Version 01/12/2009

The ESPON 2013 Programme

SPAN-3

Spatial Perspectives at Nuts-3 Level

Project 2013/2/6

Interim Report

EUROPEAN UNION
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This report presents the interim results of a Targeted Analysis conducted within the framework of the ESPON 2013 Programme, partly financed by the European Regional Development Fund.

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

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This basic report exists only in an electronic version.

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TABLE OF CONTENTS

Figures

Maps

Tables

1. EXECUTIVE SUMMARY (MAX. 5 PAGES)

The main theoretical element that drives the philosophy of the project and the modeling effort resides in the concept of "Territorial Capital". Territorial capital is the complex set of elements that explain the competitiveness and performance of single regions. In our modeling exercise, it explains the differential performance of the single territories with respect to wider reference areas: the performance of (Nuts 2) regions with respect to their country and the performance of (Nuts 3) provinces-subregions with respect to their region.

The concept of territorial capital enters the project in many ways. First of all, in the modelling and econometric exercises, where we measure some of these elements, both in the MASST model and in the new MAN-3 submodel. The relevance of the different elements of territorial capital in explaining the success of the single sub-regions is a highly relevant task for the entire ESPON project.

Secondly, it enters in the development of the Report on Barcelona and the Scenarios for the Barcelona area: business networks, social networks, city networks are already at the center of the interest of the Barcelona Diputaciò (Diputaciò Barcelona, 2002, 2006); thirdly, human capital, creativity and entrepreneurship are also important development assets and elements on which spatial policies in the Barcelona area are and will be strongly addressed to; and finally, strong public engagement with respect to the efficiency and the quality of the territory are also widely present in the area and are at the basis of its recent economic success.

The general goal of strand 2 in ESPON 2013 Programme, namely Targeted Analysis based on User demand and in particular of tender 2013/2/6 concerning "Spatial scenarios: new tools for local-regional territories", is interpreted as follows:

- to **show how the general ESPON approach to spatial analysis can be useful to local policy makers** in the interpretation of challenges and trends at the scale of specific territories – regions, provinces, cities;

- to **build new methodologies and tools which could provide support to policy makers for quantitative assessment and foresight**;

- to provide **new evidence on territorial relationships** (rural-urban, small-medium-large cities, centre-periphery at the regional and macro-regional scale), through the use of the above-mentioned quantitative tools, and in particular the territorial elements that allow a better performance of regional economies confronted with the challenges of globalisation;

- to develop interesting and **stimulating partnership processes** between scholars, local-regional policy makers and European officials in charge of EU regional policy.

The specific goal of the project is **to develop regional forecasting methodologies and tools, appropriate to the regional-local scale but consistent with a general EU-wide approach**.

The general structure and the state of the art of the project are presented in Fig. 2.1.

The Interim Report is organized as follows. In the second chapter we briefly present the methodology. In chapter three we show our results with regard to (Fig. 2.1):

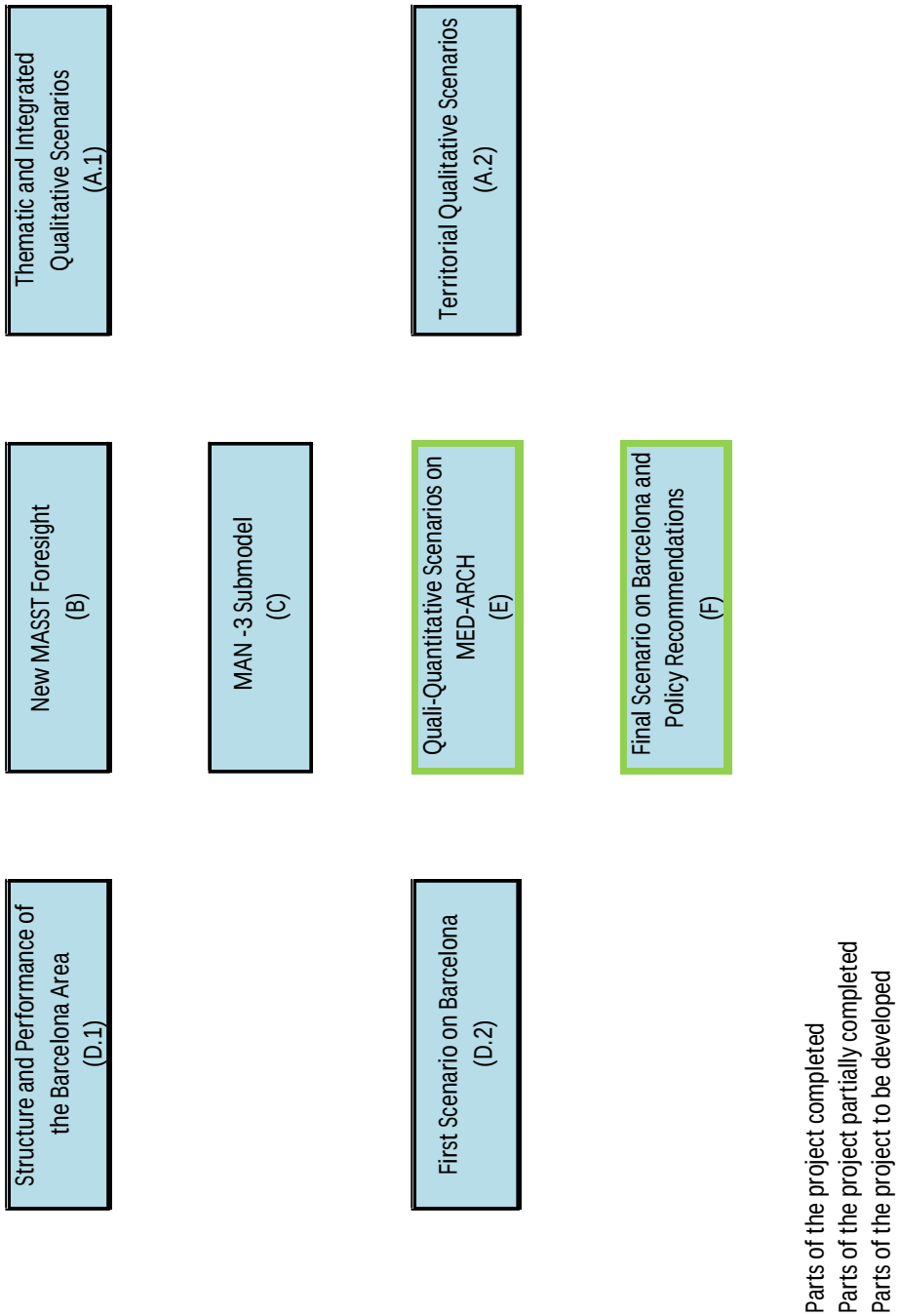
- the qualitative scenario building (A.1); update the qualitative thematic scenarios that were developed in ESPON 3.2., taking into consideration the new driving forces that imposed themselves on the international arena over the last period. On the basis of the updated thematic scenarios, integrated scenarios are developed, also at a territorial level (Latin Arc: A.2);
- the new version of MASST; we produce future GDP growth rates at NUTS 2, under the assumptions of the way the main socio-economic and institutional driving forces of change will develop in the future (B);
- the MAN-3 model; we present the methodology for "translating" the new MASST NUTS 2 results at NUTS 3. This methodology concerns the creation of a sub-model, which will be applied to the Arco Latino countries. Moreover, we provide the first estimate results (C);
- the analysis of Barcelona province and first scenario. An analysis of the structure and performance of the Province of Barcelona is provided, supplying the general socio-economic framework (D.1) on which to insert the future scenario assumptions (D.2).

In chapter four the future steps of the work are drawn.

2. OUTLINE OF METHODOLOGY

The structure and the state of the art of the project are presented in fig. 2.1.

Fig. 2.1. – General Structure and State of the Art of the project



The construction of territorial perspectives for the three countries of the Latin Arc (Spain, France, Italy) and for the Barcelona area is based on the following logics:

- some qualitative thematic scenarios (A.1) and integrated scenarios (A.2) are built, which supply the input for a qualitative foresight exercise with the MASST model (B) at the NUTS-2 level;
- these results represent the starting point for a future econometric analysis, interpreting the differential performance of NUTS-3 regions with respect to their reference NUTS-2 region: the MAN-3 model (C);
- in parallel, an analysis of the structure and performance of the Barcelona province is carried out (D.1);
- the results of the two models are confronted with the qualitative analysis on the structure of the Barcelona economy (D.1). This comparison will allow a fine-tuning of the results and allow to take into consideration elements that are not highlighted by the quantitative exercise;
- the joint results of the Barcelona structure and of the MAN-3 model are used to build the first assumptions (D.2) for the Barcelona scenarios, which will be fully developed for the draft final report (E).

2.1. Qualitative integrated scenarios

The preparation of the scenarios implies:

a. The updating and redefinition of the future driving forces according to new important trends emerged in the last years, namely:

- economic and financial crisis, started in the U.S. and involving Europe and emerging countries,
- new role of some major emerging countries (BRICs),
- contrasting and highly fluctuating oil and energy prices,
- new roles for the rural areas.

These elements are included in the Thematic Scenarios presented in Annex 1;

b. The inclusion of these updated thematic scenarios in three integrated scenarios, namely:

1 - the **Reference Scenario**, characterized by:

- A "Regionalized" globalization, with the large "triad" areas (Europe, America, East and South Asia) more independent and more internally integrated;
- BRICs entering progressively in the medium and high technology game;
- An attenuation of the deflationary effect of Asia on the world economy and consequent rising interest rates;
- A modest increase of growth of real income in Europe will be more modest;
- A limited purchasing power of some groups (retirees, civil servants, low income groups) particularly affected;
- "Regionalized" globalization processes, that will enable the recovery of manufacturing activities in Europe;
- Rising oil price that will favour investments in exploration and discovery;
- The development of a number of new technologies: nanotech, biotech, transport technologies, new materials;
- A redirection of European FDI towards the outer ring countries;
- A slow down of non-European FDI; BRICs and Sovereign Funds investments endangering competitiveness of EU;

- Impact of demographic change on (skilled) manpower shortage.

In this scenario a **new paradigm** will emerge: the **"green economy",** resulting from increasing energy prices and growing concern about climate change.

2 - a second scenario, labeled **Proactive Scenario** characterized by:

- Significant structural changes at global scale;
- Advanced economies moving towards technology oriented activities, implementing resolutely the "green economy";
- BRIC countries also moving towards more technology-intensive activities with better paid jobs;
- The dollar being no longer the sole reserve currency;
- The emerging of a more stable international financial order;
- Boosting technological investments and productivity;
- An increasing unemployment rate in the first 5 to 7 years;
- Race towards stronger tertiarisation attenuated thanks to a rapid development of the "green economy";
- An increasing investments from Europe and BRICs in poor countries (like Africa) in order to create local markets.

3 - an opposite scenario, labeled the **Reactive Scenario**, characterized by:

- Slow recovery from the crisis in the western economies and in Japan;
- A modest global demand;
- Low cost production as comparative advantages for BRIC, notwithstanding their progress in more technology-intensive sectors;
- Few foreign investments in the less developed countries of the world;
- Lower inflation rate than in the reference scenario because of low wage policies in Asia with global deflationist impacts;
- Low interest rates feed new speculative bubbles, threatening the stability of the global economy. The maintain of the dollar as reserve currency works in the same direction;
- No movement of Europe towards a new technological paradigm, and the Green Economy making no breakthrough;
- No qualified service activities;
- A steady level of European exports in the medium range (5 to 7 years), comprising a large share of products with modest added value;
- A decline of the European population in the long-range, the natural evolution being negative and immigration being strictly controlled.

c. The focalisation on the effects of these scenarios on the Latin Arc countries and the Barcelona area.

2.2. Quantitative scenarios at Nuts-2 level

The quantitative part of ESPON 3.2 scenarios relied on the MASST model, i.e. a regional growth forecasting model, able to predict behavioral trends of economic growth under different assumptions on the driving forces of change.

The same model is used in this project as a first step towards a more territorially disaggregated scenario building methodology. In fact, it allows to translate the main international trends and driving forces that emerge from the scenario assumptions into regional impacts and trends, and to test whether the logical intuitions presented in the qualitative scenarios are reflected in a comprehensive regional growth and interaction model.

The model used in this project is an updated version of the MASST model, enlarged to encompass the sectoral dimension. The simulation output of the model, at NUTS 2 for all 27 EU countries, consists of regional GDP growth rates. The assumptions behind the quantitative model are exactly those of the qualitative approach.

2.3. Quantitative scenarios at Nuts-3 level

The methodology we suggest in order to build scenarios at a more disaggregated territorial level than NUTS-2 is developed thanks to the implementation of a simplified, extrapolative / comparative sub-model, called the MAN-3 (Masst At Nuts 3) model. The sub-model is built in a way that the main trends and driving forces present in each scenario are considered and included in the forecasting process, as well as the importance of the territorial specificities of the single regions of the three countries considered. The aspect of the MASST model that will not be replicated at NUTS 3 is the comprehensive interregional interaction logic of the whole model (with the international/interregional spill-over effects) and the internal consistency of the macroeconomic forecasts.

MAN-3 sub-model is an econometric model which explains the differential GDP growth rate at NUTS3 compared to the GDP growth rate at NUTS 2. In other words, the sub-model aims at identifying the reasons that explain why a sub-regional area is able to grow more or less that its region.

The reasons that explain the relative performance of a sub-regional territory have to be found in its *territorial capital*, that covers all genetic aspects of local growth. The quantitative analysis and interpretation of the differential behaviour of Nuts 3 regions with respect to their respective Nuts 2 regions in each country, realized through the estimation of the MAN-3 sub-model, represent a relevant by-product of this phase of the project for the entire ESPON project.

2.4. Barcelona structure and performance

This section of the project presents the structure and performance of the province of Barcelona and some first scenarios on Barcelona.

The results will be discussed at the next meeting on January with experts and policy makers in order to reach a common understanding of the present development potential of Barcelona and its territory in an “after crisis” scenario.

3. MAIN RESULTS

3.1. Qualitative integrated scenarios

The following integrated scenarios are built on the basis of updated thematic scenarios presented in the Annex 1 and taking always into considerations the new driving forces.

3.1.1. European challenges before the crisis

3.1.1.1. Demography

Demography has turned to become a real challenge for the development of Europe. While population was abundant and showed sustained growth during the fordist period, the long-lasting decline of fertility rates has generated modest population growth (average annual growth rate below 0.5% since 2000) and progressive population ageing. The inclusion of the countries of Central and Eastern Europe into the European family has aggravated the general demographic situation, as population decline has already started in most of these countries. Strong population ageing is counteracted there only by low levels of life expectancy.

Western Europe is not homogeneous in demographic terms, with some regions showing high population growth (Ireland's regions, northern regions of Scotland and Italy, south-eastern regions of Spain, southern regions of France, scattered regions of Switzerland, the Netherlands, Norway and Luxembourg) and others showing weak growth or even decline (north-western regions of Spain, southern regions of Portugal and Italy, several regions of Germany and Greece, northern regions of Norway and Sweden, eastern regions of Finland). Population change in European regions is largely determined by migration flows. The past decade has been characterized by sustained flows of migrants from Eastern and Western Europe, but also within Western Europe, from southern to northern Italy, from the UK to France and Spain and also between neighboring countries (Nordic countries; Czech Republic and Slovakia etc).

Since 2000, fertility rates have increased slightly, but not enough to ensure the replacement of generations and to counterbalance population ageing. Since 2000, the increase of the old age dependency ratio has been particularly strong in Germany, Greece, Italy, Estonia, Latvia and Slovenia. It has been progressing in most other European countries.

The transformation of the demographic structure has significant impacts on the evolution of the population of working age. Since 2000, this has been declining in most regions of Germany, especially in the eastern Länder, in the northern regions of Norway and Sweden, in eastern Finland, in the Baltic States as well as in several Slovak, Rumanian and Bulgarian regions. Only 16% of European regions experienced annual growth rates of working age population higher than 1%.

3.1.1.2. Economy

The European economy is now emerging from the most severe crisis of the post-war period. During the decade before 2008, Europe was however confronted with a series of challenges in a context of accelerating globalization. Its average per capita income was more than three times higher than the world average, but it was only 70% of the US level

and lower than that of Japan. The process of convergence in which Europe had been previously involved, based on the assimilation of existing technology, organizational practices and increasing activity rates, had come to an end at the beginning of the 1980s. Although productivity increased more dynamically in Europe, it was counteracted by weak employment performance and falling working hours. While in 1970 all of the difference in GDP/capita between Europe and the USA could be attributed to lower labour productivity, this represented only 1/3 of the difference by 2000, 1/3 being accountable to fewer working hours and 1/3 to lower employment rates. By and large, Europe had not sufficiently adopted the new economic paradigm based on new organizational forms, less vertically integrated firms, greater mobility both intra- and inter-firm, greater flexibility of labour markets, a greater reliance on market finance and a higher demand for both R&D and higher education. Although the catching up process of the economies of central and eastern Europe has been encouraging, with the 2004 and 2007 enlargements the EU has inherited the largest levels of territorial inequality in its history. The Lisbon Strategy, adopted in 2000, addressing the issue of European technological competitiveness has been challenged by disappointing achievements. At the same time, the expansion of international trade and international investments far outpaced the growth of output and income. In this process, the emerging economies (BRIC) have been playing a major part, using mainly their comparative advantages of lower labour costs and growing domestic markets.

3.1.1.3. Energy

The past 10 years have been characterized by strong fluctuations in oil price and by the price increase of other energy sources (natural gas, electricity). The strong fluctuations of oil price between 2003 and 2009 were driven by both supply and demand variations: strong increase of oil price after 2003 (supply variations related to the Iraq war, demand variations, with increasing oil demand from emerging economies and role of OPEC and speculative traders); strong decrease of oil price during the second half of 2008 caused by sharp fall in demand related to the financial/economic crisis and the attenuation of speculation; increase of oil price during the first half of 2009 driven by a modest recovery from the crisis. The strongest price fluctuations concern crude oil and reflect very closely the relationship between supply and demand (no elasticity). The price evolution of other energy sources after 2003 shows an upward trend with smaller fluctuations, driven by the average change of oil price. The liberalization of electricity markets in Europe has, so far, not resulted in a decrease of electricity prices. On the contrary, electricity producers increase domestic prices in the context of emerging competition in order to be able to invest for catching new markets abroad.

3.1.1.4. Transport

Even in a context of relatively modest economic growth rates, especially in the EU-15, Europe has been facing during the past 20 years a significant increase of traffic flows at all scales. Several factors have cumulatively contributed to this process: the progress of European integration, and especially the East-West integration, the spatial segmentation of production processes in manufacturing activities, the growing motorization, expanding urban sprawl etc. Despite significant efforts, the development of transport infrastructure has not been sufficient to counterbalance congestion (roads, motorways, railways, airports). Wide disparities in accessibility remain, both in absolute and relative terms, which are progressively alleviated by the expansion of infrastructure networks (TEN-T) and by the generalization of low-cost airlines. A major problem is the imbalance of transport modes in favour of road and air transport which counteracts the objective of

sustainability. The significant increase of oil prices between 2003 and 2008 had little effects on the volume of transport flows and on modal split.

3.1.1.5. Urban systems

Between 1995 and 2004, all capital city regions in the EU, with the exception of Berlin and Dublin, increased or at least maintained their share of national GDP. The increase was particularly marked in Warsaw, Prague, Budapest, Sofia and Bucharest.

The relative growth of capital city regions is strongly related to their attraction as locations for businesses as well as for individuals. This tends to lead to unbalanced territorial development within countries, unless there are other centres of economic activity, in particular other large cities or conurbations or even networks of smaller cities and towns to provide the same kind of attraction. The concentration of economic activity in capital cities brings benefits in the form, for example, of economies of scale or of agglomeration and the large size of markets. But it also involves costs, in the form of congestion, poor air quality and higher property prices. On average, the share of capital city regions in the national GDP increased by 9% between 1995 and 2004 while the population only increased by 2%. In only three countries in Europe, do second-rank metropolitan areas seem to be effective in counterbalancing the economic power of the capital city: Barcelona (Spain); Milan and Naples (Italy); Germany (multiple growth poles such as Munich, Frankfurt, Hamburg). In other countries, the capital city region tends to dominate, even in Poland, despite relatively large concentrations of population in Lodz, Kraków and Wroclaw. Only in Germany and Italy are there second-rank cities with GDP per head higher than in the capital[1].

In the context of accelerating globalization and of enterprises' relocation towards countries with low wages and booming markets (Asia in particular), medium-sized towns are generally more affected than metropolitan areas, both in Eastern and Western Europe.

The residential, patrimonial and tourist economy favours a number of attractive European regions with small and medium-sized cities. European integration is also an important factor for the development of urban systems at the intermediate scale across national boundaries.

European urban systems are also characterized by a significant progress of suburbanization. In 90% of urban agglomerations, population grew more in the suburbs than in the core city between 1996 and 2001. Population growth around second-tier cities with population loss in the centre is evident in most cases in Austria, Poland, Slovakia, Italy and Germany. Growth of population in the suburbs is often accompanied by the suburbanization of economic activity. This is also the case around the capital cities in Central and Eastern Europe.

The spatial de-concentration of population and economic activities around agglomerations is accompanied by an over-proportional expansion of the urbanised area. Over the past 20 years, the extent of buildup areas in many western and eastern European countries has increased by 20% but the population has increased by only 6%. There is no apparent slowing down of these trends. The urban areas particularly at risk are in the southern, eastern and central parts of Europe. The mix of forces behind urban sprawl includes both micro and macroeconomic trends such as the means of transportation, the

[1] European Commission : « Growing regions, growing Europe ». Fourth Report on Economic and Social Cohesion. 2007.

price of land, individual housing preferences, demographic trends, cultural traditions and constraints, the attractiveness of existing urban areas and the application of land use planning policies at both local and regional scale.

Social tensions and polarization have been growing in a large number of European cities over the past decade. In many cities, not only are unemployment rates high, but there are huge disparities in rates. Disparities are particularly large in France, Belgium and southern Italy (for example Marseille, Catania).

Economic polarization takes place mainly in and around large cities, while demographic dispersal can be observed around an even larger number of cities, comprising also medium-sized towns. Various factors are contributing to this important trend: the deterioration of the quality of life in inner-city areas as well as in large, dense suburban housing estates, the growing concentration of low income groups in cities generating social segregation and feelings of insecurity, increased housing prices in cities, growing motorization, especially in the new member countries etc. Dispersal trends around cities are generally not spatially uniform and favour corridors along main transport infrastructure.

3.1.1.6. Rural areas and rural development[2]

During the past decade, the differentiation of European rural areas has further progressed, increasing the contrast between accessible rural areas under urban influence (stabilization or increase of population and progress of counter-urbanization; stronger development of employment in secondary activities and private services) and the more remote and peripheral rural areas (strong population ageing; declining attractiveness for businesses and households; reduced provision of services and, in various cases, vicious circles of deprivation). Intermediate rural areas are often characterized by the increasing importance of the "New Rural Economy" (clusters, post-fordism, learning regions etc.).

The importance of agriculture in rural employment and in the outputs of rural regions is further declining. In central and eastern Europe, the share of agriculture in rural employment is still significant (above 20% in numerous rural regions), but it is also rapidly declining. Agriculture is going through a slow transition process from "productivism" to various types of para-productivist (competition on the basis of specialization, technology and strong links with the agro-business) and peri-productivist (on-farm and off-farm diversification of activities and employment for farm households members) orientations. Agriculture is also affected by changes in consumption trends (growing importance of niche markets). The CAP reform, introducing direct payments to farmers, as well as environmental and safety norms, has contributed to the evolution towards more sustainable forms of agriculture. Liberalization measures, as for instance in the milk and dairy sector, are however causing severe adjustment problems and significant tensions. Agricultural activities themselves show a growing contrast between large "commercially-oriented" holdings and smaller pluri-active and diversified units.

Numerous rural areas are benefitting from the increasing value placed by society upon the rural environment, culture and heritage as well as from the increasing ability of the urban population to access recreational amenities.

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[2] ESPON Project EDORA (European Development Opportunities for rural Areas). Interim report. April 2009.

3.1.2. Perspectives and critical factors for the next 15 years

3.1.2.1. Demography

The number of European regions where population will stagnate and then decline will be growing. Population ageing will accelerate and dependency rates as well as mortality rates will increase in most regions. The increasing number of "oldest old" (aged 75 and over) will generate a significant demand of health care. The size of the population of working age will further diminish in most regions. There are however regions in Europe where the demography is still dynamic, with strong cohorts of young people. Winners will be more and more the regions capable of attracting qualified manpower and/or well off retirees. An open question is the amount of external in-migration towards Europe.

3.1.2.2. Economy

It is likely that wages will increase and technology will significantly progress in the emerging economies. Their comparative advantage of low labor costs will progressively be replaced by a competitive advantage, challenging the European economies on world markets in segments of significantly higher added value. Integration will most probably progress more within the various world regions than between them. This may have significant consequences for the orientation of FDIs. It is also not improbable that Asian countries create a common currency in order to better protect their interests. The future of the dollar as reserve currency is more questioned than ever. Its further worldwide use in the trade of energy and raw materials is also uncertain. A weak dollar may, however, mean that significant production activities will be relocated into the dollar zone in order to better access markets and also to export under better conditions. The accumulation of capital outside Europe (BRIC, energy producing countries, sovereign funds) will facilitate the taking over of European businesses by non-European groups looking for good investment opportunities, advanced technologies and short-term profits. This may endanger the long-term prosperity of increasing segments of the European economy. The likely increase of wages and related production costs in emerging economies (especially Asian countries) may induce inflation likely to spread throughout the world economy. The emergence of higher interest rates and progressing inflation is not improbable during the recovery from the economic crisis and also for a longer period.

Being the most volatile factor of territorial development, the European economy may follow rather different paths, each having its own territorial impacts. In this respect, the most strategic issue is the way how Europe will position itself at global scale after recovering from the economic crisis. Will the emerging economies (BRIC) become stronger competitors and bring Europe into a defensive attitude or will Europe be boosted by the shock of the crisis and invest massively in new technologies in order to gain largest shares of external markets? Will the internal EU market of 500 million inhabitants be more efficiently used to let new forms of endogenous growth emerge, taking advantage of the complementarities existing between European regions? Will the political priority to curb down climate change be utilized to change massively the energy paradigm and to generate economic growth through a "Green New Deal"?

In addition to issues related to the global and macro-economic context, intra-European issues are also relevant, such as the future extent of the catching up process of central and eastern Europe. The engine behind this process has largely been up to now the substantial amount of western FDIs in these countries. Will the flow of FDIs continue with the same

intensity and in the same direction after the recovery from the crisis or will western FDIs be significantly re-directed towards countries outside EU borders, farther in the East and in the eastern and southern parts of the Mediterranean Basin? Will the countries of central and eastern Europe generate sufficient endogenous growth in order to compensate for a likely reduction of FDIs?

In how far will European regions become handicapped by the decline of the working age population and by the scarcity of qualified manpower?

3.1.2.3. Energy

In the present context, energy prices are very closely related to the level of global economic growth at world scale. Despite strong price fluctuations in recent years, the general trend is upwards. Recovery from the crisis and further development of the BRIC countries are likely to strengthen this trend. The energy sector is largely globalised because of the concentration of large fossil energy resources in a small number of countries. The external dependency of Europe in terms of energy supply will remain high in the 15 years to come and therefore subject to the inelastic relation between global supply and demand. Possible depletion of oil resources in some large oilfields could generate a process of oil peaking (declining supply in a context of growing demand) which would result in extremely high energy prices.

The possible scarcity and depletion of uranium resources should not be underestimated in the context of growing demand related to the construction of numerous nuclear power plants at world scale. Coal will remain a significant energy source for the transition period between the old and the new energy paradigm. Thanks to new technologies (CO2 capture), it will be possible to reduce considerably the air pollution generated by coal-fuelled power plants.

The development speed of renewable energy sources will depend both upon the price evolution of conventional fossil energy sources and from the political willingness to depart from carbon-related energy and to promote the new energy paradigm. The introduction of substantial carbon taxes would play a major part in this respect.

3.1.2.4. Transport

The main critical issues for the future in the transport sector are the elimination of congestion, the impact of transport on climate change and improvement of the accessibility of less favoured areas. The likely change of energy paradigm in relation to climate issues and the possible scarcity of oil resources, are major challenges for the transport sector. They will significantly affect transport costs and therefore locations (households, businesses) and mobility patterns. New transport technologies will emerge in the coming decade. The speed of their diffusion and generalization is however uncertain. If significant carbon taxes are introduced, the present modal split patterns will be affected to the benefit of more environmentally friendly transport modes. They will also have an impact on the mobility of people, favouring even more the development of ICT services, as a substitute to physical mobility. Public transport networks and services are likely to be strengthened, both in urban regions and between them. High-speed train networks will continue their expansion, with new cross-border connections.

3.1.2.5. Cities and urban systems

Cities and urban systems will be facing a number of challenges during the coming decades. Some are the results of trend continuation, others will be generated by the emergence of exogenous factors and new global priorities, especially those related to climate change.

Trend-related challenges concern the rebalancing of urban systems there where capital cities and large metropolitan areas have largely captured growth in the past. This is a particular challenge for the countries of Central and Eastern Europe. Most challenges are however to be found at the scale of metropolitan regions and urban entities. The continuation of urban sprawl in the surrounding of cities and growing social polarization with all related impacts (security, riots, social segregation, ethnic tensions etc) within cities are growing concerns in numerous European towns.

Cities will in general be less affected by population ageing issues than the countryside because of the presence of larger groups of young population. Needs for additional health care services for the elderly will nevertheless increase.

Policies addressing climate change are likely to have significant impacts on cities, especially in the field of transport systems and mobility, building and construction, urban planning, greening of the urban environment etc. In case energy price will substantially increase and/or carbon taxes will be sufficiently high, changes towards more compact cities, especially with stronger concentration of settlements around the stations of public transport networks can be expected.

Municipal finances are particularly affected by the economic crisis and its impacts. Municipalities will face increasing difficulties to meet the above-mentioned challenges with more limited resources. It is likely that local taxes will increase in a number of countries.

3.1.2.6. Rural areas and rural development

As in the case of cities, future challenges for rural areas will partly result from the continuation of trends and partly from factors of exogenous, mainly policy-related origin.

Numerous rural areas are likely to be affected by population ageing and a growing number of them by population decline. Very much depends however upon the situation of rural areas in relation to cities and metropolitan areas. This factor will play in future a growing role with regard to the demographic and economic evolution of rural areas as well as to the provision of services. This will contribute to stronger differentiation in the evolution of rural areas. The perspectives of rural areas under metropolitan influence and of those which have potential for the residential, patrimonial and tourist economy are more encouraging than those of remote rural regions with declining population, low accessibility and weak attractiveness. Agricultural activities will be significantly influenced by the further liberalization of the CAP and the growing importance of extra-European competition. The reformed CAP after 2013 will again condition a number of rural activities.

The strengthening of policies supporting the further development of renewable energy sources is of great importance for the future of numerous rural areas. Potentials exist in many rural regions, but can only be extensively exploited if the conditions of profitability

improve. The introduction of carbon taxes is likely to increase the level of profitability of renewable energy sources, but it can constrain that of agriculture which consumes also significant amounts of oil-related energy.

3.1.3. Scenarios

3.1.3.1. The Reference scenario

The Reference Scenario is not a trend scenario in the conventional sense, because the simple extrapolation of trends does not seem meaningful in a context where numerous factors of strategic significance are moving (globalization, energy paradigm, climate change, social orientation, recent economic crises etc). The Reference Scenario takes into account a number of recent structural changes in addition to more long-term evolutions.

While European demography stagnates and the ageing process intensifies, a number of changes are likely to crystallize in the macroeconomic context. The regionalization of the globalization process reduces the amount of external FDIs into Europe, with the exception of those (sovereign funds etc) aiming at taking over European businesses of strategic character (technology, brands etc). European investments are less substantial but more concentrated on Europe and on its external periphery and neighborhoods (including Ukraine, Moldova, Turkey, Egypt, North Africa). The integration of currencies takes place at the scale of large world regions (North America, Europe, Asia, Gulf States), but these fluctuate more between themselves at that scale. The US dollar loses its importance as reserve currency. The deflationist effect of Asia (mainly of China) on the world economy is strongly attenuated and progressively disappears. Inflation increases as well as real interest rates. The growth of real income in Europe is more modest than before. The purchase power of specific groups (retirees, civil servants, low income groups) is particularly affected. The new generations maintain their standards of living in selling their heritage and properties. The regionalization of globalisation enables the recovery of manufacturing activities in Europe. Disparities in the productivity of the main economic sectors increase, especially between advanced economic functions (financed by capital) and basic services (paid by incomes, including social transfers). Such disparities are projected also on territorial development. A number of new technologies emerge during the coming 15 years which will have significant impacts on the economy, especially in the fields of energy production and use, including the processing of biomass, the nanotechnologies, biotechnologies and transport systems.

Growing oil and gas prices favour investments in oil and gas exploration and discovery. The Arctic region becomes a strongly targeted region in this respect. Regional tensions and possible conflicts are not excluded. The expansion of nuclear energy is constrained by the progressive depletion of uranium resources. The profitability of renewable energy increases, but political support is insufficient to generate a radical change of the energy paradigm. The progress of renewable energy sources remains dispersed and fragmented, with low synergy effects. The economy hardly benefits from this process.

Territorial aspects of the Reference Scenario

The catching up process of the economies of Central and Eastern Europe continues, but at a significantly lower speed than before the economic crisis. It is also more differentiated among the countries concerned. Despite this process at macro-scale, regional disparities are likely to increase within the EU at a lower scale. The two-speed Europe is accentuated, with advanced economic functions concentrating more and more in

metropolitan regions. New manufacturing activities, benefiting from significant technological progress and from related productivity growth, also concentrate in well-developed regions. In addition to main metropolitan regions, second-rank cities and metropolitan areas are also beneficiary, but the process is weaker in the case of a number of second-rank cities in Central and Eastern Europe which are handicapped by their low accessibility. The regions most affected by the crisis and where development perspectives are not easy to identify, are mainly manufacturing regions with low or intermediate technologies and a relatively high intensity of manpower, both in Western and Eastern Europe.

Other regions affected by the crisis and where recovery proves difficult are those which had, up to the crisis, booming activities in the sector of building and construction, largely based on speculation in the real estate sector, as for instance in Spain. Lasting difficulties may also affect regions where economic growth before the crisis was largely based on financial speculation and related financial services or on specific fiscal niches as in Ireland and in the UK. Numerous tourist regions have also been affected by the crisis, but tourism is very volatile and the recovery of these regions depends upon the general level of the European economy. In the hypothesis of moderate economic growth in the medium range, and number of tourist regions have a satisfactory recovery, a fact which does not exclude that others, especially those based on mass tourism with low added value, may face a less favourable evolution. The evolution of rural areas will be contrasting and heterogeneous, with a number of rural regions being affected by the deregulation of the CAP and trade liberalization in the context of the WTO, others benefiting from the opportunities of biomass and renewable energy production. In addition, other factors influence the future of rural areas, such as their attractiveness for retirees, their potential for rural tourism and also the impacts of climate change.

The regions where demographic factors may act as a constraint on the regional labour markets are those where the economic recovery is substantial in a context of rapid population ageing. This may be the case for metropolitan regions with low immigration in the past decades as well as for a number of rural areas subject to economic revival. Immigration further concentrates on large cities, generating a low cost housing market at their periphery. It is also substantial in tourist areas and in areas attractive for the retirees. In these regions, it favours the increase of fertility rates.

Territorial impacts for the Latin Arc

In the Latin Arc, three types of demographic structures prevail, with different development perspectives. In the Catalan part, the young age of the population (sustained natural growth and positive migration balance) favours further population increase and limit the ageing process. In the French part, the population is, in the average, older and is still growing, although more modestly than in the Catalan part, mainly under the influence of migrations. In the Italian part, low fertility rates and a high share of elderly induces a negative natural evolution, compensated in various areas, but not uniformly, by significant in-migration flows. The number of « oldest old » increases significantly, calling for a strong development of health care services.

The "Latin Arc" has a rather heterogeneous economic structure, so that developments will contrast between regions. In general terms, metropolitan areas with advanced economic functions and technological poles are more favoured than cities with an economy depending upon intermediate or low technologies. After recovery, tourist functions progress moderately. The residential economy progresses more because of

accelerating population ageing in Europe. Rural areas are affected, up to a certain extent, by the deregulation of the CAP, especially the wine producing regions. A number of rural areas benefit from the production of renewable energy, but only a modest part of the available potential is being exploited. Immigration concentrates in metropolitan and tourist areas.

Cross-border accessibility benefits from the high-speed train connections between Catalonia and France (Barcelona- Perpignan) and from the HST connection between Rhône-Alpes and Piemonte (Lyon-Torino). Along the coast, the railway connection between Nice and Genova is however not significantly improved.

The considerable potential of the Mediterranean regions in the field of solar energy is not fully exploited, because of insufficient profitability and public support.

3.1.3.2. The Proactive scenario ("Green Economy")

The proactive scenario is based on the assumption that the decisions adopted at international level aiming at curbing down the speed of climate change are efficiently used as an opportunity to generate significant economic growth throughout Europe. The realization of the scenario requires not only substantial, courageous and well coordinated public policies (such as the introduction of high carbon taxes), but also the active involvement of economic actors and of the civil society.

This proactive scenario for Europe is part of a more global context in which the large emerging countries are pulling up the world economy while moving towards more technology-intensive activities. The international financial order is stabilized by the diversification of currency reserves, the dollar having lost its monopolistic position.

Economic growth is stronger and recovery more rapid than in the reference scenario. It is not limited to Europe, but includes also the USA and Asia. The more developed economies and also the BRIC invest in the less-developed countries, especially in Africa, Latin America and Southeast Asia, in order to develop the local markets and to create demand, which is just the opposite of a protectionist attitude.

In Europe, the strategy consists of increasing significantly technological investments boosting productivity, but generating in a first stage higher unemployment rates. Only after a period of 5 to 7 years, employment is growing again. Higher skills and qualifications are required, which doesn't mean that Europe's employment is mainly composed of managers. The race for stronger tertiarisation is being attenuated thanks to a rapid development of the "green economy" which creates jobs both in R&D and in manufacturing activities. Services move towards higher added value segments. In the context of a more regional globalization, higher financial services are being re-centered on Europe. Through higher competitiveness and stronger public support, European enterprises are less in danger of being taken over by non-European groups or sovereign funds.

The concretization of the "Green Economy" is far from being an easy task, especially in the medium range, as long as the benefits are not tangible. The introduction of significant taxes in the context of declining purchase power and high unemployment levels is not popular at all. Numerous local authorities choose to take action in relation to climate change, but their resources are limited by the impacts of the economic crisis. The potential investments of SMEs are constrained by difficulties in obtaining bank credits.

The transition from carbon-related energy systems towards a new energy paradigm based more largely on renewable energy sources is affected by the levels of necessary investments and by constraints of profitability. The international harmonization of policies is also a difficult issue which generates distortions.

The progressive emergence of new economic growth and the creation of significant amounts of new jobs after a few years generate however trust in the strategy related to the "Green Economy", so that more and more businesses and households invest, with encouraging returns on investment. This leads to a mass effect which ensures sustained economy growth and strengthens social cohesion.

In the demographic sector, fertility rates are subject to a revival, favoured by the positive economic evolution, but their impact remains a long-term one. The shortage of population of working age in a growing number of regions favours the immigration of qualified manpower.

Territorial impacts of the proactive scenario

The territorial impacts of the pro-active scenario change somewhat over time. During the first phase (5 to 7 years) growth is concentrated on metropolitan areas, especially in Western Europe, because of significant investments in advanced technologies. In a second stage, production activities related to the "green economy" diffuse towards cities of second and third level and also towards regions of central and eastern Europe as well as towards the more peripheral regions of Western Europe.

The scenario favours, in the second stage, a higher degree of polycentricity of settlement systems than the reference scenario, especially with regard to regional cities, showing that specific contexts favour more polycentricity than others.

In addition to economic aspects, the adoption of the Green Economy has important impacts on the morphology and organization of cities. More compact urban forms are being developed in order to take advantage of the expansion of public transport networks. The use of electric cars is increasing, but more slowly than expected, because of limited autonomy and technical issues. Hybrid cars appear as a more flexible option, despite higher fuel price. Urban expansion, driven by economic development, remains however more contained and compact than in the referenced scenario, the greening of cities and the further development of ICT limits the motorized mobility for working and leisure purposes. Favourable economic development, including the provision of jobs with medium level qualifications, has a positive impact on social cohesion.

A significant number of rural areas benefit from the "green economy", especially in the field of renewable energy sources (biomass, solar and geothermal energy etc). The positive economic climate favours the development of the residential and tourist economy which is beneficial to small and medium-sized cities as well as to rural areas with an attractive natural and cultural heritage. This is helpful in maintaining services and containing outmigration trends. It also counteracts the negative impact of the further liberalization of agriculture in providing additional resources.

Territorial impacts on the Latin Arc

The scenario is favourable to the development of technology poles situated along the "Latin Arc". The strengthening of R&D activities generates spin-off effects in the

production sectors. In the context of the "Green Economy", the development of solar energy is booming along the "Latin Arc", from R&D activities down to the general implementation of related technologies in rural areas and cities. An increasing share of electricity needs is being covered by domestic production of solar and wind energy.

The realization of the "Union pour la Méditerranée" (UPM) is possible because economic growth in Europe is significant. The scenario provides good conditions for its implementation, especially for the development of complementarities and partnerships between the European Mediterranean regions and countries of the southern and eastern parts of the Mediterranean Basin. The metropolitan areas of the "Latin Arc" benefit significantly from this multilateral initiative. The "Latin Arc" is less subject to immigration because of stronger economic development in North Africa. A larger part of the immigrants of working age are integrated into the regional labour markets of the "Latin Arc" which are expanding.

The adoption of electric cars and the stronger use of public transport contribute significantly to the improvement of air quality in the compact and polluted Mediterranean cities. Traffic congestion diminishes up to a certain extent.

3.1.3.3.The Reactive scenario

The scenario assumes a slow recovery from the crisis in the western economies and in Japan, resulting from a weak reactivity to the changing context and also from less favourable global conditions. Global demand remains modest. In the USA, domestic demand is much weaker than before the crisis because households put higher priority on savings than on consuming on credit. The BRIC maintain their comparative advantages in low-cost production, a factor which also constrains the development of their domestic demand because of low wages. They however progress also in more technology-intensive sectors, competing more intensely with Europe. Few foreign investments are made in the less developed countries of the world, so that new external markets hardly emerge. Inflation is lower than in the reference scenario because of low wage policies in Asia with global deflationist impacts. Low interest rates feed new speculative bubbles, threatening the stability of the global economy. The maintain of the dollar as reserve currency works in the same direction.

Europe does not invent a new technological paradigm and fails to modernise significantly its productive activities, so that productivity progress is weak. Because of insufficient public support and modest mobilization of economic actors and civil society, the Green Economy cannot make a breakthrough. The profitability of investments in the sector is uncertain. Low and not well coordinated carbon taxes have no significant impact on energy systems, the traditional ones remaining powerful. Service activities do not significantly qualify, with low-profile businesses, such as call centres, being largely represented.

In the medium range (5 to 7 years) European exports are maintained, but they comprise a large share of products with modest added value. In addition, employment is artificially protected. A significant example is the strong public support to motor car industries, despite an existing production overcapacity of 20% in Europe. Cost-competitive policies are maintained in central and eastern Europe in order to attract FDIs. Their impact is however limited. While employment remains relatively well protected in the medium range, the situation worsens afterwards because of insufficient competitiveness in the global context. Exports are slowing down and unemployment increases. More European

businesses are taken over by non-European groups, which look for short-term profits and for the appropriation of technology. When the profits of such businesses are then declining because of the lack of investments in R&D and in productivity improvements, they are left out by the new owners. The European population declines in the long-range, the natural evolution being negative and immigration being strictly controlled.

Territorial impacts of the reactive scenario

In the medium range, changes in the regional patterns are modest. The catching up process of Central and Eastern Europe is however significantly affected by the fall of FDIs after the crisis of 2008/2009. The European settlement pattern is not significantly modified.

Important territorial changes take place however later on. The competitiveness of a number of activities in the sectors of agriculture, manufacturing industries and services is then declining because of insufficient adjustments and productivity-related investments. The process of decline shows similarities with the economic crisis of 2008/2009. The regions most affected are those with fordist and neo-fordist manufacturing activities. A significant number of rural regions are confronted with serious problems of decline of yields from agriculture and loss of jobs in small, no more competitive manufacturing industries. The non-emergence of the Green Economy hinders the development of alternative activities in the production of renewable energy. Investments in this field remain dispersed and insufficiently profitable. The depressed economic situation does not favour the development of the residential, patrimonial and tourist economy in rural areas. The result is that outmigration from numerous rural regions intensifies, not only in central and eastern Europe. Population ageing increases significantly and demographic decline affects numerous rural regions in the long-range. The differentiation of rural areas accelerates.

New service and manufacturing activities concentrate mainly in and around metropolitan areas in order to minimize risks. There is not sufficient economic potential and elasticity in the economy for a more polycentric development of settlement systems. Interregional migrations, which are more intense than in the reference scenario, favour large cities. Medium-sized and smaller cities which are not under metropolitan influence and the economy of which is strongly dependent upon manufacturing activities, are particularly affected. The internal evolution of metropolitan regions is raising concern. Urban sprawl accelerates under the influence of growth of population and activities and also of growing social tensions in the core cities. Social segregation, insecurity and criminality are growing in inner-city areas and densely populated suburbs, where unemployment is significant. Traffic congestion increases and the share of non-polluting cars remain low.

Territorial impacts on the Latin Arc

Under this scenario, the perspectives of development of the "Latin Arc" are less favourable than under the reference scenario. The lower level of public efforts in the field of research and technological development do not enable the technology poles of the "Latin Arc" to generate spin-off effects and to efficiently contribute to the modernization of the regional economies. Manufacturing industries in the "Latin Arc" based on low and intermediate technologies are affected during the second phase, while the potential existing in the field of solar and other renewable energy sources is only modestly exploited. This is also detrimental for rural areas, which are confronted, in addition, to the decline of agricultural activities and to depopulation trends. The stagnating European

economy handicaps the development of tourist functions and of the residential economy along the "Latin Arc".

New activities concentrate mainly in metropolitan regions, adding to congestion and urban sprawl. External immigration is further strictly controlled, but illegal immigration continues nevertheless, because of unfavourable economic conditions in North Africa and low progress in the Union pour la Méditerranée. Second level cities and medium-sized towns benefit much less from development. A number of them are affected by the decline of manufacturing activities.

3.2. Quantitative scenarios at Nuts-2 level

3.2.1. Quantitative scenario Assumptions

Quantitative scenarios come from the translation of the integrated scenarios of Section 3.1 into a quantitative model which is able to represent the results at Nuts-2 level of the European patterns of growth in the scenarios.
Nuts-2 foresights for the whole Europe are necessary in this project since they allow to predict economic growth rates under different scenarios for the various regions taking into account:

- the macroeconomic conditions, which affect all Europe and the various countries, so that the growth rate of any region is not independent from the one of its respective country and the one of Europe;
- the effects of regional interactions, since no region is a world apart but its growth rate also depends on its interactions with neighbouring regions.

The model which is used to produce these foresights is the MASST2 model, which is described in detail in Annex 2 to the report. Its main characteristics consists in the fact that it is composed by a national component, able to consider the macroeconomic variables which affect the economy at national and international level and a regional component which is able to consider the regional specificities and the regional interactions.
The main output of the MASST2 model is the GDP growth rate for each Nuts-2 region of the EU-27; other regional outputs are the population growth rates and the employment growth rates.

In order to produce foresights with the MASST2 model, the qualitative hypotheses of the integrated scenarios need to be translated into quantitative assumptions, i.e. hypotheses on the actual value that some exogenous variables will take at the end of the simulation period (i.e. in 2025).
These are called the quantitative levers of the model, and can be observed in Table 3.2.1., where reported is the correspondence between the quantitative assumptions and the levers which are touched in the model.

For example, the attenuation of the deflationary effect of Asia on the world economies is reflected on different assumptions in the value of inflation within the EU, with inflation assumed higher in the Pro-active scenario, where BRIC countries move towards technology-intensive activities and the deflationary effect disappears, and lower in the Defensive scenario where the deflationary effect is strong.
Another example is the qualitative assumption of the Dollar as the reference currency. If the Dollar is no longer the reference currency (as it is the case in the Pro-Active scenario), the exchange rates of the European currencies, and the Euro in particular, revaluate.
The same mechanism also works at regional level, with in addition the possibility to introduce differentiations by type of region. For example, the assumption of population aging is translated in quantitative assumption in the MASST through an increase of the mortality rate and a decrease of the fertility rate.
Finally, some hypotheses act at sectoral level, so that the hypothesis of the Defensive scenario that low-level activities dominate is reflected by a relatively higher growth rate of low level service activities and a relatively lower growth rate of open sectors.

In this way, the quantitative scenarios presented here are fully consistent with the qualitative scenarios of Section 3.1: the quantitative exercise allows to test whether the logic expectations that are presented in the qualitative scenarios are confirmed by a strictly ligical and consistent macroeconomic model.
The Hypotheses which are inserted in the MASST2 model are presented in the Annex, as well as how they are translated in the three scenarios. In next section the analysis of the forecasting results will be presented.

Tab. 3.2.1.-Link between the qualitative and the quantitative assumptions in the MASST2 model.

Qualitati ve assumptions	**Quantitative levers of the model**
Towards a regionalised globalisation:	
- deflationary effect of Asia on world economies attenuated	- change in the inflation target;
- Recovery of some manufacturing activities in Europe	- change in European average growth rate of some sectors
- Stability of international financial order	- change in interest rates in the EU;
- Investments from BRICs	- change in the share of FDI attracted by Eastern countries.
- Limited trade increase	- Change in the constant of the export and import growth equations;
- Technological investments and productivity in Europe	- Change in unit labour costs
- Reserve currency	- Change in exchange rate
- Internal demand in US, BRIC and J	- Change in real growth GDP in those countries
- Quality of the service sector	- Change in the share of service activities
	- Change in the share of S&T employees
Rise in energy price	- change in energy prices in the EU;
A new paradigm: "the green economy"	- change in European average growth rate of some sectors - change in the share of different professions;

3.2.2. Scenario Results

3.2.2.1. National results

The simulations with the MASST model under the hypotheses of Section 3.1 have produced results at national and regional level.
The aggregate results of the three scenarios can be seen in Table 3.2.2., for each country of and all other entities of interest for this project.

The MASST model in the reference scenario projects a national GDP growth rate for the European Union 15 old member countries (around 2% yearly) which is slighly lower with respect to the one observed in the past 10-20 years, because it consolidates the effects of the crisis, but whose value is consistent in terms of magnitute (see Box 1). We remember that the reference scenario is not an extrapolative one, yet its hypotheses lead to the confirmation of the past trends.
For the New 12, the reference scenario is more expansive than for the Old 15, but probably not as much as in the past, since its hypotheses are not specifically in favour of the New Member States, whose convergence continue without being too strong.
The performance of Latin Arc countries is around the average of the EU 15 countries, since there are no hypotheses to differentiate it from the rest of the Western countries. Still some national differences emerge among Latin Arc countries, with the performance of Spain slightly higher than the one of France and significantly higher than the one of Italy.

Despite the homogenous assumptions, the three countries behave differently because of their other structural features.

Tab. 3.2.2.-National results of the MASST model: average annual GDP per capita growth rates over the period 2005-2025.

	Reference scenario	Pro-Active scenario (A)	Defensive scenario (B)	Difference between A and Reference	Difference between B and Reference
EU27	1.99	3.04	0.96	1.05	-1.03
- Old 15	1.98	3.02	0.96	1.04	-1.02
- New 12	2.19	3.34	1.05	1.15	-1.15
Latin Arc Countries	1.89	2.92	0.87	1.03	-1.03
- Spain	1.99	3.01	0.90	1.02	-1.09
- France	1.92	2.94	0.90	1.02	-1.02
- Italy	1.79	2.84	0.79	1.05	-0.99

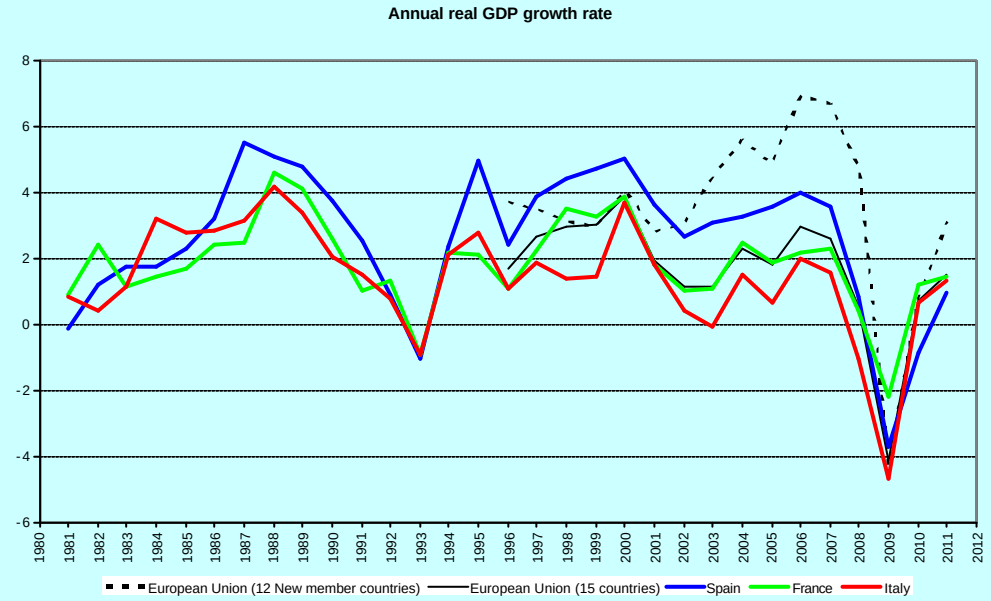
The Pro-active scenario (A) is more expansionary for Europe as a whole, as well as for its countries. Eastern countries appear to benefit from it slightly more than Western countries, because of higher FDI and stronger demand.
Latin Arc countries still performs around the average of the EU 15, with an average annual GDP growth rate which is 1% above the one of the reference scenario.
The rankings among the three countries which compose it are unaffected, but it is Italy, the least performing country, the one which however takes an imperceptibly higher advantage from the assumptions of this scenario.

The results of the Defensive scenario (B) are as expected significantly less expansionary with respect to both the Pro-Active and the Reference scenarios.
The New Member States continue to outperform the Old 15 countries, but convergence is much slower, since they are more negatively affected by the assumptions of this scenario with respect to the rest of the EU, in particular by the competition of BRICs in low-cost products.
Latin Arc Countries are as negatively affected as the rest of the European Union in this scenario. For this reason, their performance is almost in line with the one of the Old 15 member countries. It is interesting to observe that, although the relative rankings of the three countries in terms of average annual GDP growth rates remain the same of the Reference scenario, the country which is most negatively affected is Spain, though it remains the best performing of the three. Defensive strategies appear hence to be particularly hard to sustain for countries which have developed a model of high growth in the past (see Fig. B1-B3 and table B1 in Box 1 for possible interpretation of the Spanish trends).

Box 1
Confronting the MASST results with past performances and short term forecasts

Having seen the results projected by the MASST model, we would like to compare them with the past performance of the European Union and the Latin Arc.
In Figure B1 it can be observed the real annual GDP growth rate (the same variable which is projected by MASST) from Eurostat statistics updated in November 2009.
Obviously, the data up to 2008 are actual data, whereas the ones for the following years are short term projections. It is important to remember here that the MASST does not perform projections (i.e. the most precise estimate of short term future growth), but rather foresights in long term scenarios, based on possible bifurcations.
In the table, it is possible to observe that the three Latin Arc countries are rather synchronized in their cycles, so that recessions tend to hit them similarly. In periods of growth, Spain has often outperformed both France and, especially, Italy (whose growth performance has been particularly disappointing) but now appears to be hit by the recent crisis more strongly than France and is projected by Eurostat to exit from the crisis more slowly with respect to the two other countries.

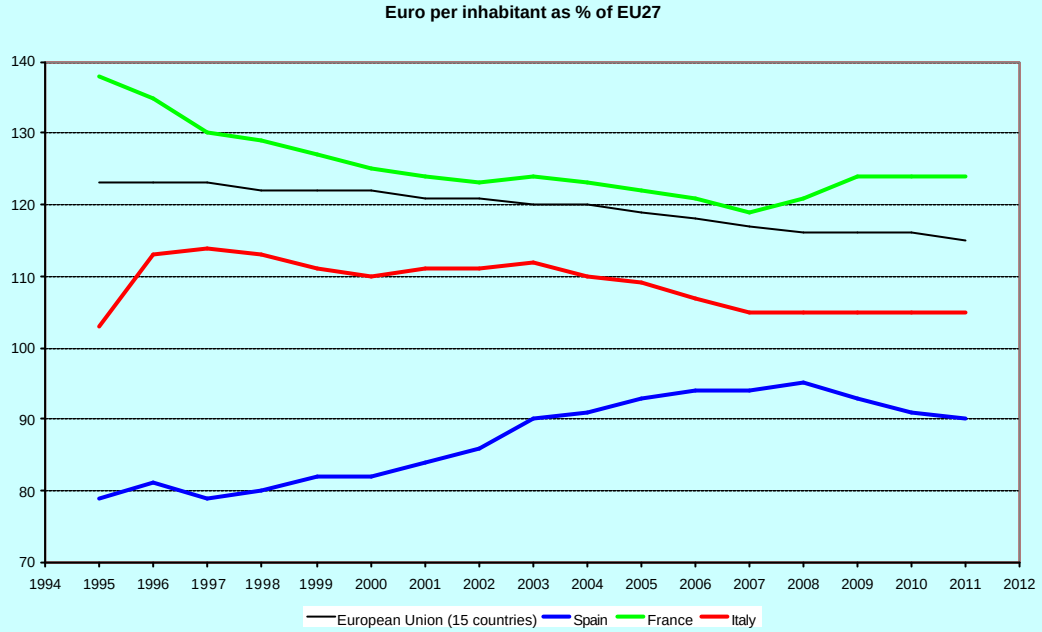
Figure B1: GDP growth performance of Latin Arc countries in the past and short-run Eurostat projections.



The MASST model projects that in all three scenarios the relative ranking of the three Latin Arc economies in terms of growth rate will remain the same of the past, i.e. Spain, then France and then Italy.
However, the differences projected by MASST are weaker than those of the past.
The first reason for this is the fact that the MASST provides with an average annual growth rate over 20 years, which is a long time span where also small differences may have a consistent effect.
The other reason is due to the fact that there has been a convergence process between the three countries which is probably going to slow down. In fact, as it can be seen in Figure B2 which represents the pattern of the GDP per capita with respect to the EU average, there has been a convergence process with France starting highest and remaining highest despite lowering its advantage over the rest of the EU. Spain, starting lowest, has been

converging, but is now projected - by Eurostat - to suffer more than the two others from the crisis.

Figure B2: Convergence of the Latin Arc countries in terms of real GDP per capita



Real GDP, however is not the whole story and it is interesting to observe the convergence in terms of PPS per inhabitant (Figure B3).
In particular, one can see a very bad performance by Italy, whose starting advantage has been eroded by inflation, and a very good one for Spain.
As a result, in 2008 the disparities between the three countries had almost faded out with respect to the initial ones. This means that Spain is around the levels of France and above the levels of Italy.
In this context, should a model project significantly different growth rates for the three countries in the next 20 years, it would determine an unlikely final result in which the convergence process is reversed and some countries end up being much richer than the others.

Beyond this consideration, one can look at the growth model of Spain, which has been so successful with respect to the one of the two other countries up to 2007. This model was based on a high increase of employment and lower increases of labour productivity; moreover, the house bubble appears to characterize Spain much more than France or Italy, as signalled by the fact that the construction sector accounted in 2008 for 9.22% of GDP in Spain with respect to 5.11% for France and 5.36% for Italy (Figure B4), and by the fact that, in a period in which construction lost importance for the rest of the EU15, including France and Italy, only in Spain it increased its share.

Figure B3: Convergence of the Latin Arc countries in terms of purchasing Power system

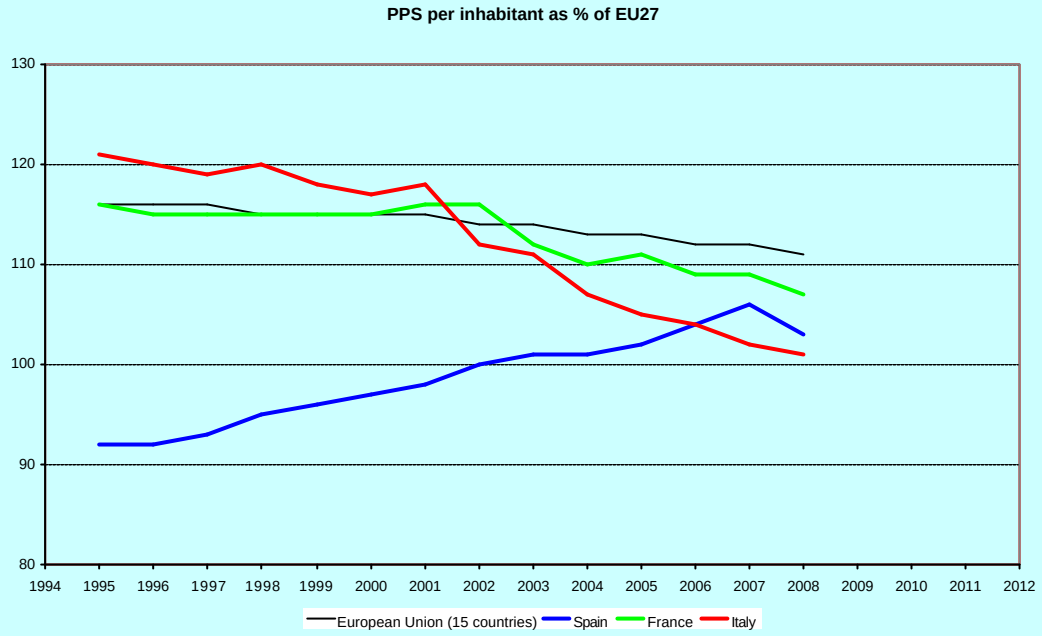
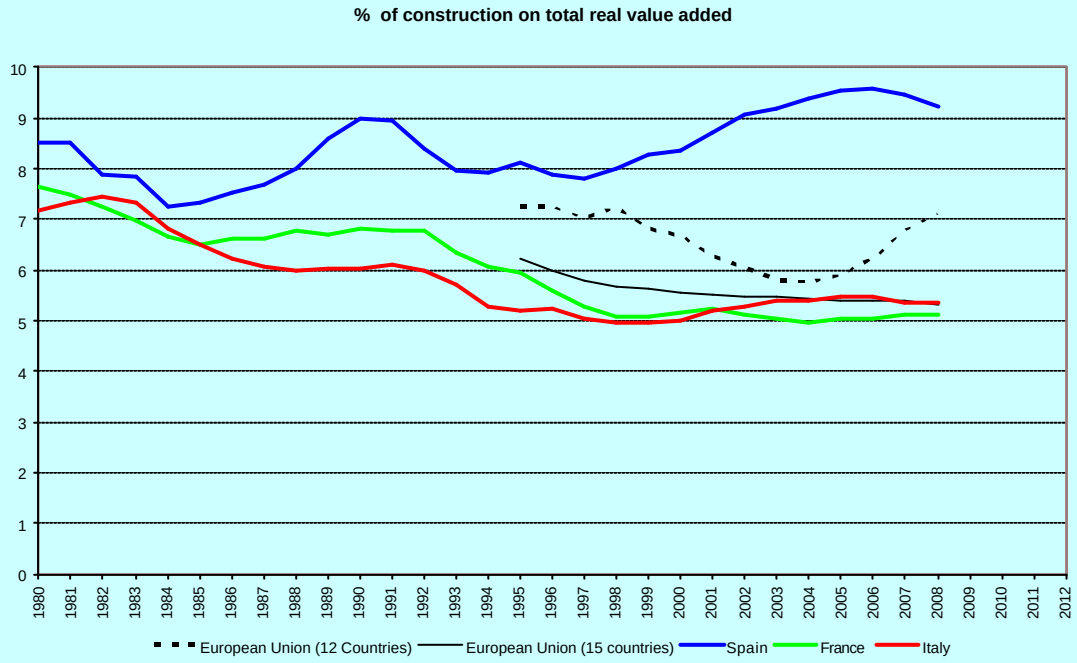


Figure B4: Percentage of real value added generated by the construction sector



Finally, there is an inversion in the pattern of FDI. As far as Spain has become richer and converged towards the rest of the EU, it has shifted from being an attractor of FDI to a net exporter of capital. As shown with data from the World Investment Report (2009), in the period 1990-2000 Spain has been importing and exporting about the same amount of capital, whereas France has been a net investor outwards and Italy a very close economy. In recent years, all three countries, but especially France and Spain, have been net exporters of capital, so that also this difference between France and Spain has faded out.
Doubts on the sustainability of Spain's outstanding performance already existed in 2007[3], and are more consistent now[4].

[3] See for Example: http://www.eurointelligence.com/Article3.1018+M5fffb2fbd30.0.html

Table B1: Foreign direct investment (FDI) as a percentage of gross fixed capital formation (source: World Investment Report 2009)

		1990-2000 (annual average)	2006	2007	2008
Spain	Inward	10.9	9.9	6.3	13.9
	Outward	11.5	26.6	21.5	16.4
France	Inward	9.3	16.7	28.2	18.8
	Outward	19.6	25.9	40.1	35.2
Italy	Inward	2.2	9.9	9.0	3.5
	Outward	3.6	10.7	20.3	9.1

3.2.2.2. Regional results

The advantage of the MASST is its ability to produce GDP foresights for each Nuts 2 region of the European Union.
The following maps represent the annual average GDP growth rate at regional level, starting with the Reference scenario.

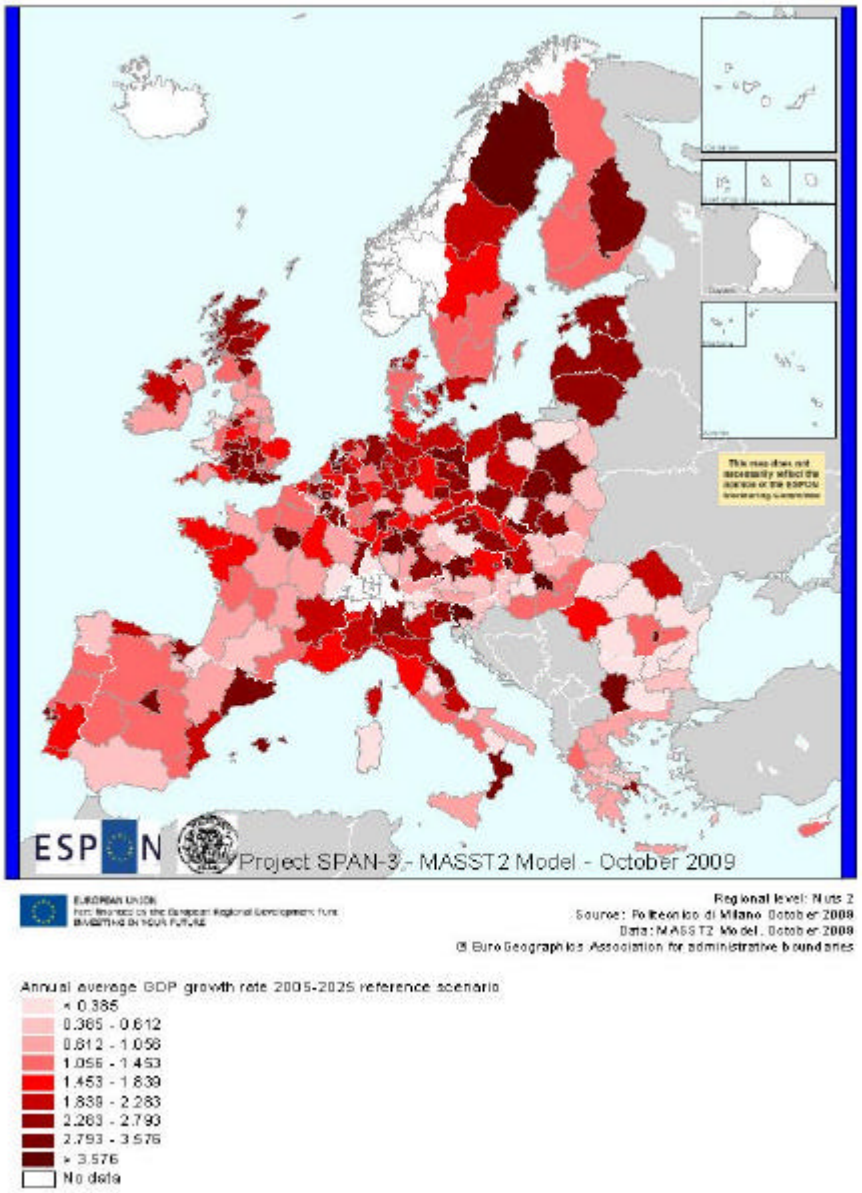
In the reference scenario (Map 3.2.1), the growth rates of European regions are highly differentiated, and the national results of Section 3.2.1 hide different patterns from different groups of regions.
The growth rate is positive for all regions, but while some considerably outperform the others, the growth in the others is sluggish.

Consistently with the thematic scenarios, one can observe that growth within countries will be a centripetal process, with the strongest areas as the leaders in all countries.
In Eastern Europe all capital regions, such ad Budapest, Sofia, Warsaw, are among the best performers overall, sometimes (as is the case of Prague, Bratislava and Bucharest) also pulling the regions just around them. Rural areas in the East are on the contrary sluggish, as all rural areas around Europe, being affected by the deregulation of CAP and increased international competition.

In the West, the first ranked regions are those which generally outperform the others, as shown by the performances of areas such as Stockholm, Copenhagen, Munich, Frankfurt, Brussels, Lisbon, Athens. However, second order areas are also thriving, as shown by the examples of Malmo, Hertfordshire, Edinburgh, Gent.
This pattern is confirmed in the Latin Arc. The highest growth rates within their respective countries are experienced by Ile de France, Lombardy, Madrid and Catalonia, but very high growth rates can also be found in second order economies, in regions such as Valencia, Rhone-Alpes, Piedmont, Emilia-Romagna. The performance of Languedoc-Roussillon is intermediate, being the outcome of differentiated areas within.

[4] A. Torrero Manas (2009) La crisis financiera internacional. Repercusión sobre la Economía Española, Documentos de Trabajo Instituto Universitario de Análisis Económico y Social, 98/09, Universidad de Alcalà.

Map 3.2. 1.-Annual average regional GDP growth rates in the Reference scenario

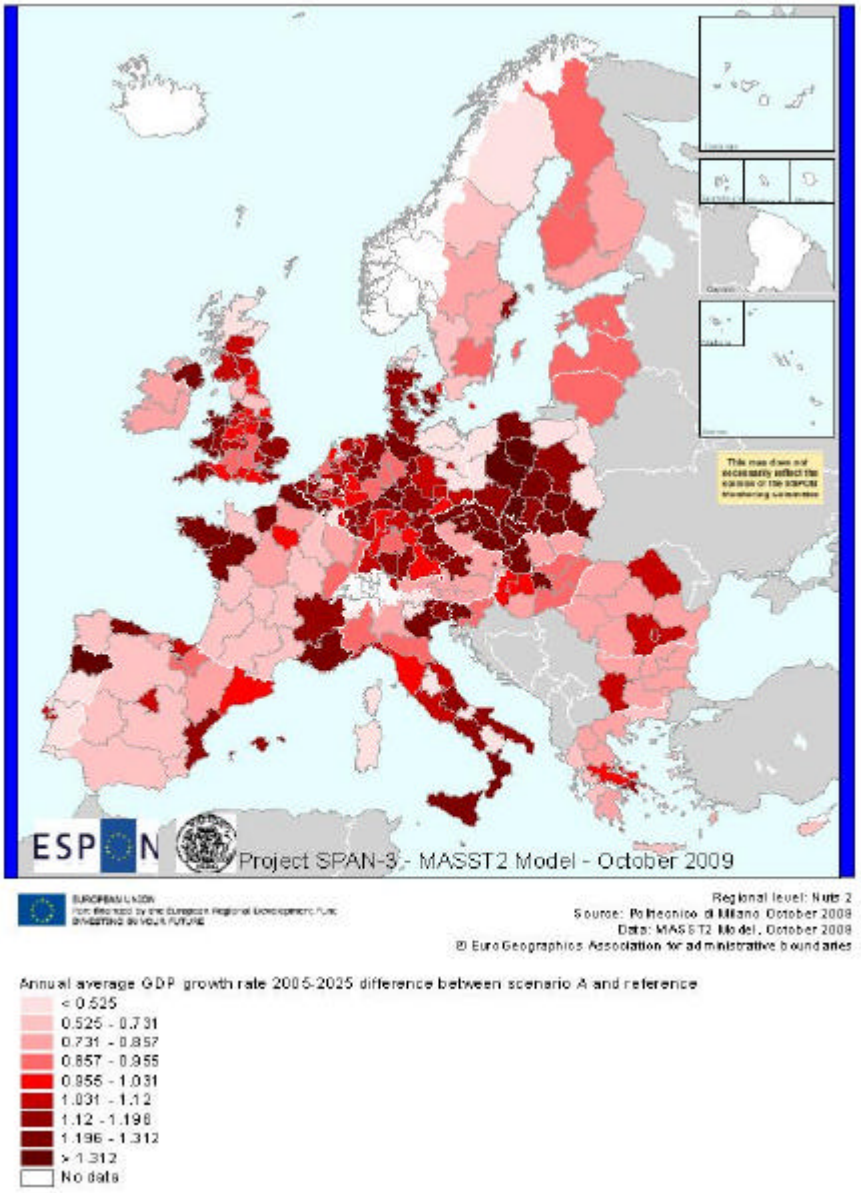


The Pro-Active scenario (Map 3.2.2.) is more expansionary for all regions of Europe, both in the West and in the East.
However, some regions benefit more than the others from the more expansionary hypotheses of this scenario.
In the New member countries, the areas which are more able to perform the technological leap which allows to be competitive in this innovative context are the core and capital ones, the only ones endowed with the human capital and technological ability to do it (e.g. Budapest, Prague, Warsaw).
Interestingly enough, especially in the West, it is not necessarily the first level core regions those which benefit more, but rather a number of second level areas. For example, Poznan in Poland, a large number of intermediate regions in Germany, Bruges and Gent in Belgium, Porto in Portugal, all register a difference of annual GDP growth rate with respect to the reference scenario which is higher than their respective capitals.
Notice however that this scenario, though it does not have the strongest regions as the clearest winners, is still a scenario in which the absolute numbers (mapped in the Annex for reasons of space) show a centripetal pattern.

For what concerns the Latin Arc, also in the Pro-Active the core regions are going well but the development spreads to second order poles.
In France, despite the good performance of Paris, Rhone-Alpes, Provence-Cote d'Azur, Haute Normandie, Bretagne and Pays de la Loire are those regions which take most advantage of the scenario.
In Spain, Madrid and Barcelona are doing very well, but the highest difference is reported in Valencia and Oviedo.
Also in Italy, the spread of development to secondary growth poles is even more marked, with very high differences reported in Veneto and Campania (the region of Naples).

Despite the good performance of second order regions, however, rural areas are doing bad in this scenario, since they have a positive but consistently lower performance both in relative and in absolute terms.

Map 3.2. 2.-Annual average regional GDP growth rate: difference between the Pro-Active and the Reference scenario



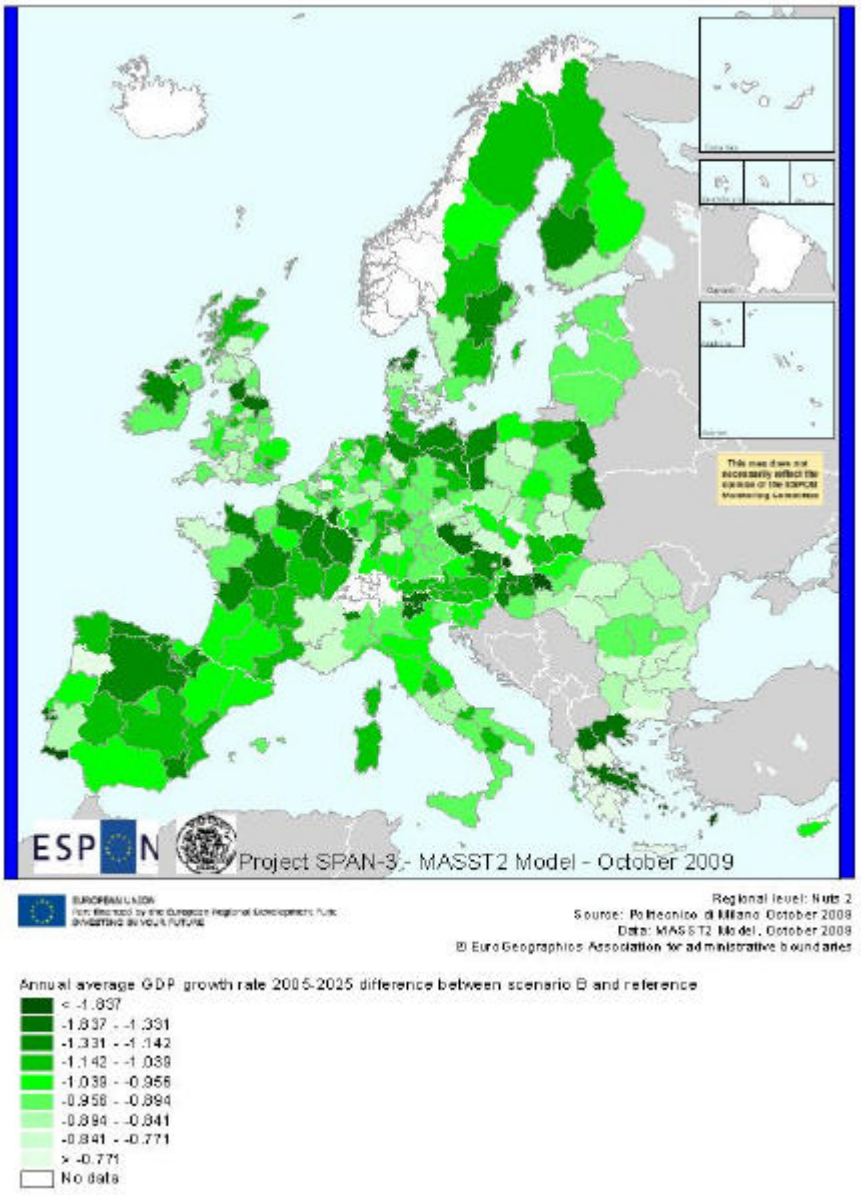
The differences between the Defensive scenario and the Reference are reported in Map 3.2.3.

This scenario (see Section 3.1) is one which is characterized by low growth rates with concentration of development in the few highest level metropolitan areas. The MASST model obtains the same results.

First, it has to be observed that this scenario is less expansionary with respect to the Benchmark for all regions of Europe.

In particular, one can observe that, in the East, among the regions more able to survive the recessions are some capital ones, such as Bucharest and Sofia: especially in absolute terms (mapped in the Annex for reasons of space), the growth rates in this scenario are significantly higher for Eastern metropolitan regions.

Map 3.2. 3.-Annual average regional GDP growth rate: difference between the defensive and the Reference scenario



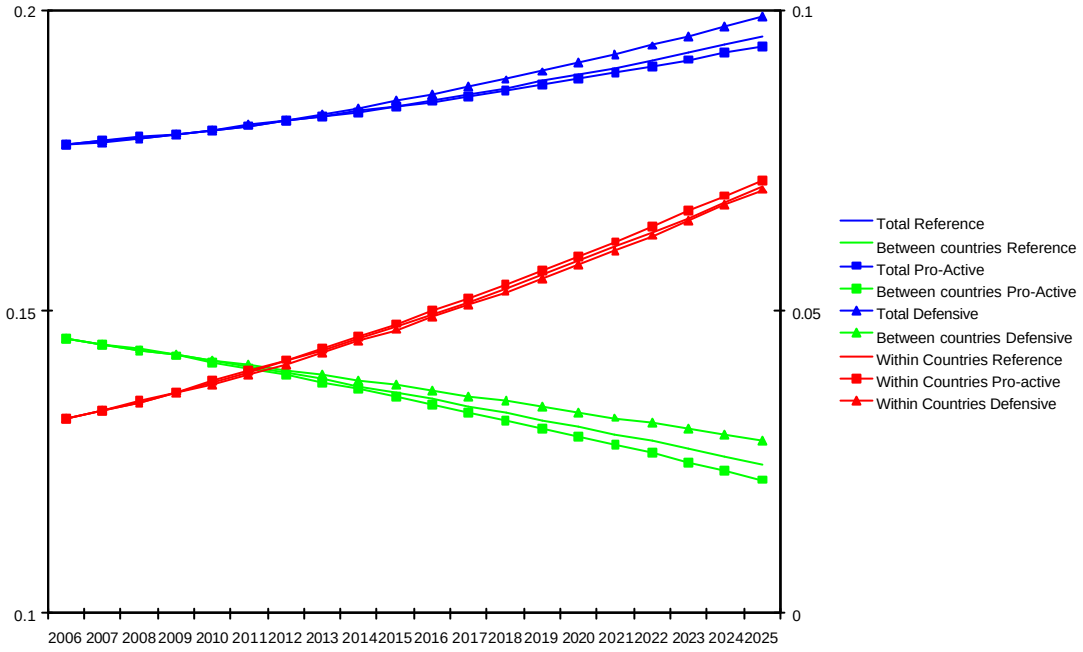
This happens also within the Latin Arc, where in Italy the best relative performance is the one of Latium, whereas in France it is the one of Provence-Cote d'Azur and Rhone-Alpes, but Paris is not the most negatively affected region.
In Spain, the differences are less marked but the regions which are better able to cope with the restrictive hypotheses are Madrid, Catalonia and Seville.

As a last consideration, it can be observed that this scenario is not in favour of rural areas. On the contrary, due to lack of demand for their products, insufficient investment and decline of manufacturing, these regions are those which lose more from this scenario.

3.2.2.3. Regional disparities

With the results of the MASST model it is possible to analyze the trends of regional disparities in the three scenarios.
To do this, we use the Theil index because it allows to disentangle the level of total disparities due to within countries disparities (i.e. intra-national disparities between regions of the same country) or due to between country disparities (i.e. the disparities between the various countries of the EU); both can be seen in Figure 3.2.1.

Fig. 3.2.1.-Theil index of regional disparities in the three scenarios



It can be observed that the total level of European disparities increases in all three scenarios, but especially in the Defensive scenario where only the most important metropolitan areas are able to react and weaker countries are often more negatively affected.
Distinguishing its two components, we can notice that the level of disparities between countries decreases in all three scenarios, whereas the disparities within countries increase. In fact, we foresight in the three scenarios (See Table 3.2.2. presented before) higher growth rates for those countries (especially the New Member States) which start with a lower GDP per capita. This is especially true for the Pro-Active scenario, where the growth rate is higher for all countries and especially higher for the Eastern countries.
Within countries disparities are lower (they are depicted on the rightern axis) but, differently from between countries disparities, they are foresight to increase in all three scenarios, and slightly more in the Pro-Active one, where first and second level regions perform better than rural and peripheral areas.
The sum of the decrease of between countries disparities and the increase of within countries disparitis determines the slight increase in total disparities.

3.3. Quantitative Scenario at Nuts-3 level (MAN-3 model)

3.3.1. The methodology

This chapter is aimed at developing a new econometric model at the province level that explains differential growth rates of provinces with respect to their regions according to territorial specificities (i.e. territorial capital) by transferring the logics and the working of the MASST model (Capello and Fratesi, 2008; Capello et al., 2008) from the regional level to the province level.
The methodology that we suggest in order to build scenarios at a more disaggregated territorial level than NUTS 2 foresees an important step in moving the quantitative results of the MASST model to the NUTS 3 level.
This step is developed thanks to the implementation of a simplified, extrapolative / comparative sub-model, called the MAN-3 (Masst At Nuts-3) model. The sub-model is built in a way that the main trends and driving forces present in each scenario are considered and included in the forecasting process, as well as the importance of the territorial specificities of the single regions of the three countries considered. The aspect of the MASST model that will not be replicated at NUTS 3 is the comprehensive interregional interaction logic of the whole model (with the international interregional spill-over effects) and the internal consistency of the macroeconomic forecasts.
The existence of these two models (MASST at NUTS 2 and MAN-3) has some advantages in the creation of the scenarios:

- MASST allows a more general and consistent scenario framework at NUTS 2, with a strong inter-linkage among all regions of Europe;
- MAN-3 allows the "fine-tuning" of the conditional foresights to the structural characteristics of the model

Particularly, the territorial capital elements we include in the sub-model are:

- local material inputs and resources, like infrastructure endowment, and share of tertiary activity;
- structural and sectoral resources and human capital: quantity and quality of human capital;
- the territorial structure, captured through the settlement structure of region, is a good proxy to capture the role of agglomeration and urbanisation economies on regional performance, enabling parameters of the different explicative variables to vary across different settlement structures present in space, again emphasising the strategic elements, like agglomeration economies;
- social factors; although it is not simple to find empirical evidence of the economic role played by "social capital", some indirect measure have been proposed in the literature (Putnam, 1993). Following this literature we use the growth of the electoral turnout rate in the European elections as an indicator of civic duty and active population in public issues.

3.3.2. The Model

The model is a simulation model to **distribute the GDP growth rates** obtained by MASST at NUTS-2 level, among the NUTS-3 areas of each region for the three countries of Latin Arc (Italy, France and Spain).

The simulation model is based on a two step procedures:

1) An **estimate procedure** of the territorial elements that explain the relative growth of each NUTS3 with respect to its NUTS2;

2) A **simulation procedure** where independent target variables are formulated and the NUTS3 growth differential is distributed according to the estimations and the assumptions made on the target variables.

In this report we present the results of the estimate procedure. In the model we assume that the relative provincial GDP growth rates with respect to the region, depend linearly on the vector X_i of structural and territorial variables:

$$\Delta y_p - \Delta y_r = f(X_i)$$

In the analysis we use similar information for the three countries and we take the differences between countries into consideration by interacting the independent variables with the dummies of countries. In fact, the goal is to make the best use of existing information on the different structural elements that characterize sub-regional territories (their "territorial capital"), both those already taken into consideration in the MASST model and other ones.

According to the elements of territorial capital the explanatory variables are grouped into the four sets of factors: *the territorial structure, local material inputs and resources, structural and sectoral resources and human capital* and *social factors.*

In order to explain the territorial structure, we use the following dummies belonging to the first set of factors and interacted with different explicative variables:

- dummy for Coastal provinces;
- dummy for Rural provinces;
- dummy for Urban provinces;
- dummy for Agglomerated provinces
- dummy for Mega provinces.

The second set of factors is related to the local material inputs and resources and contains:

- *the share of services employees*, this variable is useful to capture the role of services in explaining the economic performance. We expect that this variable positively affect the provincial performance since the service sector is on average a more value-added activity than manufacturing;

- *the share of craft and related trades workers*, it is used as a proxy of self-employment;

- *the share of touristic structures*; considering the geographic position and vocation of the Arc-Latin countries is not possible to leave apart from tourism and its impact on the economic growth. Our expectation is that it positively affects the provincial differential growth;

- *the share of urban fabric*, its effects could be negative or positive, it depends on the existence or absence of congestion effects.

Belonging to the third set of factors are:

- *the share of people with less than 20 years*, this variable can be thought as a proxy of future growth and it should positively affect the economic performance. In fact, young people are the most dynamic part of the population and ensure the basis of the economic growth;

- *the migratory balance*, a positive migratory balance helps those provinces which have a low fertility rate to have an adequate labour force. Moreover, it shows the attractiveness capacity of the territory. We expect that this variable also has a positive impact on economic growth.

Finally, as a proxy of social elements we use:

- *the electoral turnout growth rate in the European elections*, it is used as an indicator of civic duty and active population in public issues. The expectation is that the civic duty is positively correlated with the economic growth.

All variables are calculated in differential with respect to the relative region. The regression uses as dependent variable the average annual differential GDP growth rate 2001-2005, and all the independent variables are at the beginning of the period in order to avoid the problems of endogeneity and reverse causation.

3.3.3. Preliminary results

The results obtained are generally in line with our expectations and interesting considerations emerge from the interactions of variables with the dummies of countries (Tab 3.3.1)

Tab. 3.3.1.-Preliminary results

Variables	
Provincial differential of the share of urban fabric	0.023***
Provincial differential of the share of the endowment of touristic structures	-2.885***
Provincial differential of the share of the endowment of touristic structures in agglomerated provinces	2.738***
Provincial differential of the share of the migratory balance	0.014***
Provincial differential of the share of people with less than 20 years	-0.000***
Provincial differential of the share of the endowment of craft and related trades workers	-1,220
Provincial differential of the share of the endowment of craft and related trades workers in "megas"	17.756*
Provincial differential of the share of the endowment of services employees	2,323
Provincial differential of the electoral turnout growth rate in the european elections (1994-1999)	-0.042
Provincial differential of the share of people with less than 20 years in Spanish urban areas	0.369***
Provincial differential of the share of the endowment of touristic structures in Spanish rural provinces	19.042***
Provincial differential of the share of the endowment of services employees in Spanish urban areas	12.300***
Provincial differential of the electoral turnout growth rate in the european elections (1994-1999) in Spain	2.905***
Provincial differential of the share of people with less than 20 years in French urban areas	0.002*
Provincial differential of the share of the endowment of services employees in French coastal provinces	-9.166***
Provincial differential of the share of people with less than 20 years in Italy	0.295***
Dummy for Italian coastals	0.291*
Constant	-0.171**
Number of obs.	222
R-squared	0.255
Legend: *p<0.1;**p<0.05;***p<0.01	

- the share of urban fabric has a positive effect. It means that provinces with a dense urban fabric grow more; generally speaking, there are economies of agglomeration and network effects. Cities grow to exploit economies of agglomeration, but large cities may attract problems of crowding and congestion. In this case the benefits of agglomeration economies outweigh the disadvantages and congestion phenomena do not work.

- unexpectedly, the share of the endowment of touristic structures is negative and significant. In spite of the positive effect of the variable multiplied by the dummy "agglomerated", the overall effect remain negative. It is difficult to explain this negative effect in these three countries. A possible reason is an excessive increase of touristic structures which has not been matched by a proportional increase in touristic flows.
  Quite different is the effect of this variable in Spanish rural provinces, which is strongly positive, showing a new type of tourism, far from cities and close to the natural world;

- in analyzing *human capital,* as expected, we found that the migratory balance has a positive and significant effect such as the share of people with less than 20 years. This

latter independent variable is significant for all countries as a whole and for each individual country. In fact, we can see that it is highly significant in French and Spanish urban areas and in Italy.

- the result on services employees is quite surprising because it has a non significant influence on GDP growth in the Arc-Latin countries with the exception of the Spanish urban areas, where the positive sign is certainly linked to the economic transformation towards the service sector. Of some interest is also the negative and significant sign in French coastal provinces which is probably correlated with the negative impact on economic growth of the endowment of touristic structures.

- an interesting result is linked to the share of craft and related trade workers. In fact, it is strongly positive and significant in mega cities, signalling that these areas are the best places for self-employment, thanks to their market dimension and the possibility of exploiting their relational capital.

- the electoral turnout growth rate in the European elections is not significant and negative for all countries, but it is strongly significant and positive in Spain. This result is explained because economic phases of growth increase civic duty and civic duty contributes to increase the economic growth in a virtuous cycle.

These results turn to be interesting, however a more fine tuning exercise on possible explicative variables will be developed for the draft final report.

3.4. Barcelona structure and performance

3.4.1. Introduction: Barcelona, from industrial city to knowledge based metropolis

The Industrial Revolution in Spain starts in Barcelona in 1835 and until 1900 concentrated most of the manufacturing production of the Spanish economy. As a consequence of the Spanish protectionism, the economy of Barcelona experienced a technological and organizational slowdown with regard to the western European economies, especially during the isolation period (1939-1959) of the first stage of the Franco's dictatorial regime. Since the openness to the international economy in 1959, Barcelona developed a new productive manufacturing basis, with a central role for medium and small firms (PIMEs), and with an important presence of industrial multinational companies (French, German and Italian). The capacity of attracting population and activities led to an intense metropolitan dynamics. The crisis of the 1970's and the political transition meant for Barcelona the end of a development model based in a low capital intensive production, very intensive in low-qualified labour and basically oriented to a protected domestic market.

Since the entry of Spain in the European Economic Community (extension of markets and the attraction of external capitals) and the nomination of the city of Barcelona to host the Olympic Games, both in 1986, Barcelona has experienced one of the most intense processes of economic and urban transformation in Europe. Barcelona grows very significantly in population, economic activity and employment. The provision of transport and communication infrastructures expands extraordinarily (airport, expressways, university equipments). The metropolis of Barcelona experiences a great leap in scale to a polycentric metropolis of 4.8 million people when the expansion of the old industrial cities meets with the expansion of the city of Barcelona.

From 1997 on, a new municipal strategy centred in the notion of "Barcelona as a city of knowledge" began. This made possible that the city of Barcelona continue to lead the economic and urban transformation of the city. A new urban policy of transformation of land uses is deployed with the target of changing industrial uses into uses for knowledge-intensive activities: the project 22@barcelona, which pursues the transformation of the Poble Nou neighbourhood, the fisrt old industrial area where the industrial revolution took place. Furthermore the urban and infrastructural transformation continues: opening of Diagonal Avenue up to the sea, enlargement of the airport and the port, diversion of the river Llobregat, High speed train and new subway lines. This strategy is currently spreading out to the rest of the metropolitan area. Nowadays, Barcelona is considered one of the ten largest metropolises of the European Union and it shares with Lyon the territory on the eleventh Mega Region of the planet.

3.4.2. Macroeconomic performance until 2007

Barcelona has a productive basis oriented towards the foreign market (the rest of Spain, the UE and the rest of the world) which is supported on a business network in which the average dimension of production establishments is low. Regarding the foreign market as a whole, the exportation basis shows a surplus, since the large surplus with the rest of Spain balances the commercial deficit with the rest of Europe and the world.

Barcelona has a competitive economy that increases its quota of market in the external exchanges. Between 1986 and 2007 Barcelona's production and employment grew intensely, but the growth of the aggregated productivity was not very high. This low

productivity growth reflects a production function not very high intense in capital and with a relatively low use of human capital. In the last ten years the low growth of aggregated productivity can be basically explained through the increase of the activities related to the building sector, which shows a low productivity growth (negative in some years). Conversely, the growth of the industrial productivity between 2004 and 2007 is very intense.

One of the explanatory factors of the competitive success of the economy of Barcelona relies on the existence of agglomeration economies. Their extension is a consequence of the growth of scale economies (partly due to the fast development of transport and communication infrastructures), urbanisation economies (enlargement of the metropolis and large productive diversity), localisation economies (especially those linked to activities of high- knowledge economy) and the existence of network economies (synergies and complementarities).

3.4.2.1. Population

The province of Barcelona is one of the largest NUTS 3 regarding its total population (5.416.000 inhabitants). The metropolitan region of Barcelona is the tenth largest metropolis in the UE (OECD 2009). The population has still steady during the 1990s in about 4.6 million inhabitants. However, between the years 2000 and 2008 the population has rose to 5.4 millions, with 16% accumulated growth rate. This rapid growth of the population from the year 2000 is due to the attractiveness of foreign born (non-Spanish) population. Foreign born population of the province rose from 150,000 in 2000 (3.2% of the population of the province) to 660,000 in 2008 (12.2% of the population of the province) with an accumulated growth rate of 440%. This attractiveness is due to the existence of a dynamic labour market. However, the labour market of the province of Barcelona is characterized by a dual structure: a core of workers with permanent contract and high costs of redundancy, and a rising periphery made of young people and new foreign-born residents with unstable and precarious contracts and low costs of redundancy.

3.4.2.2. Gross domestic product

The evolution of production (GDP) between 1986 and 2009 shows several differentiated stages: fast growth between 1986 and 1992, a severe recession between 1993 and 1994, recovery and intense growth between 1997 and 2007, and again a severe recession from the second trimester of 2008 until now.

EUROSTAT series allows to compare the production of the province of Barcelona with the rest of Spain from 1995 (first year available of the homogeneous series). Thus, in 1995 the GDP per capita of the province was 13,900 euro (95% of the UE-27, which was 14,700 euro). After 12 years (2006 is the last year available of the homogeneous series), the GDP per capita of the province rose to 26,300 euro, about 111% of the UE average. As a consequence, there was a process of convergence in GDP per capita of about 16.4%, this is, about 1% every year. In fact, when the data are expressed in PPA, the figure raises to 123% UE average.

3.4.2.3. Employment and sectoral structure of employment

The dynamism of employment between 1986 and 2007 is rather impressive in the province of Barcelona: from 1,852,000 to 2,775,000 jobs and 50% accumulated growth rate in 20 years. It could be said that is one of the most intense processes of growth of employment in the recent UE history. Employment growth has been continuous, with the exception of 1993-1994 and after 2007 (where the growth rate is negative about 10%).

Regarding the sectorial structure of employment between 1995 and 2006, two trends can be observed. Firstly, the relative growth has been positive in all the sectors (24% in manufacturing and energy, 29% in construction and 55% in services). Secondly, growth is particularly intense in the services sector. This means that, against the opinion of most of the analysts, the growth of the province was not based on the construction sector that created 129,000 new jobs, but by manufacturing (116,000 new jobs) and particularly by the tertiary sector (602,000 new jobs). Notice that in this province and metropolis initially based on industry, there is a distinct growth of employment in export-oriented sectors: manufacturing and (tourist) services.

3.4.2.4. Productivity (low productivity growth)

Despite the impressive growth of production (GDP) and employment, productivity growth has been low. It was negative between 1997 and 2001, slightly positive from 2002 to 2005, and close to zero in 2006-2007. This is, almost all the growth of production has been explained by the growth of employment, particularly by the fast growth of sectors where productivity tend to rise slowly. Manufacturing is the sector more related to the growth of productivity in the economy of Barcelona (and in Spain as a whole). However, the growth of productivity in this sector was only important between 2004 and 2007, and it is expected to be again significant in the new period of crisis (2007-2009).

3.4.2.5. Small firm size

One of the distinctive features of the economy of Barcelona is the small average size of firms and establishments. In other researches it has been observed that this size is quite similar to some economies of industrial basis as Japan and some European Mediterranean European countries, whereas the rest of the UE and USA tend to show an average size two or three times higher. About 97% of firms have less than 50 employees, whereas medium-sized firms add up to 2.3% and large firms are only 0.41%. The province of Barcelona has only 806 large firms and 433 are concentrated in the city of Barcelona (the data is inflated by a headquarter-effect in the city of Barcelona). In Catalonia, about 80% of large firms tend to concentrate in the province of Barcelona, particularly in the metropolitan region of Barcelona and the city of Barcelona. Medium and large firms have showed an intense growth in recent times. Thus, medium firms increased from 2,786 in the year 1996 to 4.517 in 2008. Large firms rises from 526 to 806.

3.4.2.6. External and internal trade

The exports of the province have grown 458% between 1991 and 2008, rising from 7,100 to 39,800 million euro (nominal values). Exports from Barcelona to the rest of the world have increased faster than the growth of the UE or the whole world's exports so that Barcelona has increased its contribution to the UE-15 trade and to the world trade. Imports have grown 307% between 1995 and 2008, rising from 15,400 to 62,900 million euro. Despite the higher relative growth rate of exports, the total value of imports has increased more than the value of exports so that the negative balance rose from 8,300 to 23,100 million euro (178% growth rate). However, after 2007 the crisis has reduced in a significant way the imports (contraction of the demand) whereas exports have maintained better. As a result, the negative trade balance has reduced.

The export rate was 69% in 1995 and still above 70% until 2002. The growth of the internal demand fostered imports so that the export rate decreased to 62% between 2005 and 2007. In 2008, the contraction of the demand caused a reduction of imports whereas the value of exports still steady. As a consequence, the export rate has grown again.

Catalonia and Barcelona are very open economies. Exports account for 30% of GDP if the rest of Spain is not taken into account, and 68% if it does. Openness measured as exports plus imports on GDP is about 70% and if the rest of Spain is included as a foreign country the rate raises to 130%. The share of foreign trade (abroad of Spain) on production is still growing. The main origins and destination of trade flows have not suffered significant changes from 1995. Around 80% of exports and 65% of imports goes and comes from Europe. The most important destinations are France, Germany and Italy. The most important suppliers of the Catalan economy are Germany, Italy, and France. It is noticed that 20% of the imports comes from Asia, where the share of China on the total imports has growth.

Barcelona has succeeded to increase the value of its exports and enhance its share on the world's trade from 1995. Although successful, this model continues to show two main drawbacks: first, an important share of trade still based on cost differentiation; this type of competition faces the emergence of other cheap producers (in the UE or abroad) as well as the higher differential inflation of the Catalan and Spanish economy. Second, in global terms, productivity has no increased from 1995 and an important share of the exports are concentrated on weak demand products.

Catalonia is the region with a largest share regarding interregional trade in Spain. When external trade is consolidated with interregional trade, the negative trade balance of Catalonia and the province of Barcelona becomes positive. This contrasts with the important interregional negative balance of other provinces as Madrid. Thus, there is an outstanding pattern of regional specialization in Spain: whereas Barcelona produces goods and services for internal and external markets, Madrid seems to focus on the production of services for the rest of the country and exports Spanish savings to the rest of the world.

3.4.2.7. Foreign direct investment

Catalonia has consolidated itself as one of the most dynamic regions in Europe in attracting multinationals: more than 3,000 foreign multinationals, where 600 are manufacturing firms and more than 2,000 are services firms. The province of Barcelona shares a large amount of this multinationals. The most important FDI investments are

concentrated in Motor vehicles, Electric materials, Chemicals and Food and beverages. In the period 2000-2008 the annual average inflow of Catalonia has been around 2,290 million euro and the outflow 4,800 million euro with a negative balance of 2,500 million euro. Around 80% of flows have origin or destination in OECD countries where 50% belongs to the UE-27. Despite this figures, Catalonia does not play the same role on FDI that on external trade in Spain. In the period 2000-2008 Catalonia accounts for only 13.4% of Spanish inflows and 11.4% of Spanish outflows. This is due to the fact that Madrid Stock Market is much more important than the Barcelona's one and concentrates most of the Spanish FDI flows.

3.4.2.8. Knowledge economy

Since 1990, Barcelona has experienced an intense change towards the knowledge economy. Employment growth in knowledge-based industries has been faster than in non-knowledge industries. Knowledge-based jobs double between 1991 and 2008 (from 398,000 to 796,000 jobs). This growth has been especially intense in services. Furthermore, Knowledge-intensive jobs have better resisted the effect of the crisis: in 2007 knowledge-intensive industries have lost 14,000 employees whereas non-knowledge-intensive industries have lost 84,000 employees.

On the other hand, the share of R&D on GDP of Catalonia and the province of Barcelona has rose from 0.79% in 1995 to 1.49%. The total growth of this ratio has been 0.59, slightly higher than the Spanish (0.48) and much more than the UE average (0.05). Despite this fact, R&D/GDP still lower than the UE average (1.85). About 63% of the expenditures in R&D belong to firms, which is more than the Spanish average (56%). Since 2004, there is a significant rise of government expenditures in R&D so that its contribution rises from 9.3% to 13.7%.

3.4.3. Effects of the crisis: 2007-2009

The analysis of the effect of the crisis on the province of Barcelona exceeds the scope of this report. Some basic facts can be, however, pointed out:

1. The economic crisis starts in USA at September 2007. Since the third trimester of 2007, the Spanish economy (including the province of Barcelona) declines, giving pass to a recession in the second semester of 2008.
2. Between the first quadrimester of 2007 and the third quadrimester of 2009, Barcelona's growth becomes negative (-4.7%) when until 2007 was growing at an annual growth rate of 3.6%,
3. This decline of the productive activity shows its consequences on unemployment rate (rises from 7.2% to 16%) and on employment (the city of Barcelona loss 4.15% of its jobs, the province loss 10.2%, Catalonia loss 9.91% and Spain 9.7%). This means that the effects of the crisis on the city of Barcelona are lower than on the rest of the province. Furthermore, the unemployment growth rate is higher than the destruction of employment. The labour market is quite flexible (external flexibility) and with an important cyclical sensibility.
4. The price of housing decreases 4.2% in the province.

3.4.4. An introduction to the territorial structure of the province of Barcelona

3.4.4.1. Basic facts

The province of Barcelona has an area of 7.700 Km2, with a population of 5.416.000 inhabitants and a density of 700 inhabitants/Km2. The most important city is Barcelona (1,615,000 inhabitants) and other four cities have more than 200,000 inhabitants: L'Hospitalet de Llobregat (254,000 inhabitants) and Badalona (215,000 inhabitants) are contiguous to Barcelona, whereas Terrassa (206,000 inhabitants) and Sabadell (204,000 inhabitants) are 25 kilometres far from Barcelona. Other important cities in the neighbourhood of Barcelona are Santa Coloma de Gramanet (117,000 inhabitants), Cornellà de Llobregat (85,000 inhabitants), Sant Boi de Llobregat (81,000 inhabitants) and El Prat de Llobregat (63,000 inhabitants). Other medium cities in the metropolitan agglomeration of Barcelona are Mataró (120,000 inhabitants), Sant Cugat del Vallès 76,000 inhabitants), Rubí (72,000 inhabitants), Vilanova i la Geltrú (65,000 inhabitants), Viladecans (62.573 inhabitants), Castelldefels (60.572 inhabitants), Granollers (60.122 inhabitants), Cerdanyola del Vallès (58.493 inhabitants) and Mollet del Vallès (51.912 inhabitants). The only city of more than 50,000 inhabitants located away from the metropolitan agglomeration is Manresa (75.000 inhabitants).

Inside the province there are at least three administrative levels: vegueries (Barcelona Metropolitan Ambit; Central Counties), *comarcas* or counties (Alt Penedès, Baix Llobregat, Barcelonès, Garraf, Maresme, Vallès Oriental, Vallès Occidental, Anoia, Bages, Berguedà, Osona and Solsonès) and municipalities (314 municipalities). Although recognised by the legal system and updated their boundaries, comarcas and veguerias are a reminiscence of the ancient organization of Catalonia. Both are inappropriate for most of the current necessities of the XXI Century and, have only few tasks and reduced budget. In the case of veguerias, continuous territorial disputes and disagreements, as well as the fact that their use only is functional under the improbable case of dissolution of the provinces, makes it real use unlikely enough.

The real socioeconomic structure of the province is however quite different from the administrative proposals. Several points of view better serve to this propose in the concrete case of the province of Barcelona: metropolitan areas and local labour markets provides a good picture of the socioeconomic areal divisions of the province whereas the design of the networks of cities presents the structure of relations between the municipalities, which are the basic nodes in the province.

3.4.4.2. Metropolitan areas

The most outstanding division of the province of Barcelona is the differentiation between the metropolitan region of Barcelona and the rest of the province and the expansion of this metropolitan territory. In 1986 the Metropolitan Region of Barcelona began a process of economic and territorial expansion that led to it becoming one of the ten largest urban agglomerations in Europe, with a size similar to the 10th largest North American agglomeration (Washington) and ranked as one of the thirty largest metropolises in the OECD. The territorial expansion has arisen not from a process of hierarchical decentralization but rather as the effect of the increasing interaction between the urban continuum of Barcelona and a group of medium-sized cities that were old industrial centres (Mataró, Granollers, Sabadell, Terrassa, etc.).

The expansion takes place in several ways. Regarding its spatial dimension, the metropolitan region of Barcelona increased from 90 municipalities in 1986 to about 220 in 2006 and multiplied by three its spatial area. However, the spatial expansion basically stopped in 1996 because the boundaries of the metropolitan region of Barcelona achieved the boundaries of other metropolitan areas (also in expansion). As a result of the spatial expansion and a procedure of endogenous growth, the population of the metropolitan region of Barcelona increased from 3.56 million inhabitants in 1986 to 4.54 in 2001, and from 1.04 million jobs in 1986 to 1.85 in 2001. It is necessary to remark that after 1996 all the growth of population and jobs respond to endogenous factors since the number of municipalities does not increase.

Although the boundaries of the metropolitan region have been expanding until 2001, the most used definition for planning, proposed by the *Pla Territorial Metropolità* is quite similar to the 1991 real metropolitan region and covers 164 municipalities. The metropolitan region has currently 5.4 million inhabitants (91% of the province), 195,000 companies (91% of the province) and more than 2.4 million jobs (92.5% of the province). This area for planning is usually divided in two parts: the core or inner part of the metropolitan area, which mainly matches up with the area for the Barcelona Metropolitan Strategic Plan (Barcelona and other 35 surrounding municipalities) and the so called "metropolitan arc" or outer part (the other 128 municipalities).

The inner part of the metropolitan region is sometimes referred by some organisms as "the metropolitan area" so that we should be careful about the nomenclature. Most of this area forms an urban continuum and has currently 3,150,000 inhabitants (59% of the province), 120,000 companies (29% of the companies in the province) and more than 1.6 million jobs (67% of the province). The largest cities of the province are located in the central part of this inner area (Barcelona, L'Hospitalet de Llobregat and Badalona). The city of Barcelona is the true economic engine of the province as well as of the economy of Catalonia. Barcelona has 1.6 million inhabitants (30% of the province), 77,000 firms (39% of the province), and around 1,050,000 jobs (43% of the province)[5].

The outer part of the metropolitan (metropolitan arc) has 1,700,000 inhabitants (32% of the province), 57,000 companies (29% of the companies in the province) and 620,000 jobs (26% of the province). In many aspects, the economic size of this area is similar to the third Spanish metropolitan area (Valencia). Other important medium cities are located in this area, mainly old industrial subcenters in the XIX Century (Mataró, Granollers, Sabadell, Terrassa, and Vilanova i la Geltrú).

There are other three small-medium cities in the province of Barcelona with capacity to structure the territory: Igualada (38,000 inhabitants), Manresa (75,000 inhabitants) and Vic (39,000 inhabitants). Manresa forms an small area independent from the metropolitan region of Barcelona having 29 municipalities and about 148,000 inhabitants and 60,000 jobs. At this moment the population and jobs of the area have increased to 170,000 inhabitants, more than 6,000 firms and about 70,000 jobs. The Functional Urban Region procedure suggests that also Vic could form another small area (Boix and Veneri 2009).

[5] Data about firms and jobs could be slightly inflated due to the existence of a "headquarter effect" in the city of Barcelona.

3.4.4.3. Local labour markets

The province of Barcelona can be also divided in local labour markets. This division is not administrative or "official" but provides valuable information about the internal organization of the socioeconomic dynamics. There are 19 LLMAs centred in the province of Barcelona: Artés, Barcelona, Berga, Calaf, Calella, Capellades, La Garriga, Granollers, Igualada, Manresa, Mataró, Monistrol de Montserrat, Prats de Lluçanès, Sabadell, Sallent, Sant Celoni, Sant Sadurní d´Anoia, Vic, Vilafranca del Penedès.

On the other hand, a half of the local labour markets are included in the boundaries of the definition for planning of the metropolitan region of Barcelona. Although the boundaries are not exacts, the metropolitan region of Barcelona (real or for planning) might be assimilated to the LLMAs of Barcelona, Vilafranca del Penedès, Sant Sandurní d'Anoia, Capellades, Sabadell, Granollers, La Garriga, Sant Celoni, Mataró, and Calella.

3.4.4.4. Polycentric networks of cities

Networks of cities provide a complementary approach to the study of the internal structure of the province. This approach allows to identify the articulation of the links between the municipalities of the province. The main centre of the network is the city of Barcelona, where most of the relevant flows of the network converge. The range of the city of Barcelona is especially important in the metropolitan region of Barcelona although spread to the rest of the province.

The metropolitan region of Barcelona is a polycentric network of cities well-weaved around some of the old industrial subcentres and other newer industrial cities. This space cannot be simply understood as a "belt" as the subcentres are not satellites of Barcelona and the complexity of the network is high. Despite this fact, the several parts of the metropolitan arc appear as poorly connected. This design shows not only the location of the subcentres that articulates the metropolitan territory but also the deficiencies in the infrastructures between several parts of the technological arc, that at this moment are being improved. The city of Barcelona serves as a common nexus connecting these spaces as the system of infrastructures continues to be highly radial. Furthermore, there is not a true differentiation between the centre of the metropolitan region and the rest of the arc.

The differentiation between the metropolitan network and the rest of the province is more evident as the flows of the metropolitan cities are more intense with Barcelona and the same metropolitan cities. The rest of the province is articulated around four cities: Igualada, Manresa, Vic and Berga. Other small cities articulates the spaces between this medium cities, forming small networks even if self-contained enough to explain the formation of small labour markets. The largest cities form quite compact networks which are intensely connected with the city of Barcelona although few connected between them as well as with the cities of the metropolitan arc. The urban structure tends to be stable in short and medium periods of time, although the network becomes denser in 2001. The ambit of influence of the city of Barcelona becomes more important in the province. At the same time, the metropolitan network becomes more connected. In the rest of the province, the most outstanding fact is a light trend to connect the networks of the largest cities thanks to some small cities that revolve around more than one network.

3.4.4.5. Urban/rural characteristics

The province of Barcelona is classified by the OECD as predominantly urban (OECD 2009) since the average density of the province is 700 inhabitants/Km2, 99.4% of the population live at least of 45 minutes by road of a city of more than 50,000 inhabitants. However, not all the municipalities of the province are considered as urban. In fact, there is a clear differentiation between the metropolitan region of Barcelona and the rest of the province. The metropolitan region concentrates the municipalities with the highest density of the province, and only some concrete parts of the Penedès and the Vallès Oriental could be classified as rural. In the other part of the province, density is lower so that, with the exception of the medium cities (Igualada, Manresa, Vic, Berga) and some surrounding municipalities, most of this other part of the province has rural characteristics regarding density. This in part explains why the networks of cities were very hierarchical in this non-metropolitan part of the province.

Regarding the local labour markets, most of them are classified as urban following the OECD criteria as the "urbanity" of medium cities and their contribution to the population of their labour markets counterbalance the rurality of the small municipalities. Only three small local labour markets (Sallent, Prats de Lluçanès and Monistrol de Montserrat) could be classified as rural. The total population of these small labour markets is less than 30,000 inhabitants.

3.4.5. First scenarios for Barcelona 2025

3.4.5.1. Demography

- The population of Catalonia will growth very slowly. It is expected that the population of the province increases from 5.3 to 5.8 millions. This growth will be slightly based on vegetative growth and more in immigration.

- Birth rate will remain below replacement level despite a slow growth experienced in recent years due to the higher birth rate of immigrant population.

- Age's structure will vary. As a consequence of the growth in birth rate and immigration, population in school age (until 16) will increase. The share of aged population will also increase to be more than 20%. Population of more than 80 years could reach 10% raising dependence. Ageing is a consequence of the 1970s baby boom, the posterior decreasing of the birth rate and an increasing in the life expectancy (more than 80 years for men and more than 86 for women).

- The share of population in working age will diminish. Activity rates (nowadays below the UE average) will converge with the UE 15 average, particularly female activity. This fact could alleviate the pressures of changes in age's structure and reduce unemployment.

- There will be a process of territorial redistribution in Catalonia, in the sense that in most of the province of Barcelona population will be steady whereas it will grow in other provinces.

- Low productivity growth model makes uncertain the future necessities of employment as a change of model (currently completely based on the growth of employment) and could also reduce at short and medium term the necessities of workers i certain activities.

On the other hand, scarcity of workers in absence of high immigration rates could force the change of the productive model.

3.4.5.2. Energy

- Net variation in energy consumption is unclear and depends on changes in efficiency of transport.

- Transport and residential sectors as well as other services' activities could be the most important consumer of energy. On the other hand, manufacturing sector is expected to reduce their demand of energy.

- Catalonia has capacity to produce hydroelectric and wind power although their growth could be above the growth of energy consumption: few waterfalls for hydroelectric power and limited zones with intensity enough to produce wind power.

- Possibilities to produce biomass although with a limited contribution to power generation. The contribution of solar power will be small.

3.4.5.3. Economy

- Barcelona will consolidate its condition of global metropolis. In 2025 there will be two large metropolises in Spain: Madrid and Barcelona. Each one will reach 7 million people due to immigration and to the enlargement of the radius of the labour market to incorporate cities in around 100 Km. The labour market could reach 3.8 million jobs.

- About 60% of production will be oriented to exports of goods and the added value per unit will increase: 20% to the rest of Spain, 20% to the rest of the UE, and 20% to other non-UE Mediterranen countries and Asia (China, India). Services exports will also increase where tourist services will account for 50% of services exports. This will conclude the main economic change of Barcelona from a city oriented to the Spanish inner market towards an export metropolis open to international trade and increasingly oriented towards the Mediterranean and Asia.

- In the past, Barcelona attracted UE and Japan multinational firms due to its avantages in factor costs (low salaries, low land and energy prices). In 2025 the model of low costs will be replaced by a model of attraction based on life quality, qualified labour market and geographic localization.

- Limitations imposed by weak transport and communication infrastructures will change towards a new and powerful infrastructural network linking Barcelona with other places: high speed train linking the mega-region Barcelona-Lyon; the enlargement of the airport will allow for a growth of international lines connecting with Asia and the USA.

- Duality in labour market will increase: a core highly qualified, high salaries, high productivity and international orientation; and a periphery with low qualifications, salaries and productivity.

- Surplus in trade balance by current account will improve the financial role of Barcelona, in particular with regard to investment opportunities in Mediterranean countries, Africa and India.

Results coming from the MASST and MAN-3 models, and based on a territorial logic, will be compared with the quali-quantitative expectations coming from the Barcelona partners. The existence (or absence) of specific success factors in the local economy, and not sufficiently taken into consideration in the MAN-3 model could be taken as drivers for a possible variation range around the MAN-3 results for Barcelona.

4. FURTHER PROCEEDING TOWARDS THE DRAFT FINAL

The next steps of the work consist in completing the quantitative analysis with the inputs from MASST and from the qualitative scenarios. In this way, both the general trends throughout Europe will be taken into consideration thanks to MASST, as well as the specificities of single typologies of regions that thanks to the qualitative integrated scenarios will not be underestimated.

The output of the MAN 3 and the qualitative integrated scenarios for specific typologies of regions will be useful to draft the foresights for the provinces of Barcelona, Hérault, and Turin and in general for the Latin-Arc. This step will allow the "fine tuning" of the estimates and implementation of the model foresights for the three scenarios.

More specifically, the future steps are:

- Finalisation of the estimates;
- Structure of the simulation procedure (software);
- Simulation assumptions for the three scenarios;
- Final results for the "Latin Arc".

The general methodology followed for the quali-quantitative production of scenarios, will be made explicit with reference to the Barcelona case, in order to constitute a kind of standard for other foresight exercises.

This part will be done in strict cooperation also with the lead stakeholder (the Province of Barcelona), who will strongly interact on both the inputs and the outputs of the scenario building methodology.

Once the results of the MAN 3 and the qualitative territorial scenarios will be definitive, the final scenarios for Barcelona will be built.

5. ANNEX TO THE INTERIM REPORT

5.1. Policy Implications

As it is evident from the flow chart concerning phases and actions inside the project, the entire project team was involved, up to the end of November, on scenario building and econometric analysis. Therefore, policy issues, which are at the core of the project, where only indirectly taken into consideration, through the importance they assume in the three scenarios. The last three months will be devoted explicitly to policy issues, working on the basis of the econometric results and forecasts achieved between November 2009 and February 2010.

From early reflections it appears that "pro-active" scenario will be the most favourable for the Latin Arc regions, a scenario that incorporates strong normative and policy responses. At this stage, the reflection on regional policies concern the main elements of this scenario.

In particular, the further development of renewable energy sources and green technologies should be addressed by policies. Indeed, they are of great importance for the future of numerous territories because they affect multiple sectors, from agriculture to manufacturing, from building and construction to services.

Policies supporting green technologies can have significant impacts on cities, especially in the field of transport systems and mobility. In the future new transport technologies will significantly affect transport costs and therefore locations (households, businesses) and mobility patterns. In addition to economic aspects, the adoption of the "green economy" has important impacts on the morphology and organization of cities.

A significant number of rural areas benefit from the "green economy" too, especially in the field of renewable energy sources (biomass, solar and geothermal energy etc).
Potentials exist in many rural regions, but can only be extensively exploited if the conditions of profitability improve and credit constraints are mitigated. In this respect, policies should be addressed to support local authorities with limited resources and the potential investments of Small and Medium Enterprises constrained by difficulties in obtaining bank credits.

Policies should also be oriented to increase the stock of knowledge because it raises the productivity of local inputs like labour, physical capital and human capital. Moreover, the diffusion of knowledge is just as important as the creation of knowledge. There are two types of knowledge diffusion that policies should take into consideration. Form the one hand, policies have to facilitate the information flows by increasing the communication networks. On the other hand, policies must be devoted to develop transportation networks, with particularly regard to high-speeds transportation networks, because they help the face-to-face contacts which are of great importance for the diffusion of complex knowledge.

Regarding innovation, as European strategy consists of increasing significantly technological investments boosting productivity, higher skills and qualifications are required. In this respect, policies must support the human capital by increasing the stock of competences and knowledge through training and requalification.

The analysis also underlines that young people are a critical factor for growth.
Policies have to be devoted to retain young people, especially in rural areas where the employment opportunities are scarce. In particular, policies should be designed to increase employment opportunities, for example by supporting the "green economy", and provide adequate incentives to improve the possibility of young people to compete in local housing markets, where demand for housing comes from commuters, retired households and second home owners.

In rural areas, policies should also be oriented to develop the residential and tourist economy which is beneficial to rural areas with an attractive natural and cultural heritage. This is helpful in maintaining services and containing outmigration trends. It also counteracts the negative impact of the further liberalization of agriculture in providing additional resources.

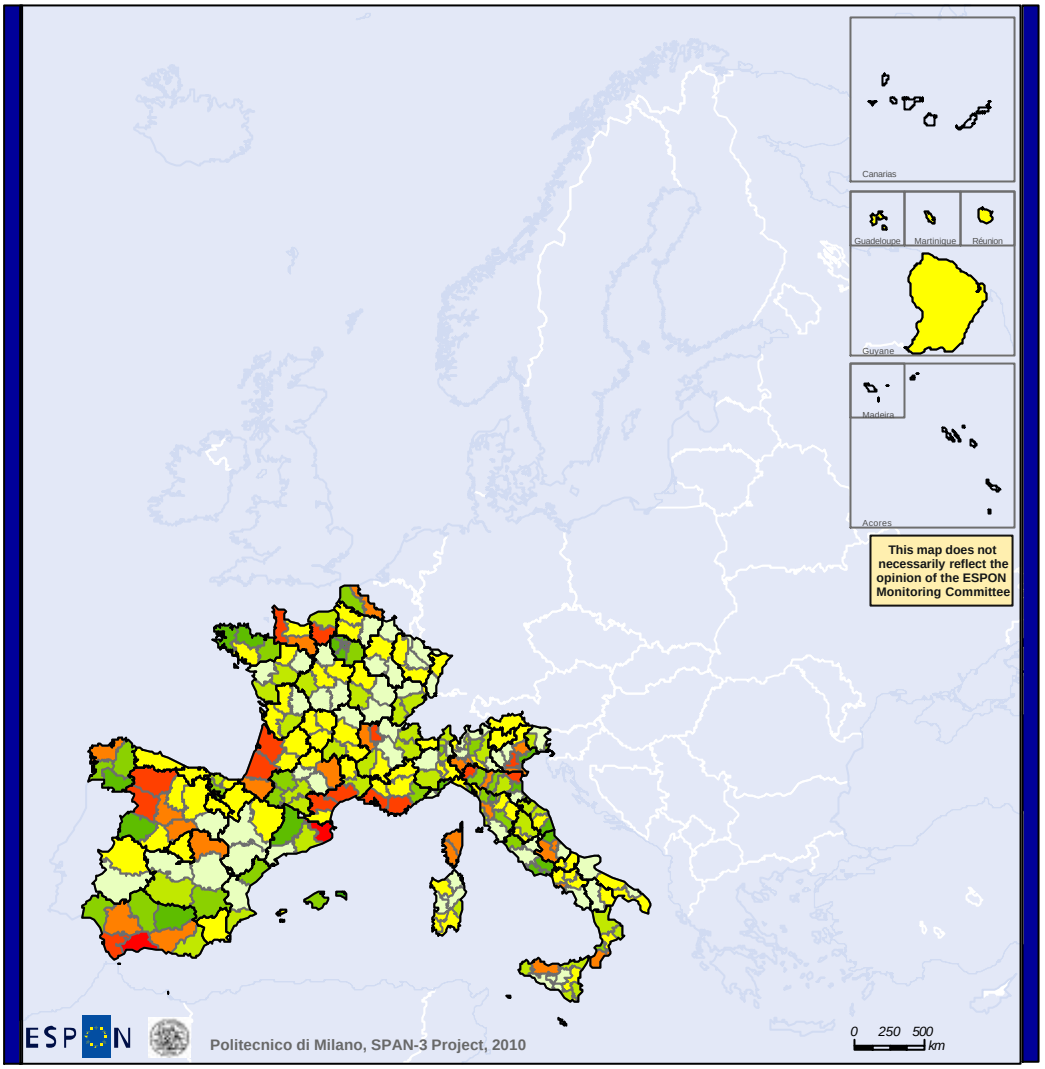
Regarding urban areas, policies must support second rank cities and promote networks of smaller cities and towns in order for them to provide the same kind of attraction as location for businesses and individuals than big cities. Strategies of urban specialization and inter-urban cooperation ("synergy" and "complementarily" networks) should be followed.
In this way, policies could help to decrease the costs of the economic concentration in the form of congestion, poor air quality and higher property prices and to lead to a more balanced territorial development within region.

Finally, policies should favour the development of complementarities and partnerships between the European Mediterranean regions and countries of the southern and eastern parts of the Mediterranean Basin. In this way the Latin Arc cities will be less subject to immigration.

5.2. Maps

1. We will provide maps with quantitative results at NUTS-3 level for the three countries and the "Latin Arc", e.g. the differential growth rate of provinces with respect to their region (in the various scenarios) and the difference between proactive or reactive scenarios and the reference scenario of the provincial growth rate:

Example A.4.2.1. – The Differential Growth Rate of Provinces with respect to their Region



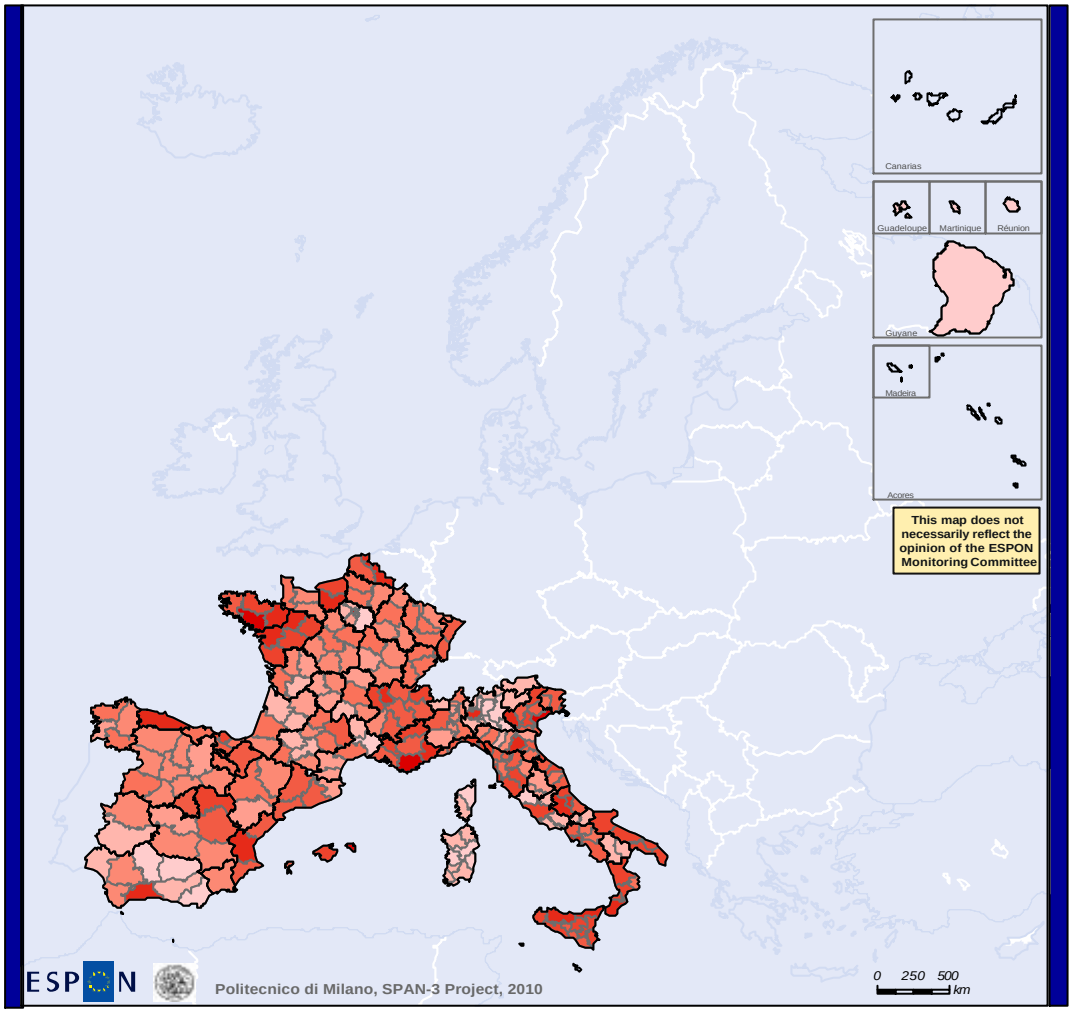
Regional level: NUTS 3
Source: Politecnico di Milano, March 2010
Origin of data: SPAN-3 model, March 2010
© EuroGeographics Association for administrative boundaries

Differential Growth Rate of Provinces with respect to their Region

Reference Scenario

- -2,195851 - -2,157983
- -2,157982 - -0,731157
- -0,731156 - -0,447207
- -0,447206 - -0,293208
- -0,293207 - -0,183770
- -0,183769 - 0,000000
- 0,000001 - 0,139875
- 0,139876 - 0,471491
- 0,471492 - 1,347940

Example A.4.2.2. – Difference between Proactive Scenario and the Reference



Regional level: NUTS 3
Source: Politecnico di Milano, March 2010
Origin of data: SPAN-3 model, March 2010
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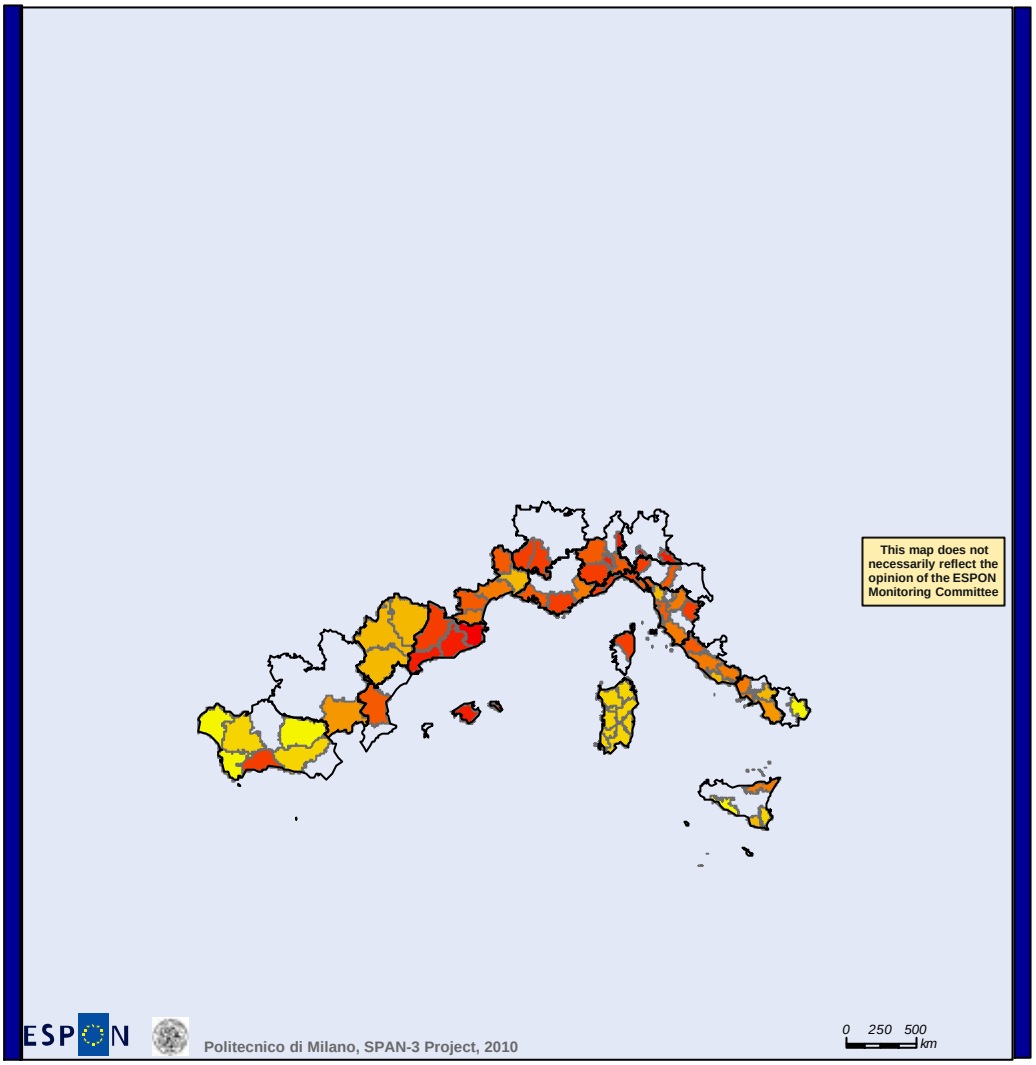
Provincial Growth Rate

Difference between the Proactive Scenario and the Reference

- -0,143210 - 0,249807
- 0,249808 - 0,476199
- 0,476200 - 0,619849
- 0,619850 - 0,755071
- 0,755072 - 0,916196
- 0,916197 - 1,102510
- 1,102511 - 1,255483
- 1,255484 - 1,510626
- 1,510627 - 2,100990

Example A.4.2.3. Latin Arc: Provincial Growth Rate in Reference Scenario



Regional level: NUTS 3
Source: Politecnico di Milano, March 2010
Origin of data: SPAN-3 model, March 2010
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Legend

Reference Scenario
Provincial Growth Rate

- -0,591757 - -0,321762
- -0,321761 - 0,298970
- 0,298971 - 0,918556
- 0,918557 - 1,000000
- 1,000001 - 1,612893
- 1,612894 - 2,111634
- 2,111635 - 2,652489
- 2,652490 - 3,400444
- 3,400445 - 4,738952

2. The same maps will be provided adding quali-quantitative information with overlapped grids, allowing a fine-tuning of previous results, using extra information on local economies with respect to that considered in the econometric analysis. These maps will be built on the basis of reactions and contributions from partners and stakeholders.
3. Inside the Barcelona province, we will provide maps on population growth, employment growth and sectoral employment structure, using data at municipal level but grouped into four areas (Barcelona, a first ring, rest of the metro area, peripheral areas).
4. Finally, wild cards representing qualitative and quantitative results will be provided for the “Latin Arc”.