798	10916	3469	14385
FR	1155	7507	584	6254	115	603	15109	1198	87	9113	421		1038	613	1587	43	5861	12	166	5399	95	150	3218	451	4364	4224	1471	1082	140	1140	22050	95251	101431	196682
GR	473	199	432	200	3902	91	7959	176	13	395	102	889		89	85	2	836	1	35	33	10	35	1067	70	1172	51	640	552	13	158	4430	24109	14222	38331
HU	4206	411	170	492	169	92	15211	205	21	617	122	1972	172		212	9	884	1	9	24	12	11	693	89	254	119	2227	370	29	2418	3474	34695	31013	65708
IE	181	826	114	692	68	95	1329	190	28	1348	132	2133	178	69		6	582	3	990	54	198	26	512	67	2086	168	282	259	8	112	6887	19623	15129	34752
IS	40	16	3	23	0	7	176	1191	11	98	59	46	2	3	6		50	0	24	2	10	4	66	244	164	29	6	451	5	24	487	3247	773	4020
IT	1909	3301	275	18797	48	465	16660	698	26	6986	296	8194	656	373	778	46		35	235	372	100	152	1833	195	4480	419	1915	598	449	1199	6799	78288	45957	124245
LI	61	3	1	35	0	1	47	8	0	14	3	33	2	2	2	0	19		0	0	1	0	3	1	15	2	3	1	0	6	0	264	106	370
LT	265	201	96	173	34	86	4139	822	75	1705	100	443	66	14	3153	154	672	0		5	749	4	396	716	621	154	10	681	0	51	2923	18507	10637	29145
LU	80	2363	9	366	3	4	1887	108	13	92	57	2696	37	19	78	20	281	2	11		7	3	157	16	70	1104	27	88	21	13	795	10429	916	11345
LV	110	91	11	156	101	24	1890	324	451	225	113	408	25	13	582	48	291	4	369	18		4	152	164	92	16	9	279	0	50	1431	7449	11357	18807
MT	14	34	8	20	20	5	92	20	4	16	4	267	10	7	37	1	138	0	1	5	3		54	4	12	10	8	26	3	22	644	1490	2668	4158
NL	1007	11377	110	1646	68	467	11045	604	44	3569	325	3987	638	417	696	43	1303	3	99	151	49	42		629	2364	896	249	1032	67	454	7929	51310	37341	88651
NO	121	136	38	204	13	44	1048	2211	64	1271	948	425	62	41	70	309	194	0	229	15	67	8	469		691	57	75	4563	3	267	1944	15590	5607	21198
PL	8029	3962	213	2518	729	2943	124526	1689	13	6204	196	7310	1769	204	15648	1099	14952	16	277	89	107	22	6946	3317		162	64	4149	13	3041	42872	253079	79997	333076
PT	372	255	58	311	15	39	4709	159	8	9444	64	5080	44	22	91	54	609	2	83	2949	24	11	1498	88	121		114	192	8	83	4953	31459	17321	48781
RO	6064	592	858	546	532	894	19149	229	22	71695	88	4282	1024	2573	405	19	78378	2	12	35	7	47	692	187	184	255		351	11	6095	1682	196910	80503	277413
SE	622	383	33	879	85	123	2682	2450	164	1368	4332	1118	588	198	282	354	536	0	218	76	155	46	720	3826	1637	126	71		60	222	3747	27102	12657	39759
SI	726	179	11	408	8	30	1369	34	0	102	6	126	9	21	30	4	469	9	6	5	2	3	99	10	24	6	2	48		171	0	3918	1845	5763
SK	4275	387	181	4679	418	25734	9437	99	0	591	26	1070	181	1161	535	22	1123	8	11	27	8	0	575	161	259	82	255	122	28		5346	56805	18526	75331
UK	1500	1679	661	4150	3073	926	10303	2432	198	28990	1115	22134	5444	2697	13077	169	6376	0	2344	222	449	565	5522	1298	6011	2031	761	2973	119	1282		128501	175428	303929
EU27+4	58450	42802	19902	72735	10636	37986	308743	20889	2685	180280	14409	109210	30523	24456	42714	3819	158682	309	7851	16578	3402	1391	47596	17598	106176	21053	40394	33200	3649	38026	185521			
Rest	60384	50381	12159	49280	6317	79587	252178	16942	2102	283391	10910	202819	34435	19048	14365	908	370686	59	6494	741	2512	1192	53060	15321	55851	32938	37843	40862	3569	23117	379153			
Total	118833	93183	32061	122015	16953	117573	560922	37831	4787	463671	25320	312028	64958	43504	57079	4727	529368	368	14345	17319	5914	2583	100656	32919	162027	53990	78237	74062	7219	61143	564675			

Table 6-3 presents the translation of the qualitative assumptions for the four elements of international migration into quantitative assumptions.

Table 6-3: Qualitative assumptions for inter-country migration (2)

Demographic component	Trend or Policy	GROWING SOCIAL EUROPE	EXPANDING MARKET EUROPE	LIMITED SOCIAL EUROPE	CHALLENG ED MARKET EUROPE
INTER-STATE MIGRATION	Total Level of Inter-State Migration	Set levels to 2050	Set levels to 2050	Set levels to 2050	Set levels to 2050
	Origins: Inter-State Out-Migration	Set origin attraction	Set origin attraction	Set origin attraction	Set origin attraction
	Destinations: Inter-State In-Migrations	Set destination attraction	Set destination attraction	Set destination attraction	Set destination attraction
	Explicit Inter-State Migration Policy	EU policy	EU policy	Some national policy	Some national policy

In order to arrive at trends in outmigration rates for the scenario period, for each scenario levels for the sets of outmigration rates have been determined for the calendar year 2050. Compared with 2005, higher levels have been used for both the Growing Social Europe scenario and the Expanding Market Europe scenario, where the last one has been allocated the highest levels. In the Limited Social Europe scenario the levels of outmigration rates are somewhat lower than that of 2005, while in the Challenged Market Europe scenario the levels are more or less the same as those of 2005.

Also the destination of the international migrants has to be determined. For this purpose the method of regional attractiveness was used. First, based on 2005 for each sending country the share of migrants going to destination countries was calculated. For example, with regard to the outmigration flows from Norway to other ESPON countries, Sweden, Denmark, Finland and the United Kingdom have the biggest share. However, those destination countries do not have the same share with regard to the population in the ESPON space. Sweden for example contains round 2 percent of the total population of the ESPON space, but receives almost 30 percent of the outmigration flows of Norway. Dividing the migration share by the population share gives the regional attractiveness factor of Sweden for Norway, namely 16. These attraction factors are presented in Table 6-4 for the base year 2005. In each policy scenario the attraction factors will change in the period up to 2035. The way they change depends on the assumption on convergence or divergence belonging to each scenario. In the Global Social Europe scenario and Limited Social Europe scenario, the attraction factors convergence by 50% while in the Expanding Market Europe scenario and the Challenged Market Europe scenario they diverge by 50%. Note, that this does not mean that 50% less or more migrants will migrate to specific destination countries. Combining the adjusted attraction factors for each period (between

2005 and 2050) with the population, delivers new figures on migration flows between the countries of the ESPON space.

These figures on migration flows between the countries of the EPSPON space have to be distinguished into the NUTS2 regions of the sending countries and those of the receiving countries. This is done based on observed data from Eurostat and some national statistics institutes (and in some cases completed with some estimations). For each sending country the migration flows (to other countries) are split into regional numbers by using the latest observed regional division of emigrants. These regional migration flows to other countries now have to be split into the regions of the specific receiving country. This have been done by using the latest observations on the regional distribution of immigrants into that specific country. During the whole scenario period these distributions are kept constant, as dynamic distributions are hard to construct and rely on lots of assumptions.

Table 6-4: Attraction factors, base year

From \ To	AT	BE	BG	CH	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IS	IT	LI	LT	LU	LV	MT	NL	NO	PL	PT	RO	SE	SI	SK	UK
Austria AT		0,4	2,6	3,2	0,8	0,8	2,0	0,6	0,3	0,2	0,4	0,2	0,6	4,3	0,5	1,1	0,2	23,9	0,2	1,7	0,2	0,4	0,5	0,3	1,0	0,4	3,1	0,4	3,7	6,0	0,4
Belgium BE	0,6		0,2	0,8	0,9	0,2	0,6	1,0	0,2	0,8	0,6	1,8	0,3	0,2	0,9	1,2	0,5	0,7	0,3	126,5	0,3	0,6	5,3	0,5	0,5	0,3	0,1	0,6	0,4	0,6	1,0
Bulgaria BG	2,8	0,3		0,4	9,2	1,8	1,2	0,2	0,1	4,0	0,1	0,2	1,1	0,1	0,3	0,5	1,0	0,3	0,3	0,3	0,0	0,5	0,4	0,2	0,2	0,1	1,0	0,2	0,0	2,8	0,6
Switzerland CH	2,1	0,4	0,2		0,7	0,3	1,4	1,1	0,1	1,1	0,7	1,2	0,3	0,2	0,8	0,9	1,8	6,1	0,2	4,6	0,2	0,5	0,7	0,5	0,3	0,4	0,1	0,7	2,4	1,6	1,0
Cyprus CY	0,1	0,3	9,8	0,4		0,1	0,1	0,1	0,6	0,0	0,2	0,1	13,8	0,9	0,9	0,2	0,0	0,0	0,1	0,2	0,1	4,9	0,2	0,1	0,1	0,0	2,8	0,3	0,4	0,2	2,5
Czech Republic CZ	2,7	0,5	7,9	1,1	2,1		1,2	0,5	0,2	0,2	0,2	0,3	0,4	0,2	0,7	0,9	0,2	0,0	0,3	0,8	0,1	0,5	0,5	0,3	0,2	0,1	1,1	0,2	0,2	25,8	1,1
Germany DE	4,6	0,6	1,5	4,8	0,8	0,5		1,0	0,6	0,5	0,4	0,4	2,1	2,2	0,7	1,2	0,6	3,1	0,8	10,6	0,5	0,4	1,1	0,7	3,6	1,0	1,3	0,7	1,3	1,7	0,7
Denmark DK	0,8	0,8	0,2	1,9	0,8	0,2	0,7		1,7	0,4	2,1	0,4	0,3	0,3	1,2	90,3	0,2	2,8	1,3	3,3	1,7	1,1	0,8	13,3	0,3	0,2	0,1	15,6	0,1	1,1	1,0
Estonia EE	0,6	0,2	0,1	0,3	3,3	0,1	0,6	1,9		0,2	38,7	0,1	0,1	0,1	0,8	5,2	0,2	0,2	1,2	2,8	9,9	1,1	0,6	2,8	0,1	0,1	0,1	3,8	0,0	0,3	1,7
Spain ES	0,7	2,0	1,5	6,0	0,4	0,1	0,9	1,5	0,1		0,9	1,1	0,1	0,2	3,0	1,1	0,3	10,3	1,3	1,7	0,1	0,3	1,2	0,9	0,3	2,4	2,1	0,9	0,1	0,4	1,8
Finland FI	1,9	1,1	0,1	2,6	1,3	0,3	1,0	2,5	26,3	0,7		0,3	0,3	0,4	2,3	5,4	0,3	1,0	1,0	2,2	3,0	0,7	1,1	4,9	0,1	0,2	0,0	16,1	0,1	0,6	0,6
France FR	0,7	3,8	0,4	4,5	0,8	0,3	1,0	1,2	0,3	1,1	0,4		0,5	0,3	2,0	0,8	0,5	1,9	0,3	62,6	0,2	2,0	1,0	0,5	0,6	2,1	0,4	0,6	0,4	1,1	1,9
Greece GR	1,2	0,4	1,2	0,6	108,6	0,2	2,0	0,7	0,2	0,2	0,4	0,3		0,2	0,4	0,2	0,3	0,8	0,2	1,5	0,1	1,8	1,4	0,3	0,6	0,1	0,6	1,3	0,1	0,6	1,5
Hungary HU	7,4	0,6	0,3	1,0	3,3	0,1	2,7	0,5	0,2	0,2	0,3	0,5	0,2		0,7	0,4	0,2	0,4	0,0	0,8	0,1	0,4	0,6	0,3	0,1	0,2	1,5	0,6	0,2	6,4	0,8
Ireland IE	0,6	2,0	0,4	2,4	2,4	0,2	0,4	0,9	0,5	0,8	0,6	0,9	0,4	0,2		0,6	0,3	2,1	7,2	3,0	2,1	1,7	0,8	0,4	1,4	0,4	0,3	0,7	0,1	0,5	3,0
Iceland IS	0,8	0,2	0,1	0,5	0,0	0,1	0,3	34,1	1,3	0,4	1,7	0,1	0,0	0,0	0,2		0,1	0,0	1,1	0,6	0,7	1,6	0,6	8,2	0,7	0,4	0,0	7,8	0,4	0,7	1,3
Italy IT	1,5	2,0	0,2	16,3	0,4	0,3	1,3	0,8	0,1	1,0	0,4	0,8	0,4	0,2	1,2	1,0		6,5	0,4	5,2	0,3	2,4	0,7	0,3	0,8	0,3	0,6	0,4	1,4	1,4	0,7
Liechtenstein LI	14,0	0,6	0,4	9,0	0,0	0,2	1,1	2,7	0,2	0,6	1,0	1,0	0,4	0,4	1,1	0,0	0,6		0,0	0,0	0,8	1,3	0,4	0,6	0,7	0,4	0,3	0,2	0,0	2,0	0,0
Lithuania LT	0,9	0,5	0,3	0,7	1,2	0,2	1,4	4,1	1,5	1,1	0,5	0,2	0,2	0,0	20,5	14,2	0,3	0,0		0,4	8,8	0,3	0,7	4,2	0,4	0,4	0,0	2,0	0,0	0,3	1,3
Luxembourg LU	0,5	10,9	0,1	2,4	0,2	0,0	1,1	1,0	0,5	0,1	0,5	2,1	0,2	0,1	0,9	3,2	0,2	2,9	0,2		0,2	0,4	0,5	0,2	0,1	5,1	0,1	0,5	0,5	0,1	0,6
Latvia LV	0,9	0,6	0,1	1,4	9,4	0,2	1,6	4,0	22,5	0,4	1,5	0,4	0,2	0,1	9,1	10,9	0,3	6,2	7,3	2,7		0,5	0,6	2,3	0,2	0,1	0,0	2,1	0,0	0,6	1,6
Malta MT	0,6	1,1	0,4	0,9	9,3	0,2	0,4	1,2	0,9	0,1	0,3	1,4	0,3	0,2	3,0	1,0	0,8	0,6	0,1	4,2	0,4		1,1	0,3	0,1	0,3	0,1	1,0	0,5	1,4	3,6
Netherlands NL	1,2	10,7	0,1	2,2	0,9	0,4	1,3	1,1	0,3	0,8	0,6	0,6	0,6	0,4	1,7	1,4	0,2	0,9	0,3	3,2	0,2	1,0		1,3	0,6	0,8	0,1	1,1	0,3	0,8	1,3
Norway NO	0,5	0,4	0,2	0,9	0,6	0,1	0,4	13,2	1,5	1,0	5,8	0,2	0,2	0,1	0,5	33,9	0,1	0,4	2,2	1,1	0,9	0,7	0,9		0,6	0,2	0,1	16,3	0,1	1,6	1,0
Poland PL	2,0	0,7	0,1	0,7	2,0	0,6	3,0	0,6	0,0	0,3	0,1	0,2	0,3	0,0	7,3	7,4	0,5	0,9	0,2	0,4	0,1	0,1	0,8	1,4		0,0	0,0	0,9	0,0	1,1	1,4
Portugal PT	0,7	0,4	0,1	0,7	0,3	0,1	0,9	0,5	0,1	3,5	0,2	1,3	0,1	0,0	0,4	2,9	0,2	0,8	0,4	103,3	0,2	0,4	1,5	0,3			0,1	0,3	0,1	0,2	1,3
Romania RO	1,9	0,1	0,3	0,2	1,8	0,2	0,6	0,1	0,0	4,3	0,0	0,2	0,2	0,7	0,3	0,2	3,4	0,1	0,0	0,2	0,0	0,3	0,1	0,1	0,0	0,1		0,1	0,0	2,9	0,1
Sweden SE	1,4	0,7	0,1	2,2	2,1	0,2	0,6	8,4	2,3	0,6	15,4	0,3	1,0	0,4	1,3	22,2	0,2	0,2	1,2	3,1	1,2	2,1	0,8	15,4	0,8	0,2	0,1		0,6	0,8	1,2
Slovenia SI	11,4	2,2	0,2	7,1	1,4	0,4	2,1	0,8	0,0	0,3	0,2	0,3	0,1	0,3	0,9	1,8	1,0	31,7	0,2	1,5	0,1	1,0	0,8	0,3	0,1	0,1	0,0	0,7		4,2	0,0
Slovakia SK	4,6	0,3	0,2	5,5	5,0	22,3	1,0	0,2	0,0	0,1	0,0	0,1	0,1	1,0	1,1	0,7	0,2	2,1	0,0	0,5	0,0	0,0	0,3	0,3	0,1	0,1	0,1	0,1	0,1		0,8
United Kingdom UK	0,7	0,6	0,3	2,2	16,3	0,4	0,5	1,8	0,6	2,6	0,8	1,4	1,9	1,0	12,4	2,2	0,4	0,0	2,6	1,9	0,7	5,5	1,3	1,1	0,6	0,8	0,1	1,3	0,2	0,9	

6.4 Policy scenarios on migration between the ESPON space and the rest of the world

In this paragraph the Extra-Europe migration between the 31 ESPON countries and the rest of the world is described. It will elaborate on the data and methods used to derive the qualitative and quantitative assumptions.

6.4.1 Qualitative assumptions

As in the other assumptions, the scenarios are based on two underlying dimensions (namely 'Economy-Environment' and 'Distribution-Fairness'), which leads to the four scenarios. For the extra-Europe migration, four driving forces are identified, as shown in Table 6-5.

Table 6-5: Qualitative assumptions for 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

The *Growing Social Europe* scenario is the one with high economic growth and a focus on social and regional cohesion. The significant increase of the GDP per capita in the countries belonging to ESPON space works as a strong attraction factor to potential immigrants from all over the world. A future of good economic prospects by living in the ESPON space, is an important goal to achieve. The focus of policy on the social and region cohesion also provides a social security system, which is rarely present in the sending countries. The pull factors are even becoming stronger over time. This is partly caused by a growing demand for labourers, as extra Europe migrants are seen as a solution to the higher demand for care in view of the ageing of the population of the ESPON area. A tolerant political climate induces more migrants coming to the ESPON space for reasons of family reunification (with relatives who have come earlier to Europe). However, too much immigrants with no specific skills might make the social security system too expensive, so some selectiveness is used in order to prevent the arrival of migrants that are not able to make a profitable contribution to the economy. The patterns of origin of the emigrants coming from the rest of the world and the destination of them inside the ESPON territory will be more or less stable. Current patterns of migrations flow between specific countries inside ESPON space on the one hand and specific countries in the rest of the world on the other hand are already well established and have the tendency to prolong into the future. Especially the historic bounds of several European countries with their

former colonies tend to influence the migration flows also in the future. For example, the former colonies in North-West Africa keep their existing migration linkages with France.

In the *Expanding Market Europe* scenario also a booming economy is assumed. The economic prospects are good and the majority of the population receives a good income. But the political orientation is different as the market philosophy causes differences in the speed of economic improvements across Europe. Some countries and regions benefit more than others. Also in the rest of the world stronger countries and regions profit more from a global economic growth than others. These strong economic differentials between the ESPON space and the rest of the world have a stimulating effect on the size of migration flows. Moreover, migrants will have a strong tendency to 'shop' between countries and regions. As they can earn a much higher wage in a some specific countries and regions within them, they become quite be selective in their choice of destination. With the lack of social and regional cohesion in this scenario, every region within the ESPON space will try to benefit the most from the economic situation. The regions will compete with each other in order to attract the 'best' migrants for their situation. Labour migrants, with a high education, are favoured above the less desired migrants, like refugees. This will lead to a divergence in the patterns of origins and destinations of international migrants. The policy in general has a positive attitude towards immigration as it is good for the economic growth. So this leads to a destruction of nearly all legal constraints, so potential migrants are able to enter the ESPON space freely.

The *Limited Social Europe* scenario shows a completely other situation with gloomy economic prospects and detrimental effects of environmental issues. The climate change, the shortage of natural resources and the rising prices will have negative influences on the economy and the social well being. The economy will not collapse but it will attract less migrants from other parts of the world. Potential migrants don't have the money to move to Europe and the economic differences between ESPON and the rest of the world will be smaller than they used to be. The natural inertia, that needs to be overcome with migration, will be bigger, compared to the benefits of migration.

With the gloomy economic situation, the need to protect Europe and its weaker regions becomes stronger. The cohesion policy will try to protect the regions, leading to a much more restrictive immigration policies. Only migrants that can make a large contribution to the economy are allowed to enter 'fortress Europe'. Illegal migration will be controlled and immigrants face much more rules and regulation on entry than before. Current patterns of migration flows between countries inside and outside the ESPON space are kept intact, as these migrants are familiar with specific countries and know the ways to enter them.

In the *Challenged Market Europe* scenario the economic prospects are not much better. This scenario is characterised by policies trying to increase regional competitiveness. This leads to greater regional differentials in economic prospects than in the previous scenario. So for potential migrants living in other parts of the world, migration to specific countries of the EPSON territory (and specific regions within them) may lead to a significant better financial situation. This has a stimulating effect on migration flows, compared with the Limited Social Europe scenario. In order to promote regional competitiveness, legal constraints on entry of the countries of the ESPON space are minimal and existing restrictive rules are withdrawn. So regions compete with each other in order to attract the 'best' migrants. As a result of this intense competition, origin and destination patterns will change and become more specific: more oriented on the strong economic regions, both within the ESPON space as outside it.

6.4.2   Quantitative assumptions

Two kinds of migration flows have to be computed: the immigration coming from the rest of the world and the emigration towards the rest of the world. The immigration has been compiled based on assumptions on immigration numbers while the emigration has been derived from the assumptions on emigration rates.

Again, the qualitative assumptions must be translated into quantitative assumptions.

Table 6-6: Quantitative assumptions for extra-Europe migration

Trend or Policy	GSE	EME	LSE	CME
Total Level of Extra-Europe Migration	Set levels to 2050	Set levels to 2050	Set levels to 2050	Set levels to 2050
Origins: Emigrations	Set origin attraction	Set origin attraction	Set origin attraction	Set origin attraction
Destinations: Immigrations	Set destination attraction	Set destination attraction	Set destination attraction	Set destination attraction
Explicit Extra-Europe Migration Policy	Restrictive policy	Permissive policy	Restrictive policy	Permissive policy

Assumptions on Immigration

From the Mimosa data the number of extra-Europe immigration for the base year 2005 could be calculated. In order to eliminate random fluctuations, 2005 was computed as an average of the years 2004-2006. This led to a total number of 2.3 million immigrants. For the scenario period, this total amount is assumed to increase or decrease up to year 2035 (the same year as used in the part on inter-country migration). In the Growing Social Europe scenario, with a moderate level of immigrants, the number of immigrants is assumed to rise to about 3.5 million. According to the Expanding Market

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Europe scenario the rise is even higher, namely:4.5 million. In the Limited Social Europe scenario a fall in immigration is foreseen to 1.5. At last, in the Challenged Market Europe scenario a slight rise to 2.5 million immigrants is assumed. The number of 4.5 million immigrants in the Expanding Market Europe scenario seems quite large, but also the number of emigrants (as shown below) will increase, so the rise in net migration is less impressive. In the period after 2035 the number of immigrants are kept constant. The method to split the immigrants coming to certain countries into immigration to the specific NUTS2 regions of those countries is similar to the method used for the regional splitting of interstate migrants (see previous paragraph).

Assumptions on Emigration

The construction of emigration is, in contrast to immigration, not in terms of absolute numbers, but based on the calculation of emigration rates. Again, the Mimosa project proved to be a very good help with providing the required extra-Europe migration statistics. From this source, the total number of emigrations could be calculated for each country. These numbers could be split into regional numbers, based on observations on the regional distribution of all emigrants in a country). These (sex and age specific) numbers on emigration for each NUTS2 could be related to the population stock in the base year 2005, in order to compute emigration rates for extra-Europe migration.

According to the policy scenarios the set of emigration rates have a different development during the scenario period. In the two market oriented scenarios, the Growing Social Europe scenario and the Expanding Market Scenario a rise in the emigration rates is assumed, with the latter having a steeper rise. In the other two scenarios a fall is assumed, with the Limited Social Europe scenario having a larger decrease than the Challenged Market Europe scenario.

6.5 Results

6.5.1   Migration between the countries of the ESPON space

Using the quantitative assumptions lots of data on international migration flows between the regions of the ESPON space have been compiled. Unfortunately, it is impossible to show all tables, graphs and maps. So, only a selection will be shown.

The outmigration rates for males and females aged 30-34 year in the base year 2005 are presented in Figure 6-3. It is clear that the Eastern countries show a higher outmigration rates. In most regions of the Southern part of Europe the outmigration rates are quite low. In general, the outmigration rates for men are higher than those for women. This is due to the fact that more males tend to migrate for reasons as demand for labour. It can also be observed that regions near the country border tend to

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show higher outmigration rates. This seems logical, as the distance to the neighbouring countries is much shorter.

Emigration Rate - Males Aged 30-34 in 2005

Total Number of Emigrated Males
per 1 000 Males, in Age Group 30-34 Years,
in 2005

- 2.1 - 5.0
- 5.0 - 7.5
- 7.5 - 10.0
- 10.0 - 12.5
- 12.5 - 102.5
- No data

Emigration Rate - Females Aged 30-34 in 2005

Total Number of Emigrated Females
per 1 000 Females, in Age Group 30-34 Years,
in 2005

- 1.0 - 5.0
- 5.0 - 7.5
- 7.5 - 10.0
- 10.0 - 12.5
- 12.5 - 102.6
- No data
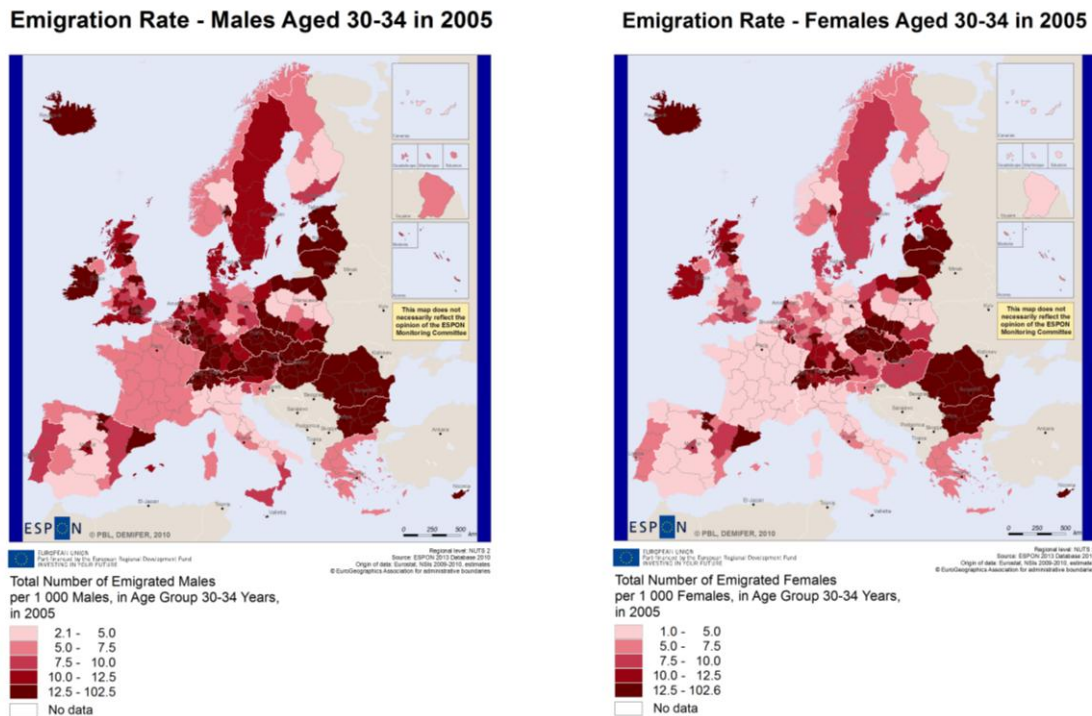
Figure 6-3: Emigration rates (per 1000), 30-34 years, males and females

In order to give an idea of the effect of convergence and divergence assumptions in the policy scenario, two graphs are shown on the percentage distribution of male migrants from Germany to other countries of the ESPON space (Figure 6-4 and Figure 6-5). It is assumed that the distribution of migrants will converge in the Growing Social Europe and Limited Social Europe scenarios and diverge in the Expanding Market Europe and Challenged Market Europe scenario. It is obvious that the majority of migrants from Germany migrate to Poland Austria and the United Kingdom. However, the shares of these countries in the specific scenarios are quite different according to the two graphs.

Destination Pattern

AT BE BG CH CY CZ DK EE ES FI FR GR HU IE IS
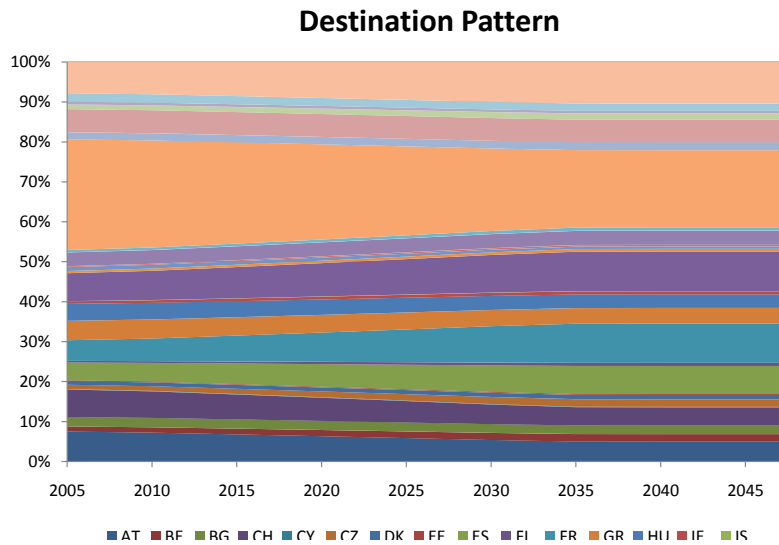
Figure 6-4: Destination Pattern German Migrants (GSE and LSE)

Destination Pattern

AT BE BG CH CY CZ DK EE ES FI FR GR HU IE IS
IT LI LT LU LV MT NL NO PL PT RO SE SI SK UK
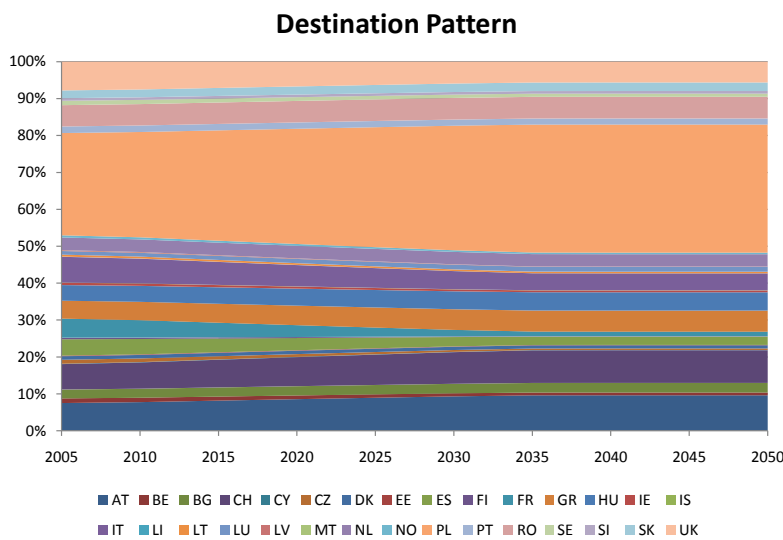
Figure 6-5: Destination Pattern German Migrants (EME and CME)

> *6.5.2   Migration between the ESPON space and the rest of the world*

Based on the qualitative assumptions immigration flows into the ESPON space and emigration flows to the rest of the world have been compiled. It is impossible to show all tables, graphs and maps, so a selection of these migration flows will be shown.

In order to illustrate the distribution and amount of immigrants in the regions of the ESPON space, five maps have been drawn (Figure 6-6 and Figure 6-7), in which each black dot represents 100 migrants. Figure 6-6 shows the immigration from outside Europe to the 287 NUTS2 regions in the

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ESPON areas in the calendar year 2005. In the map the major cities in Europe , such as Madrid, Paris and London come up. Also the coastal areas of Spain receive a large amount of immigrants; surely the proximity of Africa plays an important role. Other regions receiving a lot of immigrants are the north Italy, the United Kingdom, western Netherlands and some parts in Germany.

Immigration from Non-European Countries in 2005
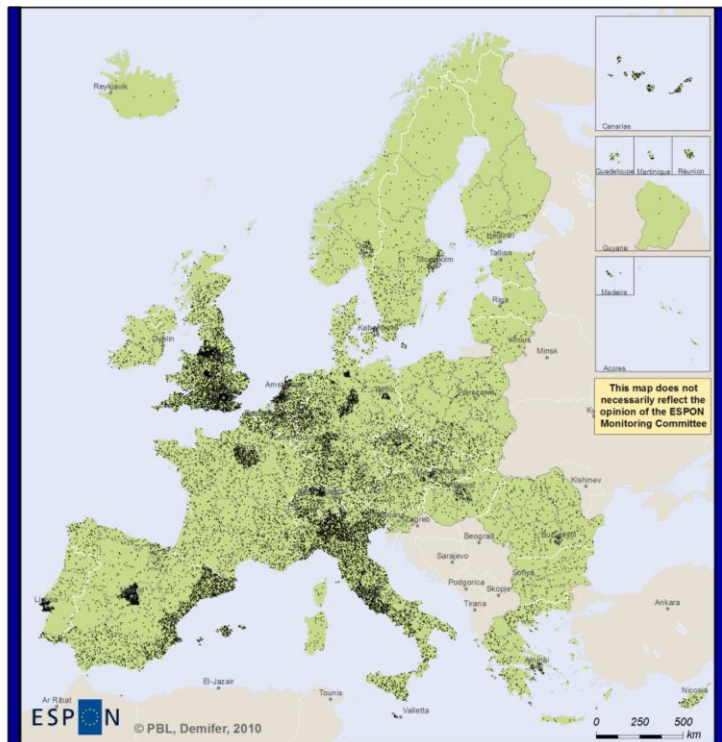
Total number of Persons Immigrated to the Region
from Non-European Countries in 2005

1 Dot Represents 100 Immigrants

Figure 6-6: Extra-Europe Immigration, 2005

Note: the dots are random placed in the NUTS2 regions. Dots do not represent placement in NUTS3, LAU1 or LAU2.

Immigration from outside Europe in 2050

Figure 6-7: Extra-Europe Immigration, 2050, GSE, EME, LSE, and CME

Note: the dots are random placed in the NUTS2 regions. Dots do not represent placement in NUTS3, LAU1 or LAU2.

The future according to the four policy scenarios are depicted in Figure 6-7. Immediately, it becomes clear that the immigration assumptions have a great influence on the distribution and size of migration flows into the ESPON space. Especially in the Expanding Market scenario, with the highest immigration numbers, several NUTS2 regions stand out as one great black area.

As was mentioned earlier in connection with fertility, the NUTS2 region scale hides considerable variety in sub-regional experience of migration at all scales. Here we illustrate the interesting migration dynamics visible in London, drawing on our case study (Figure 6-8). London comprises four NUTS2 regions but it makes more sense to study the whole of Greater London using the lowest tier unit of local government, the London Borough. The first map in Figure 6-8 shows the pattern of net migration exchanges within London. Inner London boroughs lose migrants to Outer London boroughs. For migration between London and the Rest of the UK shown in the second map in Figure 6-8 the pattern of net exchanges is partially reversed. About half of Inner London's boroughs, housing the country's business, government and cultural elite, gain from the rest of the country, attracting, for example, graduates from UK universities outside London. The other Inner and Outer London boroughs experience net migration losses as families move outwards to better and cheaper housing in the rest of South East England and to neighbouring regions of the South West and East of England. The third map shows the migration exchanges between London boroughs and the rest of the world. Most boroughs show gains, particularly parts of Inner and West London. Some boroughs on the southern edge, however, are estimated to experience net emigration. International migration thus replaces losses from internal migration in London.
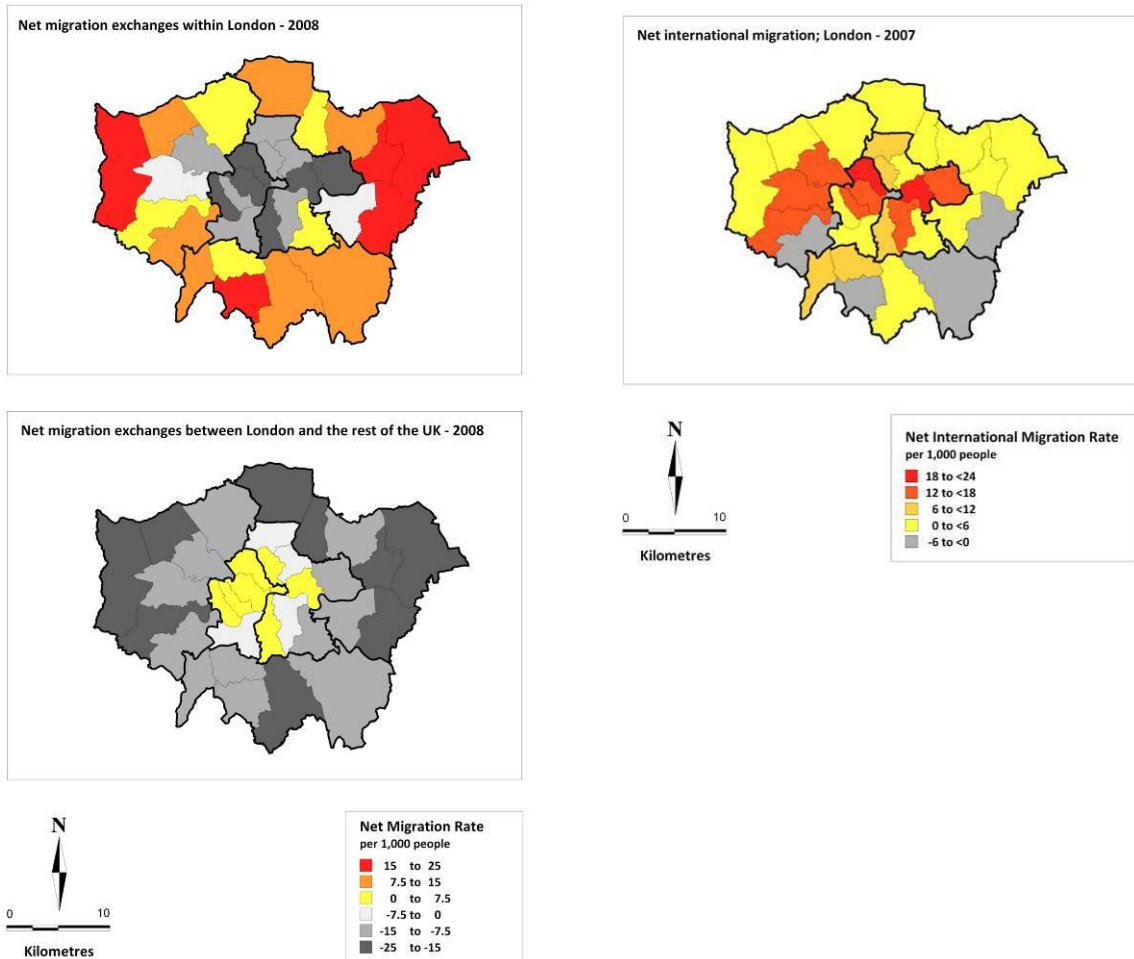
Figure 6-8: Net migration exchanges for London Boroughs within London, between London and the Rest of the UK and between London and the rest of the world

7. LABOUR FORCE PARTICIPATION SCENARIOS

7.1 Introduction

In the second half of the twentieth century, impressive changes in labour force participation have been 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. How labour force participation will develop in the future, depends on trends in the determinants of labour force participation. This chapter describes the assumptions on labour force participation underlying the four policy scenarios

The labour force comprises both persons in employment and unemployed persons. In general, fluctuations in the participation rate (the sum of employment and unemployment rate) are caused by changes in participation in three broad categories of inactive persons. First, young people in education and initial training; second, older retired or disabled persons; and third, women who have left the labour market after becoming mother. The assumptions of the policy scenario on labour force participation are predominantly formulated in terms of developments in these three categories.

This part of the report will start with a overview of determinants of labour force participation. These determinants will be used in the formulation of the qualitative assumptions of the policy scenarios. In the formulation of the quantitative assumptions the results of the expert opinion survey play an important role. To conclude this part, the results for labour force participation in the regions of the ESPON space will be presented.

7.2 Theoretical aspects of labour force participation

The trend in labour force participation is the outcome of developments in several determinants of labour force participation. They can be grouped into four main categories: economic, demographic, socio-cultural and institutional determinants. The importance and effects of the determinants may differ by sex, age group and country.

7.2.1 Economy

Macro-economic factors are of predominant importance in the analysis of employment trends. The performance of the labour market is related to the extent that economic growth leads to the creation of jobs (or in case of a negative development to the destruction of employment). Based on the relationship between economic growth and the process of job creation, it is possible to assess how many jobs will be created as economic recovery takes place and what rate of growth might be

required to achieve a given rate of job creation. It should be noted that this relationship might not necessarily be stable over time or be the same across countries. Fluctuations in the numbers in employment in the EU coincided with variations in the rate of growth of Gross Domestic Product (GDP) over the past thirty years (European Commission, 1994). Upturns in output growth have on every occasion been followed by an increase in employment growth while downturns have led to a reduction of growth or in some cases to an absolute decline of numbers in employment.

Since the second oil-crisis in 1979-1980, productivity growth has slackened. This slowdown might be related to shifts in the structure of the economy. There has been a long-term shift of employment away from agriculture to industry and then from industry to services. The service sector especially has less scope for the introduction of mechanisation and other labour saving techniques. In several more prosperous countries of Europe, especially the northern and western countries, the share of employment in services is significantly higher than in the somewhat poorer countries, such as the southern and eastern countries. However, in Germany the rather low share of employment in services is somewhat out of line, while by contrast, employment in industry is considerable higher than in the other more prosperous countries.

In the last decade, employment growth in the service sector has accelerated at the expense of manufacturing, and to a lesser extent agriculture. Recently, the kinds of service activity in which most jobs were created were personal and communal services (such as health care, social services and education as well as public administration), banking, insurance and business services and distribution, hotels and catering. The numbers employed in manufacturing and agriculture are still declining in Europe. This structural change in employment has strong effect on the sex specific labour force participation rates, as males are more often employed in manufacturing and industry and female are overrepresented in the service sector. Although the broad pattern of sector change was similar between the European countries, also some differences are visible. The southern countries suffered more from job losses in agriculture, mainly due to a high proportion of people working in this sector. The sector shift from agriculture and manufacturing towards services is coupled with a simultaneous change in the contents of jobs, i.e. the manual aspect diminished and other skills became more important, requiring a more educated work force. New products, processes and methods of organisation made it necessary for workers to acquire new skills and, in many cases, to learn a completely different job. The economies have become more open and European firms have to compete on global scale that causes that success depends largely on the ability to adapt to continuously changing market and technological pressures. The competence of the existing workforce and the possibilities of hiring new people with the requisite skills has become a critical factor. An inflexible labour market may damage the competitiveness of European economy. Flexibility of

working arrangements is an important form of labour market flexibility: the possibility to work outside standard hours (evening, Saturday and Sunday working), flexi-time arrangements in which starting and stopping times can be varied within limits and part-time working which especially provides greater flexibility in the ordering of family arrangements. Changes in flexible working arrangements have been disparate, reflecting the wide variation in national circumstances and institutional structures. Part-time working stands out as the major form of non-standard working which has shown a considerable increase over recent decades in the majority of the European. A lot of Governments have introduced measures to loosen regulations on working time and a number of large farms have introduced schemes to reorganize working time.

7.2.2 Demography

Changes in the age composition of the population have distinct effects on the development of the labour supply. The populations in the European countries are ageing and this process is expected to accelerate in the first half of the next century. As a larger proportion of the population becomes dependent, this could demand a rise in participation rates in order to sustain the growing numbers of inactive people. Especially Italy, Germany and Greece are going to face serious problems, as ageing will be probably much stronger than elsewhere. Due to rapidly falling birth figures in the 1970s, the number of persons in the younger segment of the working-age population (15-24 years) has been declining in most European countries over the last decades. This has had a negative impact on the potential labour supply and this effect has even been exacerbated by a steadily rising participation in education. This may necessitate a rise in participation rates in order to curtail an unwanted rise in dependency ratios.

The impact of migration on the development of the labour force is not clear-cut. In cases of shortages in the labour market, immigrants might fill the gap. However, in cases of persistent high unemployment rates, immigrants might primarily be seen as competitors for jobs. The entrance of certain population categories on the labour market (especially mothers with young children) might become more difficult in this way. On the other hand, ethnic minorities have in general a difficult position on the labour market, due to a low level of educational attainment, language problems, discrimination, etc. As unemployment rates are higher among migrants than average, it is not justified to believe that migration will ease the rise in dependency ratios, going upward due to the ageing of the population. To this should be added the fact that migrants – if they do not return to their home country – become old and dependent on society one day. Current migration policies try to curtail the arrival of many new immigrants. The tendency with respect to migration policies is likely to be a further restriction of existing migration regulations and asylum procedures. Growing negative public attitudes towards foreigners reinforces this tendency.

7.2.3 Socio-cultural determinants

There has been a continuous increase in the level of educational attainment of the workforce. In all European countries, the proportion of working-age population with qualifications beyond basic schooling has risen over the last decades, although significant differences remain in average levels across Europe. There has been a widespread convergence of the average educational level of women towards that of men. In most European countries, the proportion of women with higher educational attainment is almost similar to that of men. The increasing participation in education has been accompanied by a significant decline of rates of participation in the labour force, although this relationship is unambiguous. In Denmark, the Netherlands and the United Kingdom, more and more students combine work and employment; in Germany and Austria, a dual-training system dominates post-compulsory education and many youngsters are involved in apprenticeship-style training while in other European countries it is still common to concentrate on education alone rather than to combine studying with work (Rubery and Smith, 1997).

There are several explanations for the increasing educational participation of youngsters. It is partly a reflection of structural changes in the economy, which demands a highly educated work force. In general the sectors where job losses have occurred over the past decades are the ones where the educational attainment of the employees is relatively low. The sectors where job gains have been achieved and which are expected to expand in the future too are ones where the required level of education is generally high. Also the expansion of the welfare state and rising standards of living made it possible for young people to extent the period of education without high pressures to become an earner, stimulated through financial support by the family or the state.

The average education level of women and men has come closer together and is also reflected in their labour participation rates. Although labour participation among men is still higher, the gap with women is narrowing. Notwithstanding a general rise in educational attainment in Europe, the labour participation among young people remained high in most countries. The rise in educational attainment may not only lead to a higher qualified work force in the future but also to a larger availability of labour supply as higher levels of education tends to go hand in hand with higher labour participation. In general, activity rates of women (aged 25 to 49) are higher for those who have completed university education or the equivalent than for other women. The disparities in activity rates between women with different levels of education reflect that more highly educated women have more job opportunities open to them than other women, cost involved in the arrangement of suitable childcare represent less of a problem due to their greater earning capacities and that opportunity cost of not working is likely to be much higher so any break in employment tend to be more costly in terms of

the effect on their future careers. As a result, activity rates for highly educated women of prime working age are not much lower than those for men.

Male and female labour force participation rates among people aged 25-49 have been diverging over the last decades. As yet, only a small proportion (around 5%) of the men between 25 and 49 is not active on the labour market. Over time the percentages show little fluctuations, in times of an economic recession participation is falling somewhat due to a discouraged worker effect. The international differences in male participation are almost negligible, although falling participation during the prime working ages seems to be slightly more virulent in the southern countries. Over the last three decades the participation of women has been rising. The changes in labour market participation concerned primarily women in the childbearing and child-caring ages. The effects of these changes can be seen in the movement of activity curves. While the male age pattern has an inverted U-shape, in several countries the female age pattern is more or less M-shaped, reflecting a traditional pattern of labour force participation. In the seventies the activity curves of most European countries were characterised by a left-handed peak, a result of comparatively high activity rates for unmarried women between 20 and 25, and falling activity rates at later ages when most women withdrew from the labour market after marriage or childbirth. The rise in the participation rate of women over the last decades led to the emergence of a M-shaped age pattern: a first peak indicating that the presence of children reduces activity rates and a second peak that women re-enter the labour market once the children are older. In the Scandinavian countries the female age curve resembles that of males with a plateau in the age-group 30-50. These countries seem to have reached the phase in which having children no longer affects women's economic activity.

The increasing involvement of women in the labour market has been underpinned by their increasing acquisition of educational qualifications and is reinforced by drastic changes in the socio-cultural environment. As compared with three decades ago, women are entering marriage later, more are remaining single and they have fewer children nowadays. These changes in the family formation reflect changes in social values. In several southern countries and Ireland, the traditional marriage and childbearing patterns are still dominant while in most other countries, and especially the Scandinavian countries, the traditional lifecycle model is giving way to more complex patterns. Cohabitation has become more popular while marriages have become less stable, indicated by high divorce and remarriage rates. A growing incidence of single motherhood may have an impact on economic activity. Related to welfare benefit system the incentives for lone parents to work may vary by country. Financial pressures of divorce and widowhood generally draw women back into the labour market.

Motherhood in particular is used to exert a strong downward pressure on women's activity rates. Apart from the Nordic countries and Portugal, activity rates of mothers used to be well below that of non-mothers. Country variations persist when educational level is taken into account, although country differences in female activity rates are largest among women with low qualifications and much smaller among graduate women (Bulletin on Women and Employment in the EU, 1995). The highest maternal activity rates are found among graduate women, so high qualifications provide a labour market resource, which helps to offset the negative impact of motherhood on activity rates. While the arrival of children may have an impact on the probability of paid work of women, on the other hand labour market participation may influence childbearing decisions. A strong career orientation may lead to lower family size aspirations.

Activity rates among women aged 25-49 year have shown a marked growth over the last decades. The growing participation of women in the labour market has been underpinned by their increasing educational qualifications and is reinforced by drastic changes in the social and cultural environment. Compared with some decades ago, women are marrying later, more women remain single and childless, and those who became mother have got on average fewer children. Especially married women and mothers with young children have entered the labour market. The increase was particularly pronounced in countries that facilitated the combination of motherhood and paid work. The Scandinavian countries may be considered forerunners in this respect with their active policy of encouraging the combination of work and parenthood through subsidised day care, flexible working hours and a progressive structure of taxes in combination with separate taxation of spouses. In the Netherlands female participation used to be very low. However, a sustained rise has brought the Netherlands up to the average. Low female participation rates are found in the southern countries nowadays, with the exception of Portugal, where participation has always been rather high due to a relatively large primary sector.

Labour force participation does not only refer to full-time jobs but also to part-time jobs. Over the last decades there has been a gradual decline in Europe of working in full-time jobs, although almost all men still work full-time during their prime working ages. This gradual change from full-time to part-time employment is partly the result of the shift away from employment in agriculture and industry and towards services. Since part-time jobs are rare in agriculture and industry, while in the service sector flexibility in working arrangements is more common, this has stimulated part-time employment at the cost of full-time employment. Also an ongoing trend towards a more flexible organisation of work, has made it easier to employ part-time workers or people on fixed-term contracts. This creates job opportunities especially for mothers with young children. So, the growth of female employment has gone along with a rise in part-time working. The possibility to combine professional work with

the raising of children has driven the demand for part-time jobs. Relatively more women than men are working in the service sector, where part-time jobs are more common than in agriculture or industry.

7.2.4   Institutional factors

State family policy can be regarded as having a fundamental influence on the labour supply of women. In case of the Nordic countries, the family and labour market policies are largely organised to facilitate the reconciliation of women's employment and parental responsibilities. In Sweden, tax and family policies stimulated both fertility and women's paid work by reducing the costs of having children while requiring parents to be employed to collect the full benefits (Sundström and Stafford, 1992; Hoem, 1993). Important policy elements which encourage the combination of work and family responsibilities are the right for paid leave, subsidised day care, flexible working hours and a progressive structure of taxes in combination with separate taxation of spouses. As a result, women in the Nordic countries have to a large extent developed a dual strategy towards employment and motherhood: most couples have at least two children and women continue to work after and between births (Ellings *et al.,* 1996). According to Rubery and Smith (1997), this Nordic model can be labelled as 'everyone a breadwinner', as all fit adults of working age are likely to be in work or looking for work. Several other European countries, such as Austria and Germany, are considered as a strong male breadwinner model, designed around the presumption of a male breadwinner and a dependent wife. The taxation system tends to be household based, so that the total tax take is usually lower on married couples than on two single adults. This model is further characterized by limited state support with childcare and limited development of state services reducing overall demand for female wage labour. The diversity in welfare and family systems may account for the uneven development towards a more gender equal society.

The differences in state policy may have repercussions along a number of dimensions. With respect to public sector employment, in most European countries it accounts for a much higher share of female than male employment. The high level of female employment found in the Nordic countries can be linked to their well-developed welfare state. Cutbacks in public sector employment are thus likely to be more damaging to women's employment prospect than to men's. State policies with respect to facilitating child care influences the extent to which they promote the employment of women. Most countries provide parental leave systems (paid or unpaid leave. Also the policy on childcare provision determines for an important part the participation of mothers. The Nordic countries, together with France and Belgium are well known for the provision of publicly funded childcare places.

The pension system is of paramount importance for the participation of elder people. The income security system is a popular system in Europe. The state ensures high earning related benefit for those with adequate employment record. In some countries, such as the United Kingdom, older people have

to rely heavily on private pension systems because the state plays a minimal role. The statutory retirement age for men is 65 in most European countries. In most countries state funded early retirement is possible, though eligibility conditions vary. There has been a consistent trend towards early retirement among men in Europe over the last three decades. The labour participation rate of women aged 50 and over has risen, in line with the general increase in female participation.

The trend towards early retirement is stimulated by the need to reduce the size of the workforce, especially in times of economic recessions. At the political level early retirement is considered more socially acceptable than making younger employees redundant. This rationale behind early retirement may change in the (near) future as the ageing of the population presents a threat to the sustainability of the public pension systems. Moreover, early retirement will lead to a further deterioration in the ratio between the number of people in productive employment (who pay taxes, etc.) and the number of benefit recipients. European governments are already taking or preparing measures to contain the costs of future pension commitments. Hence, measures such as stricter eligibility rules and raising statutory retirement age, might reverse the current trend of the falling participation rate of men over 50. In most Member States a shift in focus is already discernible in the instruments of labour market policy: from passive measures of income support for people out of work to active measures designed to help people to find or keep jobs (European Commission, 1996b).

7.3 Policy Scenarios on labour force participation

The key assumptions of the Policy Scenarios will be formulated both in a qualitative and a quantitative sense. The qualitative assumptions of the labour force scenarios concern the demographic, economic, socio-cultural and institutional determinants/drivers of labour force participation on the one hand and the political context on the other hand.

7.3.1 Qualitative assumptions

The policy scenarios of the DEMIFER project are based on two underlying dimensions ('Economy-Environment' and 'Distribution-Fairness') which in combination leads to four scenarios. Each of these scenarios is associated with a set of policies which are assumed to impact, to a greater or lesser degree on the labour force participation rates. However, this impact is not direct but indirect, as it leads to specific effects on the driving forces behind each demographic component. In Table 7-1 the assumed impact of each scenario on the distinguished driving forces of labour force participation are shown.

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Table 7-1: Linkage of scenarios to labour force participation: outcomes in levels and regional distributions

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
Fart Time/Full time/ Self Employed	High participation	High participation	Moderate participation	Low participation
National participation Inequalities	Reduced	Increased	Persistent	Increased
Regional participation Inequalities	Reduced	Increased	Persistent	Increased

In the GSE Scenario, the political setting refers to the combination of high economic growth with policies oriented on social and regional cohesion. This leads to a rise in activity rates over the whole range of working ages. However, the rate of change is not the same for all age groups. It is assumed that the educational level of the population will increase, especially that of women. More and more youngsters will combine education and work. Part-time jobs will strongly increase, making it easier for young people to combine education and paid work. Nowadays high activity rates of young people can be witnessed in Denmark and Sweden. In the other countries a convergence to level of these countries will take place. Participation of both men and notably women will rise, for women towards levels seen in Sweden and Denmark. The flourishing economy will stimulate employers to create opportunities for mothers to combine work and raising children. In the wake of the high economic growth, flexible forms of employment will spread all across the economy. A growing service sector offers opportunities for women to combine motherhood with the pursuit of a career. So, the entrance of mothers in the labour force is stimulated trough measures such as extended childcare facilities and flexible jobs in the service sector. Jobs in the service sector are predominantly created in the governmental service sector.

Due to the process of ageing a raise in the old age dependency is inevitable. Political pressures towards an easing of the financial pressures from an ageing population will lead to measures to postpone retirement. More flexible working arrangements enable elderly males to keep on working at elderly ages. This will lead to considerable rise of the participation of men aged 50 and over. There will also be a fierce increase in the participation of women aged 50 and over. This scenario is further characterized by policies stimulating regional cohesion. In the long run this will lead to quite similar patterns in labour force participation rates and more or less corresponding levels between the

European countries. Denmark and Sweden are considered as forerunners and labour force participation of lagging countries move in the direction of these countries.

In the EME Scenario, the economic circumstances are also good, and even better than in the GSE Scenario, and a market philosophy colours the political climate. In this scenario, economic growth is even higher than in the previous scenario. Increasing economic activities in combination with milder labour taxation will lead to a strong increase in the demand for labour. Also in this scenario educational levels of the European citizens will increase. However, education is seen as a private investment in one's own career and for this reason it not publicly financed. So, in order to follow education youngsters have to combine it with (part time) working. There is an abundance of part time jobs, specifically being created for students in order to meet the high demand for labour. Also for other groups entry into the labour market will increasingly become easier. Employers try to attract women by creating flexible jobs, enabling to combine motherhood with working outside. Also a growing service sector offers opportunities for women to find employment, but in this scenario this sector is less stimulated by governments and instead the financial service sector is growing fast. All this stimulates for women to work outside, and to combine childrearing and with economic activity. For a part this is also due to high opportunity costs (of being only a housewife). In this scenario, the market philosophy leads to a divergence in regional economic performance. In the stronger economic regions economic growth will be higher than in the weaker regions. This unequal development is also reflected in the regional trends in labour force participation, as the rise will be much stronger in the stronger regions.

In the LSE Scenario policies strive to attain social and regional cohesion, like the policies in the GSE Scenario, the economic prospect are more gloomy. As the (financial) effects of climate change become visible and energy prices have risen, households have troubles to cope with rising costs of all kinds. The demand for labour is falling, causing a severe drop in labour force participation due to a discouraged worker effect. The opportunities for young people to combine work and school attendance will decrease due to fierce competition on a tight labour market. Youngsters tend to stay longer in (full-time) education in order to enhance career opportunities. The possibilities to combine this with a (part-time) job are very limited.

For mothers the perspectives to get a paid work are getting worse, although norms and values toward the combination of paid labour with having young children will be more permissive than they used tó be, partly due to policies stimulating male and female equity in labour force participation. Nevertheless, this will not result in a higher female participation due to the scarcity of (part-time)

jobs. Financial troubles have led to dramatic cut-backs in the service sector and a reorganisation of the labour markets in the sense of more flexibility in working-time arrangements stagnates.

In the political debate a preference towards early retirement prevails. This can be explained by the fact the governments give priority to the absorption of young people in the labour market. Also the conditions for elderly workers are not favourable, because the focus of employers is on full time jobs, which are too demanding for elderly people. Although economic stagnation is the general drift in European regions, poorer regions are more confronted with it than richer regions. In those economically weak regions demand for labour is especially low, unemployment is high, and in the wake of it labour force participation is declining. However, due to policies striving for regional cohesion the negative effects for especially weaker regions can be softened by the creation of specific jobs for long lasting unemployed persons by the Government. As a result, disparities between the regions of the ESPON space will largely remain intact.

Also in the CME Scenario economic growth has plummeted and severe environmental problems have arisen. This has lead to a restructuring of the economy: weaker firms could not manage to survive, while larger and stronger firms dominate the economic landscape. The economic stagnation causes a lack of jobs and induces young people to stay in education longer. This causes a decline in labour force participation of youngsters, but the more talented ones succeed in finding (part-time) jobs in (international) firms, always trying to raise their competitiveness. Policies are not directed at creating facilities for mothers to combine work with care for children. Also the introduction of more flexible forms of employment contracts stagnates. Confronted with increasing unemployment and worsening conditions in the labour market men and women are discouraged to acquire a job. However, new job opportunities are created by the large firms. As a result, male participation at prime working ages will more or less stay the same while female participation will drop slightly.

Although in this scenario no policies exists promoting early retirement continues, labour participation amongst elderly persons drop somewhat. Employers try to encourage elderly persons to stop working because their productivity is perceived to be smaller than that of younger persons. The elderly persons who remain in employment are full-time working, because of fears of losing their job altogether if they switch to working part-time. In this scenario the low performing regions are expected to suffer the most from the low economic growth. Here labour force participation will drop somewhat, and thus a trend toward divergence will be seen in the future. In contrast, not much change will take place in the regions with high activity rates.

7.3.2 *Quantitative assumptions*

The quantitative assumptions of the four Policy Scenarios refer to trends in labour force participation rates. The labour force consists of persons who during a specified period are (i) either paid employed or self-employed or (ii) unemployed. The unemployed persons are all persons who during a reference period are (i) without work, (ii) currently available for work, (iii) and seeking employment. All persons who are not classified as employed or unemployed are defined as inactive and do not belong to the labour force. The labour force participation rate represents the labour force as a percentage of the population of working age (>= 15 years). The data on labour force participation rates are derived from the Labour Force Surveys of the Statistical Office of the European Communities (Eurostat) and consist of age and gender specific participation rates.

In the actual making of the scenarios, an age pattern for 5-year age groups for the target year, i.e. 2050, has been generated. For the intermediate years between 2005 and the target year a linear path is supposed between the rates of 2005 and those of 2050.

In the conversion of qualitative into quantitative assumptions, the results from the expert opinion survey play an important role. The result of this survey showed that governments are more or less intense trying to influence labour force participation. Moreover, they also expect that it will have a positive effect on the activity rates. Especially the issue of raising female participation rates is considered to be important. The general expectation of the experts was that these policies can be quite effective. Also raising participation of youngsters was evaluated as being an important political issue. However, the opinion on the effect of policies on this group was less optimistic as many experts though it had no effect. To the opinion of the expert fewer policies were undertaken in order to raise participation of elderly persons and above this it was considered not to be effective or even having a negative effect. The political interference goes even further and extents 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. All kind of political measures on these topics might have a positive effect on labour force participation.

Table 7-2: Linkage of scenarios to demographic components: outcomes in levels and distributions

Trend or Policy	Growing Social Europe	Expanding Market Europe	Limited Social Europe	Challenged Market Europe
Trends in Participation	Raise rates	Raise rates	Lower rates	Lower rates
Participation of young persons	Raise rates	Raise rates	Lower rates	Lower rates
Female Participation	Raise rates	Raise rates	Lower rates	Lower rates
Participation of elderly persons	Raise rates	Raise rates	Lower rates	Lower rates
Fart Time/Full time/ Self Employed	Raise rates	Raise rates	Lower rates	Lower rates

From Table 7-2, it is clear that in the GSE Scenario labour force participation rates will increase in all age groups. In this scenario a lot of political measures are taken in order to raise participation of youngsters, females and elderly persons. These measures are rather successful, but this is enhanced by the fact that the economic circumstances are also favourable, leading to a large demand for employees. Participation rates of males in the prime working ages only shows a small increase, due to the fact that participation rates are already very high.

In the EME Scenario, also, the labour force participation rates will also increase in all age groups, but this time the increases are considerable higher. As the market dominates in this scenario, the economic performance is generally higher in this scenario compared with the previous scenario. In this case policies are not so concentrated at stimulating participation rates, but that is not necessary due to a significant rise in the demand for labour.

In the LSE Scenario, the participation rates are declining as a result of the negative economic developments. Although policies try to enhance labour participation of weak groups in the labour market it is not very successful, as economic 'laws' are decisive for the demand for labour. Again the effects are noticeable in all age groups. The males in the prime working ages will only experience a small decrease in labour force participation, while female participation will be confronted with a serious fall back. Also amongst youngsters and elderly persons labour participation will drop substantially.

In the CME Scenario, the economic prospects are again gloomy. Due to the free market system large companies are still making (large) profits, while small companies perish. Although the demand labour force participation is declining, the demand for labour is higher than in the LSE Scenario. For males in the prime working ages labour force participation does not change, while among youngsters, elderly persons and female the drop in labour force participation is much smaller than in the previous scenario.

7.4 Results

7.4.1 Age group 15-24 years

In order to give an impression of the current regional variation in the participation rates of young persons, Figure 7-1 presents the labour force participation rate of males of the age group 20-24 years in the calendar year 2005. This pattern is characterized by high rates in Denmark, the Netherlands, most regions of the United Kingdom and Switzerland. Many young people in these countries combine education with part-time jobs. Very low participation rates can be found in parts of several Mediterranean and East European countries.

Male aged 20-24 Labour Force Participation in 2005

Labour Force Participation Rate among Males Aged 20-24 Years in 2005, in %

- < 60.0
- 60.0 - 65.0
- 65.0 - 70.0
- 70.0 - 75.0
- 75.0 - 80.0
- > 80.0
- No data
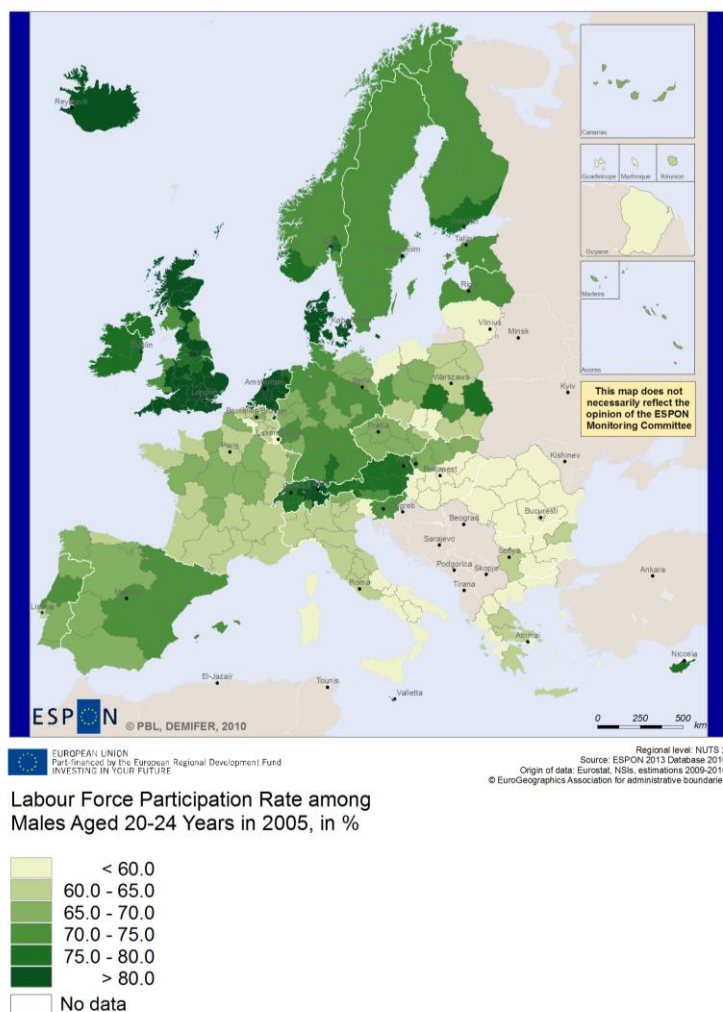
Figure 7-1: Labour force participation rate of males aged 20-24 years, 2005

Figure 7-2 gives the outcomes of the four policy scenarios with respect to the male participation rate of age group 20-24 for the calendar year 2050. In the GSE Scenario, we clearly see that the areas

with high labour force participation rates in 2005 have enlarged to the bordering regions. The regional differences in labour force participation rates have diminished somewhat, due to policies trying to attain regional cohesion.

In the EME Scenario, the participation rate amongst youngsters has risen even more, leading to a further enlargement of areas with high participation rates. The contrast between regions with high and low participation rate is sharper than in the previous scenario. Especially the economic strong regions attract more youngsters while the demand for young people more or less stays the same in the weaker regions.

In the LSE Scenario a falling course of labour force participation rate is envisaged. The result is a striking shrinkage of the areas with high rates, compared with the situation in 2005. In large parts of the ESPON space, the activity rates have become very low and especially in the several Southern and most Eastern countries. Notwithstanding a severe drop in participation of young persons in every region, regional inequalities are not becoming much larger, due to policies trying to enhance participation of youngsters in the weaker regions.

In the CME Scenario, also, a fall in the participation rate of young people is assumed, but in this case the contrast between regions with a high rate and those with a low rate is more or less kept intact. In a market oriented economic system strong regions will still flourish and provide jobs for youngsters, while in the weak regions the supply of these jobs will fall short.

Male Labour Force aged 20-24 in 2050 - Scenarios
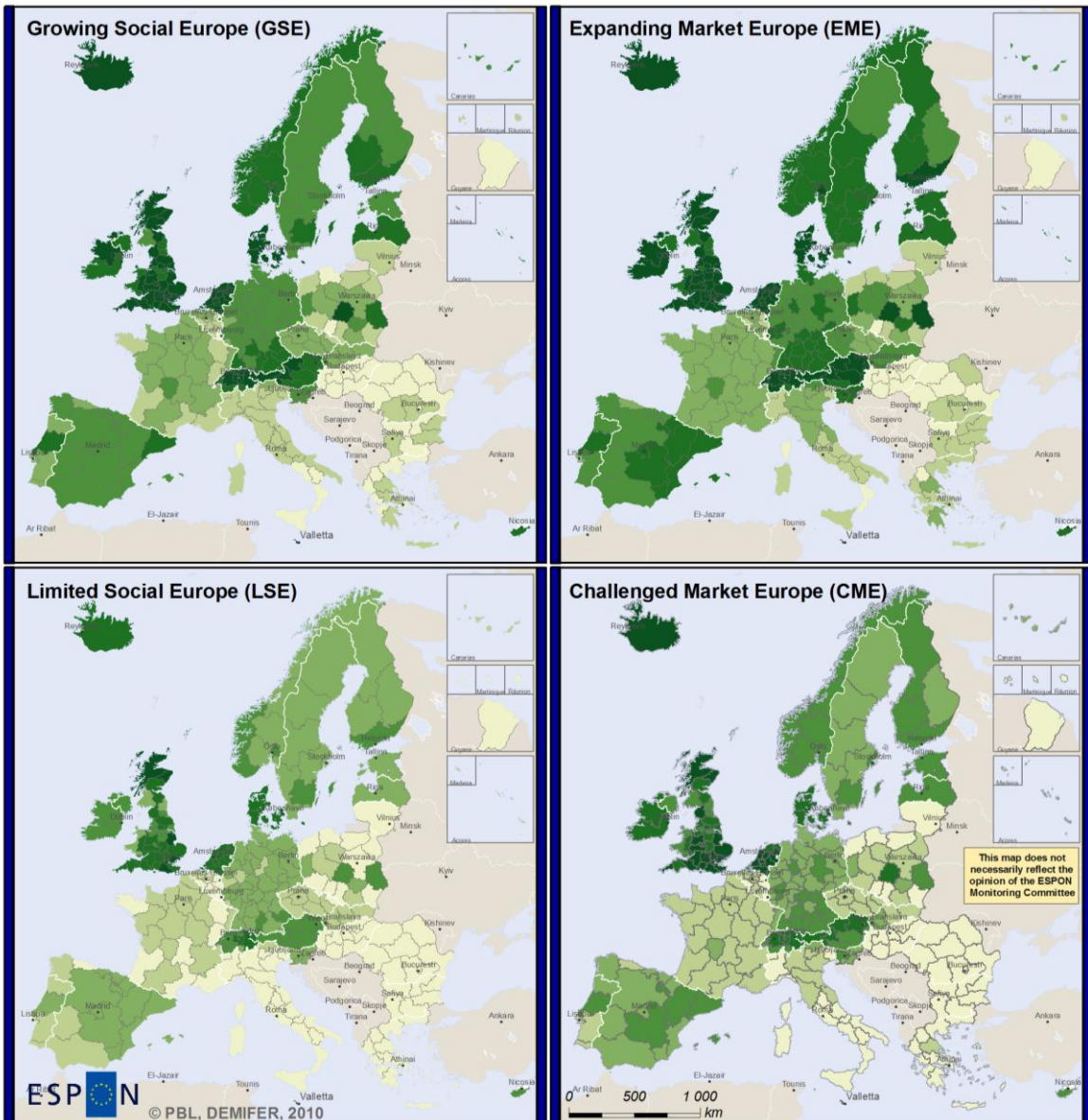
Growing Social Europe (GSE)

Expanding Market Europe (EME)

Limited Social Europe (LSE)

Challenged Market Europe (CME)

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

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Labour Force Participation Rate
among Male aged 20-24 years in 2050
After Different DEMIFER Scenarios
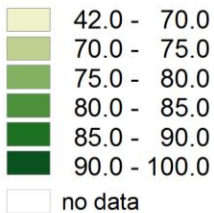
42.0 - 70.0
70.0 - 75.0
75.0 - 80.0
80.0 - 85.0
85.0 - 90.0
90.0 - 100.0
no data

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

Figure 7-2: Labour force participation rate of males aged 20-24 years, GSE, EME, LSE, and CME, 2050

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7.4.2   Female participation

In order to give an impression of the current regional variation in the labour force participation of females, Figure 7-3 presents the labour force participation rate for females aged 40-44 in 2005. In general high female activity rates can be found in almost all regions of the northern and western countries of the ESPON space. In most southern and eastern countries female participation is much lower, with the exception of Portugal (where many females are working in the agricultural sector) and Rumania. Germany shows a clear divide between former West and East Germany, with the latter having much higher rates as an inherence of the communist past. In Italy a North-South divide is visible with low female activity rates in the Southern part and high female activity rates in the northern part.

Female aged 40-44 Labour Force Participation in 2005

Labour Force Participation Rate among
Female aged 40-44 years in 2005, in %

	31.0 - 70.0
	70.0 - 75.0
	75.0 - 80.0
	80.0 - 85.0
	85.0 - 90.0
	90.0 - 96.0
	No data

Figure 7-3: Labour force participation rate of females aged 40-44 years, 2005

Figure 7-4 gives the outcomes of the four policy scenarios with respect to the female participation rate of age group 40-44 for the calendar year 2050.

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Female Labour Force aged 40-44 in 2050 - Scenarios
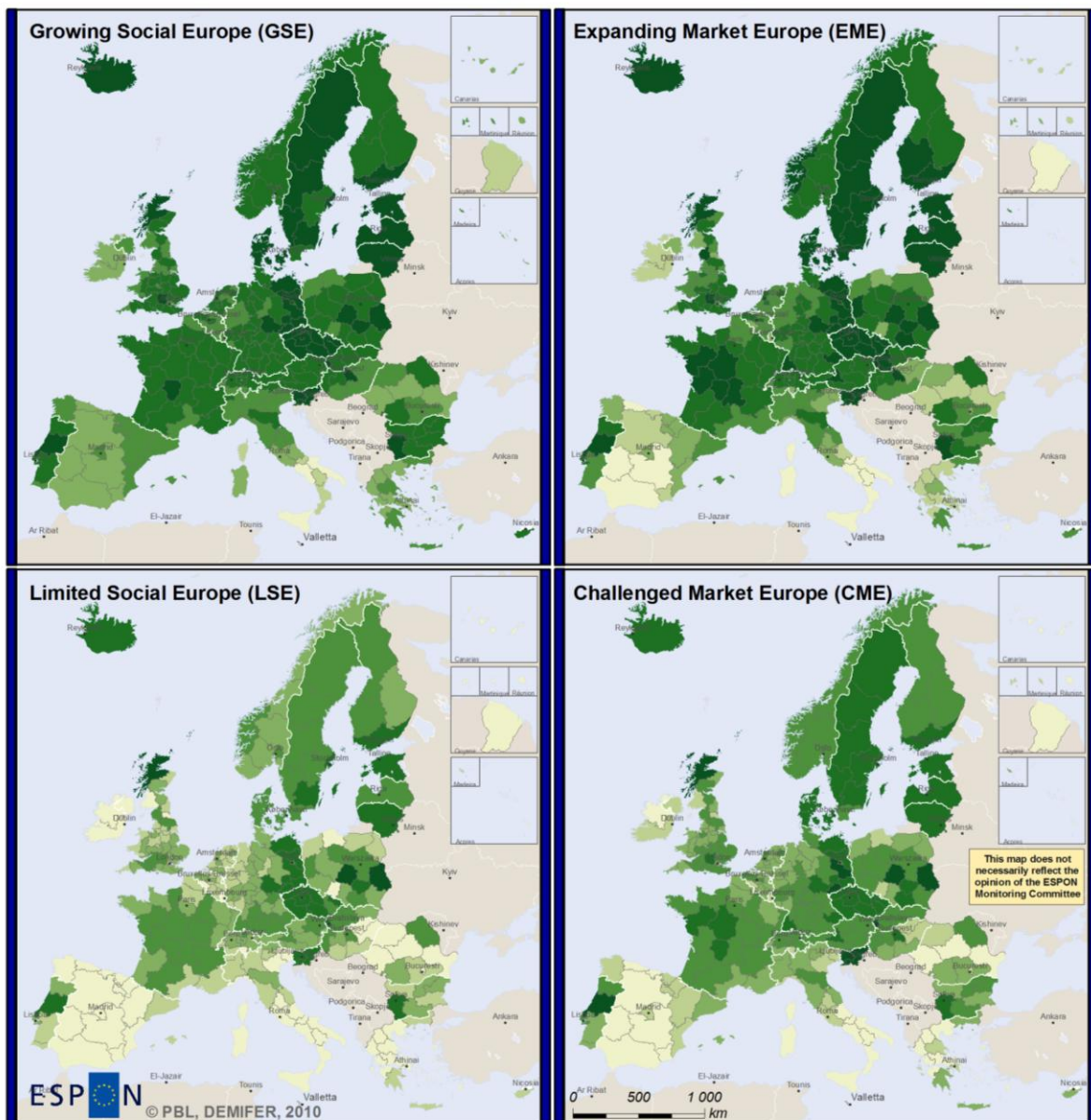
Growing Social Europe (GSE)

Expanding Market Europe (EME)

Limited Social Europe (LSE)

Challenged Market Europe (CME)

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Estimated Labour Force Participation Rate among Female aged 40-44 years in 2050 After Different DEMIFER Scenarios
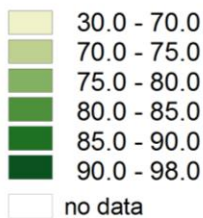
- 30.0 - 70.0
- 70.0 - 75.0
- 75.0 - 80.0
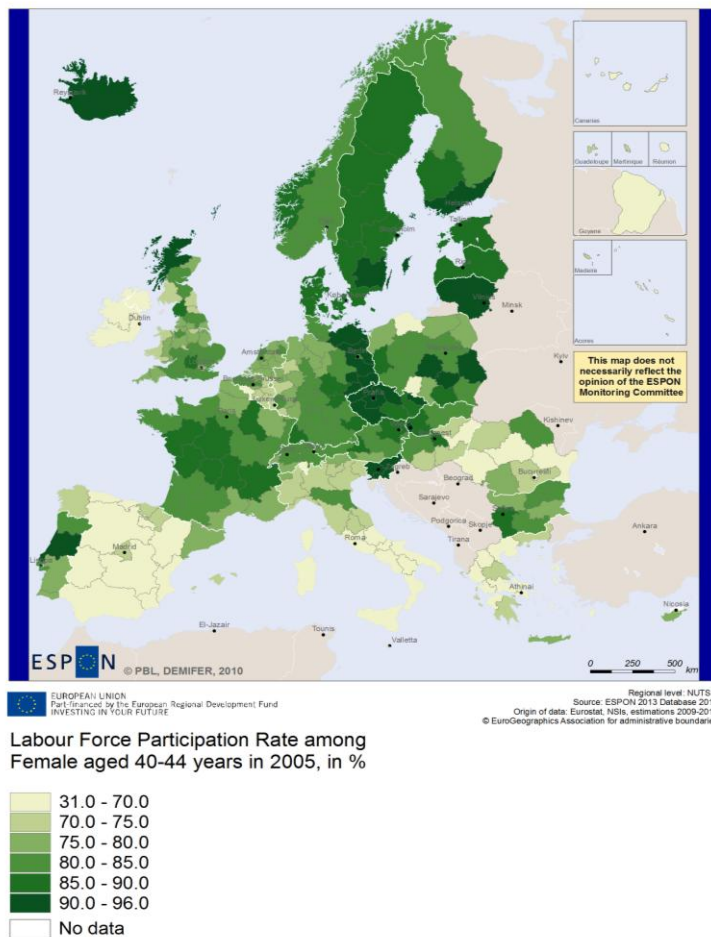- 80.0 - 85.0
- 85.0 - 90.0
- 90.0 - 98.0
- no data

Regional level: NUTS 2
Source: ESPON 2013 Database, 2010
Origin of data: Eurostat, NSIs, Estimations, 2010
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Figure 7-4: Labour force participation rate of females aged 40-44 years, GSE, EME, LSE, and CME, 2050

In the GSE Scenario a tremendous rise in female activity is visible everywhere in the ESPON space. Although Sweden and Denmark are still forerunners the gap with the other countries has been reduced to a large extent. Policies trying to erase regional equalities in female participation have been quite successful: no large regional differentials are visible anymore.

Driven by the flourishing economy, in the EME Scenario the growing demand for labour has lead to a strong increase in the participation of females. However, not all regions has profited from this situation. In several weaker regions the rise in female participation has much lower. As a result the regional differential in female participation is significantly larger than in the previous scenario.

In the LSE Scenario bleak economic perspectives have led to a general fall in female participation. Every region in the ESPON space was confronted with falling activity rates among females and even the two forerunners Sweden and Denmark had to face declining rates.

Also in the CME Scenario, the gloomy economic perspectives have led to a falling participation of females. There is no room for policies trying to attract mothers to the labour market. In the stronger regions there is still an abundance of jobs for mothers and employers are capable to finance child care facilities. So, in these stronger regions only a small drop in female activity is apparent. In the weaker region there is no need to attract women to the labour market and as a result the participation rates of females remain at a low level.

7.4.3   The age group 50 years and older

In order to give an impression of the current regional variation in the labour force participation of older persons, Figure 7-5 presents the labour force participation rate for males in the age group 55-59 years in the calendar year 2005. Large regional differentials are visible with high participation rates in the Nordic and Baltic States, several western countries such as Germany, the United Kingdom and some southern countries as Spain and Portugal. In France, Italy and several east European countries participation of elderly males is very low. The large national differences are mainly due to characteristics of the pension systems. The statutory retirement age for men is 65 in most Member States, Denmark has the highest retirement age with 67 and France the lowest with 60. Another explanation for the large regional inequalities is economic background. In regions where agriculture is dominant, many people continue to work in order to escape poverty. Elsewhere, Governments are taking measures to increase participation at higher ages in order to contain the cost of future pension commitments. Figure 7-6 gives the outcomes of the four Policy Scenarios with respect to the male participation rate of age group 55-59 for the calendar year 2050.

In the GSE Scenario a general rise in elderly activity is foreseen. This leads to rising participation rates in all regions, but especially in region with low rates nowadays. In particular, in France, Italy and several eastern European countries a considerable rise in activity is assumed.

Male aged 55-59 Labour Force Participation in 2005

Labour Force Participation Rate among Males Aged 55-59 Years in 2005, in %

- < 60.0
- 60.0 - 65.0
- 65.0 - 70.0
- 70.0 - 75.0
- 75.0 - 80.0
- > 80.0
- No data
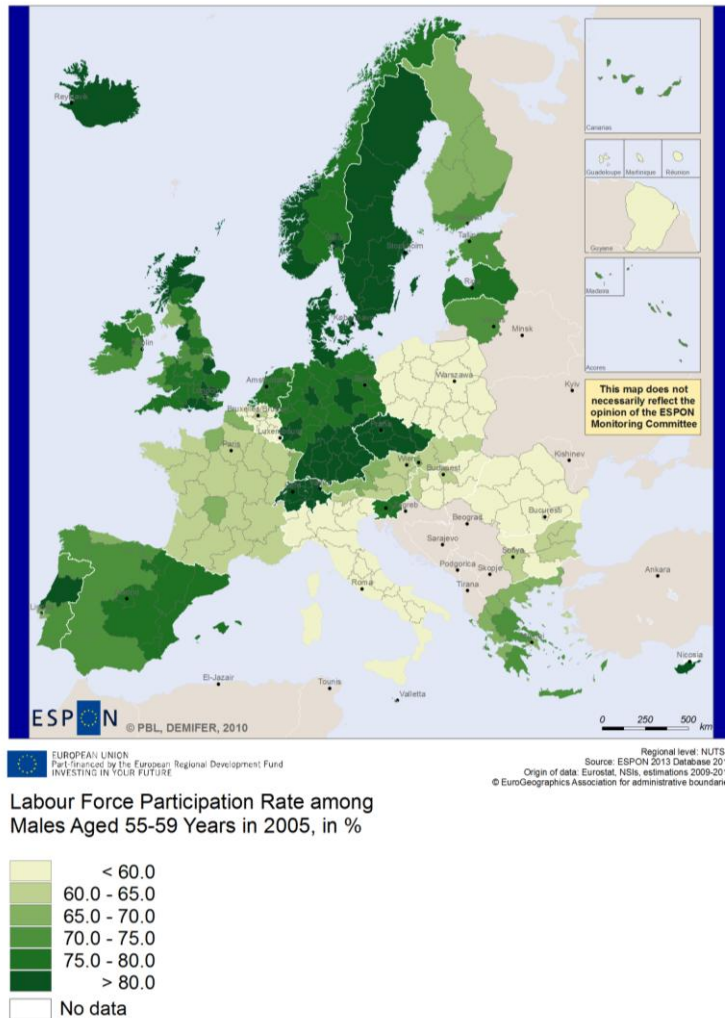
Figure 7-5: Labour force participation rate of males aged 55-59 years, 2005

Male Labour Force aged 55-59 in 2050 - Scenarios
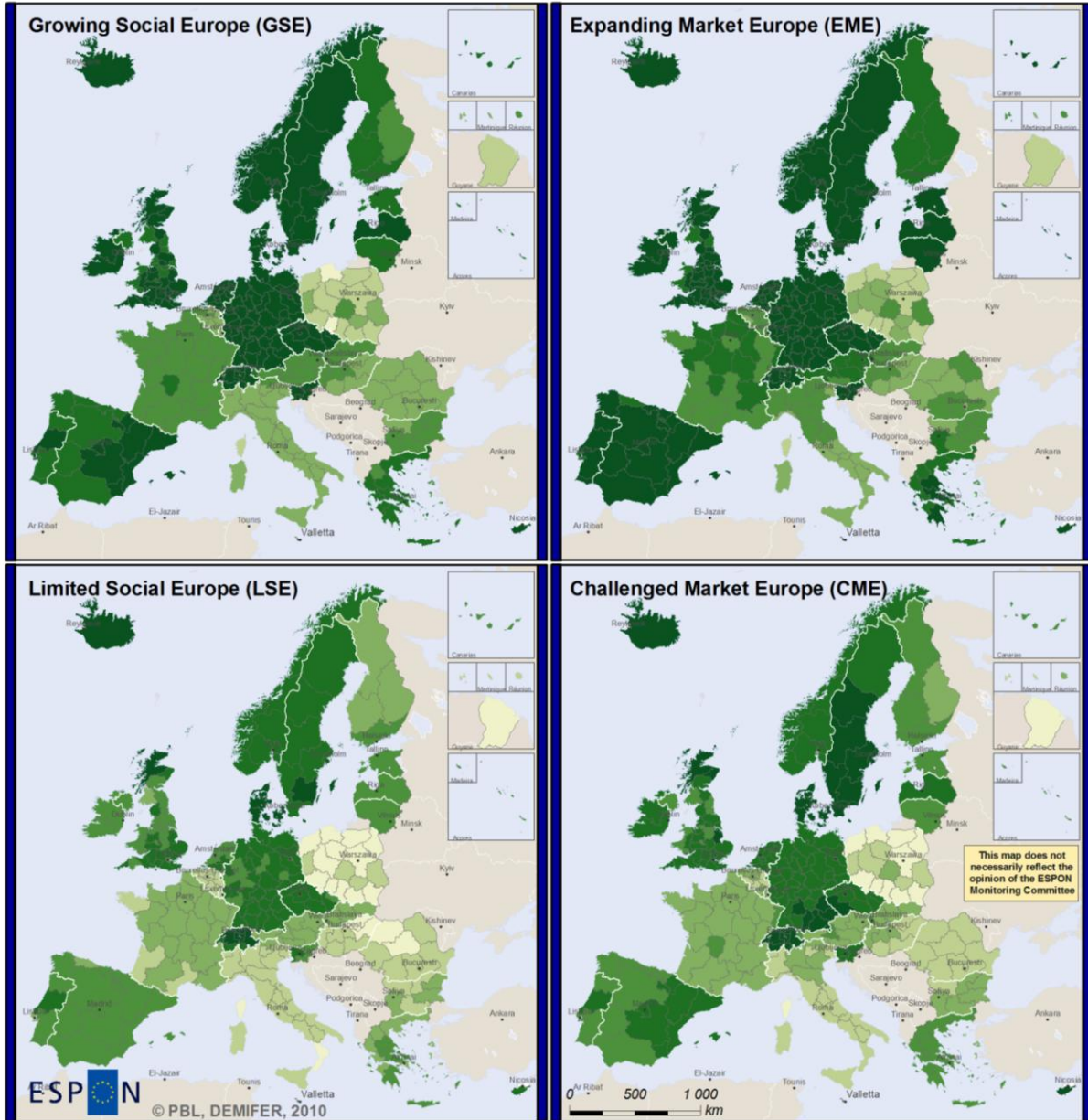
Growing Social Europe (GSE)

Expanding Market Europe (EME)

Limited Social Europe (LSE)

Challenged Market Europe (CME)

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Labour Force Participation Rate
among Male aged 55-59 years in 2050
After Different DEMIFER Scenarios

- 41.0 - 60.0
- 60.0 - 65.0
- 65.0 - 70.0
- 70.0 - 75.0
- 75.0 - 80.0
- 80.0 - 100.0
- no data

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

Figure 7-6: Labour force participation rate of males aged 55-59 years, GSE, EME, LSE, and CME, 2050

Also in the EME Scenario, a boost is foreseen for elderly participation, but now regions which already had high rates in 2005 profit the most. In large parts of the Nordic countries, the United Kingdom, Germany, Switzerland and Austria labour force rates are very high in 2050.

In the LSE Scenario, the participation of elderly persons is falling. In an economic context with a shortage of jobs, policies promote early retirement in order to make jobs for young persons.

Also in the CME Scenario, falling activity rates are assumed for elderly persons, but in this case it is due to companies trying to stimulate their elderly employees to leave. However, this tendency is less outspoken in the economic stronger countries. As a result regional differentials in elderly participation are stronger in this scenario compared with the previous scenario.

8. SCENARIO DATABASES

The four scenarios for five demographic components plus labour force participation have been prepared by the DEMIFER team at the University of Leeds and the Netherlands Environmental Assessment Agency. These scenarios have been implemented in a set of workbooks in Microsoft Excel (2003 format, '.xls' file extensions). The workbooks have been deposited on the DEMIFER Sharepoint facility and will be made available for use by other researchers at the conclusion of the project..

The set of workbooks that are available are listed in Table 8-1. In general, there is one workbook containing the benchmark data or historical series of data and one workbook in which the scenarios are developed. For some components (e.g. Mortality) one large workbook combines these two functions, with there being a separate workbook with raw deaths and population data and a separate workbook containing the life table computations. All of these workbooks are large and need a good PC for implementation. They can all be easily loaded into the 2007 version of MS Excel, which was in fact used for most of the development. The conversion back to an earlier version was effected to make use of the workbooks easier across the DEMIFER team and by external users. We can supply 2007 versions of the workbooks if required.

Table 8-1: Scenario databases (workbooks)

Workbook file	Contents
MORTALITY	
European_Mortality_Data	Population 1991-2006: time series of country populations by sex and age to 100+ (raw data) Population 1991-2006: time series of NUTS2 regional populations by sex and age to 100+ (raw data) Mortality: 1991-2006 time series of counts, rates and indicators, country deaths by sex and age to 100+ (raw data) Mortality: 1991-2006 time series of counts, rates and indicators, regional deaths by sex and age to 100+ (raw data)
DEMIFER Mortality Scenarios Final	Population 1991-2006: time series of country populations by sex and age to 100+ (estimates and modelled data) Population 1991-2006: time series of NUTS2 regional populations by sex and age to 100+ (estimates and modelled data) Mortality: 1991-2006 time series of counts, rates and indicators, country deaths by sex and age to 100+ (estimates and modelled data) Mortality: 1991-2006 time series of counts, rates and indicators, regional deaths by sex and age to 100+ (estimates and modelled data) Mortality: 2005-10 to 2045-50 time series of rates and rolling indices for regions for each scenario
DEMIFER Life Table Scenarios	Life tables 2005-10 to 2045-50 for each scenario for regions

FERTILITY	
	Fertility: 1991-2006 time series of counts, rates and indicators
	Fertility: 2005-10 to 2045-50 time series of rates and rolling indices
INTERNAL MIGRATION *Irm – Benchmark – Multipoles – v3 – Apr 2010.xls* *Irm – Scenario – Multipoles – v4 – Apr 2010.xls*	Internal migration: 2001-6 time series of counts, rates and indicators Internal migration: 2005-10 to 2045-50 time series of rates and rolling indices
INTER-COUNTRY MIGRATION	
	Inter-country migration: 2002-06 time series of counts, rates and indicators
	Inter-country migration: 2005-10 to 2045-50 time series of rates and rolling indicators
EXTRA-EUROPE MIGRATION	
	Extra-Europe migration: 2002-06 time series of counts, rates and indicators
	Extra-Europe migration: 2005-10 to 2045-50 time series of counts and rolling indicators
LABOUR FORCE PARTICIPATION	
	Labour force scenarios: 2002-6 time series of participation rates
	Labour force scenarios: 2005-10 to 2045-50 times series of rates and rolling indicators

Notes: The database work books are in zip archives (.zip) containing the information in MS Excel 2003 (.xls) and 2007 (.xlsx) formats

The status of the workbooks is first or alpha release only. Please report any computational errors to the authors of the workbooks. Each workbook should begin with a meta data sheet identifying the author and contact email. The authors provide no guarantees for the accuracy or completeness of the computations.

9. SUMMARY, DISCUSSION AND CONCLUSIONS

This report presents the results of research into alternative demographic futures for Europe. Our basic hypothesis was that a number of policies relating directly to health, to families and to migration incentives and barriers along with more general social policies linked to the degree of adoption of the welfare state and economic policies that affect regional economies will, taken together, have significant impacts on demographic behaviour. 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.

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 thought experiments that reveal the choices that European societies face. What we do in this report is to explore the determinants of change for the demographic components, relate those determinants to policies and bundle together policies (or the strength of those policies) in *Scenarios*. Scenarios are, in effect, coalitions of policies affecting different demographic components in similar ways. We propose four scenarios (linked policy bundles-demographic effects) using two axes of policy variation: a 'Distribution-Fairness' dichotomous axis and an 'Economy-Environment' dichotomous axis. Crossing these two axes produces four Policy Scenarios, which we call *Growing Social Europe (GSE)*, *Expanding Market Europe (EME)*, *Limited Social Europe (LSE)* and *Challenged Market Europe (CME)*.

We then develop models of likely change in the key drivers of each demographic component and vary the parameters in those models. The models have a variable that drives change across Europe or the member states and a distribution function that translates change to regional scale. For example, in the Mortality Policy Scenario we use the average annual percentage change in age-specific mortality rates for Europe measured in 2001-2006 as the overall driver (-2.8% for men, -2.6% for women), which result in life expectancy increasing from 76 (men) and 82 (women) in 2005-10 to 89 (men) and 92 (women) by 2045-50. In the GSE and EME Sscenarios we assume higher percentages and in the LSE and CME Scenarios we assume lower percentage changes. The regional death rates are modelled using scenarios for regional SMRs (using Europe as a standard): in the GSE and LSE Scenarios we assume convergence in regional SMRs and in the EME and CME Scenarios we assume divergence.

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The impacts of the Mortality Policy Scenarios on regional *Competitiveness* are to decrease it because the improvements in mortality increase the old age dependency ratio, assuming no other changes in the social and economic system. The Social scenarios (GSE, LSE) increase regional *Cohesion* by reducing the spread of mortality experiences across regions, while the Market scenarios decrease regional Cohesion because the variation across regions in mortality experience increases. However, much larger than these regional changes in Cohesion is the convergence of the mortality experience of men and women with the gap in life expectancy at birth for Europe shrinking from six years now to three years by mid-century.

We develop equivalent models for the other components of demographic change. So for *fertility* we use changes in the TFR tailored to each scenario and the range of TFR within countries to reflect convergence or divergence in regional fertility. For *internal migration,* within the 23 countries that contain two or more NUTS2 regions, we assume no trend in overall level of internal migration because the historical series (2001-2006) suggest no overall trends and fluctuations in response to economic conditions. We use destination attractiveness ratios (DARs) to alter the direction of out-migration. For the GSE and LSE scenarios the range of DARs is shrunk; for the EME and CME scenarios it is expanded. A similar method was used to model *inter-country migration* within the ESPON space. Trends in DARs are adopted which depend on scenarios. The Extra-Europe Migration is governed by assumptions about the total level of immigration to Europe, which is then distributed to countries and regions using the current distribution patterns. Each of the scenarios has a different level assumption: 3.5 million per year for the GSE Scenario, 4.5 for the EME Scenario, 1.5 for the LSE Scenario and 2.5 for the CME Scenario. The hypothesis is that Europe's success in solving the economic and environmental challenges will raise or lower the number of immigrants attracted but that the attractiveness will be modified by the degree of emphasis on social welfare or market demand for labour.

The body of the report discussed the assumptions and methods used in building the component inputs to the DEMIFER Policy Scenario projections (reported on under Deliverable D7). We provide also a rich mix of graph and map illustrations of selected input variables by scenario. The full set of variables are contained the DEMIFER Scenario Databases. The four sets of scenario inputs constitute a radically innovative investigation of Europe's demographic future. We have developed a set of fascinating maps of what the demographic drivers of Europe's population in the middle of the twenty-first century will look like. We don't know which of these futures will come to be. We hope that either the GSE or EME Scenarios will be the future, as this will imply that Europe has maintained a reasonable path of economic growth combined with environmental stewardship in a sustainable way. These two successful scenarios have different implications for European cohesion and

competitiveness. The GSE Scenario will deliver more solidarity and less inequality (though there will still be quite large demographic differences across Europe). The EME Scenario will deliver more competitiveness but at the cost of greater inequality. We leave it to the reader to choose his or her preferred future.

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