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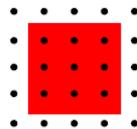
# REGIONAL CHALLENGES IN THE PERSPECTIVE OF 2020

## REGIONAL DESPARITIES AND FUTURE CHALLENGES

A report to the Directorate-General for Regional Policy  
Unit Conception, forward studies, impact assessment

## SYNTHESIS

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## EXECUTIVE SUMMARY

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The following analysis is part of a broader project of DG REGIO, which, together with the World Bank and the Bertelsmann Foundation, has set up the Regional Future Initiative, a network of experts looking at the future of regional trends. The objective of the network is to analyse and build a consensus on the future impacts of the key challenges that regions will face in the future and to elaborate and discuss possible responses. The output of the network should provide a basis for policy discussion and choices in the coming years.

The potential impacts of globalisation, climate change, demographic change, energy risks and social risks on regional disparities in Europe and neighbouring countries have been explored under two main hypotheses of fast and slow growth.

Five papers on each challenge have been drafted and discussed with thematic experts in five workshops. The results of the analysis and the insights provided by the workshops are part of the synthesis report which broadens and deepens the analysis by looking at the linkages among challenges as well as the impact of multiple challenges on regional disparities. This exercise has obliged the study team to establish a model in which regional growth of income is not only related to the different challenges but in which each challenge and its drivers are linked among themselves and then to the disparities in income. Two overall scenarios of regional disparities in the perspective of 2020 arise from this exercise and mirror the range of the challenges' impact under two extreme hypotheses: a long lasting crisis and slow growth on the one hand and a fast resumption of growth on the basis of a more favourable structural relation among weak and strong regions on the other. The model is still in its initial phase and the part concerning regional impacts needs to be improved as many

drivers lack statistical data at regional level.

### INDIVIDUAL CHALLENGES AND REGIONAL DISPARITIES

#### GLOBALISATION

Globalisation is increasingly integrating of world markets due to diminishing transaction costs and weakened barriers to the exchange of goods, services, capital, people, ideas, information and knowledge. While it provides a unique opportunity for development, it mainly benefits the regions with trading potential. In a globalised world the prosperity of each region depends heavily on exports to other areas. The highest rewards for participation in global trade typically go to enterprises that gain a dominant market position through branding, product and process innovation. In a "knowledge economy", higher education and extensive international connections confer a significant competitive advantage. The ability of each area to gain external income depends on several other factors which impact local areas in different ways; these include climate, natural resources, location and the pattern and strength of existing market linkages.

The main features of globalisation which determine potential benefits and costs are: global firms driving innovation and specialisation; free trade agreements; volatility in commodity prices and volumes of industrial goods and services; growth of cross-border portfolio investment and capital markets; dependence on specialised human resources and skills.

Features may generate benefits and costs in individual countries and regions, in some cases perpetuating economic, social and environmental disparities and in other cases reducing them. For instance, the growing importance of global firms provides opportunities for a rapid growth of industries and services in

regions that have the resources, institutions and cost levels that are attractive to them; at the same time, it leads to loss of jobs and income in traditional industries, adverse macro-economic impact if export earnings are not sufficiently dynamic, exposure to global market downturns and risks of relocation as business and market patterns change etc.

The determinants of regional vulnerability to globalisation are: the existing pattern of trade; the ability of a region to take advantage of growing export markets; the potential to gain from cross-border investments and remittances; the ability to support changing patterns of cost and specialization; location, natural resources and infrastructure; the education and skill level of the work-force which affects competitiveness in the knowledge economy; the ability of labour market institutions and other social and collective institutions to mitigate pressures on income distribution, to ensure reasonable security of employment, and to finance welfare systems and the provision of public goods.

European-wide trade linkages are the vehicle for globalisation, implying spill-over effects as regions gain or lose from the success of others.

## DEMOGRAPHIC CHANGE

Demographic change consists of modifications to the size and structure of a population brought about by changes in fertility, life expectancy and migration. Demographic change generates benefits and costs, increasing or reducing economic, social and environmental disparities.

The main features of demographic change include natural growth and ageing of population; migration within and between countries. Demographic decline characterises European and neighbouring regions with ageing populations and out-migration of younger people, which result in a

shrinking labour force, high old-age dependency ratios, possible scarcity of services and weak economic performance. In-migration encouraged by income disparities and demand for services may enhance growing countries, while in a context of a depressed economy and rising unemployment it may increase risks of social conflicts. Demographic expansion occurs in a limited number of areas (e.g. Neighbouring Mediterranean countries) with a risk of high youth unemployment.

The determinants of regional vulnerability which affect the strength and direction of the impact of demographic change are in part internal to the region and predetermined, at least in the period to 2020 (patterns of fertility and life expectancy). On the contrary, changes arising from migration are less predictable and depend on relationships between population and economic growth in different regions within each country and between different EU member states as well as patterns and trends in the rest of the world.

## CLIMATE CHANGE

Climate change consists of a set of alterations in the average weather caused by global warming due to the emission of anthropogenic greenhouse gases. Climate change has important consequences on the economy, health and quality of life of the population.

The main features of climate change include: rising sea levels affecting coastal areas; the warming of northern regions; aridity and storms in southern regions.

Although these features are likely to develop only slowly in the period leading up to 2020, they are uncertain and have cumulative and irreversible effects. The impact will not be felt significantly due to the brevity of the time span of the analysis, however, urgent answers must be found already at the regional level to slow down and, where possible,

counteract the negative impacts. Features of climate change may produce costs and benefits in different regions, increasing or reducing disparities. For instance, the rise in sea levels requires significant investment in drainage and coastal protection; furthermore, it gives rise to relocation costs and may lead to a decline in tourism and agriculture in affected areas. The warming of northern regions, on the contrary, is likely to benefit local agriculture and tourism. Aridity and storms are likely to plague southern regions, increasing health risks, depressing local agriculture etc.

The determinants of vulnerability which influence the strength and direction of the impact of climate change on countries and regions include: the region's climate zone as well as temperature and precipitation changes; the share of population affected by river floods; the share of population living in coastal areas; the vulnerability to drought; the intensity of the 'heat island' effect in cities; regional income; the economic importance of agriculture, fisheries and tourism.

## ENERGY RISKS

The risk of being unable to guarantee a secure, sustainable and competitive energy supply and use are related to shortcomings and rigidities in supply, the growth and pattern of demand and volatility of energy prices.

The main features of the energy challenge in the period up to 2020 include: unstable world prices for energy products; risks of interruptions and localised shortages of supply; the need to reduce greenhouse gas emissions; localised environmental pollution.

The need to reduce greenhouse gas emissions worldwide requires reduced use of carbon fuels through improved energy efficiency and increased use of non-carbon energy sources as well as development of carbon capture

technologies. The impact of these developments on energy prices is relatively uncertain. The impact of energy risks on disparities is difficult to assess. For example, the need to reduce greenhouse gases may lead to a decline in energy-intensive industries but, at the same time, encourage the development of new sources of supply and energy-efficient products and services.

The determinants of regional vulnerability which influence the strength and direction of the impact of change on countries and regions include: existing patterns of energy production and use; dependence on imports; infrastructures and connection to the European grid; opportunities for developing new energy sources and technologies and energy-efficient products and services.

## SOCIAL RISKS

Social risks can be, both, "new" and "old". New risks include increased exposure of wider sections of the population to job instability, poverty and failures of welfare systems. Such risks may hit any member of a social group at a particular phase of his/her life cycle and add to older risks – such as unemployment, illness, disability and old age poverty – altering the structure and priorities of welfare systems and competing for their resources. Globalisation drives significant changes in models of living, organisation of households and capacity of families to provide "in house" care services.

Failure to maintain economic growth or failure to spread benefits of growth to the whole population will intensify social polarisation.

Features of social risks include: household fragmentation implying potential poverty among single-parent households and households where one or both parents are not in work; inequality of pay and wealth; high dependency ratios; inability to provide "in house" care to children and

elderly; budgetary pressure on welfare systems.

The combination of these factors may imply: pressure to increase the number of family members at work together with deteriorating quality of life and inadequate care for children, the old, the sick and disabled family members; unequal access to housing or to opportunities for children and/or other sections of society.

Budgetary pressure on welfare systems reduces the ability of local and national authorities to alleviate household poverty and tends to reinforce unequal development. This may lead to insecurity, community tensions and hostility towards migration.

The determinants of regional vulnerability which affect strength and direction of the impact of social polarisation include: household structure (e.g. the number of single person households); employment opportunities; educational attainment which influences earning potential; the ability of welfare and social protection systems to deal with social risks.

#### RELATIONSHIPS BETWEEN CHALLENGES AND COMBINED IMPACT ON DISPARITIES

Challenges may affect regions in a more or less independent manner, or alternatively produce mutually reinforcing impacts.

In the former case, the opportunities and risks (as previously discussed) may be considered as elements of a normal historical process which in most cases can be managed by existing community, national and regional institutions.

In the latter case, when impacts are mutually reinforcing, challenges acquire greater significance and may imply needs for new institutions and policies. The distribution of risks presents serious problems when good or bad effects interact in a multiplicative rather than additive manner.

The interpretative model used in this study distinguishes between exogenous and endogenous challenges, and identifies their main outcomes.

Exogenous challenges are either given or strongly influence the success in dealing with the risks and threats posed by other challenges. These are: climate change, natural demographic change (e.g. fertility and aging) and globalisation.

Climate change is given up to 2020; although it will affect regions in a number of ways that may in some cases require major changes in infrastructure and livelihood; there are many uncertainties about the timing of impacts and the cost and pattern of responses.

Natural aspects of demographic change are also given up to 2020; the ageing of existing populations is relatively certain although migration may affect the main features of the labour market in each region, while effects on population structure and birth rates are limited and may become evident only in the long run.

Globalisation and the knowledge economy set the context for economic growth or stagnation and structural changes in each country or region. The pattern of regional income per capita, which is closely linked to consequences of globalisation, provides a baseline for understanding the potential impacts of challenges in the period up to 2020.

Endogenous challenges are strongly dependent on the other challenges. These are: energy risks and new social risks.

Patterns of energy supply and demand are strongly affected by economic growth, and structural change as well as by climate change and migration trends.

New social risks are also substantially affected by growth/stagnation and structural change as well as by migration, through impacts on job opportunities and family income per capita.

Exogenous challenges function as drivers that affect endogenous challenges, as explained before, and determine a series of outcomes. Outcomes can be estimated by using variables which explain the interactions among challenges on regional disparities (e.g. energy prices, GDP growth, activity rate, migration flows). They perpetuate economic and social inequalities between and within regions and potentially introduce new sources of divergence.

Interrelations between exogenous, endogenous challenges and outcomes are complex and produce effects, positive and negative, which in several important cases may differ not only in magnitude but also in direction depending on the regional context. In this framework GDP growth is the single most important element linking drivers and outcomes. Challenges are more easily tackled and opportunities exploited in regions with a relatively high per capita income and a sustainable growth rate. This makes income disparities a crucial threat to cohesion and good relations within the EU and between the EU and neighbouring countries.

Exogenous challenges strongly affect endogenous challenges and outcomes. Effects are often bidirectional and difficult to assess. For instance, increases in global temperature reduce heating and energy requirements in Northern regions, while increasing cooling requirements in Southern regions.

Regions with potential to provide new sources of energy that do not generate CO<sub>2</sub> or other harmful emissions also stand to benefit from climate change. Extreme weather events and global warming may reduce the attractiveness of certain regions. At the same time, some Northern regions may become more attractive, leading to a South-North migration (from within and outside the EU)

Natural demographic change (birth rates and ageing) may result in positive effects on GDP growth in regions where the

labour force increases and a high rate of household formation encourages investment in new homes. The consequences of ageing may be more controversial. On the one hand, an ageing population creates strong demand for a wide range of services for retired people, but maintaining economic growth may prove difficult if the working-age population is falling. There is a common tendency to regard ageing as a negative factor for GDP growth but this has yet to be demonstrated in higher-income areas where the elderly may have sufficient accumulated wealth to generate buoyant demand. Indeed areas that attract inward migration of elderly people have been among the most prosperous in high income countries in recent decades.

The effect of demographic change on activity rates is also two-sided. In regions with low birth rates, smaller numbers of new entrants join the labour force and job opportunities for young people and old people who want to work will be improved. On the other hand, regions with higher birth rates and an expanding population of young people typically experience problems of youth unemployment.

Globalisation also has direct, positive effects on migration as the increased exchange of goods and services reinforces links between communities in different regions.

The effects on the environment and social cohesion are controversial and often negative. For instance, risks to the environment arise from the intensification of competition that may induce businesses and governments to relax environmental protection measures.

The main risk to social cohesion is the tendency for globalisation to generate unequal income distribution within each region.

Endogenous drivers and outcomes are affected by exogenous drivers but they also produce important effects.

For example, the immediate impact of changing energy prices on producers and consumers is substantial because energy is by far the most important raw material used by modern economic systems, affecting citizens in many ways, most directly through their impact on costs of transport, heating and cooling, power and light in the home. The benefit or cost of changes in energy prices depends on the position of individuals and firms in the circuits of production and use. Energy exporting countries may obtain immediate and substantial increases in external income from a rise in world prices and vice versa importing countries can suffer immediate and substantial increases in external costs.

In the long run, energy prices have a major impact on the viability of alternative sources and development of new technologies.

GDP growth is an outcome of exogenous drivers, especially globalisation, as well as local factors including the quality of the environment and social cohesion. At the same time it is a key driver of employment opportunities and activity rates, local infrastructure and cohesion. Most of the effects of GDP growth are positive although, in the absence of effective environmental protection and infrastructure investment, it may result in congestion and detrimental changes in the local environment.

Activity rates depend mainly on demographic factors and GDP growth. Increased activity rates encourage inward migration and may improve social cohesion by reducing unemployment and income inequality. Low activity rates encourage outward migration and may aggravate social polarisation by generating pools of long-term unemployed.

Positive feedback between GDP growth, social cohesion and improved local environments are an important aspect of 'cumulative causation' that allows high-income regions to maintain advantages over long periods of time and

consequently makes it difficult for low-income regions to catch up.

## OVERALL SCENARIOS OF REGIONAL DISPARITIES

Scenarios result from combining hypotheses of challenge intensity<sup>1</sup> with regional sensitivity<sup>2</sup>. They include an estimation of per capita GDP, in EU Member States and neighbouring countries, produced by our model following two opposite hypotheses of gradual and rapid recovery from the world crisis.

### SCENARIO A: A EUROPE WITH A SHRINKING CORE

In the low growth scenario economic expansion is not expected to provide much help to regions facing the challenges reviewed in this paper. A minority of regions in high-income countries may be able to deal with their vulnerabilities or have sufficient capability to take advantage of opportunities associated with the challenges. In lower-income countries the comparatively low level of GDP per capita is likely to intensify vulnerability to the challenges.

The intensity of challenges is assumed to range from severe (traditional social risks) to moderate (climate change, natural

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<sup>1</sup> The potential scale of impact in the most vulnerable affected region in 2020; intensity can be zero or positive.

<sup>2</sup> It summarizes the vulnerability of each region under that challenge and gives us a parameter to estimate the likely impact of the challenge on its economic performance. Sensitivity may be positive (benefits from high intensity) or negative (disadvantages from high intensity); in detail, each challenge is characterised by features that are more or less beneficial (positive sensitivity), features that are more or less harmful (negative sensitivity) and features that may affect regions either way. (negative for some, positive for others).

demographic change, globalisation and new social risks), slight (energy risks) and none (migration).

With the exception of traditional social risks all challenges are classified as slight to moderate intensity and, perpetuate existing differences between regions with different sensitivity to the challenges.

The main results of this scenario are determined by the extent to which sustainable income in 2020 will affect current sensitivity patterns. Low income growth will have negative implications for cohesion at the country level and at the regional level.

In the case of slow recovery from the world crisis and high intensity of climate change, most European regions should be considered vulnerable and will experience potential losses from the combined challenges.

In this scenario, there are over 110 regions with moderate to severe vulnerability to the combined challenges, over 40% of the European regions. 90 regions show slight vulnerability and just over 60 can be considered beneficiaries; vulnerability is widespread in terms of number of regions and population, 75 % of the European population in almost all geographical areas. Furthermore, vulnerability afflicts regions that were previously successful but whose situation worsened as a result of the combined challenges impact in a low growth context.

There is a clear cut divide between the Eastern and Southern regions and the rest of Europe. Overall benefits from challenges, in this scenario, is confined to a relatively small group of European regions (Central/Northern Europe: Southern/central Germany, the Netherlands and Belgium, Southern Britain and Ireland, and regions in Austria, Denmark, Southern Sweden and Western Finland), 25% of the European population, while the population with severe and moderate vulnerability amounts to almost 46%.

## SCENARIO B: A EUROPE WITH NARROWING DISPARITIES

In the high growth scenario vulnerability to challenges is at least partially offset by rising GDP per capita in the majority of regions and even in lower-income countries the negative effect of low GDP per capita is comparatively small.

In this scenario, intensity of challenges ranges from severe (globalisation and new social risks) to moderate (natural demographic change, traditional social risks), and minor (migration, climate change, energy risks). Europe will achieve a better growth performance than the US, roughly equal to that of Japan and other countries in East Asia with the exception of China.

Faster growth of demand in the world economy through higher public and private investment in Europe and neighbouring regions will result in rapid recovery. Systematic relocation of agricultural production in Europe towards the South and East from the North and West and rapid development of service exports in the South and East are other important scenario assumptions.

Income growth in relatively fast-growing countries in the South and East of Europe would substantially boost internal manufacturing and profits on capital.

The scenario highlights the importance of global recovery from the recession and the benefits to the European economy produced by higher levels of investment and trade. New patterns of trade in agriculture and services enhance development in low income countries.

In this scenario, there are less than 90 regions with moderate to severe vulnerability to the combined challenges, the majority being only moderately affected - over 30% of the European regions. 60 regions show slight vulnerability and over 110 can be considered beneficiaries. Only 15% of the population would still suffer from severe vulnerability while more than 40% would

become beneficiaries in almost all geographic areas. Furthermore, comparing the two scenarios, over 44% of the population would move from severe vulnerability to lower vulnerability levels. Analyzing these results in terms of geographic areas we can see that the groups of regions with the highest vulnerability in EU12 and in the South would benefit to the largest extent even if they still often remain within the vulnerability range area. Beneficiaries concentrate in the Scandinavian peninsula, the UK and Ireland. The results for Italy and Spain, where low and moderate vulnerability coexist, are more diversified. In Greece and Portugal conditions of severe vulnerability prevail in almost all regions. The picture within the EU12 is also diversified as the large urban regions and the border regions with EU 15 resume their growth rates of the past decade and are thus able to reduce the negative impacts of other challenges.

Rapid recovery and low intensity of climate change, increase the group of regions that benefit from the challenges, including Northern and Central Europe as well as several French regions. It is interesting to observe that the areas of vulnerability differ: many regions (both in Southern and Eastern Europe) see their vulnerability level diminished and some to a significant extent.

## THE PERSPECTIVE FOR NEIGHBOURING COUNTRIES

Neighbouring countries to the East and South have substantially lower income and are more vulnerable to the challenges, especially in a time of crisis.

Some neighbours are Europe's most important energy exporters (Russia and North Africa) or are in a strategic position to affect energy security, therefore the way they are affected by the energy as well as by the other challenges may have important implications for European regions.

Eastern neighbours have experienced a consumption boom and the development of the service sector in recent years; this has produced more business opportunities in Europe and has also increased environmental spill-over. Due to the sensitivity of neighbours to the world crisis, their growth came to an abrupt halt more recently. The Eastern neighbours are an ageing society characterised by strong outmigration; the costs for pensions and health care is rising quickly while the demand for primary education is going down leading to an excess of capacity; intense migration flows from these regions are likely to continue. The Eastern neighbours are also affected by social risks depending on the reduction of family size, unemployment, the size of the grey economy, weak welfare etc.; these features determine widespread poverty, problems in education, healthcare etc.; as a consequence, with intense migration flows, Europe may face social polarization and pressure on wages.

The Southern Mediterranean neighbours are characterised by high exposure to external shocks, and limited trade integration with the world markets; this has led to low external trade diversification, excess saving of oil rich countries; there are substantial business opportunities for Europe, linked to the expansion of its neighbours' demands.

Differently from the East, the Southern neighbours are characterised by population growth; there is a growing risk of polarisation and a shortage of resources for education; the consequences for Europe are more intense migration as well as cohesion and exclusion problems.

The Southern neighbours are characterised by low participation and insufficient welfare coverage leading to strong inequalities, problems of access to education, health care, safe water etc.; the main implications for Europe may be social polarisation and pressure on wages.

Climate change will also affect neighbouring countries, in particular southern neighbours and coastal areas. Negative consequences, even though more likely in the long run, may be devastating for their economy and also for Europe, intensifying conflicts and mass migration of people and wildlife.

## CONCLUDING REMARKS

The key challenges examined in this study have distinct identities and have been analyzed, both, independently of each other and simultaneously as part of an interpretative model which aimed at exploring interrelation, synergies and cumulative effects. These interrelations are more difficult to understand and foresee but central to Cohesion Policy.

Taken individually, the challenges can generate neutral, negative or positive impacts on regional outcomes, depending on specific and identifiable characteristics of different regions.

Even if impacts are similar in nature, there is a high degree of variance in the scale of vulnerability due to different initial conditions as well as physical and economic features. Impacts are also significantly influenced by the region's location and links with other regions both, nearby and more distant. Impacts within regions differ too as a result of physical, geographical and socio-economic specificities.

The impact of challenges will be felt over different time scales. Some challenges have a more gradual but potentially powerful longer-term impact, growing in a cumulative manner (climate change and natural demographic developments), while others have a more immediate or medium-term impact.

Taken together, challenges can be represented as a hierarchy. Climate change, natural demographic change and globalisation are relatively independent. Economic performance, in particular GDP growth, enters the model

as an intermediate endogenous variable. Energy security, migration and social polarisation have both exogenous and endogenous elements. By and large, globalization and the current economic crisis emerge as the most relevant factors influencing growth of regional income and consequently income disparities up to 2020. However, the results of the analysis also point out that economic growth is a necessary but not a sufficient condition to ensure cohesion and reduce regional disparities in both the EU and neighbouring countries.

Apart from presenting two extreme pictures of the future impact of challenges, the overall scenarios developed in this study raise the question of how the EU can make sure that in 2020 it will find itself in the positive scenario and what policies it has to implement to achieve this. This question opens a debate on policy options which can help shape the future in a positive way.

To introduce a more comprehensive discussion of policies, however, a more in depth analysis of vulnerabilities is necessary. This must also take into account the regional capacities to mitigate or adapt to challenges as well as the ability to shape the political and institutional context at international, European and national level in order to establish a cooperative multilateral framework necessary to seize opportunities and counteract negative impacts arising from these challenges.

# 1. Introduction

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This paper<sup>3</sup> provides a concise analysis of the potential impacts of key challenges such as globalisation, demographic change, climate change, energy and new social risks on regional disparities in Europe in the period up to 2020.

The challenges reviewed here are relevant for other parts of the world as well as Europe and will require responses at many levels - global, European, national, regional and local. This paper is particularly concerned with regional impacts and more especially the potential effect of new challenges on convergence or divergence of trends in regional income and well-being within the European Community and neighbouring areas.

The present paper is based upon 5 thematic workshops held between March and June 2009 in Brussels and the background papers prepared by experts in preparation of the workshops. The paper is also based upon a new analysis produced by the Regional Future network itself, as well as prior research by international institutions and scholars.

The study team has carried out the analysis using a definition of the challenges considered more suitable for the aim of the study on regional disparities; definitions which would allow to identify and measure effect on disparities more directly were adopted. Furthermore, we avoided as far as possible the overlapping between definitions of challenges and their manifestation, which we call features of the challenge. This approach implies that each feature has been analyzed only within one challenge, even if it was relevant for others as well. The purpose was to clarify and simplify the conceptual framework of the analysis in which the number of links among challenges is very high and their direction and sign is difficult to define. In other words, we made sure that each individual feature of the challenges was analyzed once, in coherence with the challenge boundaries set by its definition.

This method allows us to make clear hypothesis on the two sided nature of each phenomenon and of its features; many features of the challenges in fact can benefit as well as penalize regions depending on the economic and social structure, the geography and location and also the geo-economic position of each region. Most of these factors are strongly influenced by the National characteristics of the Member State to which they belong.

To carry out the analysis we defined a model based on a definition of sensitivity to the challenge which summarizes the vulnerability of each region under that challenge and gives us a parameter to estimate the likely impact of the challenge on its economic performance. The sensitivity parameters of each region were then related to a set of hypothesis of challenge intensity (scenarios), namely how fast and how strong the challenge impact would affect EU regions and give rise to income disparities.

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<sup>3</sup> Synthesis report prepared by Enrico Wolleb, Francis Cripps, Andrea Ciffolilli, Roman Römisch. The authors benefited from the comments of Wolfgang Munch (DG REGIO - European Commission), the World Bank, the International Organisation for Migration (IOM) and DG RELEX (European Commission). The authors also wish to thank Andrea Naldini, Giuseppe Gesano, Frank Heins, Guglielmo Wolleb, Alessandro Daraio and András Inotai for their input to the discussion.

## 2. Overview of key challenges

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This chapter is made up of two sections. The first one summarises the main features of each challenge that may be expected to have a significant impact on Europe in the period leading up to 2020. The second section provides a concise review of the literature on challenges examined in the background papers.

### 2.1 Features, potential developments and impacts on disparities

Each challenge is characterised by several features which are the main symptoms or effects of the challenge in the economy. Each feature has potential benefits and costs to countries and regions.

In the subparagraphs below, a definition of each challenge is outlined. Their features, the intensity in the period to 2020 and the corresponding costs/benefits are listed. The intensity of a feature of a challenge can be zero or positive. Three measures of intensity are used in the tables: low, medium or high.

Moreover, regional sensitivity may be positive (benefits of high intensity) or negative (disadvantages of high intensity). Therefore we need to distinguish features that are more or less beneficial (positive sensitivity), from those that are more or less harmful (negative sensitivity) and those that may affect regions either way (negative for some, positive for others).

#### 2.1.1 Globalisation

Globalisation is the increasing integration of world markets due to diminishing transaction costs and lower barriers to the exchange of goods, services, capital, people, ideas, information and knowledge. In a globalised world the prosperity of each region, large or small, depends heavily on exports to other areas. The highest rewards for participation in global trade typically accrue to enterprises that gain a dominant market position through branding, product innovation and process innovation. This has created a "knowledge economy" where high education and extensive international connections confer a significant competitive advantage. The main features of the globalisation challenge are summarised below:

Exhibit 1 – Globalisation: features, intensity and potential benefits/costs

Feature	Intensity in period to 2020	Potential benefits / costs
Global business driving innovation and specialisation across a wide range of goods and services	Medium	Benefits: opportunities for rapid growth of industries and services in regions that get the balance right between value added and costs. Costs: loss of jobs and income in traditional industries, adverse macro-economic impact if export earnings are not sufficiently dynamic. Exposure to global market downturns and risks of relocation as business and market patterns change.
Free trade agreements	Medium	Benefits: improved security of market access

Feature	Intensity in period to 2020	Potential benefits / costs
intended to reduce hindrances to cross-border trade and investment		and enhanced opportunities for specialisation and integration of value chains Risks: local industries may be unable to take advantage of new opportunities and to maintain jobs and income in the face of new competition from external producers.
Volatility of world trade and commodity markets	Medium	Benefits: on average consumers gain and, with proper risk management tools, also individual suppliers gain. Costs: macro-economic fragility (recessions, credit squeezes, frequent changes in policy emphasis and direction, business and employment risks)
Rapid growth of portfolio investment around the world as savers seek to diversify risk and take advantage of higher returns or different risk profiles	Medium	Benefits: enhanced opportunities for wealth accumulation and reduction of risk Costs: instability of currencies and stock markets in different world regions and financial centres driven by volatile expectations of global investors, encouraging restrictive financial policies that inhibit economic growth
Human resources and skills to specialize in dynamic sectors and advanced services	High	Benefits: dynamic regional economy, improved trade competitiveness and rise in the export share of world trade Costs: Economic decline as traditional specialization loose competitiveness, slow growth and increasing unemployment.

The regional impact of globalisation is mediated by European-wide and national trade linkages, implying that regions may gain or lose from the success of other regions or countries in European and world markets. Such mediation is itself quite uneven as some regions have strong positive links to other regions or countries while depressed or backward regions often have few positive linkages except eligibility for national and Community assistance that may not always be effective or sustainable in the long run.

The regional impact of globalisation depends on many factors including the ability of firms in the region to take advantage of growing export markets, adaptation to competition from other regions within or outside Europe, the region's potential to gain from cross-border investments and remittances, and the ability of labour market institutions and other social and collective institutions in the region to mitigate pressures on income distribution, security of employment, finance of welfare systems and provision of public goods.

### 2.1.2 Demographic change

Demographic change consists of modifications in the population brought about by changes in fertility and life expectancy as well as migration. The main features of the demographic challenge are summarised below:

Exhibit 2 – Demographic change: features, intensity and potential benefits/costs

Feature	Intensity in period to 2020	Potential benefits / costs
Natural growth and ageing of population	Medium	Benefits: increased job opportunities for young people and old people who want to work, possible opportunities for beneficial migration Costs: overburdening of welfare systems and failure to provide quality of support to old people and other disadvantaged groups
Migration within and between countries	Medium	Benefits: improved balance between population structure and job opportunities in European regions and surrounding areas Potential risk of depopulation, economic decline and deprivation in some areas

Several distinct demographic patterns are anticipated in different regions of Europe and neighbouring areas including: demographic decline in areas with ageing populations and emigration of younger people resulting in a shrinking labour force and depressed economic prospects; gradual decline in areas with ageing population and limited immigration resulting in high old-age dependency ratios, possible scarcity of services and weak economic performance; areas where the demographic structure is balanced through immigration which have good prospects so long as economic growth continues but may run into social conflicts if the economy is depressed and unemployment is high; areas of demographic expansion due to high birth rates in current and recent decades where the main risk is one of high youth unemployment unless the economy can expand at a fast rate.

For this challenge the neighbouring countries' demography has emerged as relevant for the migration flows which they may give rise to; furthermore, the difference between neighbouring and other emerging or less developed countries in the other parts of the world may be irrelevant with respect to the future population flows in a globalised world.

### 2.1.3 Climate change

Climate change consists of a set of alterations in the average weather caused by global warming due to the emission of anthropogenic greenhouse gases. The main features of climate change are summarised in the table below:

Exhibit 3 – Climate change: features, intensity and potential benefits/costs

Feature	Intensity in period to 2020	Potential benefits / costs
Rise in sea level affecting coastal areas	Low	Costs: investment in drainage and coastal protection, relocation costs, decline of tourism and agriculture
Warming of northern regions	Low	Benefits to agriculture and tourism
Aridity and storms in southern regions	Low	Damage to agriculture, health risks

The timing of changes and the pattern and cost of responses is relatively uncertain. Regional sensitivity to climate change is very varied. While a rise in temperature is a slow

phenomenon with cumulative, long term effects, extreme climate events are likely to represent the most relevant negative aspect of climate change from now to 2020.

Climate change is a challenge that potentially in the medium-long run can have very significant impacts on the regions which are more sensitive to it; at the same time, it is the challenge which has, for most of its features the highest degree of uncertainty as far as the time-span of their different impact and the intensity of such impact is concerned. Consequently, although the time span of our analysis is not long enough for the impact to be significant, we need to conceive urgent answers at the regional level to slow down and possibly counteract the vast negative impacts which it may give rise to.

### 2.1.4 Energy risks

Energy risks are related to shortcomings and rigidities as regards supply (e.g. interruptions and shortages, infrastructural problems), demand (e.g. structural changes, switch to clean-energy, more energy efficiency) and volatility of energy prices. The main features of the energy challenge are summarised below:

Exhibit 4 – Energy risks: features, intensity and potential benefits/costs

Feature	Intensity in period to 2020	Potential benefits / costs
Unstable world prices and occasional interruptions to supply	Medium	Costs: fluctuations in incomes and costs, disruption of production
Rising cost of supply of fossil fuels	Medium	Benefits: long-run opportunities for innovation in energy supply and use Costs: decline of energy-intensive industries and modes of production
Need to reduce greenhouse gases that may accelerate global climate change	Medium	Benefits: opportunities to develop new sources of supply that do not generate greenhouse gases Costs: decline of 'dirty' industries and modes of energy use
Localised pollution of the environment	Low	Costs: damage to affected areas, costs of mitigation and clean-up

The movement of energy prices and speed of change in patterns of supply and use are quite closely linked to the global economic cycle. Slow growth of world income and trade tends to imply falling energy prices and delayed introduction of new energy sources and technologies and energy-saving investments. More rapid growth of world income and trade raises supply problems and promotes high prices that encourage accelerated investment in structural change.

The direct impact of energy challenges on regions varies considerably depending on their energy resources, needs and infrastructures. For instance, being connected to the European grid is a relevant issue and some regions are not (e.g. Baltic states) with important consequences on security of supply.

Global pressure for new patterns of energy supply and use also presents opportunities in regions with the capability to pioneer relevant innovations and capture significant shares in new product, technology and service markets. Finally, regions that sell goods and services to energy-exporting countries may benefit from rising energy prices that increase needs and budgets in those countries, boosting exports from regions that are their main

suppliers. The geographical characteristics and location of a region are relevant for determining its sensitivity to the challenge. These aspects influence their ability to develop renewable energies, and to have easier access to conventional sources.

Linkages between energy and non-energy trade and between energy prices, investment and incomes of energy suppliers and consumers mean that it is not easy to categorise gainers and losers. Very often some firms and households gain while others in the same region pay higher energy prices without any significant compensation.

### 2.1.5 New social risks

New social risks consist of higher exposure of wider sections of the population to job instability, poverty and failures of welfare. They can hit any social group in a particular phase of a life cycle rather than hitting a specific social group. New social risk features need to be added to the old social risks; they alter the structure and the priorities of the welfare system and compete for its resources. The increase of global competitive pressure determines remarkable changes in models of living, organisation of households and capacity of families to provide "in house" care services. The main features of the new social risks are summarised below:

Exhibit 5 – New social risks: features, intensity and potential benefits/costs

Feature	Intensity in period to 2020	Potential benefits / costs
Household fragmentation	Medium	Poverty of single-parent households and households where one or both parents are unemployed, high maintenance costs, especially in rural areas
High dependency ratio	High	Need to increase the number of family members at work to guarantee a historically acceptable standard of living. Costs: deteriorating quality of life due to a great pressure on all household members to increase the household labour supply
Conciliation	Medium	Increasing difficulty for household members to conciliate the need for more paid work and the need for more "in house" care services. Costs: deteriorating quality of life
Increased inequality of pay and impoverishment of unskilled workers	High	Costs: poverty of employed workers as well as the unemployed and students and elderly people who are not in full-time employment
Budgetary pressure on welfare systems	High	Costs: deteriorating ability to alleviate household poverty and support casualties of unequal development leading to insecurity, community tensions and hostility to migration

New social risks may intensify in case of failure to maintain economic growth or failure to spread benefits of economic growth to the whole population.

It is worth noting that it is difficult to give social risks a regional expression. In other words, the regional dimension is not necessarily adequate when dealing with this challenge. Some issues are indeed urban while others affect all regions.

## 2.2 Synthesis of literature review

The literary review is extensively dealt with in the background papers dealing with challenges; in the present report we concentrate on those aspects which sustain the objective of analysing regional disparities more directly.

### 2.2.1 Globalisation

#### General features

Though different ages of the human history have witnessed intensive forms of economic exchange<sup>4</sup>, two main waves of global market integration can be basically considered as the most crucial (Baldwin and Martin, 1999). The first one is obviously related to the industrial revolution of the period 1820-1914, while the second one is the current phenomenon, which can be dated to the 60ies, and which has been experiencing a strong acceleration since the 90ies. The recent literature about globalization has stressed the unique features of this current wave that distinguish it from the previous one and which can be briefly summarized as follows:

- ever increasing interconnection between regions within the world economy; an inadequate governance by the international institutions (e.g. WTO, IMF); rising demand to institutions and to governments to provide welfare schemes and social guarantees against income and job losses, due to strong competition, in a context of low tax rates.
- increasing market opportunities for emerging high population economies such as China, India and the countries of the former Soviet Union (Hamilton, 2008); this has created catching up opportunities for the less developed regions due to technology transfers.
- growing importance of "trade in ideas" (WTO, 2007) characterised by continuous and fast information exchange and advances in ICT, by an impressive reduction of communication and transport costs (Wolf, 2004), by FDI carried out by multinational enterprises in manufacturing, services and outsourcing industries.
- redistributive nature of globalization (Wolf, 2004); joining the global economy for developing countries has contributed to the reduction of poverty<sup>5</sup>, though it still remains a major problem. Moreover, available evidence has shown an increase in the inequality within most countries in the last two decades in both developing and developed area<sup>6</sup>.

A closer investigation of the European situation at an aggregate level allows to assess an overall positive effect of globalisation (Sapir report 2003).

Indeed it is possible to find evidence of the net positive effects of globalisation (that is, taking into account the social cost of adjustments):

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<sup>4</sup> From the Roman to the Islamic Golden Age, from the Silk Road during the Mongol Empire to the East India Company during the British Empire and so forth.

<sup>5</sup> China in particular recorded the largest decline in poverty in history dropping in 22 years from 74% to 15% in 2004 ; and in India from 63% in 1981 to 42% in 2001

<sup>6</sup> Trade liberalization and export growth are found to be associated with lower income inequality, while increased financial openness is associated with higher inequality. However their combined contribution to rising inequality has been much lower than technological change, both at global level and especially in developing countries (IMF, 2008)

- globalisation has doubled the number of workers (Freeman, 2006),
- globalisation has expanded export opportunities and made imports cheaper, hence boosting productivity;
- job losses have tended to be replaced by new higher-paid jobs and, as shown in Storrie and Ward (2007) for the period 2002-2005, offshore sourcing and delocalisation have had a quite limited impact on jobs reductions.

On the other hand, both literature (Rae and Sollie, 2007) and quantitative measures provided by international organizations (Dreher and Axel, 2006; Dreher, Axel, Gaston and Martens, 2008) have stressed the different effects of globalization among regions in relation to the quality of the human capital, as in the Nordic countries, whereas most of continental Europe suffers from a relative weakness in the educational sector as well as in administrative procedures for business start-up (Hamilton, 2008); the situation of Southern and Eastern countries is the most critical due to a shortage of human capital, low quality institutions and a low value added specialization of the economy.

#### Relevance for regional disparities

When focusing on the numerous economic, social and environmental impacts of globalisation on European regions (Fisher, 2003) and the asymmetry of such impacts across countries, regions and social groups, it is necessary to take into account the extreme complexity of the phenomenon which has been described by the literature.

The endogenous growth theory has stressed the role of technology diffusion and non exclusive use of knowledge as sources of long-term growth (Romer, 1990; Aghion and Howitt, 1997), but other analysis have highlighted the role of several additional transmission mechanisms:

- history and context may be important factors in determining the capacity of climbing up the technology ladder (Scott and Storper, 2003);
- spatial organization may affect economic integration (World Bank, 2009) with its three dimensions: density (related to agglomeration economies and urbanization policies), distance (related to migration and to territorial development and infrastructural policies) and division (related to integration policies)
- technological change continuously acts as a powerful driver of change of specialization and employment patterns
- location strategies of multinational corporations exert influence on the organization of production and its regional patterns (Storper and Chen, 2000)
- increased competition, the rise of new markets and new technological opportunities make production networks more dispersed, extensive and connected across continents; new integration patterns may disrupt existing concentration and generate new clusters in locations offering more or different externalities (Scott and Storper, 2003).

Hence, it is not only the national performance that influences regional vulnerability but also the individual region's capacities to deal with the globalization challenge.

Moreover, core-periphery and cumulative causation theories suggest that external competition can exacerbate income inequalities (Feser, 2003).

Existing contributions (Venables, 1998; Fujita and Hu, 2001; Meardon, 2001; Mansori, 2003), bearing in mind the relevant sub-national differences, identify the following patterns which are the results of the above mentioned factors determining the regional capacities to cope with globalization:

- North Western regions are characterised by high employment, education and productivity and are thus able to cope with globalization

- South and Eastern regions are characterised by low workforce skill levels and by specialization in low value added activities, resulting in a high degree of vulnerability
- All regions with major urban centres have the capacities, in terms of human capital and advanced activities, to reap the opportunities of globalization

The prosperity of the lagging regions will depend in a crucial way on policy efforts to close the gap in terms of the above mentioned factors which determine the capacities to exploit globalization opportunities.

Another relevant issue for the EU is how and at what pace the main European neighbouring countries will develop and will integrate with the EU economy: indeed, the development of the states of the former Soviet Union (good economic performances, important offshore sourcing location, relevant natural resources endowment), Turkey and the Balkans (relatively high growth rates, important offshore sourcing location, fast growing R&D investments), and Middle East and North African regions (high growth rates, important offshore sourcing location, excess savings invested in financial markets) (DG REGIO, 2009; Scott, 1998) represent important opportunities for corporate Europe and can also have positive impacts on European social cohesion with special reference to lower-income regions in Eastern and Southern Europe.

## 2.2.2 Demographic Change

### General features

Population structure and trends are key factors in regional economic and social development. Patterns of living and working conditions in the EU and its regions are significantly influenced by their demography. Present regional development patterns and potential are determined by the extent to which the work force can sustain income growth in a quantitative as well as a qualitative way, and allows the access to the labour market of young and skilled workers. A relevant number of studies have been devoted to improve the understanding of the regional demographic structures and long term trends, as well as of their impacts.

The literature has identified three main demographic transition phases which have shaped the long term trends in population change in Europe:

- The first demographic transition describes the shift from high birth and death rates to a new equilibrium characterized by low birth and death rates.
- The second demographic transition leads to radical changes in the living arrangements and patterns of family formation which in most cases has led to low fertility and a shrinking population (van de Kaa and Lesthaeghe, 1986).
- A third demographic transition phase identified by Coleman (2006) and D. Myers emphasises immigration: low fertility combined with high immigration lead to a rapid change in the composition of the population, caused directly and indirectly by immigration<sup>7</sup>.

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<sup>7</sup> Whereas Coleman evaluates the consequences of this transition negatively, Myers emphasizes the need for the integration of immigrants and the expansion of educational opportunities for them. It is worth noting that migration and changes in the composition of the population are in part an inevitable consequence of globalization; as stressed by the IOM World Migration Report 2008, contemporary migration, especially labour migration, is strictly related to globalization and this has led to an unprecedented context in which human mobility seeks to find expression on a global scale.

In recent years, analysis of EU demographic structures and trends has been carried out at both national and regional level.

In Europe, the most relevant feature of the demographic challenge is considered to be population ageing with its impacts on the labour market, productivity and economic growth, social security and public finances (Commission Communication COM, 2006)<sup>8</sup>.

The processes behind population ageing and its impacts are discussed by the Commission (EC 2007): changes in fertility and mortality as well as trends in migration<sup>9</sup> are analysed together with their underlying processes.

An NIDI (Netherlands Interdisciplinary Demographic Institute) report considers the demographic trends in the perspective of the life cycle structured by the behaviour of individuals, couples, families or households, and the social context of this behaviour (van Nimwegen and Beets 2006). The report analyses both the working and retirement phase of a life cycle, the latter in relation to social protection, the pension system and the health care system.

Relevant analyses on population scenarios for the 21st century were presented at the European Population Conference 1999:

- Van de Kaa (1999) highlights the historical roots of demographic trends and heterogeneity among European nations
- Leridon (1999) stresses the recent revolution in Europe regarding fertility and the various aspects (childlessness, desire for children and ideal number of children) of its steep decline.
- Gesano (1999) discusses the trends in economic activity and the role of unemployment
- Okölski (1999) focuses on 21<sup>st</sup> century future migration flows towards Europe by adopting a rather liberal scenario. In fact and as already noted above, migration inflows reached an unprecedented level in several European countries in the first years of the 21<sup>st</sup> century.

#### Relevance for regional disparities

The first demographic transition was characterised by uniformity in its regional impact; the second and, even more, the third transition are marked by regional specificities: the phenomenon of immigration hinges on regional economic and social development creating opportunities for immigrants and, as a consequence, the second and third transition are more heavily dependent on the socio-economic and socio-cultural features of the regions, their ability to attract and integrate migrants.

Demographic dynamics varies enormously across the globe. As stressed in the Commission Staff Working Document "Regions 2020" (EC 2008a) Europe witnesses the clash between its mostly aged demographic systems which are now at around zero-growth and are heading toward future population decline, and the young, still fast growing populations of neighbouring countries. Such different trends are expected to raise opposite socio-economic problems on the two sides of the Mediterranean Sea.

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<sup>8</sup> Commission of the European Communities (2006). The demographic future of Europe – from challenge to opportunity. COM(2006) 571.

<sup>9</sup> Some data on migration based on estimates prepared by the UN Population Division are reported: 39,593 thousand non-nationals are living (2005) in the countries of the European Union (EU27), which represents 8.3% of the total population. In the following countries the non-nationals represented more than 10 % of the total population: Luxembourg, Latvia, Estonia, Austria, Ireland, Germany, Sweden, Spain, France and the Netherlands

The diversity of demographic structures and trends across Europe is illustrated in the demographic atlas of the European regions (NUTS2 and NUTS3) (ESPON 2008, 6) over the last 10 years:

- East-West polarisation between regions with population growth and regions affected by population decline.
- Most of the regions with growing populations are located in the Central-Western part of Europe, in the Southern part of the Nordic countries and Iceland.
- Some regions well endowed with amenities in Greece and Cyprus, as well as the immediate surroundings of capital city regions in Eastern Europe reveal a positive population development.
- Southern European regions are characterised by low and lowest-low fertility in contrast with countries on the Southern and Eastern rims of the Mediterranean Sea where demographic dynamics are still high.

Migratory movements have been a main determinant of demographic change in recent years in the European regions. The East-West polarisation of demographic change challenges the objective of territorial cohesion: the regions experiencing population decline are concentrated in Eastern and Northern Europe<sup>10</sup> "A negative migration balance is mainly observed in many regions in Eastern Europe, in particular in Estonia, Latvia, Lithuania, Romania and Bulgaria. This situation is particularly visible in some isolated rural regions and former industrial areas in Poland (such as Silesia) and Romania. Regions with a positive migratory balance are the capital regions, Sophia, Warsaw, Vilnius, Riga and in addition the region of Varna." (ESPON 2008).

In addition, the effects of interregional and international net migration combine to generate disparities in the regional migratory balances:

- The Eastern and Northern European regions with negative net migration are losing population to national economic and political centres and other European regions
- European regions with a positive migration balance depend on inflows from other European regions and migration flows from Non-EU countries.

In most cases an analysis of the migration flows and of the selection process by which migrants select their regional destination is not made possible on available data<sup>11</sup>.

Whereas recent demographic changes in most urban regions is positive (85%), the remote rural regions do not show a similar trend (EPSON 2008). However, some cities in East Germany and in Eastern Europe are affected by the opposite phenomenon of "shrinking cities", due to the loss of their economic base.

A recent report from the Berlin-Institut (2008) classifies the European regions on the basis of their economic and demographic performance. The aspects of demographic performance are population growth (Europe will not return to growth), fertility levels (need policies to sustain accordance between work and family life), economy and labour (qualifications and skills as key variables for a fair economic growth), population ageing and social policy (solidarity between generations), migration and integration (immigration necessary for regional economic growth in an ageing society, integration through human capital formation), education (the formation of human capital as a growth potential). The

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<sup>10</sup> In this context the current trend of EU migration policy towards stronger partnerships with countries of origin is worth mentioning.

<sup>11</sup> For example, young and well trained migrants are attracted by the more prosperous and economically dynamic regions, whereas retirees and older migrants are attracted by regions with a relatively favourable climate and well equipped amenities.

report looks at metropolitan areas as the demographic and economic growth centres in Europe; while paradoxically demographic policies (EU wide and national) are not linked to local, urban and regional policies<sup>12</sup>.

### 2.2.3 Climate change

#### General features

Climate change is a serious issue and will have severe and at the same time heterogeneous effects on the countries in the world. A main point of concern for any country is that climate change is a multidimensional phenomenon, and as such its negative effects could be worse than the effects of any other challenge. Moreover, to deal with the risks of climate change successfully, countries need to cooperate and follow a common strategy; if a single country or group of countries take solitary action to mitigate climate problems, this may still not be sufficient to avoid the negative consequences even within its own boundaries due to the importance of global negative spill-over.

As any other part of the world, Europe will be affected by climate change according to each region's climatic zone. Hence, given the multidimensional characteristics of the challenge, Europe will simultaneously have to cope with not only one but a large number of challenges related to climate change.

The warming trend throughout Europe is well established (Alcamo et al., 2007; EEA, 2008); on average, up to 2007 in the European land area the temperature increased by 1.2 °C above pre-industrial levels. Moreover, between 1996 and 2007 8 years belong to the 12 warmest years recorded since 1850.

The Stern Review Report (2007) highlights that the complexity of the climate change features will produce several global challenges which will affect all essential aspects of life:

- Water: the impact of climate change is most strongly felt through changes in the distribution of water around the world and its seasonal and annual variability<sup>13</sup>.
- Food: even small amounts of warming lead to declines in yield.
- Health: climate change increases the number of deaths from malnutrition, diseases and heat stress in the world
- Land: rising sea levels increase the amount of land lost and people displaced due to permanent inundation
- Infrastructure: costs of infrastructure damage increase; thawing weakens soil conditions and causes subsidence of buildings and infrastructure
- Ecosystems and biodiversity: global warming directly affects ecosystems (e.g. species have been moving pole wards, seasonal events, such as flowering or egg-laying)
- Extreme weather events: climate change is likely to increase the costs imposed by events such as heat waves, severe floods, droughts and storms which occur more often

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<sup>12</sup> Holbach-Grömig and Trapp (2006) emphasise the variability of the demographic changes at local level and the importance of the spatial context. In their study the consequences of the demographic trend refer to specific policy fields like social services, spatial planning, employment and social exclusion

<sup>13</sup> Climate change will alter patterns of water availability by intensifying the water cycle. Droughts and floods will become more severe in many areas

Hence, in contrast to many other challenges, dramatic changes in world climate do not only affect one area of people's life at a time, rather, their negative effects may turn out to be much worse than the effects of any other challenge, as for example globalisation or energy issues.

The wide ranging impact of climate change gives rise to uncertainties linked to the time span in which effects will take place as well as on the direct and indirect links between its features, the chain of physical phenomena which will be generated, their impact on the social and economic environment of the regions. The IPCC Special Report on Emission Scenarios (SRES, 2001) (the base for many climate change analysis) highlights "that the current literature analysis suggests the future is inherently unpredictable and so views will differ as to which of the storylines and representative scenarios could be more or less likely"

Climate change affects the developed as well as the developing world with different features and intensity, which in the latter will be more severe, especially in the south of the globe because of its geographic exposure, low incomes, and greater reliance on climate sensitive sectors. Together these mean that impacts are proportionally greater and the ability to adapt smaller.

#### Relevance for regional disparities

The literature highlights how the impacts of climate change may influence the economic, social and environmental dimension of our life, and underlines that these impacts are unequally distributed among the European regions, depending on the climate region to which they belong and their internal physical characteristics.

Projections suggest that warming is to be greatest over Eastern Europe in winter and over western and southern Europe in summer (Alcamo et al., 2007; EEA, 2008). A very large increase in summer temperatures is expected in the south-western parts of Europe, exceeding 6°C in parts of France and the Iberian Peninsula. Mean annual precipitation is expected to increase in Northern Europe and to decrease further south. In general, the impact will be highest in Southern regions and gradually decline towards the north.

A description of the main impacts on European regions follows. They have been divided into two broad categories to illustrate the varying aspects that need to be taken into account:

#### 1. Economic and social impacts

- agriculture and fisheries: shortened growing season locally at southern latitudes and longer growing season of several agricultural crops at northern latitudes<sup>14</sup>. The greatest reductions of all crops are expected in the Mediterranean, the south-west Balkans and in the south of European Russia. Temperature increase has a major effect on fisheries production in the North Atlantic, causing changes in the distribution of species, increased recruitment and production in northern waters and a marked decrease at the southern edge of current ranges
- energy: a strong increase in cooling requirements is reported for central and southern Europe; wintertime heating demand is expected to decrease in Northern Europe as well as in Eastern Europe
- transport: extreme weather events are likely to cause varying damage to the transport systems, with particular relevance for Northern Europe

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<sup>14</sup> However, technological development (e.g., new crop varieties and better cropping practices) might far outweigh the effects of climate change.

- tourism and recreation: conditions for tourism are expected to improve in northern and western Europe; higher summer temperatures may lead to a gradual decrease in summer tourism in the Mediterranean but an increase in spring and perhaps autumn; Alpine tourism will have to change from winter to summer seasons
- human health: climate change is likely to increase the risk of mortality and injury from wind storms, flash floods and coastal flooding; the possible spread of diseases depends on early detection and preventive measures in place<sup>15</sup>.

## 2. Environmental impacts

- Water: diminished groundwater recharge is likely in central and eastern Europe, with a greater reduction in valleys and lowlands (e.g., in the Hungarian steppes)(Alcamo et al., 2007); increase in winter river flows and decrease in summer flows in the Rhine, Slovakian rivers, the Volga and central and eastern Europe
- Coastal and marine systems: further increase in wind speeds and storm intensity in the north-eastern Atlantic with a shift of storm centre maxima closer to European coasts; decline in storminess and wind intensity eastwards into the Mediterranean, but with localised increased storminess in parts of the Adriatic, Aegean and Black Seas<sup>16</sup>
- Cryosphere, mountains and sub-Arctic regions: European glaciers are melting rapidly (particularly in the Alps); birds, insects, mammals and other animal groups are also moving northwards and uphill<sup>17</sup>. A combination of the rate of climate change, habitat fragmentation and other obstacles will impede the movement of many animal species, possibly leading to a progressive decline in European biodiversity. Arctic sea ice may even disappear at the height of the melting season in the coming decades, creating a feedback that will further increase climate change because dark open water reflects much less sunlight than white snow-covered surfaces
- Biodiversity: the range of plants is very likely to expand northward and contract in southern European mountains and in the Mediterranean Basin; higher temperatures are likely to lead to increased species in freshwater ecosystems in northern Europe and decrease in parts of south-western Europe (Alcamo et al., 2007).

Overall the impression is that climate change may well exacerbate world as well as European regional cohesion problems. Disparities may and indeed will grow to a very significant extent if timely counteracting and adaptive measures are not taken. Therefore, regional actions and responses will play an important role in dealing with and adapting to the climate challenge and may significantly change the sensitivity as well as the intensity of the challenge. This increases the uncertainties of the potential impact of the challenge, partly due to the complexity of the links between physical phenomena and their interaction with the social and economic dimension.

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<sup>15</sup> Some water- and food-borne disease outbreaks are expected to become more frequent with rising temperatures and more frequent extreme events. The risk depends on human behavior and the quality of health care services and early detection and action.

<sup>16</sup> Model projections of the IPCC give a global mean sea-level rise of 0.09 to 0.88 m by 2100, with sea level rising at rates of circa 2 to 4 times faster than those of the present day.

<sup>17</sup> Sea-level rise is also likely to have major impacts on biodiversity. Examples include flooding of haul-out sites used for breeding nurseries and resting by seals. Increased sea temperatures may also trigger large scale disease-related mortality of dolphins in the Mediterranean and of seals in Europe. Seals that rely on ice for breeding are also likely to suffer considerable habitat loss (Alcamo et al., 2007)

## 2.2.4 Energy Risks

### General features

In the new European Energy Policy (EEP) three main challenges and objectives are described: sustainability, security of supply and competitiveness:

- Sustainability: this addresses the issue of global warming caused by anthropogenic greenhouse gas (GHG) emissions, overwhelmingly due to the production and consumption of energy<sup>18</sup>.
- Security of supply: as European indigenous fossil fuel reserves are depleting, Europe will become more dependent on imported fossil fuels, over the medium run, making it vulnerable to political and economic risks; security of supply mainly address diversification of energy sources (including renewables), diversification of origin of imports and routes, energy efficiency
- Competitiveness: this addresses the issues of energy price volatility, the development of the internal energy market; again, infrastructures are important in this context.

The energy issue is characterised by many dimensions that are partly heterogeneous and partly interlinked. Roughly, one can distinguish between three main energy related topics: energy supply, energy transaction and energy demand.

### 1. Energy supply

The World Energy Outlook(IEA,2008) estimates that the world's overall energy resources are adequate to meet the increasing demand up to 2030. Yet, it is noted explicitly, that an increasing share of energy demand will be met by non-conventional or frontier resources and renewables, that are more costly and difficult to exploit. Though the technology for this is constantly improving, the costs are estimated to be higher than for conventional sources, as a consequence the price of energy (especially fossil fuels) is likely to increase over time.

### 2. Energy transaction:

To reduce the EU's vulnerability to supply shocks it is essential to increase the number of potential suppliers to the EU (especially with respect to natural gas), as well as to diversify transport routes. This is well established in the EU's large scale energy infrastructure projects<sup>19</sup>. A number of important infrastructure priorities are dealt with by the Second Strategic Energy Review<sup>20</sup>.

High oil prices can have substantial impacts on core areas of economic activity<sup>21</sup>.

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<sup>18</sup> The EEP is a major step in the EU's efforts to reduce GHG emissions and thus limit global warming to the EU's self set goal of a global temperature increase of up to 2°C compared to pre-industrial levels.

<sup>19</sup> The Community Guidelines for the trans-European energy networks (TEN-E) state the EU has to act in order to ensure the "interoperability of natural gas networks within the Community and with those in accession and candidate countries and other countries in Europe, in the Mediterranean Sea, Black Sea and Caspian Sea basins, as well as in the Middle East and the Gulf regions, and diversification of natural gas sources and supply routes." EC, 2006, Decision No 1364/2006/EC of the European Parliament and of the Council laying down guidelines for trans-European energy networks, Article 4

<sup>20</sup> EC (2008), Second Strategic Energy Review - Securing our Energy Future, November.

<sup>21</sup> For a recent overview see Christie E., Pellenyi G., Barta J., Hegedus M., Holzner M., Oszlay A. and Sass M. (2008), "Economic and trade policy impacts of sustained high oil prices", wiiw Research Reports, No. 346, April.

In the literature several attempts identify the mechanism of oil price formation,:

- Excess demand (lack of spare capacity, low stockholdings, tight refining capacity) though empirical evidence shows that commercial stock management in oil importing countries is significant (Dées, Gasteuil, Kaufmann and Mann, 2008)
- past economic and financial shocks can have long-lasting effects on oil price formation given the long lead times of investments in production capacity (Aune, Mohn, Osmundsen and Rosendahl, 2007).
- the concentration of market power and the degree of cartelisation is a well-recognised factor on the supply side (Wirl, 2008).
- the expectations of financial investors reflected on the markets of oil futures could affect real industry decisions in terms of inventory (stock) holdings, thereby affecting real demand flows (EU Commission, 2009).

Overall, recent literature highlights several determinants of oil price formation which demonstrate that oil prices are hard to predict.

Econometric models show a negative impact of price shocks on GDP and inflation rates of oil importing countries (IEA, 2004; US Energy Information Administration, 2006).

### 3. Energy demand

Projections made by the International Energy Agency (IEA) and the OECD suggest that energy demand will increase steadily over the next 20 years<sup>22</sup>. Thus despite a worldwide slowdown of economic growth gross primary energy demand will grow by about 1.6% per year<sup>23</sup>. Energy consumption in the EU27 has stagnated over recent years (COM, 2008). This stagnation of EU energy demand is due to improvements of energy intensity, especially in industry and to a lesser extent in transport and services.

Although overall energy import dependency in the EU is high and increasing, the situation varies from country to country. Denmark is the sole country which is completely energy independent, while for some countries, like Poland and the United Kingdom, import dependency ratios are quite low (close to 20%). At the other extreme the import dependency of Ireland, Italy, Portugal and Spain exceeds 80%<sup>24</sup>.

#### Relevance for regional disparities

The energy supply and security issue have been analyzed at a national or European level. Still, there are good reasons to believe that an increasing volatility or a shortage of energy, especially with respect to fossil fuels, will have different effects on the EU regions, depending on their characteristics.

Two recent works (EU Commission, DG Regio, 2007; EU Commission, 2008) have developed an analysis of this topic in a regional disparities perspective by exploring the main causal links.

In the 4<sup>th</sup> Report on Economic and Social Cohesion (EU Commission, DG Regio, 2007) it is assumed a long-run tendency of energy and in particular oil prices to increase<sup>25</sup>. This increase in energy costs will likely affect European regions in different ways, depending on their geographical locations, their climate and structure of economic activity. Indeed, the

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<sup>22</sup> The IEA/OECD projects global energy trends until 2030.

<sup>23</sup> These projections were made before the full extent of the global economic crisis was visible. Because of that it can be assumed that the projections have an upward bias.

<sup>24</sup> Apart from the high import dependency it is also the case that countries are highly dependent on one single supplier. E.g. Estonia, Latvia, Lithuania, Bulgaria, Slovakia, Ireland, Sweden and Finland are dependent on one supplier for gas imports.

<sup>25</sup> As "more accessible reserves are depleted and the need to reduce greenhouse gas emissions will feed through into overall energy costs." (EU Commission, DG Regio, 2007).

increase of prices will negatively impact transport costs which in turn will influence both between and within regions disparities:

- 1) The peripheral regions such as the southern parts of Italy, Portugal and Spain or the Eastern parts in the EU12 that will be affected most. Any increase in the costs of transportation is equivalent to an increase in the price of the goods and services they export to other (the core) regions in the EU., erodes their competitive position and creates an additional obstacle to their development.
- 2) In the analysis of EU Commission (2008) the link between energy risks and within regions disparities is put forward. The increase in energy prices generates significant welfare effects for lower income households whose energy expenditures accounts for a larger part of their disposable income. Moreover, (EU Commission, DG Regio, (2007), a "rise in energy costs could also encourage a shift in the pattern of settlements within regions with people tending to live closer to where they work, or vice versa, though it will take some time before this is reflected in spatial development". This differential effect of increasing energy price is also highlighted in the study "Regions 2020". It says "that metropolitan areas with compact settlements generally seem less vulnerable to the energy challenge than remote areas, owing to the higher energy efficiency of the economy and lower household consumption". However, this may be challenged by the fact that urban areas are supposed to be more transport intensive than rural areas.

The effects of an increase in energy prices depend on the productive structure of the region: increasing "energy prices will also tend to push up the cost of some processes and products more than others and encourage less energy-intensive methods of production and the development of new materials, such as, for example, composite materials to replace steel which uses substantial amounts of energy in its production. Regions which rely more than others on industries are most affected in income and jobs — for example, the regions specialising in steel-making<sup>26</sup>".

In these analysis there are some positive effects for regional development: indeed, regions with the potential to develop the production of renewable energies are likely to benefit from the shift towards an increasing use of this type of energy. But the literature highlights some caveats to bear in mind:

- to exploit the renewable energy opportunities an adequate endowment of resources, skilled labour and infrastructure is necessary
- production of renewable energies might lead to an increase in energy prices if the prices for renewable energy are higher than those of conventional energy: this has potential negative effects on energy intensive industries. It also has negative effects on the consumers as a larger part of their disposable income will go on energy
- pushing renewable energies alone is likely to have some impacts on the regions concerned, but they may be minor if they are not accompanied by an overall development strategy to attract firms or technologies.
- some studies suggest that the positive and negative impacts of renewable (as jobs might be lost in the fossil fuel sectors) almost cancel out.

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<sup>26</sup> Additionally, regions specialising in tourism are likely to suffer from higher price of travel.

## 2.2.5 New Social Risks

### General features

In recent years, along with the main persistent risks of an industrial society (e.g. unemployment, sickness or disability, retirement, education), new social risks have emerged as a result of the interaction between cultural, economic and demographic changes. Patterns and expectations of consumption, gender equality, competitive pressures giving rise to jobs and income volatility, among other factors, have altered the traditional behavioural pattern of the life cycle, the family size and its reproductive functions in the developed world.

These new social risks are: reconciling work and family life, single parenthood, having a frail relative, possessing low or obsolete skills.

They can be ascribed to the evolution of different factors (Liddle and Lerais, 2008; Eurostat, 2008b):

- Transition to a knowledge based economy: this has tightened up the link between education and employment and has widened the gap between high skilled and low skilled workers
- Greater labour market flexibility and destabilisation of workers (higher probability of job loss during the whole working life), with an impact on larger parts of society and different age cohorts and no longer limited to a specific social class.
- Changes in size and composition of families: large families have almost disappeared in most advanced countries; one parent families are growing in number. Female activity rate has increased sharply (Taylor-Gooby, 2004; Bonoli, 2005; Ranci, 2009 forthcoming): the emergence of dual-earner couples reduces families' financial dependency on the male breadwinner, but also generates new problems and dilemmas related to the externalization of care and domestic work (EC2007, 244; EC2005, 33).

The studies of Ranci (2009 forthcoming) Sen (1985, 1987) and Van Den Bosh (2001) define the social risk as the likelihood of that reduced opportunities in life while a perception of insecurity, isolation, inequity and inequality is fuelled<sup>27</sup>. New social risks are not fully consistent with traditional classification of social risks -class based risks, life courses risks, intergenerational risks (Esping-Andersen, 1999)- and they can affect any social group in a particular phase of a life cycle, being the result of general existential risks and several group specific ones (Kitschelt and Rehm, 2006). These peculiar features of new social risks give rise to the question whether welfare regimes have the capacity to deal with them and to integrate new answers within the traditional protection schemes, without increasing the taxation level and labour cost.

### Relevance for regional disparities

The characteristics of new social risks make it particularly difficult to understand their regional patterns and impacts on disparities. Indeed, as argued by Leisering and Leibfried (1999) and Barnes et al. (2002), they can hit any social group in a particular phase of a life cycle and, moreover, they contribute to an increased vulnerability of a large part of the society through greater job insecurity, income instability, increasing fragility of family support and inertia of welfare institutions (Vatsa, 2004; Ranci, 2009 forthcoming).

The literature focuses on how these phenomena can be measured and the most widely accepted proxy to analyze poverty is disposable income, which allows to take into

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<sup>27</sup> In the literature we find the definitions of risk and vulnerability. Risk refers to the probability of a certain event occurring, the vulnerability to the severity of the impact of a certain event, regardless of whether it occurs or not.

account both primary and secondary distribution<sup>28</sup>. Taking the household as unit of analysis, disposable income is equivalised to consider different size and composition of families, through an equivalence scale that attributes different weights to family members (e.g. distinguishing between adults and children). The risk of poverty is defined as the share of persons with an equivalised disposable income below a given threshold<sup>29</sup>. However, this approach is not without drawbacks, (see Curatolo and Wolleb, 2009) especially in a dynamic context.

A widely used empirical tool for across country and region comparisons is cross section analysis, which focuses exclusively on the situation at a given point of time, though several studies have shown the advantages of longitudinal analysis to distinguish among temporarily, persistent and cyclical poverty (Apospori and Millan, 2003; Layte and Fouarge, 2004; Layte and Whelan, 2003; Leisering and Leibfried, 1999; Whelan and Maitre, 2007; Curatolo and Wolleb, 2009). They have shown that the number of people facing episodes of poverty is much higher than the number of poor at a certain point in time. That means that a large number of households live in conditions of vulnerability and may fall under the poverty threshold every time they face a negative event during the life cycle.

The adoption of the relative income approach to poverty is however subject to a number of limits that have been stressed in the literature. Given that standards of living are not only linked to income but also to savings, credits and debts, to the availability of public services and to what households can produce by themselves (Eurostat, 2008b; Whelan et al., 2002; OECD, 2008), various authors have used absolute measures including a wide array of life-style related variables (e.g.: food and clothing, car, phone, etc.), and then identified households with low standards of living<sup>30</sup>.

The persistence of old social risks and the emergence of the new ones cast some doubts on the sustainability and the adequacy of present models of social welfare in facing this challenge. And it is the degree of coverage of risks of the different systems to cause a variety of impacts across European countries.

Welfare systems meet two basic aims: redistribution of income and coverage against main social risks<sup>31</sup>. Social policies, solidarity and sustainability of welfare systems are necessary for deeper and wider economic integration in Europe. The current transformations of the labour market and of the family structure pose serious problems of adequacy for the European welfare states, indeed financial problems, trends in employment basis and difficulties in adopting welfare arrangements represent a binding constraint on the ability of European systems to deal with both old and new social risks. Hence, the most recent policies go in the direction of an integrated flex-security

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<sup>28</sup> This measure considers all income earned as employee and self-employment as well as capital income deriving from the stock of wealth; moreover it includes the public transfers to households and taxes and social contributions collected by the government.

<sup>29</sup> Some studies on European regions take the European median as their reference point; in the European Open Method of Coordination in the field of social protection and social inclusion, the threshold is set at 60% of the national median equivalised disposable income, expressed in purchasing power parity.

<sup>30</sup> These analysis have been based on different sources of data, the most important being the European Community Household Panel (ECHP), the Eurostat project Statistics on Income and Living Conditions (EU-SILC), the Luxembourg Wealth Study.

<sup>31</sup> It represents the majority of total public expenditure in the European Union, around one quarter of GDP, going mainly on health care and old age pensions. In recent years social protection expenditure has grown a little more rapidly than GDP due to more dynamic developments in health care and unemployment expenditure, while pension expenditures has grown more slowly.

approach, linking together flexible and reliable contractual arrangement in the labour market, comprehensive lifelong learning strategies, effective active labour market policies and a modern social security system to provide adequate income support, encourage employment and facilitate labour market mobility (EC2007, 359).

### 3. Relationships among challenges and summary of regional sensitivity

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Challenges may affect regions in a (more or less) independent manner, or alternatively produce mutually reinforcing impacts.

In the former case, the opportunities and risks may be considered as elements of a normal historical process that in nearly all cases should be managed well enough by existing community, national and regional institutions.

On the contrary, when impacts are mutually reinforcing, challenges acquire greater significance and may imply needs for new institutions and policies. The distribution of risks is even more likely to present serious problems to the extent that good or bad effects interact in a multiplicative rather than additive manner.

In the present chapter, an interpretative model of relations between challenges is proposed. It provides a baseline for understanding potential impacts of the challenges in the perspective of 2020 and is a result of a cross-sectional analysis of the background papers<sup>32</sup> and of brainstorming sessions among the experts of the study team.

After a description of the model's principal traits, all the main logical links between its components are summarised. Key challenges are multifaceted phenomena, characterised by very complex and often bi-directional relationships. For this reason, the assessment of net regional payoffs and the identification of gainers and losers, even in the same region, is a very difficult task. The purpose of the paragraph is therefore exploring links and, as a further step, describing implications for regional sensitivity/vulnerability, rather than measuring payoffs.

#### 3.1 An interpretative model to analyse impacts on disparities

In order to set up an interpretative framework for examining the combined consequences of analysed phenomena, we distinguish between largely exogenous and largely endogenous challenges, and identify their main outcomes.

Exogenous challenges function as drivers. Their interaction with endogenous challenges may perpetuate economic and social inequalities between and within regions and potentially introduce new sources of divergence.

Exogenous challenges are either given or strongly influence the success in dealing with the risks and threats posed by other challenges. They include climate change, natural demographic change and globalisation.

- o climate change is given in the period up to 2020, although it will affect regions in a number of ways that may in some cases require major changes in

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<sup>32</sup> These have been finalised on the basis of the thematic workshops held in Brussels between March and May 2009.

infrastructure and livelihood; there are many uncertainties about the timing of impacts and the cost and pattern of responses<sup>33</sup>;

- o natural aspects of demographic change such as birth rate and aging are also given in the period up to 2020; ageing of existing populations is relatively certain although migration may affect the main features of the labour market in each region, while effects on population structure and birth rates are limited and may take place only in the long run;
- o globalisation and the knowledge economy set the context for economic growth or stagnation and structural changes in each country or region; the pattern of regional income per capita, which is closely linked to consequences of globalisation, provides a baseline for understanding the potential impacts of challenges in the period to 2020.

Endogenous challenges are strongly dependent on the other challenges. These are:

- o energy risks. Patterns of energy supply and demand are strongly affected by economic growth and structural change as well as by climate change and migration trends.
- o new social risks. These are also considerably affected by growth/stagnation and structural change as well as by migration, through impacts on job opportunities and family income.

Outcomes of the interaction between exogenous and endogenous challenges can be estimated by using variables which capture the main impacts on regional disparities:

- o Energy prices (proxy for pressure to change patterns of supply and use)
- o GDP growth (national and regional economy)
- o Activity rate (indicates employment opportunities relative to population)
- o Environment (infrastructure, reduction/absence of pollution)
- o Social cohesion (community, reduction of poverty and polarisation)
- o Migration (the most important aspect of demographic change which is not given and has potential short term impacts on disparities; it is strongly determined by growth differences and globalisation).

### 3.2 Links between drivers and outcomes

A portrait of relationships between drivers and outcomes is provided in the following exhibit. Pluses/minuses indicate positive or negative effects. Presence of both plus and minus indicates effects that may work either way depending on the regional context. A double plus ++ indicates particularly strong positive effects (i.e. globalisation on GDP growth and GDP growth on activity rate).

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<sup>33</sup> Most climate models unisono predict that, even if action is taken now, climate change is set to continue well beyond 2020. At the same time these models predict that the increase in global temperature until 2020 is likely to be low and the effects thereof small. By contrast some models suggest that at least until 2020 instead of global warming the main concern is the increase in the number of extreme events and their economic, environmental and social impacts.

Exhibit 6 – Summary of links between drivers and outcomes

	Outcomes					
	Energy prices	GDP growth	Activity rate	Migration	Environment	Social cohesion
Exogenous challenges/drivers						
Globalisation	+	++	+/-	+	-	-
Natural demographic change		+/-	+/-	+/-		-
Climate change	+/-	+/-		+/-	+/-	
Endogenous drivers						
Energy prices		+/-			+	-
GDP growth	+		++	+/-	+	+
Activity rate				+		+
Migration						-
Environment		+				+
Social cohesion		+				

### GDP growth as a key indicator of the combined outcome

The table above shows the complexity of interrelations and their differing effects, positive and negative, which in several important cases may vary not only in magnitude but also in direction depending on the regional context.

However, the table makes it clear that GDP growth is the single most important element linking drivers and outcomes. Challenges are more easily confronted and opportunities realised in regions with relatively high per capita income and a sustainable growth rate. This tends to justify emphasis on income disparities as a crucial element threatening cohesion and good relationships within the EU and between the EU and neighbouring countries and regions<sup>34</sup>.

### Main effects of globalisation, demography and climate change on endogenous drivers

- Globalisation
  - Globalisation, through increased trade and higher growth rates, generates pressure on the energy market and has an upward effect on energy prices (in

<sup>34</sup> It is worth noting that other analysis also show that usually GDP per head is correlated with other important statistics (labour market, sectoral structure etc)

particular as regards fossil fuels) and the speed of change in the energy sector. Global market integration, income and trade growth generate pressures on energy demand and supply and adjustments in energy prices.

- Globalisation is a powerful engine for GDP growth in most regions as expanding export markets around the world create many new opportunities for business development.
  - Globalisation also has direct, positive effects on migration as the increased exchange of goods and services reinforces links between communities in different regions and countries that facilitate movement of people to areas where there are more opportunities.
  - The effects on the environment and social cohesion are controversial and often negative. Risks to the environment arise from intensification of competition that may induce business and government to relax environmental protection measures in order to keep costs to a minimum and maximise income and jobs.
  - The main risk to social cohesion is the tendency for globalisation to generate unequal income distribution within each region, as pay and working conditions in some sectors are squeezed while incomes rise rapidly in the sectors that are able to reap strong benefits from global market opportunities. Negative effects of increasingly unequal pay are often reinforced by increasing insecurity of jobs and failure of welfare systems to cover a wider range of problems. Thus, increased global competitive pressure has in many regions brought about major changes in life styles and household organisation that reduce the capacity of families, local communities and governments to provide caring services.
- Natural demographic change (birth rates and ageing)
    - Natural demographic change may result in positive effects on GDP growth in regions where the labour force increases and a high rate of household formation encourages investment in new homes. The opposite case in which the population of working age falls relative to the number of elderly people is more controversial. On the one hand, an ageing population creates strong demand for a wide range of services for retired people, but on the other hand there may be problems about maintaining economic growth if the population of working age is falling. There is a common tendency to regard ageing as a negative factor for GDP growth but this has yet to be demonstrated in higher-income areas where the elderly may have sufficient accumulated wealth to generate buoyant demand. Indeed areas that attract inward migration of elderly people have been among the most prosperous in high income countries in recent decades.
    - The effect of demographic change on activity rates is also two-sided. In regions with low birth rates, smaller cohorts of new entrants join the labour force and job opportunities for young people and old people who want to work will be improved. On the other hand, regions with higher birth rates and an expanding population of young people typically experience problems of youth unemployment and may offer low job opportunities for older people unless GDP growth is very rapid. The gap between GDP growth and demographic influences on labour supply can in favourable circumstances be mitigated by migration of young people from regions with growing populations to those with ageing populations but opportunities for adjustment through migration are

increasingly limited by social pressures in areas to which people may want to migrate<sup>35</sup>.

- High birth rates in one region combined with low economic prospects might lead to an outward migration from such regions to regions that are economically more prosperous.
- Climate change
  - Increases in global temperature reduce heating and energy requirements in Northern regions, while increase cooling requirements in Southern regions. Moreover, energy production might face reductions (e.g. as cooling nuclear power plants become more difficult and river power stations may face difficulties during heat waves and droughts).
  - In the short-medium term, climate change may have a positive effect on GDP growth in northern areas where industries such as agriculture and tourism can benefit from warming.
  - Regions that have a good potential to provide new sources of energy that do not generate CO<sub>2</sub> or other harmful emissions also stand to benefit from climate change to the extent that this accelerates pressure to reduce greenhouse gases.
  - On the other hand, climate change will have negative effects on low-lying coastal areas vulnerable to a rise in the sea level and on Southern regions where high summer temperatures, aridity and extreme weather events may depress their economic basis (e.g. agriculture and tourism) and or worsen living conditions. This may lead to a South-North migration (from within and outside the EU), and also migration within countries.
  - In cases where the negative effects of climate change on the local environment are severe, for example in southern coastal regions and areas that already suffer from aridity, deterioration of the environment may in turn have more general adverse effects on the regional economy.

#### Endogenous drivers and outcomes

- Energy prices
  - Energy prices in general and the price of oil in particular are important indicators of supply/demand pressures.
  - The immediate impact of changing energy prices on producers and consumers is substantial because energy is by far the most important raw material used by modern economic systems. It affects citizens in many ways, most directly through its impact on costs of transport, heating and cooling, power and light in the home. The benefit or cost of changes in energy prices depends on the position of individuals and firms in circuits of production and use. Energy exporting countries can gain immediate and substantial increases in external

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<sup>35</sup> This raises the issue of a need to define more flexible and strategic integration measures. Quality education and entry to the labour market are key to the successful integration of migrants. Cooperation with third countries in particular with regard to pre-departure measures such as linguistic, cultural and civil training is another element to increase successful integration.

income from a rise in world prices and vice versa importing countries can suffer immediate and substantial increases in external costs.

- In the longer run, energy prices have a major impact on viability of alternative sources and patterns of use and development and exploitation of new technologies. The ability of regions to take advantage of higher prices or mitigate the potential cost varies greatly, depending on natural resources and climate, industrial structure and patterns of development. Overall, higher energy prices are likely to make a positive contribution to GDP growth in some regions but are a negative factor in others.
  - Rising energy prices may be expected to have a favourable effect on the environment in most cases since a high price encourages efficient use of fuels and makes environmental protection less expensive relative to the cost of the energy itself.
- GDP growth
    - GDP growth is an outcome of exogenous drivers, especially globalisation, as well as local factors including the quality of the environment and social cohesion. At the same time GDP growth is a key driver affecting employment opportunities and activity rates, local infrastructure and cohesion. Most of the effects of GDP growth are positive although in the absence of effective environmental protection and infrastructure investment it can result in congestion and detrimental changes in the local environment. Higher growth also leads to a higher consumption of energy (provided that energy intensity is reduced by less than GDP grows); a higher energy demand has to be met either via additional imports of traditional fuels or increased production of alternative forms of energy. Finally, differences in economic development might trigger migratory movements from less to more prosperous regions (within and from outside the EU)
- Activity rates and migration
    - Activity rates depend mainly on demographic factors and GDP growth. Increased activity rates encourage inward migration and may improve social cohesion by reducing unemployment and income inequality. Per contra, low activity rates encourage outward migration and may aggravate social polarisation by generating pools of long-term unemployed and exerting downward pressure on wages and salaries at the bottom of the income scale.
    - In favourable circumstances migration from regions with relatively low employment opportunities to areas of stronger labour demand can make a large contribution to reduction of regional disparities. But migration is generally seen as a negative factor so far as social cohesion is concerned because of the length of time needed for cultural accommodation when it concerns movement of people across linguistic and ethnic boundaries<sup>36</sup>.

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<sup>36</sup> See footnote no. 38

- Local environment and social cohesion
  - These two factors are important in determining the 'attractiveness' of regions to tourists and, more important, multinational firms and cross-border business. A local environment can be considered attractive when it is well equipped with both material and immaterial infrastructures and institutions and when the environment is, so to speak, innovation friendly. This means that business can count on lines of communication, transport hubs and also high quality business services. In order to be attractive to people, both for employment and tourist reasons, the local environment should provide opportunities and be well preserved in ecological terms. On the whole an attractive local environment, characterised by the simultaneous presence of the above elements, is probably also conducive to social cohesion.
  - The quality of the local environment remains significantly at risk in regions adversely affected by climate change or incapable to mitigate or adapt to pressures linked to globalisation. In other regions rising income may result in public and private investment to improve the local environment and encourage social cohesion.
  - Positive feedbacks between GDP growth, social cohesion and improved local environments are an important aspect of 'cumulative causation' that allows high-income regions to maintain advantages over long periods of time and correspondingly makes it difficult for low-income regions to catch up.

## 4. Overall scenarios of disparities in the perspective of 2020

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The present chapter identifies overall scenarios as regards the joint impact of key challenges on regional disparities in 2020. Scenarios result from combining hypotheses of challenge intensity with regional sensitivity. They include an estimation of per capita GDP produced by our model under two opposite hypotheses of gradual and rapid recovery from the world crisis.

### 4.1 Assumptions on growth and intensity of challenges

#### 4.1.1 GDP growth

The analysis is based on the assumption that the patterns of GDP per capita will continue to be the most important indicators of regional disparities within Europe and neighbouring countries. These are closely linked to consequences of globalisation and demographic change over the past two decades.

There are great differences in national and regional GDP per capita in different parts of Europe which have an important influence on the ability of national and regional communities to respond to challenges of the kind examined in this study. Although it has not been possible to provide scenarios for regional GDP per capita in 2020 in the present study, the background paper on globalisation has provided estimates of sustainable levels of GDP per capita<sup>37</sup> at the country level under alternative hypotheses concerning the rate of growth of the world economy and the degree of restructuring within Europe<sup>38</sup>.

National growth performance crucially influences regional growth as widely recognised by the empirical literature on regional development and cohesion and hence these national scenarios represent a fundamental starting point for the analysis of regional disparities. These scenarios, take into account the financial crisis and alternatives are based on two assumptions on the recovery path from the recession:

- A. gradual recovery from the world recession with minimum structural change;
- B. rapid recovery with major structural shifts facilitating development of Europe's neighbouring regions and continued convergence of low-income countries within Europe.

There is inevitably much uncertainty about the growth of world trade and changing patterns of specialisation looking ahead to 2020. Therefore, neither A or B should be considered as a forecast or even as a bound on conceivable developments over the next decade.

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<sup>37</sup> Sustainable income is the actual level or the level at which the current account deficit would not exceed a sustainable level of capital inflow, given the past growth rate of GDP, and the actual value of exports and import content of domestic spending.

<sup>38</sup> The main tool for analysis of global trends in the globalisation background paper is a databank and structural model of the world economy that relies on long-period historical series for 1970-2007. See annex 3 for a brief outline of the model.

Estimates of sustainable income from the two scenarios (A and B) are used here to provide an index of ability to respond positively to regional challenges in low growth and high growth scenarios respectively.

The neutral position or baseline for measuring strength or vulnerability is somewhat arbitrarily taken to be the average figure for GDP per capita in Europe as a whole in scenario A (low growth) and the level of GDP per capita representing maximum vulnerability (index value of 1) as the minimum level for European countries in scenario B<sup>39</sup>.

In the low growth scenario economic growth is not expected to provide much help on average to regions facing the challenges reviewed in this paper. A minority of regions in high-income countries may be able to deal with their vulnerabilities or have sufficient capability to take advantage of opportunities associated with the challenges. In lower-income countries the comparatively low level of GDP per capita is likely to intensify vulnerability to the challenges.

In the high growth scenario vulnerability to challenges is assumed to be at least partially offset by rising GDP per capita in the majority of regions and even in lower-income countries the negative effect of low GDP per capita is assumed to be comparatively small.

#### 4.1.2 Intensity of challenges: weights and sets of hypotheses

The intensity measure for each challenge or a single feature represents the potential scale of impact in the most vulnerable affected region. Intensity can be zero or positive. When positive, it can range from a very low to a very high level. To generate combined impact measures, intensity levels are converted to weights. The scale of intensity used in the analysis and the corresponding weights are the following:

Exhibit 7 – scale of intensity

Intensity levels	None	Slight	Minor	Moderate	Severe	Large
Associated weights	0	1	2	3	5	10

Using these weights, the maximum potential challenge arising from all factors combined ranges between 24 (minimum) and 35 (maximum). In practice, no single region will face the full impact of all challenges simultaneously so we expect the challenge level in the most vulnerable individual regions to be in the range of 10-20. Less vulnerable regions will show combined impacts or challenge levels between 0 and 10. High-income regions which are well-placed to take advantage of potential benefits or opportunities presented

<sup>39</sup> The distribution of index values under each scenario, calibrated in this way, is indicated in the following table:

Indicator	Low growth scenario	High growth scenario
Regions with maximum vulnerability	1	0.28
Average sensitivity (+ or -)	0.07	-0.40
Regions realising maximum benefit	-0.45	-1.05

by the challenges may show negative overall scores implying that they stand to gain net benefits.

Keeping in mind the tight interactions between the challenges explored in chapter 3, a meaningful way to produce alternative scenarios is to identify 4 combinations of challenge intensity and GDP growth. These combinations take into account some peculiarities of the climate and demographic change. Moreover, traditional social risks (particularly linked to poverty and unemployment) are distinguished from new social risks (especially related to education and effectiveness of welfare) to capture all the most important and sometimes controversial impacts that the challenge may produce on disparities.

As we pointed out previously, demographic change and climate change must be handled carefully. The former is characterised by features which are in part given (ageing) and in part may register low or high intensity (migration) in 2020. The latter is very uncertain in terms of timing and scope of consequences, especially regarding extreme events.

In brief, taking into account the foregoing peculiarities, we identify four sets of hypotheses as presented in the following table. The first two sets are characterised by low growth and assume, alternatively, low and high climate change. The third and fourth set assume high growth and, alternatively, low and high climate change.

Exhibit 8 – basic set of hypotheses

<u>Scenario</u>	<u>1 – Low growth and low climate change (AL)</u>	<u>2 – Low growth and high climate change (AH)</u>	<u>3 – High growth and low climate change (BL)</u>	<u>4 – High growth and high climate change (BH)</u>
Climate change	slight	moderate	Slight	moderate
Demographic change				
natural change	moderate	moderate	Moderate	moderate
migration	none	none	Minor	Minor
Globalisation	moderate	moderate	Severe	Severe
Energy risks	slight	slight	Minor	Minor
Social risks				
traditional	severe	severe	Moderate	moderate
New	moderate	moderate	Severe	Severe
Sustainable GDP	assumption A	assumption A	assumption B	assumption B

Thus in the best case for the period up to 2020, the worst affected regions would suffer slight impacts in relation to climate change, energy risks and new social risks and moderate impacts arising from natural demographic change, globalisation pressures and traditional social risks but would still be severely affected by low sustainable income. Similarly in the worst case, worst affected regions would suffer minor impacts from migration and energy risks, moderate impacts from climate change and natural demographic change and severe impacts from globalisation, social risks and low sustainable income.

## 4.2 Assessment of regional sensitivity to combined challenges

To be able to combine growth scenarios, assumed challenge intensity level and regional sensitivity, it is necessary to reconsider the way in which sensitivity indicators have been normalised in the background papers in order to take account of and emphasise cases in which there are potential gains as well as losses. In most cases, sensitivity indicators were normalised as indexes with values in the range 0 (least vulnerable) to 1 (most vulnerable).

The procedure followed here is to adjust the normalisation of individual indicators so that in all cases the value of 1 represents maximum vulnerability (potential loss), the value of 0 (zero) represents neutrality or indifference to the relevant challenge or feature while negative values indicate a potential benefit. The set of indicators used to assess overall sensitivity, their range and weights are discussed in Annex 2.

## 4.3 Overall scenarios in 2020

Reassessed regional sensitivity scores have been added up by using the intensity weights which correspond to each set of hypotheses as presented above. This procedure has resulted in a summary score for each scenario. The scores are presented in the following maps.

Given that there is little difference between high and low climate change variants, the reason being that in some cases climate change benefits challenged regions, two scenarios based on only two sets of hypotheses out of the 4 previously mentioned (see exhibit 8) are shown and analyzed.

These two scenarios represent the extreme cases (the most pessimistic vs. the most optimistic) and are able to show how regional disparities may be influenced by growth perspectives, intensity of challenges and regional sensitivity:

- Low growth scenario with high climate change (A)
- High growth scenario with low climate change (B)

On the maps, variations of orange/red indicate a positive score showing the vulnerability of a region to combined challenges. Variations of blue indicate a negative score which means that a region is likely to benefit from the combined impact.

### 4.3.1 Scenario A – Low growth and high climate change: a Europe with a shrinking “core”

In this scenario, intensity of challenges is assumed to range from none to severe. Europe as a whole will not achieve the same expansion up to 2020 as it did in the decade ending in 2007. European trade will slow down, world prices for raw materials and oil will be depressed with negative effects on Europe’s neighbours. In other parts of the world, where the impact of the low oil price is less significant (East Asia and America), trade will grow more rapidly. External credits will become the most important source of external income in Europe by 2020.

Exhibit 9 – Hypotheses of intensity

	Challenge intensity
Climate change	Moderate
Demographic change	
natural change	Moderate
migration	None
Globalisation	Moderate
Energy risks	Slight
Social risks	
traditional	Severe
new	Moderate
Sustainable GDP	assumption A

Relatively slight to moderate intensity of all challenges apart from traditional social risks, perpetuate existing differences between regions with different sensitivity to the challenges. In other words challenges tend to reinforce economic disparities determined by growth differentials.

The main results of this scenario are determined by the extent sustainable income in 2020 will affect current sensitivity patterns. Low income growth will have negative implications for cohesion at the country level and at the regional level.

In case of slow recovery from the world crisis and high intensity of climate change, most European regions can be considered vulnerable and will experience potential losses from the combined challenges.

There is a clear cut divide between the Eastern and Southern regions and the rest of Europe. Disparities between vulnerable regions located in these areas and the regions with only minor risks increase. Overall benefits from challenges, in this scenario, are confined to a relatively small group of European regions (Central/Northern Europe: Southern/central Germany, The Netherlands and Belgium, Southern Britain and Ireland, Danish, Austrian, Southern Swedish and Western Finnish regions) Involving 25% of the European population, while the population with severe and moderate vulnerability amounts to almost 46% (See exhibit13).

In this scenario, there are over 110 regions with moderate to severe vulnerability to the combined challenges, the majority being severely affected; this means over 40% of the European regions. 90 regions show slight vulnerability and just over 60 can be considered beneficiaries. The area of vulnerability, on the whole, is large in terms of number of regions and population, 75% of the European population spread across almost all geographical areas. Furthermore, vulnerability afflicts regions that were previously successful but whose situation worsened as a result of the combined challenges impact in a low growth context.

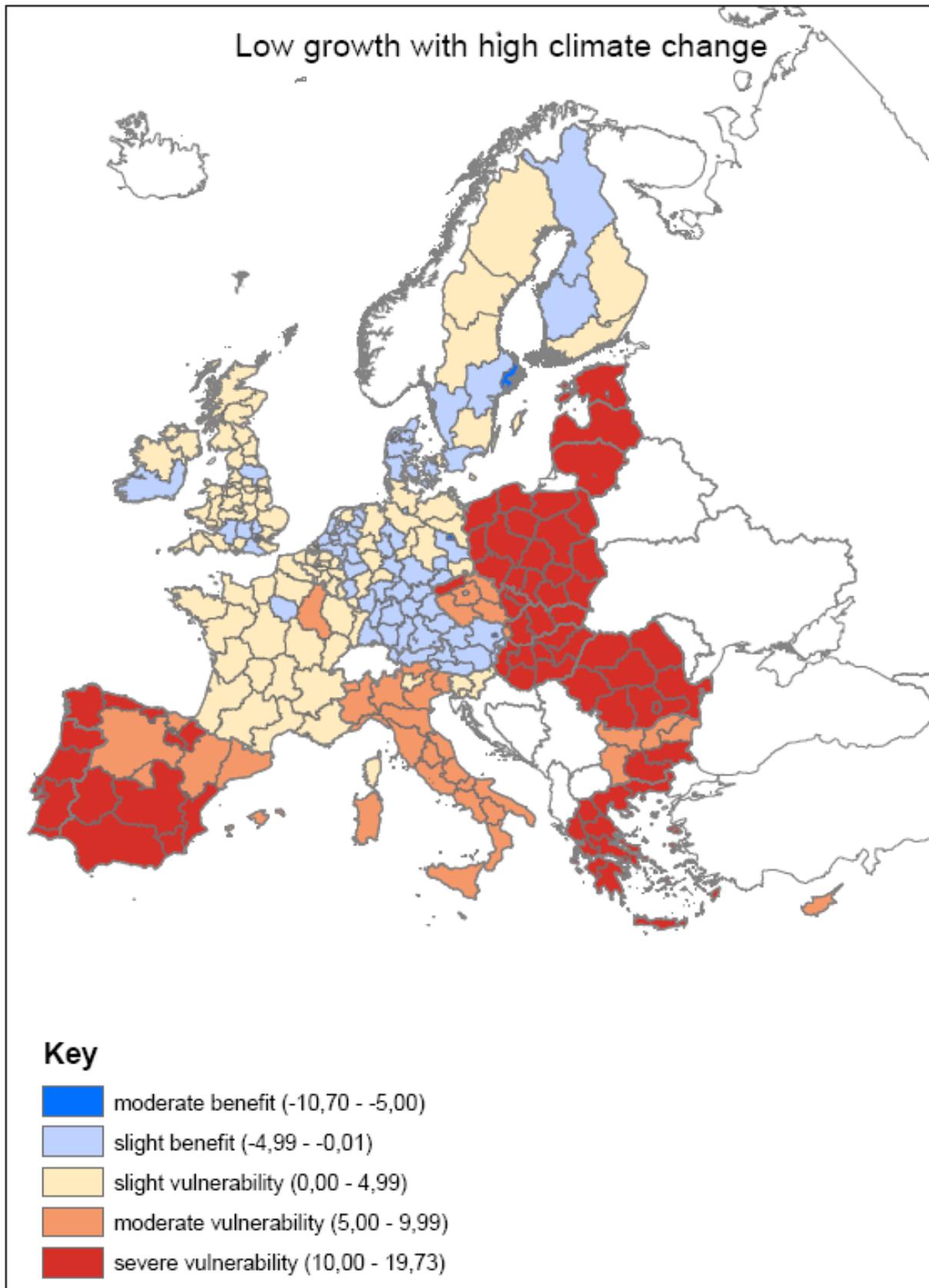
Exhibit 10 - Summary of scenario implications

Geographical area	Countries	Challenge relevance to determine vulnerability	Vulnerability and results
Southern/ Mediterranean Regions	Spain, Portugal, South of Italy, Greece, Cyprus, Malta	Globalisation nnn Climate change nnnnn Demographic change nnnnn Energy risks nnnn Social risks nnnn	<ul style="list-style-type: none"> <li>o No regions show benefits: moderate to severe vulnerability affects the whole region.</li> <li>o Most of Southern Spanish, Greek and Portuguese regions are affected more than the rest of the region.</li> <li>o Northern Spain and Southern Italy are moderately vulnerable.</li> <li>o Insufficient resources to invest to mitigate negative consequences of challenges</li> </ul>
Central European Regions	France, Germany, Austria, Belgium, the Netherlands, Northern and Central Italy, Slovenia	Globalisation nn Climate change nnn Demographic change nnn Energy risks nn Social risks nn	<ul style="list-style-type: none"> <li>o Highly differentiated, going from moderate vulnerability to slight benefit.</li> <li>o Most of German, Dutch, Belgian regions experience mild benefits</li> <li>o Some central British regions as well as large urban areas and capitals also show slight benefit.</li> <li>o Most French regions as well as Central and Northern UK regions are slightly vulnerable</li> <li>o Northern and Central Italian regions are at the lowest end of the scale and show moderate vulnerability</li> <li>o On the whole the area of vulnerability of regions once among the most successful increases</li> </ul>
Northern European Regions and Islands	UK, Ireland, Denmark, Sweden and Finland	Globalisation n Climate change nn Demographic change nnn Energy risks n Social risks nn	<ul style="list-style-type: none"> <li>o From slight vulnerability to moderate benefit</li> <li>o Most Scandinavian regions, except the more peripheral areas benefit from the challenges</li> <li>o Favourable income p.c. is reinforced by positive consequences of climate change</li> </ul>
EU12 Regions from Eastern Europe	Latvia, Lithuania, Estonia, Poland, Czech Republic, Slovakia, Hungary, Romania, Bulgaria	Globalisation nn Climate change nnn Demographic change nn Energy risks nnnn Social risks nnnn	<ul style="list-style-type: none"> <li>o No regions benefit; large number of regions show severe vulnerability</li> <li>o Only the Czech Republic and some Bulgarian regions show moderate levels of vulnerability</li> <li>o Disparities with the other European regions increase</li> </ul>

Exhibit 11 – Number of regions for each class of vulnerability in the case of low growth and high climate change

<u>Score</u>	<u>Vulnerability</u>	<u>Number of regions</u>	<u>%</u>
10 or more	severe	74	28
5 to 10	moderate	38	14
0 to 5	slight	90	34
less than 0	beneficiary	64	24
Total		266	100

Exhibit 12 – Scenario A – Map of European Regions: Low growth and high climate change scenario



The regional pattern of impacts is strongly associated with GDP, globalisation and vulnerability to social risks, weakly correlated with demographic change and negatively correlated with vulnerability to effects of climate change.

This possibly conservative finding implies that problems of regional disparity where economic, social and financial factors reinforce one another will remain a major issue for the European Union in the period up to 2020, being particularly severe in case of relatively slow growth in Europe as a whole.

Exhibit 13 – Population (2006) of each vulnerability group

Score	Vulnerability	Total population ('000)	%
10 or more	severe	133.818	27,1
5 to 10	moderate	91.579	18,7
0 to 5	slight	143.247	29,1
less than 0	beneficiary	123.736	25,1
total		492.379	100

Exhibit 14 – Vulnerability and beneficiary: Bottom and Top regions

Most vulnerable			Top beneficiary		
REGION	INDEX	POPULATION	REGION	INDEX	POPULATION
ro41	19,73	2.294	uki1	-10,70	2.973
ro11	19,17	2.729	at13	-5,70	1.658
ro21	18,62	3.731	de30	-5,39	3.400
ro22	18,52	2.839	se11	-5,28	1.904
ro12	17,95	2.529	de21	-3,69	4.259
ro42	17,33	1.928	at32	-3,55	529
ro31	17,32	3.313	nl31	-3,38	1.185
gr41	16,78	201	uki2	-3,21	4.537
pt11	16,49	3.741	ukj2	-2,97	2.615
pt20	16,49	243	fi20	-2,93	27
pl52	16,22	1.045	nl32	-2,82	2.610
gr13	16,07	294	ukj1	-2,61	2.161
gr22	15,91	225	at33	-2,45	699
pl43	15,90	1.009	nl22	-2,21	1.977
gr25	15,87	596	nl42	-2,09	1.130
ro32	15,61	2.224	uke2	-1,93	783
gr11	15,60	607	de12	-1,88	2.733
gr21	15,57	347	fi19	-1,68	1.337
pt30	15,49	246	dk03	-1,57	1.188
pt17	15,43	2.787	dk04	-1,55	1.224
total		32927	total		38927
% of EU pop		6,7	% of EU pop		7,9

#### 4.3.2 Scenario B – High growth and low climate change: a Europe with narrowing disparities

In this scenario intensity of challenges is assumed to range from minor to severe (as shown in exhibit 15). Challenge intensity is generally higher than in the previous one, except for climate change. In this case, Europe would achieve a better growth performance than the US, roughly equal to that of Japan and other countries in East Asia except China.

Faster growth of demand in the world economy through higher public and private investment in Europe and neighbouring regions and some other parts of the world underlie the possibility of rapid recovery. Systematic relocation of agricultural production in Europe towards the South and East from the North and West and rapid development of service exports in the South and East are other important scenario assumptions.

Income growth in relatively fast-growing countries in the South and East of Europe would substantially boost the internal market for manufactures and profits on capital invested in those countries.

Exhibit 15 – Hypotheses of intensity

	Challenge intensity
Climate change	Slight
Demographic change	
natural change	Moderate
Migration	Minor
Globalisation	Severe
Energy risks	Minor
Social risks	
Traditional	Moderate
New	Severe
Sustainable GDP	assumption B

The scenario highlights the importance of global recovery from the recession and the benefits to the European economy produced by higher levels of investment and trade. New patterns of trade in agriculture and services act as a mean for more rapid development of low income countries in Europe.

Rapid recovery and low intensity of climate change increase the group of regions that benefit from the challenges, including Northern and Central Europe as well several French regions.

It is interesting to observe that the area of vulnerability changes: many regions (both in Southern and Eastern Europe) see a decrease in their vulnerability level, a few of them to a very significant extent.

Exhibit 16 - Summary of scenario implications:

Geographical area	Countries	Challenge relevance to determine vulnerability	Vulnerability and results
Southern/ Mediterranean Regions	Spain, Portugal, Southern Italy, Greece, Cyprus, Malta	Globalisation nn Climate change nn Demographic change nnn Energy risks nn Social risks nn	<ul style="list-style-type: none"> <li>o No area benefits (apart from Cyprus): from slight to severe vulnerability</li> <li>o Portuguese and Greek regions continue to suffer significantly</li> <li>o Southern Italy and Spanish regions improve their position</li> <li>o Rapid growth enables investments that help mitigate the negative consequences of the challenges</li> </ul>
Central European Regions	France, Germany, Belgium, the Netherlands, Northern and Central Italy	Globalisation n Climate change n Demographic change nn Energy risks n Social risks n	<ul style="list-style-type: none"> <li>o Patchy situation with a large number of beneficiaries and areas of slight vulnerability and extended areas of vulnerability</li> <li>o German, Austrian, Belgian, Dutch and a few French regions largely benefit and further improve their relative position</li> <li>o Most of France as well as Northern and Central Italian regions also improve their position, as compared with the previous scenario, but still show slight vulnerability</li> </ul>
Northern European Regions and Islands	UK, Ireland, Denmark, Sweden and Finland	Globalisation n Climate change n Demographic change nn Energy risks n Social risks n	<ul style="list-style-type: none"> <li>o These areas mainly gain</li> <li>o Moderate to high benefits characterise large urban areas/capitals</li> <li>o Slight vulnerability only in some UK regions</li> </ul>
EU12 Regions from Eastern Europe	Latvia, Lithuania, Estonia, Poland, Czech Republic, Slovakia, Hungary, Romania, Bulgaria	Globalisation n Climate change n Demographic change n Energy risks nnn Social risks nnn	<ul style="list-style-type: none"> <li>o General improvement and decrease of vulnerability in the Czech, Slovak, Hungarian and Bulgarian regions</li> <li>o Still severe vulnerability in Polish, Romanian and Baltic regions</li> <li>o Some areas of very slight vulnerability or slight benefits in correspondence to capitals (e.g. Prague, Budapest)</li> </ul>

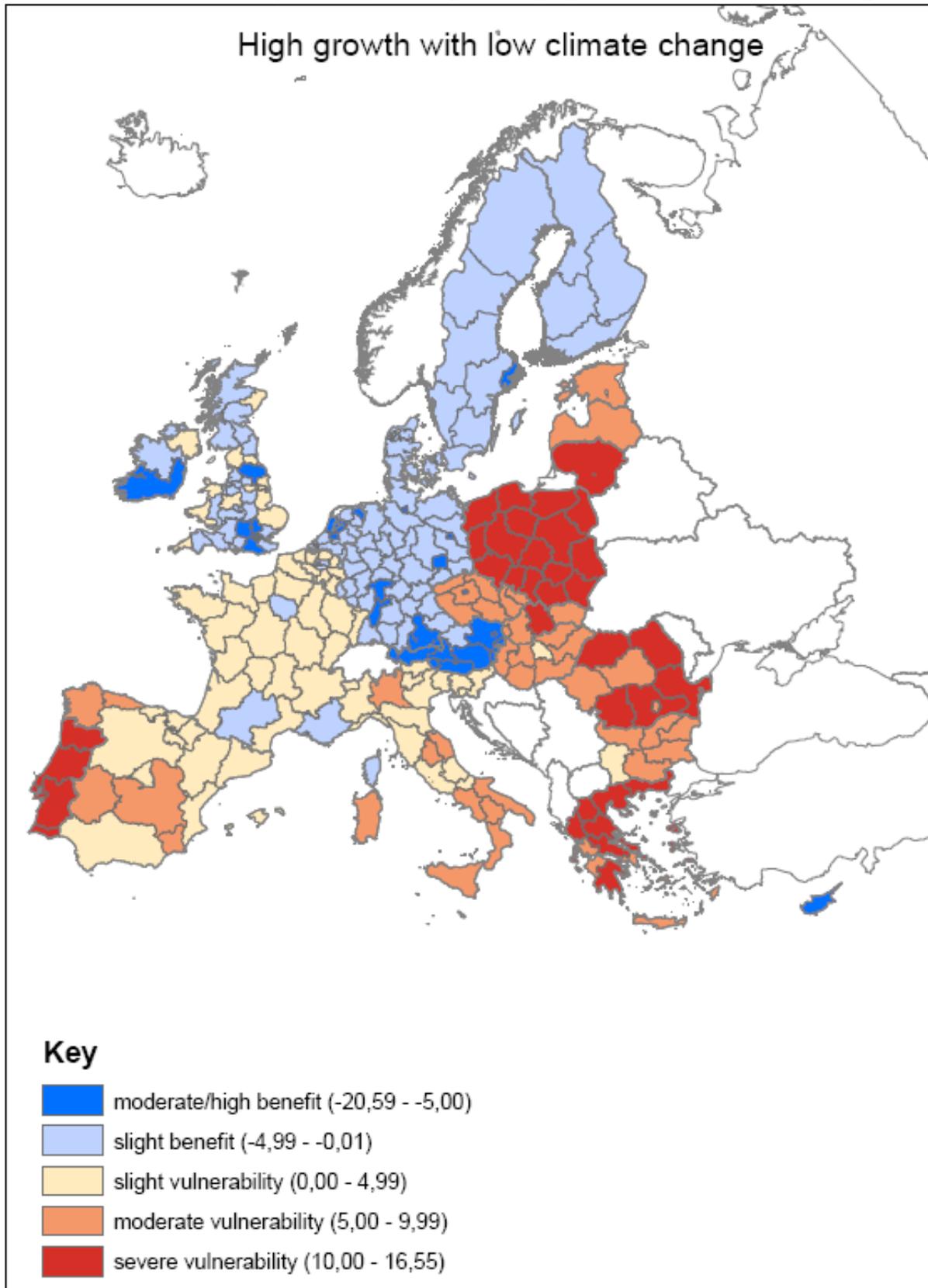
In this scenario, there are less than 90 regions with moderate to severe vulnerability to the combined challenges, the majority being only moderately affected - over 30% of the European regions. 60 regions show slight vulnerability and over 110 can be considered beneficiaries. Only 15% of the population would still suffer from severe vulnerability while more than 40% would become beneficiary in almost all geographic areas. Furthermore, comparing the 2 scenarios over 44% of the population would move from severe vulnerability to lower vulnerability levels. If we analyze these results in terms of geographic

areas, we can see that the groups of regions with the highest vulnerability in EU12 and in the south would benefit to the largest extent even if they still often remain within the vulnerability range area. Beneficiaries concentrate in northern Europe and the Scandinavian peninsula, the UK and Ireland. The results for Italy and Spain where low and moderate vulnerability coexist are more diversified. In Greece and Portugal conditions of severe vulnerability prevail in almost all regions. The picture within the EU12 countries is more diversified as the large urban regions and the border regions with EU 15 resume their growth rates of the past decade and are thus able to reduce the negative impacts of other challenges.

Exhibit 17 – number of regions for each class of vulnerability in the case of high growth and low climate change

<u>Score</u>	<u>Vulnerability</u>	<u>Number of regions</u>	<u>%</u>
10 or more	severe	39	15
5 to 10	moderate	44	17
0 to 5	slight	67	25
less than 0	beneficiary	116	44
Total		266	100

Exhibit 18 – Scenario B – Map of European Regions: High growth and low climate change scenario



Within the EU 15 area, vulnerability levels differ greatly from region to region. On the one hand, the position of some Central and Southern regions improve substantially. This is the case, in central Europe, of most of Germany and France. In the South, several Spanish

regions and a few Italian areas are less vulnerable. On the other hand, most of southern Italy and Greece still experience moderate to severe vulnerability. In the north of Europe Denmark, Sweden and Finland experience an overall improvement. This is also true for the United Kingdom and Ireland.

Exhibit 19 – population (2006) of each vulnerability group

Score	Vulnerability	Total population ('000)	%
10 or more	Severe	73.865	15
5 to 10	moderate	81.046	16,5
0 to 5	Slight	134.420	27,3
less than 0	beneficiary	203.049	41,2
total		492.379	100

Exhibit 20– Vulnerability and beneficiary: Bottom and Top regions

Most vulnerable			Top beneficiary		
REGION	INDEX	POPULATION	REGION	INDEX	POPULATION
pt20	16,55	243	uki1	-20,59	2.973
pt11	15,95	3.741	at13	-13,66	1.658
pt30	14,45	246	nl31	-12,99	1.185
pl61	13,95	2.067	de30	-12,01	3.400
pl33	13,90	1.282	se11	-10,70	1.904
pl52	13,88	1.045	uki2	-10,06	4.537
pl62	13,76	1.428	ie02	-8,44	3.121
pl43	13,65	1.009	cz01	-8,36	1.185
pl31	13,15	2.176	at32	-8,25	529
pt17	12,98	2.787	at33	-8,10	699
pl34	12,86	1.198	ukj2	-7,99	2.615
pt18	12,71	765	nl32	-7,96	2.610
pl32	12,65	2.098	de21	-7,74	4.259
pl22	12,58	4.678	fi20	-7,52	27
pl42	12,51	1.694	de60	-6,93	1.749
ro41	12,47	2.294	ukj1	-6,85	2.161
pl21	12,42	3.269	uke2	-6,72	783
ro11	12,31	2.729	at21	-6,51	560
pl11	12,21	2.572	de71	-5,54	3.776
gr13	12,09	294	at34	-5,52	364
total		37613	total		40093
% of EU pop		7,6	% of EU pop		8,1

## 5. THE PERSPECTIVE FOR NEIGHBOURING COUNTRIES

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### 5.1 Introduction: the relevance of neighbours in a globalised world

The position of neighbouring countries with respect to the key challenges and the implications for Europe are diverse.

Neighbouring countries are Europe's main energy providers (e.g. Russia and some North African Countries) or in strategic positions which may affect security of supply (e.g. other countries from the former Soviet Block). Beside existence and location of energy sources, national infrastructures and income, specific agreements and privileged relations between EU States and their Neighbours substantially influence the severity of the challenge in European regions.

The analysis of globalisation and of sustainable income prospects has highlighted that it is unlikely that European neighbouring countries to the East and the South will be able to bridge their income gap with Europe, in particular with the EU15 in the period leading up to 2020. This seriously hampers cohesion, even though increasing economic integration between Europe and neighbours, through, for example, outsourcing and off-shoring, fosters catching up.

In relation to globalisation, it is also worth mentioning that developments in ICT and worldwide transport facilities have changed the notion of physical distance and therefore spatial contiguity is less relevant to determine migration flows as well as cultural links and integration, even though proximity still counts in relation to knowledge diffusion. Strong interaction among features of challenges progressively involve the entire world community. Macro-regions and world blocks tend to become more relevant and in relation to the exchange of goods, capital and people the impact of distant actors such as China and India has become more important than that of neighbouring countries.

As regards migration, European integration has fostered the skyrocketing of intra EU flows. However, due to the fact that globalisation has reduced the importance of distance, extra EU inflows from far East Asia and Central Africa have also increased. Despite this, neighbouring countries remain important players not only because they tend to maintain negative migration balances towards Europe but also because they are gates to the EU and sometimes departing hubs or intermediate stops for people arriving from all over the world.

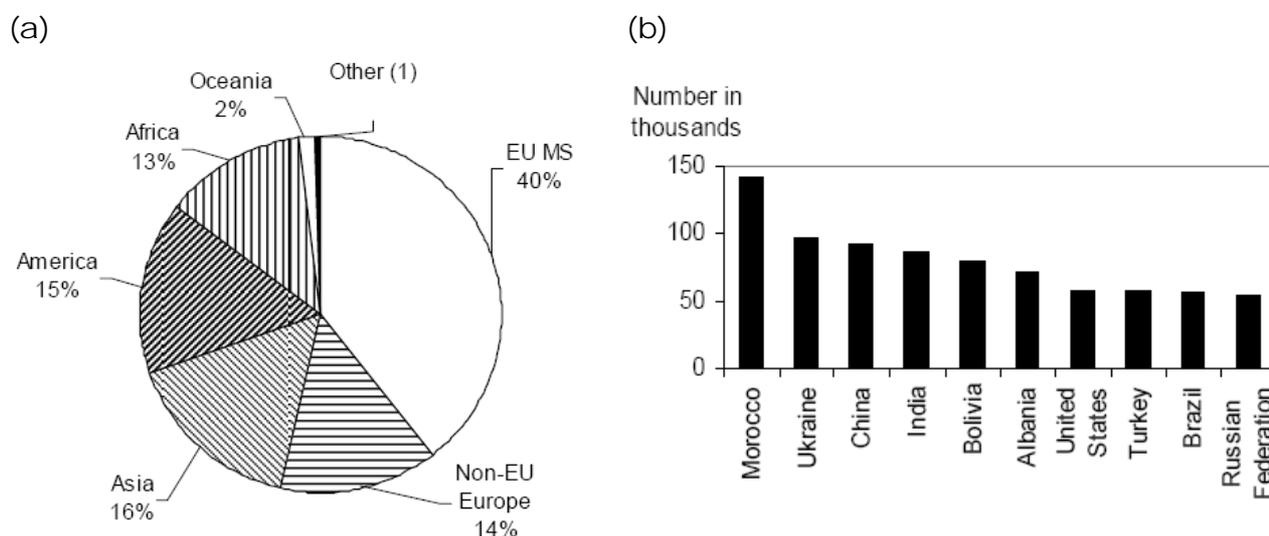
The position of neighbours with respect to the impact of social risks is tightly linked to the impact of globalisation on their economy and job markets as well as their position with respect to migration flows. Globalisation has determined an increase in the relocation of industries to areas where costs are lower to the benefit of emerging economies and neighbours. This has generated higher social risks in European areas where industries are dismissed.

Globalisation concentrates around the hot spots, and while traditional social risks linked to poverty and unemployment may decrease in successful areas, new social risks, linked to lifelong job insecurity, family fragmentation and rising care needs etc., may increase in both winning and losing areas.

Social polarisation is strongly felt in neighbouring regions, migration is fostered and adds on migration from other world regions and further increasing congestion in European cities and regions.

Climate change is an exogenous factor whose effects are likely to show their strength after 2020 with an unpredictable intensity and cumulative effects. Climate change mitigation can be achieved through coordinated action in the global arena. The capacity of neighbours to adapt to extreme events on agriculture, water supply, health etc. will impact migration.

Exhibit 21 – Foreign immigrants by the location of the country of citizenship (a); ten most numerous citizenships of non-EU immigrants (b), EU27, 2006



Source: Eurostat, migration statistics (a) and estimate (b)

The tables in the following paragraphs outline for each challenge, the characteristics of neighbouring countries, the main implications for their income and the implications for the EU<sup>40</sup>.

EU Neighbours include a wide variety of countries at different stages of development, in different climatic zones, with a very diverse demographic structure, export specialization as well as political links with the Union. They exercise an influence on the sensitivity and intensity of challenges impact on the EU regions, both in a positive and negative direction. They cannot therefore be considered as an homogeneous entity but need specific analysis according to how each challenge's feature affects each particular country. In the background papers these different features have been analyzed and their impact singled out. Two groups of neighbouring countries are identified in this paper on the basis of a geographical criterion: Eastern neighbours and Southern Mediterranean neighbours. The first group includes, the Eastern Europe and Central Asia region (that is mainly former

<sup>40</sup> The tables on neighbouring countries draw upon the analysis carried out in the previous sections as well as upon a number of World Bank studies on Europe and Central Asia region and MENA. These include: The path to prosperity: Productivity and Growth in Eastern Europe and the former Soviet Union; Migration and Remittances in Eastern Europe and the former Soviet Union; Growth, Poverty and Inequality in Eastern Europe and the former Soviet Union; From Red to Gray: The Third Transition of Aging Population in Eastern Europe and the former Soviet Union; Innovation, Inclusion and Integration: From Transition to Convergence in Eastern Europe and the former Soviet Union; Adapting to Climate Change in Europe and Central Asia; Shaping the Future: A Long-term Perspective of People and Job Mobility for the Middle East and North Africa.

Soviet States and Balkan countries). The second includes MENA (Middle East and North Africa) and Turkey. This grouping is not exhaustive and cannot be easily adapted to all challenges without caveats.

## 5.2 Neighbouring features, impact of challenges and implications for the EU

### 5.2.1 Globalisation

Neighbouring countries are important actors of globalisation and increasingly involved in international trade and linked to the European Union.

States of the former Soviet Union are recovering after the collapse of the USSR. Russia, Belarus and Ukraine (together with the Balkans) accounted for 13% of EU flows to emerging markets in 2005 (34% total extra EU outflows) and have become important offshore sourcing location; their consumption has periodically provided a major stimulus to the global economy. Their relevant endowment of natural resources is an important strategic factor (in particular in the case of Russia) at an international level.

Middle East and North African regions are experiencing high growth rates and have been an important location for offshore investment for a long time. Between 2000 and 2006 excess savings of oil-rich nations fuelled demand for imports and investment from the E.U. with Middle Eastern imports rising by 116%, greatly helping to balance the growing oil deficit of the Union.

Turkey is an important destination for FDI; despite poor innovation performance, fast growing R&D investment is likely to increase its potential, together with the Balkan countries, as trade partners for Europe.

Neighbouring countries are an opportunity for boosting EU economic growth; most of them are strongly linked to EU and significantly sustained EU growth in the past decade. Their increasing integration is an opportunity to enlarge Europe's economic sphere and a major stimulus to world aggregate demand. EU exports to Eastern Europe, Russia, the Middle East and North Africa soared between 2000 and 2006: North Africa's imports from EU more than doubled; central, eastern European and Russian imports from the EU increased by 174%; Middle East imports from the EU rose by 116%.

EU foreign direct investment in neighbouring countries has boosted the competitive position and profits of many European companies in both manufacturing and services.

Exhibit 22 - Neighbouring countries and globalisation: a geographical perspective

Country group	Main features	Implications for their income	Implications for the EU
Eastern neighbours	<ul style="list-style-type: none"> <li>- late growth resurgence</li> <li>- increasing trade</li> <li>- development of service sector</li> <li>- high current account deficits and external debt levels,</li> <li>- rapid credit growth</li> <li>- consumption boom financed by foreign currency borrowing</li> <li>- tighter trade connections</li> </ul>	<ul style="list-style-type: none"> <li>- Productivity increase in manufacturing and agriculture (due to labour shedding)</li> <li>- Opportunity to increase their income steadily but also high sensitivity to world crisis</li> <li>- Recent growth halt due to drop in commodity prices</li> <li>- Recent increase in</li> </ul>	<ul style="list-style-type: none"> <li>- Increase in world aggregate demand and opportunities for export, FDI, growth</li> <li>- Higher growth in regions specialised in knowledge intensive services that can seize the expansion of the world market</li> <li>- Unemployment and social tensions in</li> </ul>

	with the rest of the world	unemployment in economic centres and lower remittances	areas of industrial decline and low growth - Negative environmental externalities
Southern Mediterranean neighbours (MENA + Turkey)	<ul style="list-style-type: none"> <li>- growing imports and stronger trade but</li> <li>- limited external trade diversification</li> <li>- excess savings of oil rich nations</li> <li>- relatively low integration with the international capital markets</li> <li>- low external debt levels</li> <li>- limited poverty but high sensitivity to food price volatility</li> <li>- ongoing business reforms</li> </ul>	<ul style="list-style-type: none"> <li>- High exposure to external shocks</li> <li>- Reduced entry barriers and increased opportunities from global integration</li> </ul>	<ul style="list-style-type: none"> <li>- Increase in export, FDI and business opportunities</li> <li>- Possible increase in unemployment and social tensions in agricultural regions and areas of industrial decline that suffer competition from MENA</li> </ul>

### 5.2.2 Demographic change

The demographic structure of the neighbouring countries is diversified. Unlike the majority of the European countries characterized by fast ageing, most neighbouring countries have a fast rising population. However, substantial differences among the southern and the eastern neighbours exist.

The demographic structure of the States from the former Soviet Union and Balkans is similar to the EU population structure (e.g.: in the Russian Federation, 71,1% working age population vs. 67,3% EU27 average value; 13,8% elderly people vs. 16,7% EU27 average value in 2005) and fertility rate (e.g.: Russian Federation, 1,37 children per woman vs. 1,53 in EU27 in 2005-10); the higher mortality and intense out-migration from these countries cause their population decrease or stagnate (e.g.: Russian Fed. -4,0%; Ukraine -6,5%; Republic of Moldova -10%). Though still larger and younger than in most of EU27 countries, their working-age population is approaching a shrinking phase, which will reduce the potential for further migration to the rest of Europe, at least of young workers.

Middle East and North African regions need to cope with a strong increase of young people (15-24) (more than 1/3 of the population in the MENA region, 1/4 in the rest of Europe, and only 1/5 in EU27 in 2005) who upon entering the working age do not find sufficient labour demand at home; population ageing does not represent an urgent problem (4% of elderly people vs. 17% in EU27 and 12% in the other European countries in 2005).

Intense out-migration from the neighbouring countries is the main feature of the demographic and economic imbalance with the EU regions. Migrants looking for jobs compete among themselves and with the internal EU27 migrants, increasing social and economic problems, concerning integration, inclusion, social protection and skill needs; on the other hand they are also topping up the diminishing group of young people of working age, which is depressing EU productivity and is causing financial imbalances in the retirement schemes.

Exhibit 23 - Neighbouring countries and demographic change: a geographical perspective

Country group		Main features	Implications for their income	Implications for the EU
Eastern neighbours	- Eastern Europe and Central Asia (apart from Albania, Azerbaijan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan)	- Aging - Outmigration - Low life expectancy	- Low growth perspective (decrease in output, productivity, savings) - High pension expenditure - High cost of personal care (due to aging and the decline in availability of informal, family-based care) - large opportunity costs if younger people spend the time they would spend in the labour force caring for the elderly - reduced demand for preschool, primary and secondary education with redundant capacity of staff and facilities and shortage in higher education	- Declining migration flows - Reduced contribution to mitigate problems related to aging and employment in the sectors where eastern immigrants play an important role (e.g. personal care, building industry and manufacturing)
	Other Eastern neighbours (Albania, Azerbaijan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan)	- Population growth - Outmigration - Low life expectancy	- Problems of social polarisation - Shortage of staff and facilities to meet growing demand for education	- Increased migration - increased problems of social cohesion, exclusion etc. in areas with excess or mismatched migration
Southern Mediterranean neighbours (MENA + Turkey)		- fast population growth - outmigration	- Danger of social polarisation - Shortage of staff and facilities to meet growing demand for education	- Sustained migration from the south helps to mitigate problems related to aging, excess demand for labour - increased problems of social cohesion, exclusion etc. in areas with excess inflow of migration

### 5.2.3 Climate change

Climate change affects neighbouring countries in different ways depending on their geography and climate zone. Different studies (e.g. EEA, 2008; Giannakopoulos et al., 2005) identify the main characteristics of these phenomena with the consequent risks.

In Mediterranean countries, a global temperature rise of 2 °C is likely to lead to a corresponding warming of 1-3 °C. The temperature increase is likely to be higher inland than along the coast. Extremely hot days and heat-waves are expected to increase substantially, especially inland and in southern Mediterranean locations. Longer droughts become more frequent, and the number of dry days increases while the number of wet and very wet days remains unchanged. As a consequence:

- fire risk is likely to increase nearly everywhere;
- agricultural crop yields decline throughout the region and the adoption of specific crop management options help reduce this effect but could require up to 40% more water for irrigation, not necessarily available in the future;
- heating degree days decrease substantially in the northern Mediterranean and cooling degree days increase everywhere in the Mediterranean;
- water demand exceeds available water supply (with more severe problems in North Africa);
- distribution and abundance of species are likely to be affected, potentially increasing the risks of extinction

In Europe and Central Asia, temperatures continue increasing everywhere in the region, with the greater changes occurring at northern latitudes. The north will see greater temperature changes in winter, with the number of frosty days declining by 14 to 30 days over the next 20 to 40 years. Southern parts of the region are expected to see the greatest changes in the summer, with the number of hot days increasing by 22 to 37 days over the same period. Water availability decreases everywhere (especially in South-eastern Europe -25%) but Russia, as increased precipitation in many regions (except South-eastern Europe) is offset by greater evaporation due to higher temperatures. The sea level is going to rise. The main effects include:

- more frequent storms and melting of glaciers;
- damages to coastal infrastructures
- health problems due to heat waves and the reappearance of once rare infectious diseases such as malaria
- the power sector is hard pressed to respond to the peaks in electricity demand associated with rising summer temperatures and is badly in need of upgrade and expansion
- in the northern areas, global warming is likely to bring positive rather than negative effects (at least in the short term) for food security and agriculture since there will be less frost vulnerable and risk-prone agricultural lands

In the medium-long term, climate change in neighbouring countries in the south has far reaching consequences for Europe, perhaps more than other challenges. The phenomena of rising temperatures is widespread, however our Mediterranean and southern neighbours are bound to be hit more severely and so are their neighbours located in Sub-Saharan Africa. Mass migration can affect Europe.

It is possible to identify the following direct and indirect impacts on European countries:

- Migration of people. Further temperature increases in countries where climate conditions are already not favourable (e.g. North Africa; Middle East) will foster human migration towards the Northern regions which, initially, are expected to benefit from climate change

- Migration of animals. This may have remarkable negative effects on biodiversity
- Change in land fertility. Southern regions are expected to lose capacity to cultivate a number, if not all, crops while European countries with more favourable weather conditions are supposed to intensify, where possible, the cultivation of products previously produced in the neighbourhood.

Exhibit 24 - Neighbouring countries and climate change: a geographical perspective

Country group	Features	Implications for their income	Implications for the EU
Eastern neighbours	<ul style="list-style-type: none"> <li>- Warming of northern regions</li> <li>- Availability of water decreases as evaporation offsets increased rates of precipitation</li> <li>- Rise in sea level affecting coastal areas</li> <li>- Increase in diffusion of infectious diseases</li> </ul>	<ul style="list-style-type: none"> <li>- Damage to coastal infrastructure</li> <li>- Increased tourism in areas that benefit from tourism</li> <li>- Decrease in tourist opportunities in mountain areas</li> <li>- Decrease in energy requirements</li> <li>- Increased costs of health care</li> </ul>	<ul style="list-style-type: none"> <li>- Decrease in energy prices may benefit EU dependent regions</li> <li>- Increased food security: eastern neighbours contribute to compensate agricultural decline in the South</li> </ul>
Southern Mediterranean neighbours (MENA + Turkey)	<ul style="list-style-type: none"> <li>- Increase intensity of heat-waves and hot days</li> <li>- Longer droughts</li> <li>- Loss of biodiversity</li> <li>- Rise in sea level affecting coastal areas</li> <li>- Negative consequences on health</li> </ul>	<ul style="list-style-type: none"> <li>- Increase in water demand for human consumption, crops and livestock</li> <li>- Negative effects on agriculture, farming and fishing</li> <li>- Increase in energy requirements for cooling</li> <li>- Increased costs of health care</li> </ul>	<ul style="list-style-type: none"> <li>- Increased opportunities for EU agriculture in areas not negatively affected by climate change to compensate lack of production in neighbourhood</li> <li>- Increase in energy prices</li> <li>- Increase in migratory pressure of people and wildlife towards the EU</li> </ul>

### 5.2.4 Energy risks

Energy security is a key factor for development. The relations with oil and gas producing countries are of prime importance for the EU Member States and as a consequence for the EU regions.

Among the countries from the former Soviet Union, Russia is the single most important exporter of fossil fuels to EU-27. In 2005 around 30% of the EU's oil and around 45% of the gas imports were supplied by Russia. While Russia's resources and proximity make European-Russian collaboration a necessity, Russia's apparent willingness to use its energy wealth to achieve its foreign policy objectives may push European countries towards alternative strategies. One of the focal points of European energy diversification is Central Asia and the Caspian and Black Sea regions.

As regards the Middle East and North African regions, Europe already depends on them for close to 30% of its oil imports and approximately 15% of its gas imports; the potential for growth is significant in the light of the European need to decrease dependence on Russia.

However, competition with Asia and North America and long-term political instability throughout the region will restrain European dependence on this area.

The high degree of dependence of many European countries in particular on Russia's supply, but also on the Middle East and North Africa regions, has negative consequences for European energy security given the vulnerability to supply shocks, as shown in the case of the Russia-Ukraine dispute.

Geo-strategic issues urge for a differentiation of the supply sources. A diversification strategy requires an effective implementation of EU's large scale energy infrastructure projects.

At the same time, the economic development of the neighbourhood is dependent on a sufficient energy provision, hence an additional pressure on world supply will be generated leaving more room to speculation and volatility of prices.

Exhibit 25 - Neighbouring countries and energy risks: a geographical perspective

Country group		Main features	Implications for their income	Implications for the EU
Eastern neighbours	- Eastern neighbours (that are exporters)	- Most important exporters or potential exporters of fossil fuels (Russia, Caspian Sea regions)	- Benefit from price increase and from lock in of importing neighbours and EU - In the long term, if neighbours and EU diversify sources, they may face substantial losses	- Low energy security and vulnerability to shocks - price volatility foster development of alternative sources in EU regions that invest in new technologies.
	- Balkan and Eastern neighbours that are not energy exporters	- Growing energy demand - Energy dependence - Key location with respect to infrastructures connecting producers and the EU users	- Lower growth if prices increase, with cohesion and possible political tensions - Energy prices encourage more efficient use	- Possible disruptions of supply when infrastructure fail and political tensions arise - More efficient use and investment in alternative sources and suppliers is encouraged
Southern Mediterranean neighbours	- Southern Mediterranean neighbours exporters	- Oil and gas exporters - Lack of access to electricity in rural areas - price distortions and inefficient use - high energy intensity in energy use, increasing environmental problems and increasing burden on government finances	- Benefit from price increase - Unlikely that the gains are equally distributed and benefit large portions of the population	- Need to compete with Asia and North America for supplies - Price volatility fosters development of alternative sources in EU regions that invest in new technologies.
	- Southern Mediterranean	- Oil and gas importers - Growing energy	- high and volatile prices of fuels strain finances at the	- Mediterranean importing regions can increase

	neighbours net importers	demand - Lack of access to electricity in rural areas	government and the utility level - problems of coping with high oil prices while financing the rapidly growing demand for energy in general, and electricity in particular	pressure on supply and determine further increase in prices - More efficient use and investment in alternative sources and suppliers is encouraged in the EU
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### 5.2.5 Social risks

Most neighbouring countries suffer from high unemployment affecting, in particular, young people and women, a large informal economy which leaves workers without social rights and social protection, a mismatch between education and labour-market needs.

In the States of the former Soviet Union, poverty is widespread (in addition to the 35 million people in absolute poverty, nearly 88 million in 2005-2006 lived on an income of \$2.15–\$4.30 a day in PPS, being extremely vulnerable to downturns in economic activity) and so are social and regional disparities (the proportion of the absolute poor in the population is still relevant and ranges from 2.9% in the middle income CIS, to 5.8% in South-Eastern Europe (SEE), and to 38.6% in the low income CIS), with the number of people under the poverty line far above EU average. The welfare systems are far from adequate in providing solutions to those risks.

In the Middle East and North African regions, economic growth has reduced poverty, but its effect has weakened over time (during the period 1990-2005 just 1% of MENA's people moved out of poverty compared to 3% in the previous decade). Income distribution is unequal and poverty affects roughly 40% of the population. Social protection systems need important modernization to widen coverage of the population for basic needs (e.g. healthcare and retirement).

Despite its high growth, Turkey is facing severe income inequality (disparities in regional economic development are reflected in disparities in household income, with relatively high concentrations of poverty). The effectiveness of the social protection system is low in Turkey where alternative institutional systems emerged at local level.

The emergence of new social risks in the neighbouring countries can effect European countries mainly through the channel of increasing migration flows and social conflicts. The insufficient welfare system coverage worsens the impact of the current global economic crisis, with the following consequences:

- an increase in the migration inflow to the EU with positive impacts on a shrinking labour supply (a productivity increase may also result from migration of qualified people)
- competitive wages in low-skilled labour segments allow migrants to enter formal labour market
- in some sectors foreign labour may compete with domestic labour with potentially negative effects on wage, welfare and working conditions
- mismatching between skills required by employers and immigrants' skills may lead to an increase in welfare program costs; moreover: well educated migrants are more able to move to work in other sectors than migrants with low skills

- population heterogeneity requires additional and better handling of ethnic diversity and cultural integration in receiving countries with an impact on the cost-benefit balance of migration.

Exhibit 26 - Neighbouring countries and social risks: a geographical perspective

Country group	Main features	Implications for their income	Implications for the EU
Eastern neighbours	<ul style="list-style-type: none"> <li>- Late growth resurgence</li> <li>- Rapid aging with less youngster to support the poor</li> <li>- Reduction of family size</li> <li>- High unemployment</li> <li>- Large grey economy and inadequate welfare coverage</li> </ul>	<ul style="list-style-type: none"> <li>- Widespread poverty</li> <li>- Unequal distribution</li> <li>- Exposure to shocks that would otherwise be managed by intra-family and community networks</li> <li>- Problems of access to education, healthcare, safe water, and heating</li> </ul>	<ul style="list-style-type: none"> <li>- Increased migration and social polarization in destination areas</li> <li>- Downward pressure on wages with degradation of working conditions</li> <li>- Benefit from possible skilled migration</li> </ul>
Southern Mediterranean neighbours (MENA)	<ul style="list-style-type: none"> <li>- High growth</li> <li>- Significant unemployment</li> <li>- High food import</li> <li>- Insufficient welfare coverage</li> <li>- Low women participation and inclusion</li> </ul>	<ul style="list-style-type: none"> <li>- Growth has reduced poverty but strong inequalities persist</li> <li>- Problems of access to education, healthcare, safe water</li> <li>- Low food security</li> </ul>	<ul style="list-style-type: none"> <li>- Persistent inequalities generate desperate migration towards the EU</li> <li>- Only if growth of neighbours is more inclusive, these regions become attractive to EU business and tourism</li> </ul>

### 5.2.6 Summary of challenge intensity in the neighbourhood and main implications

In conclusion, based on the exploration of the features of neighbouring countries with respect to each challenge and the analysis of the implications for their economy as well as for the EU, we provide an assessment of the most intensive challenges in the neighbourhood.

Demographic change, migration in particular, may affect neighbours to the East and the South in a different way but with remarkable intensity. Climate change is a global challenge but certainly neighbours to the South could be more intensively struck in the short-medium term. Social risks, due to demographic features and globalisation, are widespread and relevant to all neighbours. The other challenges are relevant but less intense (see the following exhibit).

Exhibit 27 – Neighbours to the East and South: challenge intensity and implications for the EU

	Globalisation	Demographic change	Climate change	Energy risks	Social risks
Most intensive challenges in Eastern neighbours	++	++++	++	++	+++
Most intensive challenges in Southern neighbours	++	++++	+++	+	+++
Main Implications for the EU	<ul style="list-style-type: none"> <li>- Opportunities due to expansion of global demand</li> <li>- Increased competition and unemployment in declining manufacturing areas</li> <li>- Environmental spillover</li> </ul>	<ul style="list-style-type: none"> <li>- Lower migration flows from Eastern neighbours</li> <li>- More intensive migration from South Mediterranean neighbours</li> <li>- Cohesion problems in destination areas</li> </ul>	<ul style="list-style-type: none"> <li>- Migratory pressure of people and wildlife from the South</li> </ul>	<ul style="list-style-type: none"> <li>- Lower energy security</li> <li>- More efficient energy use and investment in alternative sources and suppliers</li> </ul>	<ul style="list-style-type: none"> <li>- Increased migration and social polarization</li> <li>- Downward pressure on wages with degradation of working conditions</li> </ul>

## 6. Conclusion

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The study has made significant headway in the analysis of drivers that determine the regional impacts of the main challenges faced by EU regions in the perspective of 2020.

The analysis of regional vulnerability to the key features of the various challenges is complex and requires the identification of a large range of indicators to explain the intensity and timescale of each feature of EU regions vulnerability, and to take into account the combined impact of multiple challenges. Data availability is of crucial importance and many limitations exist especially in relation to regional and local level of these phenomena. Moreover, methods for normalisation, synthesis and scenario-building are diverse each one with its both positive and negative aspects. Gaps in knowledge and information still remain in relation to the understanding of their features and combined effects. Future research in this field should work towards closing such gaps.

The five key challenges have distinct identities and have been analyzed, both, independently of each other and simultaneously as part of an interpretative model which aims at exploring interrelation, synergies and cumulative effects. These interrelations are more difficult to understand and foresee but central to Cohesion Policy.

Taken individually, the challenges can generate neutral, negative or positive impacts on regional outcomes, depending on the specific and identifiable characteristics of different regions.

Even if impacts are similar in nature, the degree of vulnerability varies greatly due to different initial conditions and physical and economic features. Impacts are also significantly influenced by the regions' location and links with other regions. Impacts within regions differ too as a result of physical, geographical and socio-economic specificities.

The impact of challenges will be felt over different time scales. Some challenges have a more gradual but potentially more powerful longer-term impact, growing in a cumulative manner (climate change and natural demographic developments), while others have a more immediate or medium-term impact (globalisation, migration, energy and social risks). In relation to the former, we operate in a context of high uncertainty and significant disagreements among experts as to their longer-term significance; other challenges have a clearer and more foreseeable impact.

In the interpretive model set up to explore combined impact of multiple challenges, these can be represented as a hierarchy. Climate change, natural demographic change and globalisation are relatively independent (exogenous). Economic performance, in particular GDP growth, enters the model as an intermediate endogenous variable. Energy security, migration and social polarisation have both exogenous and endogenous elements. By and large, globalization and the current economic crisis emerge as the most relevant factors influencing growth of regional income and consequently income disparities up to 2020. However, the results of the analysis also point out that economic growth cannot ensure cohesion and reduce regional disparities on its own in both the EU and neighbouring countries.

The overall scenarios represent an optimistic situation (high growth and low climate change) and a pessimistic condition (low growth and high climate change) in which European and neighbouring regions could find themselves in 2020. The scenarios take into account the current economic and financial crisis and show, unsurprisingly that in the first case regional disparities tend to decrease while in the second they persist and become even more severe.

Apart from presenting two extreme pictures of the future, the overall scenarios raise the question of how the EU in 2020 can make sure that it will find itself in the positive scenario and what policies it has to implement to achieve this. This question opens a debate on policy options which can help shape the future in the positive direction.

The analysis carried out in the present paper did not explicitly include policy on purpose, in order to focus on challenge impacts and relationships.

A discussion of policies needs a more careful analysis of vulnerabilities and the regional capacities to mitigate or adapt to challenges as well as of the political and institutional context at national and European level. This is beyond the scope of this phase of the study. However, the present analysis provides a good basis for starting a discussion on specific policy choices.

A first level of policy analysis deals with identifying initiatives that can be undertaken with respect to each challenge or each endogenous and exogenous variable, in order to make the optimistic scenario happen. Specific initiatives can be characterised on the basis of the policy area or the objective pursued, on the basis of the existing instrument (e.g. infrastructures, aid schemes, education and training) and on the basis of the beneficiaries (private/public organisation, individuals, networks etc.).

A second level of policy analysis aims at selecting an appropriate and well balanced policy mix for each region or group of regions. This second level should take into account the Cohesion policy, its mechanisms and the current debate for its reform. For instance, the Barca<sup>41</sup> report proposes a territorialised Social Agenda: a development policy which aims at both efficiency and social inclusion. It may provide useful criteria for identifying the most effective and efficient policy mix. This will also obviously raise the issue of the optimal balance between place-based and sectoral policy responses and between Community, national and regional action. This will be an important aspect of programmes for the period 2014-2020 and there is a need for information and debate before matters are settled.

The following table is an attempt to provide a preliminary scheme for debating these issues in the light of the outcomes of the present study.

Drivers of regional disparities	Most relevant categories of policy instrument	Appropriate levels of action	Balance between place based and sectoral responses
Exogenous			
Climate change	Aid schemes Infrastructure Education and training	Global cooperation, European, National as regards mitigation Regional as regards adaptation	Sectoral for mitigation Place based for adaptation
Natural demographic change	Infrastructure Education and training	European, national	Place based mainly
Globalisation	Aid schemes Infrastructure Education and training	European, national, regional	Sectoral and place based

<sup>41</sup> F. Barca (2009), An agenda for a reformed Cohesion Policy. A place-based approach to meeting European Union challenges and expectations. Independent Report, prepared at the request of Danuta Hübner, Commissioner for Regional Policy.

Endogenous			
Energy prices	Aid schemes Infrastructure	European, national, regional (for what concern alternative sources)	Sectoral mainly
GDP growth	Aid schemes Infrastructure Education and training	National and regional	Sectoral and place based
Activity rate	Education and training	National and regional	Sectoral and place based
Migration	Education and training	European, national and regional	Place based mainly
Environment	Aid schemes Infrastructure Education and training	European and regional	Sectoral and place based
Social cohesion	Infrastructure Education and training	Regional	Place based mainly

## 7. Annex 1 – the impact of the economic crisis on the challenges

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The present economic crisis exploded in correspondence with the beginning of the present assignment and has deeply influenced its course, the scenarios as well as the analysis of most challenges, of their main manifestations in the regions as a result of the deepest and most prolonged slump since world war II.

Some aspects of the impact of the crisis on growth and unemployment are summarised in the following tables.

Exhibit 28 – Annual percent change in GDP (constant prices)

	2007	2008	2009	2010	2011	2012
EU27	3,1	1,1	-4,0	-0,3	1,7	2,4
Germany	2,5	1,3	-5,6	-1,0	1,5	1,8
France	2,1	0,7	-3,0	0,4	1,7	2,0
United Kingdom	3,0	0,7	-4,1	-0,4	2,1	2,9
Spain	3,7	1,2	-3,0	-0,7	0,9	1,3
Italy	1,6	-1,0	-4,5	-0,4	0,7	1,4
Greece	4,0	2,9	-0,1	-0,6	1,1	1,6
Portugal	1,9	0,0	-4,1	-0,5	1,0	1,5
Romania	6,2	7,1	-4,1	0,0	5,0	7,2
Poland	6,7	4,8	-0,7	1,3	4,0	4,4
Czech Republic	6,0	3,2	-3,5	0,1	2,5	3,5
World	5,2	3,2	-1,3	1,9	4,3	4,8
Central and Eastern Europe	5,4	2,9	-3,7	0,8	3,8	4,3
CIS + Mongolia	8,6	5,5	-5,1	1,2	3,8	4,8
United States	2,0	1,1	-2,8	0,0	3,5	3,6
China	13,0	9,0	6,5	7,5	10,2	10,7
India	9,3	7,3	4,5	5,6	6,9	7,6
Turkey	4,7	1,1	-5,1	1,5	4,0	3,5
Japan	2,4	-0,6	-6,2	0,5	2,2	3,2

Source: IMF, WEO, April 2009

As the analysis is based on existing studies and literature, it could not focus on the crisis, its causes and its likely dramatic effects on the regions. However, the model used for generating scenarios specific to globalisation as well as overall scenarios of combined impact of challenges has taken the credit crunch into account. Indeed, scenarios are based on two projections of sustainable income in 2020, low and high, which reflect two opposite assumptions about recovery from the crisis. In the low growth scenario, recovery is slow while it is fast in the high growth case.

Exhibit 29 – Unemployment rate 2007-2010

	2007	2008	2009	2010
EU27	7,1	7,0	9,4	10,9
Germany	8,4	7,3	8,6	10,4
France	8,3	7,8	9,6	10,7
United Kingdom	5,3	5,6	8,2	9,4
Spain	8,3	11,3	17,3	20,5
Italy	6,1	6,8	8,8	9,4
Greece	8,3	7,7	9,1	9,7
Portugal	8,1	7,7	9,1	9,8
Romania	6,4	5,8	8,0	7,7
Poland	9,6	7,1	9,9	12,1
Czech Republic	5,3	4,4	6,1	7,4
Russia*	5,6	5,9	9,5	8,4
United States*	4,6	5,8	8,9	10,2
China**	4,0	4,0	4,6	4,7
Turkey*	8,5	9,4	13,1	12,9
Japan*	3,9	3,9	5,8	6,3

\*=as % of total labour force

\*\*=Urban unemployment (as % of total labour force)

Source: Economic Forecast - Spring 2009 EUROPEAN ECONOMY 3/09

There is still a great deal of uncertainty as to the crisis length, its features and effects in the financial and in the real sector in the years to come, and finally on its impact at the regional and local level. Few forecast analyses of the crisis development in the medium term have been produced ; most international institutions were caught unprepared when the crisis exploded last autumn and it was clear that they did not have the instruments to make reliable analysis on the ongoing phenomena, not to say predictions or forecasts of what would happen next. The policy debate, however, was centred on the financial disorder caused by the lack of rules governing the financial markets and its main actors which originated the recession.

After the strong public intervention of most governments in the developed world to save the banking and the financial sectors from bankruptcy, the crisis struck the manufacturing sector, trade flows and world growth slowed down significantly became negative in many countries in the EU. The emerging countries seem to be least hit while the USA and, to a lesser extent, Western Europe were affected more seriously. Within the EU some countries have been hit more than others. Unemployment is rising fast in all major economies (the USA and China, and within the EU in Spain, Ireland and in EU12) and in those countries which benefited from large capital inflows which have virtually stopped or have been severely curtailed.

Many questions are still pending as to the future developments of the crisis, they concern Europe as a whole as well as each member country and region. We can mention the following: the time lag for growth to resume, how the income losses will be shared among countries and regions, structural changes, including the rise of public deficits, and how they will shape future European competitiveness in the world market. This will also depend on how the growth of the world economy is going to be pulled, which country will be the

locomotive, to what extent Europe can be pulled or play a more active role. Then a third level of questions concern the new rules for economic governance, from finance to trade to international settlements, to assure equity and stability among countries. This last appears to be the most important new element in the present crisis apart from its unprecedented strength; it has undermined the previous governance rules which were already under severe criticism but which had been kept for lack of political foresight and agreement on how to change them. This last aspect, however, has pushed some leading western powers to put climate change and emissions and clean energy in the forefront of the political agenda for change; this may be a unique opportunity if the major countries accept the challenge and impose the needed reforms. This opportunity to negotiate for new rules in the global arena and a new wave of investments to reduce emissions and produce clean energy could become the driving force for the economy to resume growth; but there still is a long way to go to make this opportunity a common policy.

The implications of the present crisis on the challenges impact on regional cohesion is a more complex issue to analyze since there is even more uncertainty as to its strength at regional level, as well as the regions' capability to resume growth after the crisis. The specific manifestation of the crisis at regional level, their specializations in the exposed sectors as well as their resilience to the fall of internal consumption have yet to be registered by the statistical indicators and the analysis cannot be more than speculative. In the past decades weak regions tended to suffer least in the short term from an international crisis since they were less exposed to international competition and large shares of their income was based on internal consumption, but they also found it more difficult to resume growth again; in this case, however, the picture may be different since the crisis in the EU has been particularly strong in NMC which were developing fast as a result of relevant capital inflows, from EU 15 in particular. There follows a summary of challenges impact analysis relevant to the crisis.

#### The impact of the economic crisis on globalisation

In the horizon of 2020, whatever its length, the impact of the crisis will worsen the cohesion among regions in the EU and between the EU and its neighbours. All challenges analysis and in particular the one concerning globalization concluded that growth is a necessary but not sufficient condition for benefiting from higher trade and lowering disparities among regions in Europe. Lower growth will result in less investments both endogenous and from abroad in the weak regions, less trade, and the least competitive segments of the productive chain, mostly located in lower income regions, will be hit more severely. The fall of consumption will hit tourism and related services which are the bulk of export services (from the regional viewpoint) in countries like Greece and in the south of Italy and several Spanish cohesion regions. We can review the growth and investment perspectives of countries with the largest number of cohesion and competitiveness regions but little can be added as to how the slump will hit growth in the different regions. The sharp fall in direct investments in EU12 are penalizing in particular those countries without a large internal market whose fast growth in the past decade was due to outsourcing and delocalization of plants from EU15. Those countries where the bulk of cohesion regions are located will suffer mostly from the long recession, also because the stability of their economy is not protected by the EURO and they may be obliged to a creeping devaluation which may endanger the resumption of direct investments. Among EU15, also Spain, which was characterised by significant regional disparities in the past decade, was sustained by important capital inflows and is now particularly penalized by the crisis as the inflow has come to a halt while unemployment risen above 10%. Therefore, competitive advantages, inflow of direct investments, export services (e.g. tourism) all the drivers which

determine the regional impact of globalisation, are likely to be unfavourable to the least developed regions and to the problem areas and increase their sensitivity to the challenge.

The impact of the crisis on climate change and energy risks is far from clear as in the short term lower growth brings less emissions, lower energy consumption from the business sector and saves the market from tensions caused by demand peaks.

The impact of the economic crisis on the energy challenge and on climate change

Lower international demand for oil and gas has reduced energy price and has somewhat improved the safety of supply. However these impacts of the crisis are short term and in no way will provide any significant relief to the challenges intensity in the medium or long term; no structural improvements can be expected as a result. Furthermore, as we have argued in the paper, in the 2020 perspective climate change will impact regions mostly as a result of extreme natural events; the crisis is likely to hit investments in adaptive policies needed to prevent or to alleviate the negative impact of the extreme events. Also the mitigating policies to lower CO<sub>2</sub> emissions need significant investments from the private sector and the households, therefore the crisis impact in the medium, long term may discourage the necessary investments for clean energy and lower emissions technologies. Lower energy prices and more stable supply may also reduce the market profitability for investments for alternative clean energies by changing the relative prices in favour of oil and gas.

The global economic downturn has reduced energy consumption and energy prices. At first sight this increases, to some extent, the security of energy supply – as existing resources are less quickly depleted - and hence decreases the severity of the energy challenge for the EU and its regions. As such, this has a slightly stabilising impact on the regions economy in times of crisis.

Yet, at the same time, the vulnerability to potential supply shocks is higher than before. Thus, any (dramatic) increase in energy prices now, is in danger of choking off any mild signs of recovery or, in the worst case, prolonging and even exacerbating the crisis. Still, despite the fact that reduced energy prices have a positive impact in the short run, these effects come at a high cost. Firstly, the basic energy challenge of a secure and stable supply of energy remains on the agenda, at best it is only postponed for some years by the crisis. Secondly, and much worse, the current crisis and all the efforts to stabilise the financial and real economy reduce the availability of public funds to be invested in necessary structural improvements, basically hitting each area in the energy field, i.e. the supply side (renewable energy, new power plants), transaction (energy networks) and the demand side (energy savings technologies, increases in energy efficiency).

Thirdly, low energy prices also lower the motivation or the economic incentives for private investment in the field of energy. Thus, low energy prices lower the competitiveness of alternative energy from renewable sources (wind, solar etc.) and thus provide less attractiveness for R&D and investments in these areas. All this comes at a time, when the development of alternative fuels or energy could be not only the basis for a long lasting competitive advantage of the European Union (as it is a global front-runner in this area, but also an important source of employment and income (especially also in the more disadvantaged regions) in the EU.

With respect to regional disparities changes in the energy challenge because of the crisis, in the short run, are expected to sustain the existing disparities between regions. In the longer run, however, regional disparities may well increase, as some of the EU countries and regions hit hardest by the crisis are amongst the least developed countries (especially in EU12 ). Hence, any reduction of investment in the field of energy now, might more than

proportionally lower those countries' and regions' capacity to catch up with other regions in the future, with the consequence of an increase in (income) inequality across the EU regions.

The economic crisis is expected to intensify the climate challenge in the regions, both in the short and the long run. Though the sharp reduction of economic activity due to the crisis also has led to a reduction of GHG emissions, per se beneficial in terms of global warming, the positive effects thereof will only materialise at some point in the future (Moreover the crisis will not stop global warming, just postpone it, provided that the crisis ends).

By contrast, in the short run, the current crisis erodes the funds available for investment in adaptation measures to climate change (which in the short run is expected to materialise mainly through extreme events). As a consequence regional disparities due to climate change might increase between regions, where such adaptation measures are already in place and those where they are not, once those regions are hit by floods, droughts etc.

In the longer run, though benefits from reduced GHG emission will have materialised (it is questionable whether the reduction of GHG emissions during the crisis has a significant effect on long term climate developments), the danger is that at present governments are tempted to water down ambitious climate goals and environmental measures for the sake of higher but unsustainable growth. If this is the case, any changes in climate and environmental laws or taxes might well more than offset any reduction of GHG emissions in the longer run with the consequence of a dramatic increase in temperature and extreme events in the future.

#### The impact of the economic crisis on demographic change

Demography and migration are relatively independent from the crisis. The demographic challenge impact on the regions is clear and fairly certain up to 2020; the crisis can only generate minor variations. What on the contrary may vary is the migration flows which were already significant before the crisis. The analysis, however, does not establish a strong correlation between migration pressure from outside Europe and the rate of growth, therefore the lower growth rate in EU and the fall in labour demand, will not discourage migration flows from low income and developing countries which are hit by the crisis in equal measure to the EU.

A change can occur only if the internal policies of migration become more severe and try to reduce the inflow, as is already happening in several member countries. Another aspect is the internal migration from member countries and especially from EU12 towards EU15, which might increase as a result of their fall in growth and the demand for labour. This will very much depend on how long the crisis lasts and on how and where growth will resume; in particular if the EU12 manages to resume growth alongside the EU 15.

#### The impact of the economic crisis on social risks

Social risks is the challenge which will be more severely influenced by the crisis and its effects on employment and income, as well as on the budgetary deficit. This last aspect may be crucial to allow the national employment and income protection systems to cope with increasing pressure from unemployed workers. Consequently, both traditional risks as well as new risks will significantly increase and will cumulate their demand on the national systems of welfare.

The crisis impact will increase the intensity of the phenomena due to the new social risks challenge in the following ways:

- Generalized loss of income as a consequence of higher unemployment.
- Concentration of welfare expenditure on employment and income guarantee schemes.
- Increasing differences between guaranteed and unprotected workers.
- Uncertainties about the future budgetary equilibrium discourage the required adjustments to tackle new social risks.
- The new social risks features (family fragmentation, instability of employment in time, demand for inclusion services etc.) will increase as a result of the slump.

All these impacts are likely to exacerbate social and regional disparities as stronger intensity will hit regions with a higher vulnerability to those phenomena as shown in the scenarios.

The following table summarises the main consequences of the economic crisis on the drivers of the various challenges and lists the potential long run implications of these effects.

	Main effects	Potential long run implications
Globalisation	GDP slow down/recession Slow growth of exports Reduction of capital inflows, particularly to the detriment of Eastern Europe and other 'weak' regions whose growth is substantially dependent on capital inflows (e.g. Convergence regions in Spain, Portugal) increase of disparities	Persistence of slow growth Less Integration and trade barriers, depending on the recovery path of the world economy and on regional capacity to succeed in the knowledge economy
Demographic change	More intensive migration due to the increase in conflicts in the neighbourhood and other out-migrating countries hit by the crisis The increase in unemployment in receiving regions leads to increasing internal disparities	Long run effect on internal and international migration (+/-) depending on the recovery path of out migrating countries and regions
Climate change	No significant boost to drivers of change even if speed of accumulation of CO2 decreases during the crisis Slowing down of international agreements and of actions of mitigation.	Incentive to invest in technologies which may decrease dependence on fossil fuels Potentially higher costs of adaptation and mitigation if action has been postponed
Energy risks	Decrease of price of fossil fuels benefits importing regions harming exporting neighbours income growth.	Less financial speculations on energy prices; Less Incentives to invest in alternative sources to reduce dependence on oil and imports
Social risks	Increase in traditional social risks (poverty, unemployment) No major effect on new social risks which are linked to structural change and globalisation	Increase in income inequalities Unemployment and poverty Increased pressure on public finance

## 8. Annex 2 – Indicators used for assessing sensitivity to combined challenges: range and weights

The following table summarises the challenge indicators used to assess overall sensitivity, their normalised range and weights.

Exhibit 30 – indicators used to assess overall sensitivity

	Indicator	Normalized range	Weight
Climate change	Change in population exposed to floods	-,1	2
	Population in low-lying coastal areas	0,1	2
	Vulnerability to drought	0,1	2
	Risk of 'heat islands'	0,1	1
	Agriculture and tourism	-,1	2
Natural demographic change	Above or below average share of population of working age (15-65)	0,1	2
	Prospective increase or decrease in population of working age	0,1	5
	Share of the very old (80+)	0,1	1
	Prospective increase in the very old	0,1	1
Migration	Net in or out migration	-,1	1
Globalisation	Revealed comparative advantage - business services	-,1	1
	Revealed comparative advantage - medium-high tech manufacturing	-,1	3
	Revealed comparative advantage - other services	-,1	1
	People with tertiary education	-,1	1
	Share of employment in hotels and restaurants	-,1	1
	Per capita GDP growth	-,1	1
	Employment growth	-,1	1
Energy risks	Dependence on imported energy	0,1	1
	Energy consumption by households	0,1	2
	Energy intensity (low efficiency)	0,1	2
Traditional social risks	Population at risk of poverty	0,1	1
	Low employment rate	0,1	1
New social risks	Low educational attainment of working people	0,1	1
	Ineffective or less sustainable welfare systems	0,1	1

## Climate change

Indicators normalised to the range -1 take on negative values for regions that stand to benefit from certain aspects of climate change. Those normalised to the range 0,1 indicate neutrality or varying degrees of vulnerability<sup>42</sup>.

The combined (weighted-average) index of sensitivity to climate change is renormalised so that the value for the most vulnerable region is equal to 1. The mean value is 0.09 and the index value for the region that stands to gain the most benefit is -0.87.

## Natural demographic change

The indicators all measure vulnerability (range 0,1). The combined weighted average index is renormalised to have the same range (maximum vulnerability = 1, minimum = 0).

Regions are judged to have minimum vulnerability if the proportion of their population of working age corresponds to the average for all regions, the size of the working age population is not expected to change significantly, and the expected proportion of very old people in 2020 is not expected to be higher than elsewhere in Europe.

Two groups of regions exhibit substantial vulnerability: those with a relatively small number of children implying a prospective decrease in population of working age supporting an increasing number of elderly people, and those with a relatively large number of children implying a prospective increase in population of working age with consequent vulnerability to high rates of unemployment.

Although several other indicators were provided in the background paper, the above indicators appear to be the most suitable for inclusion in the combined assessment of regional vulnerability since they exhibit significant vulnerability to regions on both sides of the demographic divide.

## Migration

The only available regional indicator is estimates of recent net migration. In this case a zero value (no net migration) may be considered as a vulnerability and a high rate as a potential advantage since migration can make a significant contribution to the resolution of demographic imbalances.

The normalised migration indicator has a maximum value of 1, minimum value of -1 and average value of 0.63 implying that net migration has been relatively small in most regions which may indicate potential lack of flexibility in the face of demographic and economic pressures.

In low growth scenarios migration has been assigned a zero weight implying that it will not be a significant factor in regional performance up to 2020. In high growth scenarios migration has been treated as a minor contributory factor.

## Globalisation

All globalisation indicators have been normalised to encompass potential benefits as well as vulnerability or costs.

The combined index is normalised so that the most vulnerable region has a score of 1. The average value for all regions is 0.01 and the value in the region that stands to achieve the maximum benefit is -4.27. The distribution is somewhat skewed in the sense that a small

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<sup>42</sup> The normalised indicators take negative values for regions for which the original indicator has a negative value or in the case of measures where lower values indicate greater vulnerability, regions for which the original value of the indicator exceeds the assumed point of neutrality.

number of regions are positioned to achieve substantial benefits while the majority of regions exhibit mild vulnerability.

#### Energy risks

Energy is regarded as a potential vulnerability with indicators in the range 0,1. The average combined vulnerability for all regions is 0.25 with some regions with much higher vulnerability due to high household energy consumption or high intensity of energy use in production activities.

#### Traditional social risks

Traditional social risks are linked to poverty and unemployment or underemployment. The normalised index takes values between zero and one with the average vulnerability equal to 0.38.

#### New social risks

In labour markets that are increasingly exposed to pressures of globalisation and societies where households are increasingly fragmented, vulnerability to social risks is indicated particularly by low educational attainment of the working population and ineffective or fragile welfare systems that may not be able to provide adequate support to fragmented households with low earnings.

The normalised index for new social risks again takes values between zero and one with average vulnerability equal to 0.37.

## 9. Annex 3 – A brief note on the CAM model

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The CAM model was used to generate scenarios for the impact of globalisation on Europe and neighbouring countries. The model originates from work at the Cambridge University Department of Applied Economics in the 1980s and has been developed progressively for use in global macro-economic analysis over the past two decades<sup>43</sup>.

The model is designed to examine medium and long-term changes in macro-economic behaviour and generate policy scenarios in which different assumptions may be made about policy response functions. A flexible system of geographical aggregation allows researchers to investigate policy issues and interactions using any desired grouping of countries into blocs. The objective is to provide a simple and robust framework that allows researchers freedom to introduce modifications into the model itself and define scenarios in terms of objectives (targets) and behavioural modifications (instruments).

The model has a relatively detailed coverage of trade and the balance of payments with separate subsystems for primary products and energy that makes it possible to investigate the influence of changes in terms of trade and on movements of the share of exporters in each country or region in markets for manufactured products in other countries and regions as well as changes in the pattern of trade in services and receipts and payments of income and transfers.

The impact of exchange rate movements on each component of the current account is represented explicitly and the model is closed by assumptions about adjustment of domestic spending in each country or region to income and balance of payments outcomes. The global databank and model rely mainly on UN sources.

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<sup>43</sup> For further information see: Cripps F. (2008), Growth and distribution in the world economy: concepts and methodology for a global policy model, October, Alphametrics.  
Cripps F. and Khurasee N. (2008), CAM MODEL OF THE WORLD ECONOMY, VERSION 3.0, USER GUIDE, October, Alphametrics.