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The impact of globalisation and increased trade liberalisation on European regions

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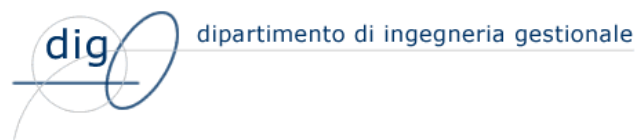
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“The impact of globalisation and increased trade liberalisation on European regions”

Study for DG Regio Final report

**IGEAT – ULB
Politecnico di Milano
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Abstract

The main question raised by this study is whether growing external competition affects regional welfare in Europe. In a more globalized world, notably because of the liberalization of trade, Europe has to face growing external competition, especially concentrated in some sectors. Indeed, because of negative and deteriorating balances, some sectors are particularly suffering from external competition (vulnerable sectors): textile, Metal and electric and optical equipments manufacturing industries are the most affected when looking at the European economy as a whole (see chapter 1). Of course, this general pattern is geographically differentiated within the European space because European countries are facing external competition in very different ways and with different comparative advantages. Moreover, this external competition has very differentiated impacts on the economic growth and social welfare of European nations and regions (see chapter 3). First, we observe a complex relationship between external competition and the sectoral growth at national level. This means that even in the most vulnerable sectors, some countries have been able to face extra-European competition or, at least, compensate for these losses on external competition by gains within the European market (3.1.). Second, regions which are potentially affected by this competition because of their economic specialization are indeed reacting in very different ways. This can be asserted by the fact that we found no simple relationship between the regional share of vulnerable sectors and economic and/or employment growth in the 1995-2005 period (3.2). To understand this diversity of regional responses to a common potential threat put into the fore in section 3.3, we used quantitative econometric analysis and qualitative analysis, based on regional case studies (see section 4). By the first method (4.2), it clearly appears that endogenous factors of the regions, such as innovation capacities, seem to play a decisive role to understand the success of the region when facing this external competition. In this context, it is important to note, however, that we do not dispose of sufficient statistical information to measure the actual integration into global markets of these regions. By the second method (4.3), we put into the fore qualitative factors, such as the historical background or the governance strategies to face the problems of these specific regions. Finally, the MASST model forecasts the spatial consequences at regional scale of different strategies of the EU (chapter 5) and the BRIC countries, providing GDP and employment growth estimates. The main conclusions of this study are (chapter 6):

- Sectoral structure is relevant to define a certain level of vulnerability, but not sufficient at all for the understanding of regional development paths.
- These paths are very heterogeneous across Europe's regions and are heavily influenced by many, often endogenous, factors of regional growth. This also means that sector structure is not a satisfying means to identify regions in need of policy intervention.

We highlight 5 aspects which policy needs to take into account and possibly act upon:

- the need to ensure the regional embeddedness of firms in order to increase their positive impact on the region and prolong this impact
- the need to enhance region's capacities of profiting of the presence of large exogenous firms

- the difficulty to politically create cluster structures which are generally the result of long historical evolutions, but the need to support existing clusters in the development of more technological innovation
- the importance of education, notably basic secondary education, for the capacity of a region to profit of opportunities, be it in the form of large exogenous firms or cluster structures
- the risk of letting regions destructure completely and thus the possible need to support certain declining industries to ensure the preservation of activities and know-hows.

Executive summary

• Introduction

The main issue raised by this study is whether the growing external competition affects regional welfare in Europe. In a more globalized world, notably because of the liberalization of trade, Europe has to face a growing extra-European competition, especially in some manufacturing sectors and in some less technological segments of production. Since these vulnerable sectors are concentrated in some areas, one should expect negative consequences of this regional specialization, both socially and economically.

Identifying these sectors and understanding how regions react to this vulnerability should then allow the formulation of policies which anticipate these developments and increase regions' resilience against the potential negative impacts.

In this study, the following steps have been implemented to increase the understanding of the issues surrounding this notion of vulnerability:

- 1 – Identification of the most vulnerable sectors regarding extra-European international trade, and exploration of the relationship between trade indicators and sectoral dynamics for the whole EU during the 1995-2005 period;
- 2 – Exploration of the impact of specialization in the most vulnerable sectors on the regional welfare. Regional welfare takes into account the employment and gross added value dynamics in the vulnerable sector and in the global regional economy, as well as social indicators regarding the labour market;
- 3 – Identification of major factors of success or failures of the most vulnerable regions, through quantitative econometric analyses as well as qualitative analyses centred on case studies.
- 4 – Prospective analysis through the MASST model in order to identify plausible future evolutions and their consequences on regional development.

• Vulnerable sectors

Sectoral vulnerability can be apprehended through the concepts of product cycle and space-time diffusion: new products and technologies appear in the most developed parts of the world -the core areas -, where the technological skill is the highest and then tend to diffuse across space to the least developed areas (semi-peripheries and peripheries). Since the sectors have different technological level, they are situated at different stages of these product cycles and this could explain their geographical distribution at the world scale: while new sectors and technologies tend to concentrate in the core areas, the old and less technological sectors diffuse in the peripheral countries, as soon as they become “taylorisable”, i.e. as soon as the production processes become simple and

transferable enough to be delocalised either to other parts of the local labour force or globally. Light manufacturing industries and especially textile clearly illustrate this pattern of diffusion, and Western Europe is now underspecialized in textile. At the other extreme, we find mechanical or chemical industries which remain very central. As far as electric and optical equipments are concerned, patterns are complicated by internal heterogeneity and diffusion seems to be limited to semi-peripheries (Eastern Europe for example) rather than peripheral countries. Metal and automotive industries present the same general picture.

As a consequence, global competition does not produce the same constraints on different sectors in Europe. We basically defined vulnerable sectors by the combination of high openness to extra-EU competition (high import penetration ratio) and negative and deteriorating trade balance: in a sector very open to external competition, a deteriorating trade balance illustrates a loss of competitiveness that could potentially affect the industrial production. Textile (DB and DC NACE sector) and miscellaneous manufacturing industries (DN) clearly fit to the criteria because of their situation in the space-time diffusion process. Metal (DJ) and electric and optical equipments (DL) also fit to our criteria but in a less clear-cut way since they only have a part of their activities in the low technological segments which progressively diffuse to semi-peripheral countries.

However, this delimitation raises three problems: first, trade indicators by sector show some contradictory and unstable trends; second, and more importantly, the economic sectors show a high heterogeneity in terms of trade evolutions; third, global EU-27 evolutions hide different patterns of trade evolution across space, especially between Eastern and Western countries. Since the low technological segments of production are more affected by growing competition from low cost labour countries, we can add that some non vulnerable sectors have indeed very vulnerable segments of production. From the final analysis, only textile sectors, which are globally characterized by low technological levels, appear vulnerable in a relatively homogeneous way, and in a long term perspective.

How does this sectoral vulnerability in the global competition affect sectoral performances within the EU ? In EU-27 taken as a whole, we observe a stable and significant correlation between the evolution of the trade balance and employment or GVA growth in the period 1995-2005. This means that the degradation of the trade balance in a sector has a significant impact on its growth. We also observed that this relationship is confirmed at national level, yet with some important differences between countries. This result is important for the whole approach of this study since it shows that the sectors which are the most affected by growing extra-European competition are also suffering in terms of GVA and employment dynamics. This is particularly true of textile, electric and optical equipment and miscellaneous manufacturing industries. As far as the metal sector is concerned, results are less clear: this sector remains more closed to international competition and the trade evolutions seem to have less impacts on economic evolutions.

- **Impacts on regional welfare**

Our major concern, however, is about **the geographical consequences of this growing international extra-European competition**. We examine these consequences at the national and the regional scales.

First, we observe a complex relationship between external competition and sectoral growth **at national level**. This means that even in the most vulnerable sectors, some countries have been able to face extra-European competition or, at least, compensate for these losses by gains within the European market.

Second, at regional level, in the absence of regional trade data, we explored the relationship between the regional specialization in the vulnerable sectors and the regional economic performances, in the vulnerable sectors as well as for the entire regional economy. As far as the vulnerable sectors are concerned, we found no correlation between the regional share of vulnerable sectors and the GVA or employment growth in the sector in the 1995-2005 period, except for the electric and optical equipment sector. In this sector the concentration of this activity seems to be an advantage to face international competition. **When considering total regional economic growth results show very complex relationships between regional potential vulnerability and regional economic dynamism.** : this relationship varies with the vulnerable sectors (textile, metal or electric/optical equipment) and the macro-regions (Eastern, Southern or Western Europe).

We define vulnerable regions by a high share of vulnerable sectors in the employment or GVA structure. Simple comparisons between vulnerable and non vulnerable regions show that, in EU-15 at least, vulnerable regions are poorer and perform worse in both employment and GDP growth during the 1995-2005 period (Table 1). But this hides important differences regarding the type of vulnerability: electric/onic regions are indeed richer and perform better in terms of GDP if compared to European or national averages, while the reverse is true for textile regions. However, evolutions are different if one considers employment rather than GDP growth, which is positive in textile regions and negative in the other two types. In the new member states, the picture is much more complex, even if we also found that electric/onic regions are richer than the others, at least regarding the European average.

By using regression analyses we identify, in a second step, a negative impact of the regional share of vulnerable sectors on the regional GDP growth. However, here again, this result hides differences as regards the sector and the macro-regions of the European space: metallurgy has a negative impact in nearly all macro-regions, textile has a mostly negative impact but not significantly, “electric and optical equipment” globally has a positive effect on economic growth, especially in the core and Nordic Europe, where the sector focuses on the most technological segment. When considering industrial employment, results are not the same, since the share of vulnerable sector has a positive impact on employment growth, especially in textile and miscellaneous industries when results are not controlled by national trends.

		Total employment	Industrial employment	Gross Domestic Product			
		Average annual growth between 1995 and 2004 (%)	Average annual growth between 1995 and 2004 (%)	GDP/inhab. 2004 EU-27 =100	GDP/inhab. EU 2004 - 1995	GDP/inhab. 2004 country = 100	GDP/inhab. Nat 2004 - 1995
EU 15*	Non vulnerable regions	1,53	0,22	112,0	0,4	101,4	0,3
	Globally vulnerable regions (1)	1,05	0,06	105,2	-10,3	98,4	-1,2
	Textile regions**	1,23	0,49	96,1	-10,8	94,5	-2,3
	Metal regions**	0,95	-0,33	107,8	-9,2	98,4	-1,7
	Electr. Regions**	0,98	-0,50	121,0	-8,2	108,3	-0,4
	EU-15 average	1,35	0,02	111,3	-2,7	-	-
New Member States	Non vulnerable regions	-1,67	-2,53	55,0	9,1	104,4	0,9
	Globally vulnerable regions (1)	-1,33	-0,70	58,8	6,6	89,4	-2,3
	Textile regions**	-1,25	-1,04	49,0	8,6	95,7	-1,2
	Metal regions**	-0,90	-1,29	58,6	3,7	83,7	-0,4
	Electr. Regions**	-0,18	-0,69	63,1	6,0	83,1	0,3
	NMS average	-1,46	-1,55	57,0	7,1	-	-

Table 1. Performances of vulnerable regions according to the types of vulnerability

Source: Eurostat

Notes: Vulnerable regions have been aggregated on the NUTS3/NUTS2 regional division of EU.

* Eastern Germany not included (included in NMS)

** those regions could also be included in (1)

Finally, we also explored **the social impact** of this regional vulnerability.

First, we can assert that vulnerable regions are not affected by worse social indicators on jobs precariousness. Moreover, as far as unemployment is concerned, vulnerable regions are characterized by lower rates, while not in all regions. How can we interpret this result? First, the national labour market is still the major factor to explain regional situations. Second, marshallian textile districts are clearly characterized by lower than average unemployment rates, because of a very flexible labour market. Indeed, textile regions, despite their bad economic performances, are still able to create jobs. In electric/onic regions, the good economic wealth of most of them could explain low unemployment rates; in metal regions, only the old industrial regions show high rates of unemployment.

Second, we explored what happened to the workers in the vulnerable regions in relation to level of qualification. It clearly appears that the low qualified persons are the first victims of job losses, yet to a much higher extent in the “electric and optical equipment” than in the textile sector, which remains a relatively unqualified sector at the EU-27 scale. But the situation of the lowly qualified is not worse in vulnerable regions than in other regions: First, globalization can also hit first the low qualified people in the other regions, specialized in non vulnerable sectors but which are also growing up in the technological level. Second, in many vulnerable regions, especially marshallian textile districts, unemployment rates remain low and the development of basic services seems to be able to absorb most of the jobs losses. Third, even in the most specialized regions,

vulnerable sectors represent only a moderate share of the employment as compared to the service sector for example.

It results from these analyses that we found no evidence of a clear impact of the regional specialization in the vulnerable sectors: vulnerable regions are indeed reacting in very different ways to this growing international competition in their specialization sector.

• **How can successes and failures in the vulnerable regions be explained?**

To understand this diversity of regional responses to the common potential threat of extra-European international competition, we used quantitative econometric analysis and qualitative analysis, the latter based on regional case studies.

From the econometric analyses, the most important success factors for general regional dynamics are:

1. innovation;
2. share of highly qualified workers;
3. structural funds;
4. regional specialization (only for total value added growth);

Interestingly enough, all these factors impact more on employment growth than on value added growth. As a result, none of them is able to explain a positive increase in labour productivity growth.

In vulnerable regions one can highlight the following specificities in terms of success factors:

1. high value added functions do not explain employment growth dynamics, as they do for other regions;
2. while regional specialization and sectoral reconversion penalize employment dynamics, they are not significant in explaining value added growth;
3. innovation and entrepreneurship do not turn out significant in the explanation of total labour productivity.

Successful strategies are analysed through those factors that directly or indirectly can capture the development of these strategies: *innovation, composition of the labour force, and degree of sectoral reconversion.*

1) an increase in productivity, through innovation:

For industrial sectors in vulnerable regions, innovation does not explain neither value added growth nor employment growth, consequently it does not explain productivity growth. When one considers the effect on total performance, innovation is again not significant in explaining productivity growth and it is even of detriment for total productivity growth in non vulnerable regions. In non vulnerable regions, innovation positively impacts on total employment growth and total value added growth, witnessing the implementation of both product and process innovation.

2) *a rationalization of low value added activities in favour of higher value added activities:*

The reconversion in favour of high value function allows maintaining or increasing both total and industrial employment in non vulnerable regions. Moreover, it has a positive effect on total value added growth. In vulnerable regions this strategy does not affect the industrial performances and it only influences positively the total employment growth.

3) *a sectoral reconversion:*

In non vulnerable regions this strategy never has positive effect whilst it negatively affects employment growth rates. It is interesting that in vulnerable regions sectoral reconversion always has a positive and significant effect on value added and productivity, through a decrease in employment dynamics. This shows that in vulnerable regions the only winning strategy for industrial sectors put in place is the sectoral reconversion.

From the qualitative analysis of cases of vulnerable regions, several factors of success emerge. **We distinguish three major types of factors: those related to the firms, to the structural context and to the policies.**

As far as firms are concerned, several factors can be put into the fore. First, the activity sector does play an important role through the evolution of world markets and the sector's composition in terms of different production segments: while textile firms are suffering from the growing international competition, despite their positioning in technological segments, “electric and optical equipment” firms benefit from a growing world demand, even if the regions have to abandon the low technological segments. Second, the size of firms is an important element. Large firms certainly suppose regional dependence but small and medium enterprises sometimes suffer from insufficient financial capacity and R&D, sometimes compensated by the existence of networking and collaboration between firms. Finally, embeddedness of firms and endogeneity of development are also two important factors to face structural change. For example, exogenous large firms in Eastern Europe (Western Hungary, North-Eastern Romania) are clearly not embedded in their regional industrial tissue, while in some regions endogenous large firms present much stronger local links (Nokia in Northern Finland, metal industry in the Ruhr). Marshallian districts also show this opposition: “weak marshallian districts” (Norte Portugal, Jura) suffer from the importance of external capital and consequent insufficiencies of local know-how, while in the most successful marshallian districts (Herning, Kortrijk area, Prato), strategic functions do not leave the region.

This leads us to a **second range of successful factors related to the regional structural context** in which firms are embedded. Case studies have pointed some decisive factors. The quality of the workforce is a central element to keep investors in, at least in the high segments of production. This supposes a good education system and in many cases a connection between the education and institutional research system, on the one hand, and the industrial network, on the other hand. Too much specialization of the education system is however a potential problem when the sector is faced with a crisis. Labour costs have also been a significant factor of attractiveness but certainly not

of embeddedness, since the firms leave as soon as they find cheaper labour somewhere else. Another contextual factor of success is entrepreneurial spirit, whose historical origins are not easy to apprehend.

In this context, what have been the **public policies** and which impacts did they produce on the regional welfare? We could first mention the regional policies that have been favoured all over European regions. These policies have been implemented to create favourable conditions for economic growth and to improve the regional environment in which firms are acting. The focus on education is a general feature of these policies, at least in the recent years. Finland and Toulouse are clearly two cases where this factor has been very important to explain the economic success. Favouring institutional research and collaboration between Universities and local industry is another example of structural policies which have been put in place all over the regions, for example through the promotion of spin-off or technological centres. However, one could hardly say if the success in Northern Finland or Toulouse could be explained by such a policy or if this collaboration is the consequence of a general positive dynamics. The accent on entrepreneurship is also a common feature, especially in the old heavy industrial regions, but with little success, especially when programmes focus on the most vulnerable populations.

More precisely, the vulnerable regions nearly all inscribe their industrial policies in the “cluster paradigm”, with the aim to create a “critical mass” in some sectors or segments of production mainly through the development of small and medium enterprises, the promotion of collaboration and networking between them and the improvement of the connection with the education research institutional system. This critical mass is supposed to support competitiveness through the diffusion of innovation. Old industrial regions and Franche-Comté clearly show how these policies are limited by structural obstacles such as the lack of entrepreneurship or the external dependence.

However, in some of the successful regions, public interventions have been decisive through direct investments. Northern Finland and the Toulouse area are good examples but these successes are not easily replicable: first, they build also partially on structural features; second, big public investments are limited in number.

On the basis of the analyses in this part of the study we propose a typology of regions **at risk** as opposed to **vulnerable**. This clearly shows that only a subset of those regions identified on the grounds of their sector structure actually are likely to suffer from globalisation, which is important to take into account in any prospective policy analysis.

Prospective

Quali-quantitative scenarios on possible future alternative growth patterns in Europe have been built according to two opposite competitive strategies of emerging countries, of Western countries and of the EU:

- a scenario combining a reactive strategy by the Member Countries, a modernising strategy by BRIC, and a competitive strategy by the European Commission, i.e. *a scenario of an aggressive Europe in a high-quality competitive world (scenario A)*;
- a scenario based on opposite strategies: defensive Member States, a price-

competitive strategy by BRICs, and a cohesive strategy by the European Commission, i.e. *a scenario of a defensive Europe in a price-competitive world (scenario B)*.

The results of the scenarios are presented with respect to a baseline scenario, built on the assumption that the present trends affecting growth and the associated policies put in place will continue in the future. The following table presents the summary of the situation in 2020 according to the three scenarios.

2020 Growth rates	Baseline scenario			Scenario A: Aggressive Europe (difference to baseline)			Scenario B: Defensive Europe (difference to baseline)		
	GDP	Industrial Employ.	Tertiary Employ.	GDP	Industrial Employ.	Tertiary Employ.	GDP	Industrial Employ.	Tertiary Employ.
EU27	2.66	-0.61	1.51	0.72	-0.09	0.34	-0.22	-0.08	-0.37
EU15	2.65	-0.79	1.43	0.71	-0.08	0.33	-0.20	-0.07	-0.34
EU12	2.87	-0.06	1.94	0.93	-0.09	0.35	-0.70	-0.12	-0.54

Scenario A thus presents overall growth rates which are higher than the baseline, except for industrial employment growth and scenario B presents significantly lower growth rates both in GDP and in employment, although industrial employment does not suffer more than in scenario A. However, these growth rates are highly differentiated across the regions of EU27, with a general difference between EU15 and EU12, but also other differentiations such as between central and peripheral regions.

For the vulnerable regions, we can draw the following conclusions from this scenario exercise:

In scenario A:

- vulnerable regions would benefit, as all others, from the scenario A more than from a scenario of protectionism. Within vulnerable regions, the ones taking less advantage from a courageous scenario are the rural ones;
- in terms of GDP per capita, vulnerable regions follow mixed patterns, also because this typology contains both “global vulnerable regions” and regions “vulnerable in one sector”. Those in the west appear on average as having a good outcome; their endowment of urban and tertiary structure is probably its winning feature. Vulnerable regions in the East, on the contrary, are generally outperformed by the – non-vulnerable – capital regions;
- interestingly enough, in the courageous scenario vulnerable regions show mixed evidence in terms of industrial employment dynamics, but in general they are the ones which lose more. This is a scenario in which vulnerable sectors are less affected by external competition than now: given this assumption, our result suggests that the more tertiary and less specialized structure of non-vulnerable regions help them in growing even in front of a high competition in non-vulnerable sectors;
- vulnerable regions are the ones gaining less in terms of tertiary employment.

They seem not to be able to replace industry with tertiary activities.

In scenario B:

- different sensitivity in terms of GDP growth between Eastern and Western vulnerable regions; the former have higher variance in terms of GDP growth than the latter;
- the decisive loss in industrial employment growth in vulnerable regions;
- the relative lower loss of service employment growth in vulnerable regions with respect to the others.

• Conclusion

Scientifically we can conclude that sectoral structure is not sufficient to explain regional development, even though sectors do have an influence on regions' potentials. It seems that segments of production (notably through the related levels of qualification) are more decisive, but that in general a more generic approach such as the one proposed by evolutionary economic geography would be more appropriate to understand regional dynamism. It is also important to note that impacts can be very different between GVA and employment.

In support to policy elaboration, we can highlight the following points:

- The need to ensure the regional “embeddedness” of firms in order to increase their positive impact on the region and prolong this impact: Embeddedness in this context means that the large firm is made dependent on very specific factors of the region, mostly specific forms of cooperation.
- The need to enhance region's capacities of profiting of the presence of large exogenous firms: Policies should increase the intensity and the speed of spillovers from the exogenous firm to regional actors. Such policies imply decisive investments in knowledge transfer, education, etc, often in a very short period of time.
- The difficulty to politically create cluster structures which are generally the result of long historical evolutions, but the need to support existing clusters in the development of more technological innovation: There do not seem to be many examples of politically created clusters. Policy should, thus, focus more on the identification and support of existing ones, notably providing them with the necessary resources to fund decisive technological advances.
- The importance of education, notably basic secondary education, for the capacity of a region to profit of opportunities, be it in the form of large exogenous firms or cluster structures: although vocational training can support short-term development, a high level of more general education seems supportive to increasing the capacity of regions to adapt.
- The need to maintain territorial capital in regions in decline, including through public intervention, as it seems an important, although highly intangible, factor explaining regional success and difficult to recreate once it has been lost.

Introduction

“Virtually all regions are confronted with the need to restructure, modernise and facilitate continuous knowledge-based innovation, in products, management and processes as well as human capital, to face the challenge of globalisation. Even against a background of impressive growth rates, regions of the new Member States have an economic structure largely concentrated on sectors where competition from the emerging Asian economies is high. The economic imperative for these regions will be the anticipation and facilitation of change. This will help minimise the costs of change and also be an enabling factor for change. For these reasons, anticipative measures must be taken well in advance to equip and prepare the people and the regions for change.

Similarly, many regions in the more prosperous Member States have a high share of employment in traditional sectors, where competitive advantage is largely based on lower-cost, lower-wage production methods.”¹

“The firms have integrated the international dimension in their organization and their strategy, “outsourcing” some of their activities, re-locating their production and promoting the dissemination of their products on multiple markets to take advantage of economies of scale.”²

This study is based on the acknowledgement of a threat to the European economy as a whole and to some regional economies in particular. This threat is generally called “globalisation”, but is probably more precisely presented as increased competition in many economic sectors due to the rise of new actors with very different cost structures and to the lowering of global trade barriers. This threat is frequently seen as one of the major challenges to regional development in Europe.³

As expressed in the above quotes, there is a political desire to foresee the future impacts of this phenomena in order to prepare anticipative measures. This study is aimed at supporting such measures by identifying possible actions that might mitigate some of these impacts.

In the launch of the study the Commission took an explicitly sectoral approach to the issue: *“This study will analyse the impact of globalisation and increased trade liberalisation on regional economies that have high shares of employment in sectors exposed to more global competition.”⁴* This approach was based on a previous study by Applica and wiiw on « Changing regions - structural changes in the EU regions »⁵ which also had a resolutely sectoral approach. The general hypothesis is thus that

1 European Commission (2007), *Growing Regions, growing Europe. Fourth report on economic and social cohesion*.

2 European Commission (1999), *The competitiveness of European firms in the face of globalization*, Brussels, 20.01.1999 COM (1998) 718 final.

3 Idem + IGEAT et al, ESPON 3.2: « Spatial scenarios in relation to the ESDP and EU Cohesion Policy ».

4 Call for Tenders by Open Procedure, N° 2007.CE.16.0.AT.028, Tender specifications.

5 http://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/changing_regions2007.pdf.

regions with a higher concentration of employment in “vulnerable sectors” will be more vulnerable and, therefore, more prone to crises of restructuring than others. This hypothesis was used unquestioned as a starting point for this present study, but as the results show, it seems highly insufficient to explain actual regional development paths.

As already mentioned, the study should also support prospective policy thinking by forecasting possible evolutions in terms of vulnerability. Linked to the choice of a sectoral approach, this thus meant to forecast which sectors would be the most vulnerable in 5-10 years. Again, this approach proved to be very limited for two reasons: a) the already mentioned difficulty of actually explaining regional paths through their sectoral structure and b) the fact that it often are not sectors which are vulnerable as such, but rather specific segments of production, as highlighted by some of the existing literature on the subject.⁶ Even though some sectors concentrate higher proportions of these specific segments, this is not straightforward to analyse prospectively. The teams has, therefore, focused on a more generic approach, highlighting those general factors that seem determinant in allowing regions to profit of a period of growth (and thus a concentration) in a specific sector before this same sector becomes vulnerable to larger competition.

The study thus presents the following parts. We begin by identifying those sectors which show vulnerability in terms of trade evolution at EU27 level (Chapter 1). We then continue with the identification of regions which concentrate a particularly high share of employment in these sectors. (Chapter 2). On this basis, Chapter 3 then studies the actual performances in terms of employment and production of the vulnerable regions, including the spatial variations of these performances. Chapter 4 provides several attempts at explaining these performances by isolating some of the determinant factors, both through quantitative analyses and through case studies. Chapter 5 focuses on the prospective analysis using the MASST model to forecast future regional evolutions according to two different scenarios. Chapter 6 synthesises all the results and distilling relative policy conclusions from them.

6 OECD (2007), *Globalisation and Regional Economies, Can OECD Regions Compete in Global Industries?*; J.-L. Gaffard (2007), « Existe-t-il un avenir industriel pour la France et l'Europe dans la mondialisation ? », in J-P Fitoussi et E. Laurent eds, *France 2012 E book de campagne à l'usage des citoyens*, www.ofce.sciences-po.fr

1. Vulnerable sectors

As mentioned in the introduction the sectoral approach to vulnerability was a given from the start, based on the Applica and wii study. This chapter explains how the sectors were identified based on the evolution of the trade balance and the import penetration ratio.

In the perspective of this study, vulnerability is defined regarding extra-European competition, with a basic hypothesis that global trade vulnerability has important consequences on economic evolutions. This is why, in a second step, we test and confirm this hypothesis by exploring the relationship between the vulnerability to international competition and the economic evolutions, at both European and national scales.

We begin by looking at the global space-time diffusion cycles of some representative products in order to understand what trade data might show us concerning the position of each sector in this diffusion process, and thus the vulnerability linked to this sector. We then identify those sectors which show trade evolutions marking them as potentially vulnerable to then go on and test the impact of this vulnerability on economic performance.

1.1. The vulnerable sectors according to international trade

Sectoral vulnerability can be apprehended through the concepts of product cycle and space-time diffusion: new products and technologies appear in the most developed parts of the world -the core areas -, where the technological skill is the highest and then tends to diffuse across space to the least developed areas (semi-peripheries and peripheries). A general description of these innovation cycles can be achieved by using the Kondratjeff cycles: in the A phase (25 years), new sectors related to decisive innovations emerge in the core areas producing economic dynamism; in the B phase, the cycle slows down in the core areas and technologies tend to diffuse to other parts of the world (Vandermotten, 2005; Braudel, 1980; Taylor, 2000; Wallerstein, 2002). Since the sectors have different technological level, they are situated at different stages of these cycles and this could explain their geographical distribution at the world scale: while new sectors and technologies tend to concentrate in the core areas, the old and less technological sectors diffuse in the peripheral countries. However, to apply this general pattern to sectoral classifications raises some difficulties: the sectors cannot easily be assimilated to a defined technological level, notably because of internal heterogeneity of the sectors but also because innovation is a permanent feature in all sectors.

This general pattern has been tested for textile at two different scales during the 1967-2006 period: by country in the Euro-Mediterranean space (Figure 1) and by macro-regions at the world scale⁷ (Table 2). While national specificities are obviously present during the whole period, figure 1 still puts into the fore the space-time diffusion pattern

⁷ See annex of chapter 1 in the volume 1 of annexes for the detailed classification of countries.

of textile: specialization in textile exports is higher in core countries at the beginning of the period, and is clearly higher in the most peripheral areas of the Euro-Mediterranean space at the end of the period (Balkan countries, Turkey and non-petroleum countries of Northern Africa). In central-Eastern countries, we observed a rapid specialization after the collapse of communism and a decline as soon as the second half of the nineties. Table 2 illustrates the same pattern for the different macro-regions of the world: in each world region, we observe a decline of textile specialization in the core and semi-peripheral countries between 1976 and 2006 (except for Northern America where textile specialization was already very weak in 1976), and a spectacular growth in peripheral countries of the three macro-regions, especially in Eastern Asia which growingly concentrates the labour-intensive textile production at the world scale.

		A-America	B-EurAfrica	C-AsiaPacifica	Total
1976	1-Core	0,29	1,03	0,69	0,80
	2-Semi-Periphery	1,10	1,64	3,86	2,43
	3-BRIC	0,93	0,08	3,28	1,27
	4-Periphery	0,61	0,50	1,89	0,68
	Total	0,38	1,02	1,76	1,00
2006	1-Core	0,29	0,69	0,18	0,53
	2-Semi-Periphery	0,63	1,40	0,80	1,01
	3-BRIC	0,64	0,44	2,87	2,32
	4-Periphery	1,14	1,36	5,05	2,35
	Total	0,45	0,81	1,63	1,00

Table 2. Evolution of the relative specialization* of textile exports by macro-regions and level of development

*Indicator= share of textile in the exports of the macro-region/share of textile at the world level

Source: Chelem database

Note: see annex for more methodological precisions

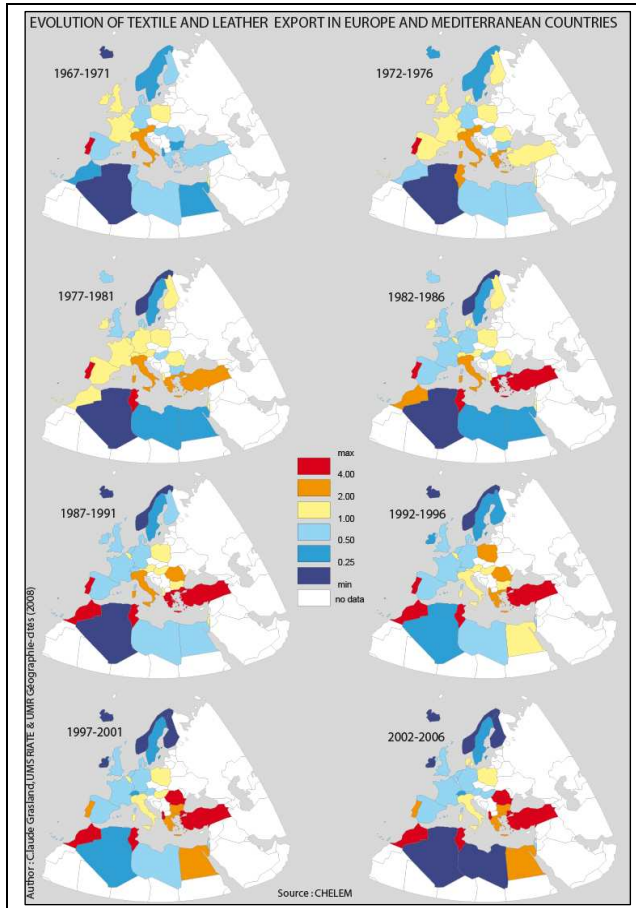


Figure 1. The space-time diffusion of textile in the Euro-Mediterranean space

Indicator = share of textile in the exports of each country

Source: Chelem database

Note: see annex for more methodological precisions

The assumption of core-periphery diffusion is also globally true at the world scale for electronics (Table 3) but the process is not yet as important (or is at an earlier stage) as compared to the case of textile. In 1976, the highest level of specialisation was observed in central and semi-peripheral countries while in 2006 semi-peripheral countries and BRICS have become the most specialized areas in electronics industry. In the same time, the level of specialisation in Electronics has remained relatively weak in peripheries. We can also notice that the relocation process from centre to periphery has been particularly strong in AsiaPacifica which is precisely the part of the world that has remained the most specialised in Electronic. It is related to the concentration of labour-intensive segments of production in Asia-Pacific semi-periphery (including China and India). On the contrary, the diffusion was less important in the two other world regions (America and EurAfrica) where we can only notice a relative decline of the specialisation of centre and an increase or stability of semi-periphery.

		A-America	B-EurAfrica	C-AsiaPacifica	Total
1976	1-Core	1,10	0,96	1,97	1,13
	2-Semi-Periphery	1,84	0,38	2,15	1,11
	3-BRIC	0,31	0,28	0,10	0,23
	4-Periphery	0,13	0,09	0,08	0,10
	Total	0,97	0,80	1,77	1,00
2006	1-Core	0,76	0,74	1,04	0,78
	2-Semi-Periphery	1,41	0,53	2,51	1,62
	3-BRIC	0,21	0,11	1,68	1,32
	4-Periphery	0,25	0,16	0,43	0,27
	Total	0,74	0,66	1,71	1,00

Table 3. Evolution of the relative specialization of electronics* exports by macro-regions and level of development

*Indicator= share of electronics in the exports of the macro-region/share of electronics at the world level

Source: Chelem database

Note: see annex for more methodological precisions

In the case of mechanic products⁸ (Table 4), the picture is rather different: the advantage of the core regions is obvious and clearly maintained between 1976 and 2006. For all world regions, the core countries remain the most specialised in the exports of mechanic product. However, we also observe a clear increase of the specialisation in the export of mechanic products in all other countries of semi-periphery, BRIC and Periphery.

		A-America	B-EurAfrica	C-AsiaPacifica	Total
1976	1-Core	1,28	1,21	1,13	1,21
	2-Semi-Periphery	0,33	0,63	0,38	0,52
	3-BRIC	0,24	0,34	0,25	0,28
	4-Periphery	0,14	0,12	0,04	0,12
	Total	1,07	1,03	0,81	1,00
2006	1-Core	1,44	1,19	1,19	1,24
	2-Semi-Periphery	0,71	0,93	0,66	0,77
	3-BRIC	0,78	0,44	0,60	0,60
	4-Periphery	0,32	0,45	0,24	0,34
	Total	1,18	1,09	0,75	1,00

Table 4. Evolution of the relative specialization* of mechanic industry exports by macro-regions and level of development

*Indicator= share of mechanic industry in the exports of the macro-region/share of mechanic industry at the world level

Source: Chelem database

Note: see annex for more methodological precisions

Nearly all other industrial sectors can be assimilated to one of the three models described above:

- miscellaneous manufacturing industries (DN) and other light manufacturing industries present common points with textile, but with less extended process of relocation to Eastern Asia ;

⁸ The definition of mechanic industry does not directly correspond to the machinery sector of the NACE classification as it also includes shipbuilding and aeronautics.

- automotive industry (DM) and metal industry (DJ) show a similar picture as electronics but the diffusion seems to go no further than semi-peripheries and concerns less peripheral countries, mainly of Eastern Asia;
- Chemical industry remains concentrated in core areas, as also observed for the mechanic industries.

1.2 Identifying Europe's vulnerable sectors

As shown in the previous section, product cycles determine the role of different parts of the global economy in different stages of a particular cycle. Obviously, this approach does not work in a deterministic and equal manner for all sectors, but it provides a useful framework for the analysis. Given this framework, the challenge then becomes the identification of those sectors which are in a vulnerable state for Europe as a whole and which might thus cause problems for those regions particularly specialised in these sectors.

The difficulty of this exercise lies in the fact that evolutions of the trade balance do not necessarily imply a loss of competitiveness, but could also simply signal a heightened level of activity in a particular sector implying growth in that sector, but also more trade, including imports. In view of this difficulty, it was decided to use fairly simple, but reasoned criteria for the selection of the relevant sectors, based on the hypothesis that **vulnerability of a sector to global competition is indicated by a combination of the openness and the evolution of the trade balance of this sector.** In other words, only if the sector is sufficiently open to global trade will a deterioration of the trade balance play a role, and only if there is a deterioration of the trade balance, the openness of the sector is of importance in terms of vulnerability. This definition obviously uses the past to define vulnerable sectors, leaving out sectors which might become vulnerable in the coming years. However, trying to identify specific sectors which will be vulnerable in the future seemed a very hazardous endeavour, and we, therefore, rather used the past in order to learn about relevant factors which might influence regions behaviours in the future, whatever the vulnerable sectors.

The precise indicators used were the ratio between exports and imports as a measure of trade balance and the ratio between imports and gross value added (import penetration index) as a measure of openness. Focusing on imports is justified by the will to identify vulnerable rather than winning sectors. As static indicators are not sufficient because negative but stable trade balances will not produce the same negative economic consequences as a deteriorating trade balance, we also used the evolution of these two indicators. The most decisive combination for the identification of vulnerable sectors was a deteriorating trade balance in a very open sector. Generally, the European average is used as an approximate threshold. As shown further on, the situation for EU27 does not always provide coherent results because of the different development paths of EU15 and EU12 and lack of data for EU12 before 1999. In certain cases, such as electrical and optical equipment, we, therefore, also took into account the evolution of EU15 which shows a significant deterioration of the trade balance, notably in the period 1995-2005.

The application of these criteria lead to the definition of four vulnerable sectors (Table 5; Figures 2 and 3), confirming the Applica and wii study and the Commission's ideas expressed in the project specifications:

1°) **Textile, clothing (DB) and footwear and leather (DC)** fit all criteria. Figure 1 illustrates the intensity of the diffusion process to less developed countries inside the Euro-mediterranean space, while at the world level European less developed areas have to face a growing competition from Eastern Asia (Table 2). The two sectors will be dealt with together because of the same global characteristics (lowly qualified, similar geography...) and similar recent evolutions. In these sectors, the liberalization of European markets has produced a real shock and an acceleration of a restructuring process including the delocalization of the low qualified segments of production.

2°) **Manufacturing of basic metals and fabricated metal products (DJ)** is a much less open sector but its evolution has been negative during the last years, with a growing openness to extra-European competition and a deteriorating balance. However, this sector has strong internal differentiation, with the deterioration of the balance mainly concentrated on non ferrous metals; If the metal industry has been affected for decades by the crisis in the basic metal industry at the world level, it has recently somewhat recovered by reason of a high world demand from emerging countries, although the current economic crisis seems to have brought this upturn to a sharp halt.

3°) **Electrical and optical equipment (DL)** is a very open sector with a very negative balance but the balance has been relatively stable in the recent years. Like metal industries, this sector is very heterogeneous, with very negative balances in office machinery and electronic equipments but not in some very technological segments such as scientific instruments. Generally speaking, the European electronic sector has suffered from the world competition, especially in low qualified segments. There is also a growing importance of Central and Eastern Europe in this sector, even if the trade balance remains slightly positive for EU15 vis-à-vis NMS. However, the growth in new member states is submitted to the growing tendency of relocation of the labour-intensive segments of production in Eastern Asia (Table 3);

4°) finally, **miscellaneous manufacturing industries (DN)** have a very negative and deteriorating balance. DN is by definition very heterogeneous but faces negative evolutions in nearly all subsectors, especially furniture and miscellaneous manufacturing activities (including toys for example).

These 4 sectors clearly present strong processes of relocation at the world level, as illustrated by the examples of textile and electronics in Tables 2 and 3.

Other manufacturing sectors present less clear situations (Table 5):

- The wood value chain remains a closed sector, though with a negative balance. However, it has become more positive during the recent years. If we include furniture, the sector has lost jobs and is submitted to a growing competition in EU-15, but mainly originating from NMS. Since it is a lowly qualified sector, it could be more and more subject to extra-European competition in the future. Other non-metallic products (DI) show the same general pattern, but a positive and stable balance with extra-European countries;

- Transport equipment have had a growingly positive balance in the last decade, notably due to an increasing extra-European demand. At the same time, we can observe a growing tendency to locate in Central and Eastern Europe and, as a result, trade between

EU15 and NMS is now balanced, which was not the case ten years before. This is perfectly coherent with the general tendency of this sector which has known a relocation process limited to semi-peripheral areas. However, we cannot exclude a growing extra-European competition from more peripheral areas or BRIC, notably in the “low cost” segments of production.

Non manufacturing sectors are all excluded from the list of vulnerable sectors:

1° **Services sectors** have a rather low import penetration ratio. As a consequence, their dynamics depend mostly on internal factors (productivity and demand). Trade balances are increasingly positive in the service sectors, especially in financial and business services, although the evolution will have to be monitored in the follow-up of the current financial crisis, which has allowed market entry to some emerging countries' firms possessing large cash reserves, and in view of the increasing taylorisation of services allowing certain segments to be more or less automated and thus delocalised;

2° **Primary production and manufacturing of energy** (coal, gas, and petroleum) fit our criteria of vulnerable sectors, but only few jobs inside EU-27 are concerned, and outside production does not enter into competition with internal production, except for coal production mainly located in Eastern Europe;

3° Even though the situation is changing in the framework of the WTO negotiations and the reform of the CAP, **agriculture** is still a relatively closed and heavily regulated activity. The negative balance is mostly explained by imports which do not enter into competition with EU-27 production and these recent years have not shown major evolution. So, heavy losses of jobs are mostly concentrated in the NMS and result from the restructuring of the sector in the EU27 framework rather than from extra-European competition.

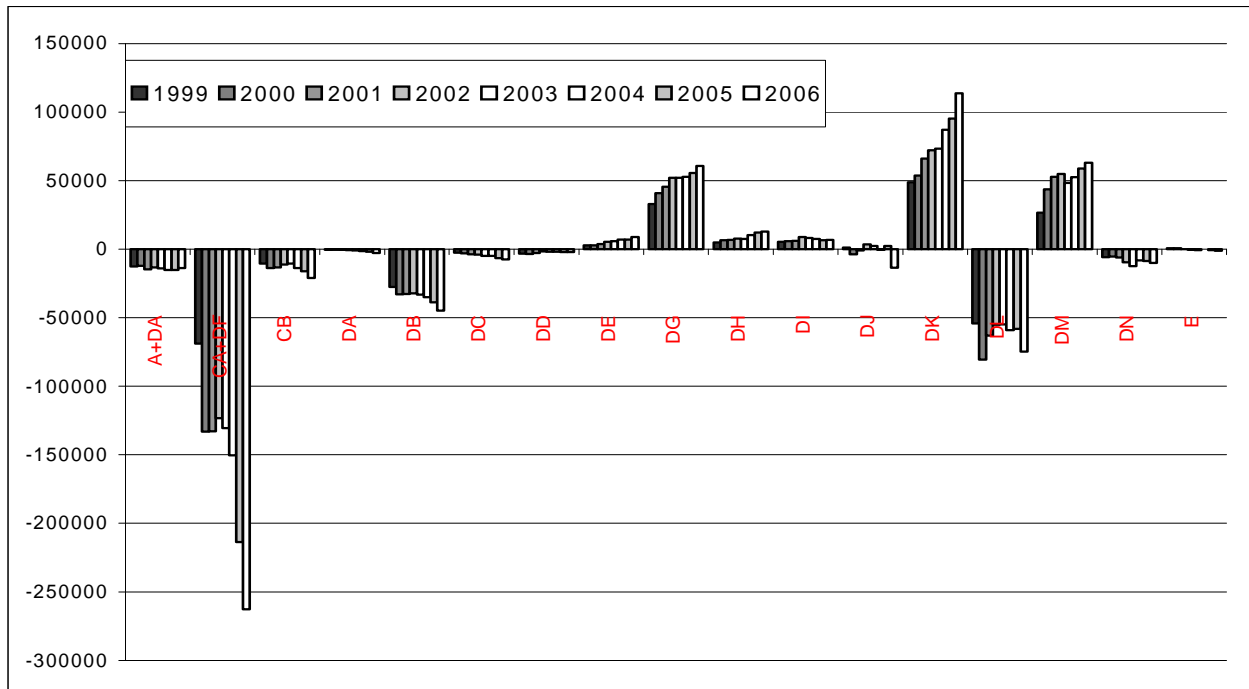


Figure 2. Evolution of the EU-27 external balance trade (in millions Euros) in the industrial NACE sectors, from 1999 to 2006.

Source: Comext from Eurostat, 2007

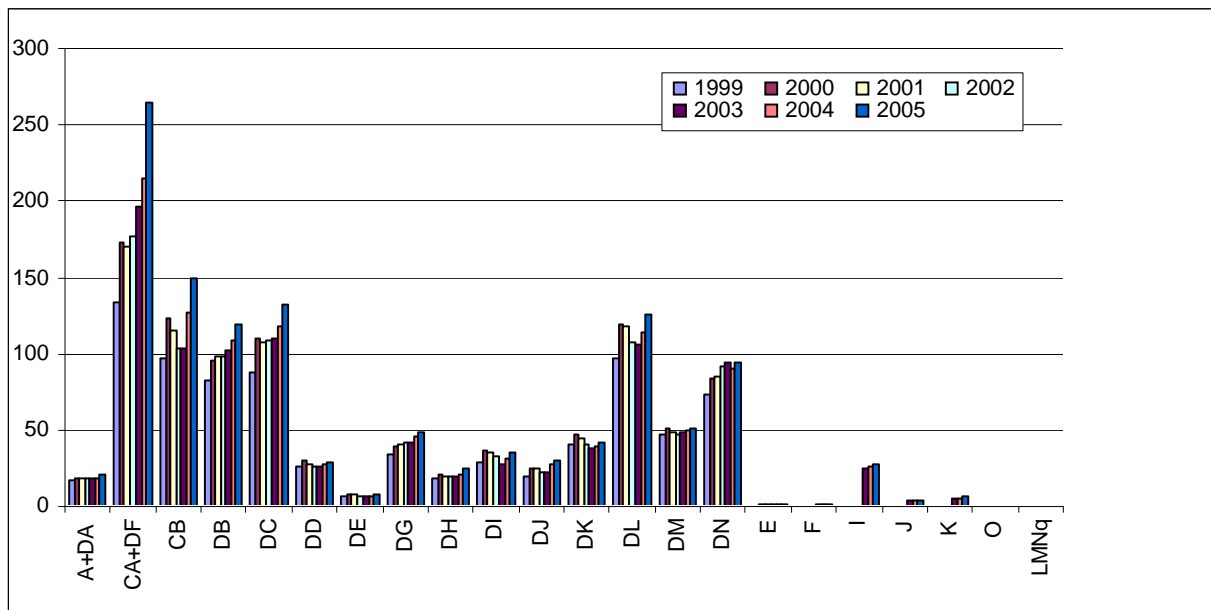


Figure 3. Evolution of the ratio (%) between imports and GVA for EU-27, by NACE sector, 1999-2005.

Source: Comext, Eurostat 2007; National accounts from Eurostat; OECD Statistics on International Trade in Services, 2007 Edition.

Notes: No data for services before 2003; data for services concern only EU-25.

NACE code	Name	Importation ratio (Import/GVA)		Export/Import ratio		Comment
		2005	Evolution 1999-2005 (2005-1999/1999)	2005	Evolution 1999-2005 (2005-1999/1999)	
A+DA	Food	19,0	0,22	0,77	0,02	weak openness; stability
CA+DF	Energy	256,0	1,19	0,17	0,03	Non competitive sector
CB	Mining and quarrying except energy producing materials	144,0	0,82	0,34	0,39	Non competitive sector
DB	Manufacture of textiles and textile products	111,4	0,60	0,47	-0,11	High openness ; negative balance; deterioration of the balance
DC	Manufacture of leather and leather products	127,3	0,73	0,65	-0,17	High openness ; negative balance; deterioration of the balance
DD	Manufacture of wood and wood products	27,4	0,13	0,80	0,26	low openness; Negative balance; no deterioration
DE	Manufacture of pulp, paper and paper products; publishing and printing	7,3	0,07	1,67	0,39	very low openness ; balance getting more positive
DG	Manufacture of chemicals, chemical products and man-made fibres	49,4	0,53	1,64	-0,01	Medium and growing openness; very positive stable balance
DH	Manufacture of rubber and plastic products	24,1	0,48	1,65	0,16	Medium and growing openness; growingly positive balance
DI	Manufacture of other non-metallic mineral products	32,7	0,18	1,27	-0,02	low openness ; Positive balance ; stable
DJ	Manufacture of basic metals and fabricated metal products	30,7	1,02	1,03	-0,16	low but growing openness ; deterioration of the trade balance
DK	Manufacture of machinery and equipment n.e.c.	43,1	0,08	2,20	0,31	medium openness ; growingly positive balance
DL	Manufacture of electrical and optical equipment	126,9	0,36	0,76	0,04	high openness ; negative and stable balance
DM	Manufacture of transport equipment	50,3	0,05	1,66	0,24	medium and stable openness ;growingly positive balance
DN	Manufacturing n.e.c.	90,8	0,33	0,85	-0,03	high openness ; negative and deteriorating balance
E	Electricity, gas and water supply	1,2	2,23	0,66	-0,65	
	Merchandises	52,8	0,52	0,89	-0,06	
F	Construction	1,9	-	1,78	-	very low openness ; positive balance
I	Transport, storage and communication	26,6	-	1,01	-	very low openness ; positive balance
J	Financial intermediation	7,4	-	1,86	-	very low openness ; positive balance
K	Real estate, renting and business activities	7,3	-	1,24	-	very low openness ; positive balance
O	Other community, social, personal service activities	1,3	-	0,84	-	very low openness
LMNQ	Public administration, education, health	0,5	-	1,27	-	very low openness ; positive balance
	Services	5,4	-	1,16	-	very low openness ; positive balance
	Total	14,7	-	0,96	-	

Table 5. Trade indicators for the selection of vulnerable sectors at the EU-level

Source: Comext, Eurostat; National accounts, Eurostat; OECD Statistics on International Trade in Services

1.3. The relationship between sectoral growth and external competition

In order to confirm this choice of sectors, we need to confirm the basic hypothesis that the evolution of trade in a given sector has an impact on both added value and employment in that same sector. The confirmation of this hypothesis obviously reinforces the choice of a sectoral approach

To evaluate the relationship between trade and economic evolution **by sector for the whole EU**, we will simply measure the correlation between the evolution of trade balance, on the one hand, and the evolution of added value or employment during the same period, on the other hand. There are several ways to measure trade performances but trade balance is the most synthetic indicator since it takes into account European

performances outside the EU (exports) and the performance of the rest of the world inside the EU (imports), with both potentially affecting EU production. However, absolute figures depend much upon the overall size of trade in the sector. This is why we opted for relative indicators which better enable us to test the potential impact on production or added value:

Indicator 1 = $((X-M)_{2005} - (X-M)_{1995}) / (X+M)_{1995}$.

Indicator 2 = $(X-M)/VA$ by sector in 2005 - $(X-M)/VA$ by sector in 1995

Each indicator presents specific advantages. The first one enables us to calculate the correlation with GVA growth while it is not the case for the second, since added value would then appear in the dependent and independent variables. The latter allows us to relativize the evolution of the trade balance according to the production of the sector: if trade is important compared to added value, the potential impact of the deterioration of the balance is higher than if it is negligible according to production of the European space.

For the whole EU, we observe a positive and significant correlation between the evolution of trade balance and the evolution of employment or/ added value by sector in the 1999-2005 period (Figures 4 and 5). The more a sector's trade balance has grown, the better the results in terms of employment or added value. For example, the textile sector had the worst performances in terms of trade, and is also the sector in which job losses were the most dramatic. For EU15, Electric and optical equipments (DL) present the same negative evolution. On the other hand, we find the most positive evolution of trade balances in sectors such as transport equipment (DM) or machine industry (DK). The third vulnerable sector, the metal sector (DJ), shows intermediary performances in terms of trade but appears among the best performances regarding employment or added value inside the manufacturing sectors.

Correlation coefficients are higher with the indicator of trade balance evolution in relation to added value in the sector: it can be explained because the potential impact of trade is higher in sectors where trade represents a higher share of internal production. Finally, correlation coefficients are higher if we take employment growth rather than GVA growth as dependent variable. It could mean that the pressure of external competition is higher on employment than on added value. One of the possible explanations is that the deterioration of the trade balance is related to production offshoring, which has an impact on low qualified jobs but not necessarily on production, which moves up to more qualified segments.

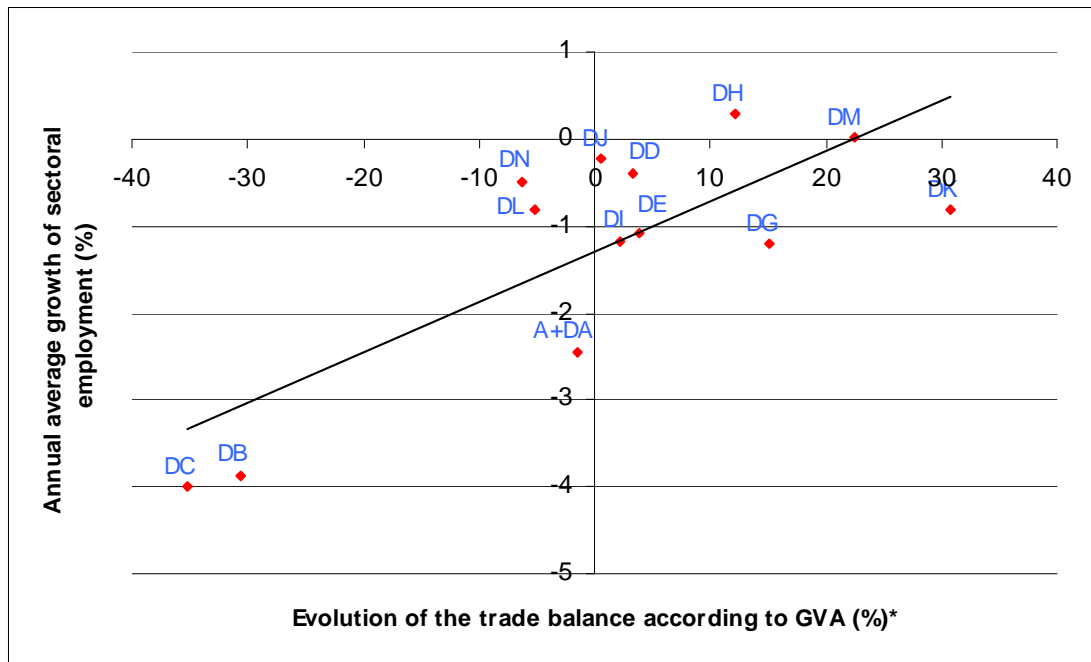


Figure 4. International competition and employment growth by sector in EU27 between 1999 and 2005.

* $(X-M)/VA$ by sector in 2005 - $(X-M)/VA$ by sector in 1999

The correlation ($R^2=0,610$) is significant at 0,01

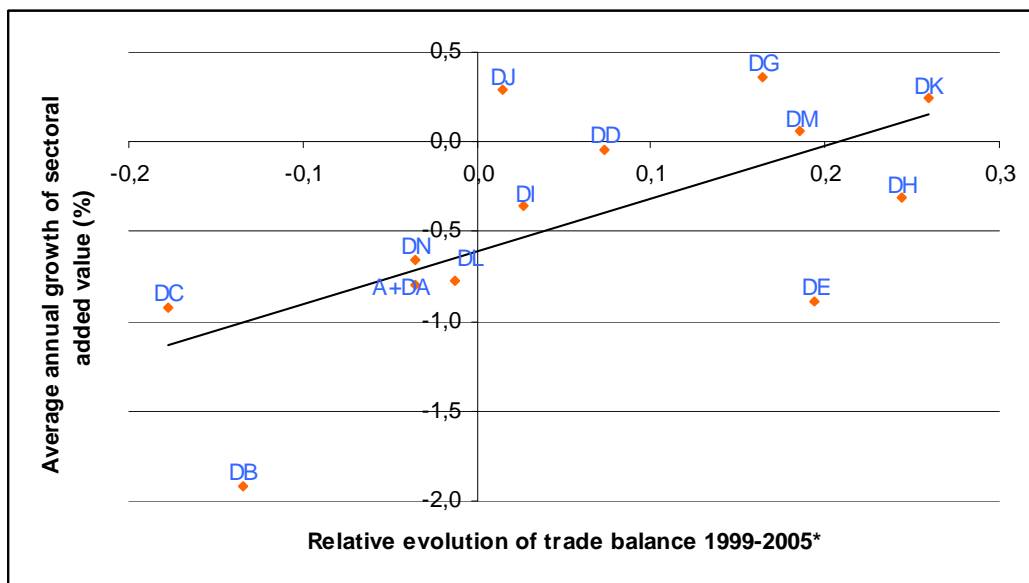


Figure 5. International competition and added value growth by sector in EU27 between 1999 and 2005.

* Indicator 1 = $((X-M)_{2005} - (X-M)_{1995}) / (X+M)_{1995}$.

The correlation ($R^2=0,408$) is significant at 0,05

By applying the same methodology at the **national level**, we observe that most of the correlation coefficients between employment growth and evolution of trade balance

according to GVA between 1999 and 2005 are positive (Table 6): on the whole, employment growth⁹ tends to be positively affected by trade performances in the different sectors. When considering the evolution of extra-European balance, nearly all coefficients are positive and 6 of them in a significant way. In the biggest European countries, only Italy does not show a significant correlation between employment growth and the evolution of trade performances in the different sectors. However, we have to insist on the instability of the relationships between these variables. While in some countries, the coefficient is significantly positive as expected, in many countries, the correlation is not significant and, in a few of them, the correlation is even negative. This instability has different possible explanations: the number of observations (sectors) is low and, as a consequence, atypical behaviour of one sector might have an impact on the correlation coefficient; trade performances can be affected by the instability over time in trade performances within a sector in a country¹⁰; the relationship between growth and trade performances is of a different nature according to the countries.

	Correlation coefficients (R Pearson)		
	Extra-EU balance	Intra-EU balance	Total balance
Belgium	,753(**)	-,752(**)	-,689(**)
Czech Republik	,694(**)	,699(**)	,713(**)
Germany	,681(*)	-,662(*)	-0,100
Denmark	-0,360	0,157	-0,398
Spain	,747(**)	0,015	0,440
Finland	0,353	0,101	0,195
France	,613(*)	0,544	,779(**)
United Kingdom	,861(**)	0,440	,807(**)
Greece	0,338	0,095	0,201
Hungary	-0,278	0,363	0,391
Ireland	0,149	0,432	0,418
Italy	0,362	0,316	0,433
Netherlands	0,457	-,612(*)	-,679(*)
Portugal	-0,400	0,542	0,508
Sweden	0,075	0,312	0,379
Slovenia	0,192	,592(*)	,579(*)
Slovakia	0,330	0,521	0,547

Table 6. Correlation between the evolution of trade balance* and employment growth at sectoral level in 17 EU between 1999 and 2005

* $(X-M)/VA$ by sector in 2005 - $(X-M)/VA$ by sector in 1999

(*) significant at 0.05 (**) significant at 0.01

Note: For Greece and Sweden, employment growth is between 1999 and 2004.

As a conclusion, regarding EU-27 as a whole, our basic hypothesis seems to be confirmed. Trade evolutions at sectoral level seem to have an impact on their added value and employment growth, especially if we measure trade performances relatively to the internal production. Vulnerable sectors are characterized by their poor trade

⁹ Estimates carried out with added value confirm this general tendency.

¹⁰ This is much less true of the whole EU-27, for which we found more regular evolution of trade patterns over the years.

performances, which have affected jobs and production. This is undoubtedly true of textile, but also electrical and optical equipment (DL) as well as miscellaneous manufacturing industries (DN), whose relatively bad trade performances have resulted in substantial jobs losses. However, in the metal sector (DJ), employment and added value performed better than expected in view of trade performances. In this sector, we could argue that economic performances are less dependent on trade evolutions because the metal sector is relatively closed¹¹ compared to the other vulnerable sectors. Analyses at national level globally confirm the general tendency observed at the EU-27 level: sectors with bad trade performances are showing worse employment and/or added value performances and vice-versa.

¹¹ It is useful to remind that this import penetration rate, rather weak in the Metal sector, has rapidly increased in the recent years. This was notably why it was included in the list of vulnerable sectors.

Main results of chapter 1

1. The concepts of products cycle and space-time diffusion enable us to understand the spatial pattern of the world trade according mainly to the technological level of the sectors. The vulnerability of the sector is strongly related to the diffusion of low segments of production to more peripheral areas.
2. The combination of balance trade, imports penetration rate in static and dynamic ways has allowed us to define 4 vulnerable regions regarding the extra-European competition: Textile (DB-DC), Metal (DJ), electric and optical equipment (DL), and miscellaneous manufacturing industries (DN). However, we also noticed the internal diversity of trade performances in the vulnerable sectors, especially in the metal and electric and optical sectors.
3. For the EU-27 as a whole, and for most of the countries individually, it appears that bad trade performances in a sector impact on employment or GVA growth rates. This result confirms the hypothesis that sectoral trade performances have an impact on economic performances for the whole EU.

2. Vulnerable regions

This entire study is about regions, not sectors. The identification of vulnerable sectors in chapter 1 was thus just a first step in the identification of vulnerable regions. In line with the sectoral approach chosen, we consider regions as vulnerable if they are specialised, in terms of employment of value added, in one (or more) of the vulnerable sectors. More precisely, we define vulnerable regions as all regions which have more than one standard deviation above average of their employment or added value in the vulnerable sectors, taken as a whole and separately. However, we do not include regions specialised only in miscellaneous manufacturing industries since this sector is by definition very heterogeneous and of a limited weight in the European economy. Table 7 gives the elaboration of the thresholds used to define vulnerable regions.

		Employment			Added value		
		EU-27 average (1)	Standard deviation (2)	Threshold to define a vulnerable region (1+2)	EU-27 average (1)	Standard deviation (2)	Threshold to define a vulnerable region (1+2)
Manufacture of textiles-leather and textile-leather products	DBDC	2,17	3,04	5,20	1,05	1,25	2,30
Manufacture of basic metals and fabricated metal products	DJ	2,73	2,11	4,84	2,34	1,71	4,06
Manufacture of electrical and optical equipment	DL	1,97	1,60	3,58	2,15	1,36	3,51
Manufacturing n.e.c.	DN	1,18	0,95	2,13	0,77	0,46	1,23
All vulnerable sectors		8,05	4,98	13,03	6,31	3,21	9,53

Table 7. Elaboration of the threshold to define vulnerable regions, in 2002.

Note: Standard deviation is defined on a NUTS2/NUTS3 division

Source: IGEAT matrix

By applying these criteria, we obtain the map of the potentially vulnerable regions at NUTS3/NUTS2 scale¹² (figures 6a and 6b). However, the definition of globally vulnerable regions is not very satisfactory because these different sectors present rather different geographical patterns, as illustrated by weak correlations. This is why we also distinguish the regions according to the vulnerable sector(s) in which they are the most specialized (figures 6a and 6b): all non white regions are vulnerable because of the high share of vulnerable sectors as a whole or in one of the vulnerable sectors; different colours indicate, for all vulnerable regions, the sectors where the “threshold of vulnerability” is passed over. A synthetic analysis has shown that textile and miscellaneous manufacturing industries have a significant correlation, while some

¹² This geographical division allows a more homogeneous division of the EU-27 space, according to the demographic or economic importance. NUTS3 is used for France, Spain, Italy and Poland; Nuts2 everywhere else.

regions present an association between “electrical and optical equipment” and the metal sector.

Our analyses will have to take into account the diversity between the vulnerable sectors and focus on separate analysis rather than considering vulnerable sectors together.

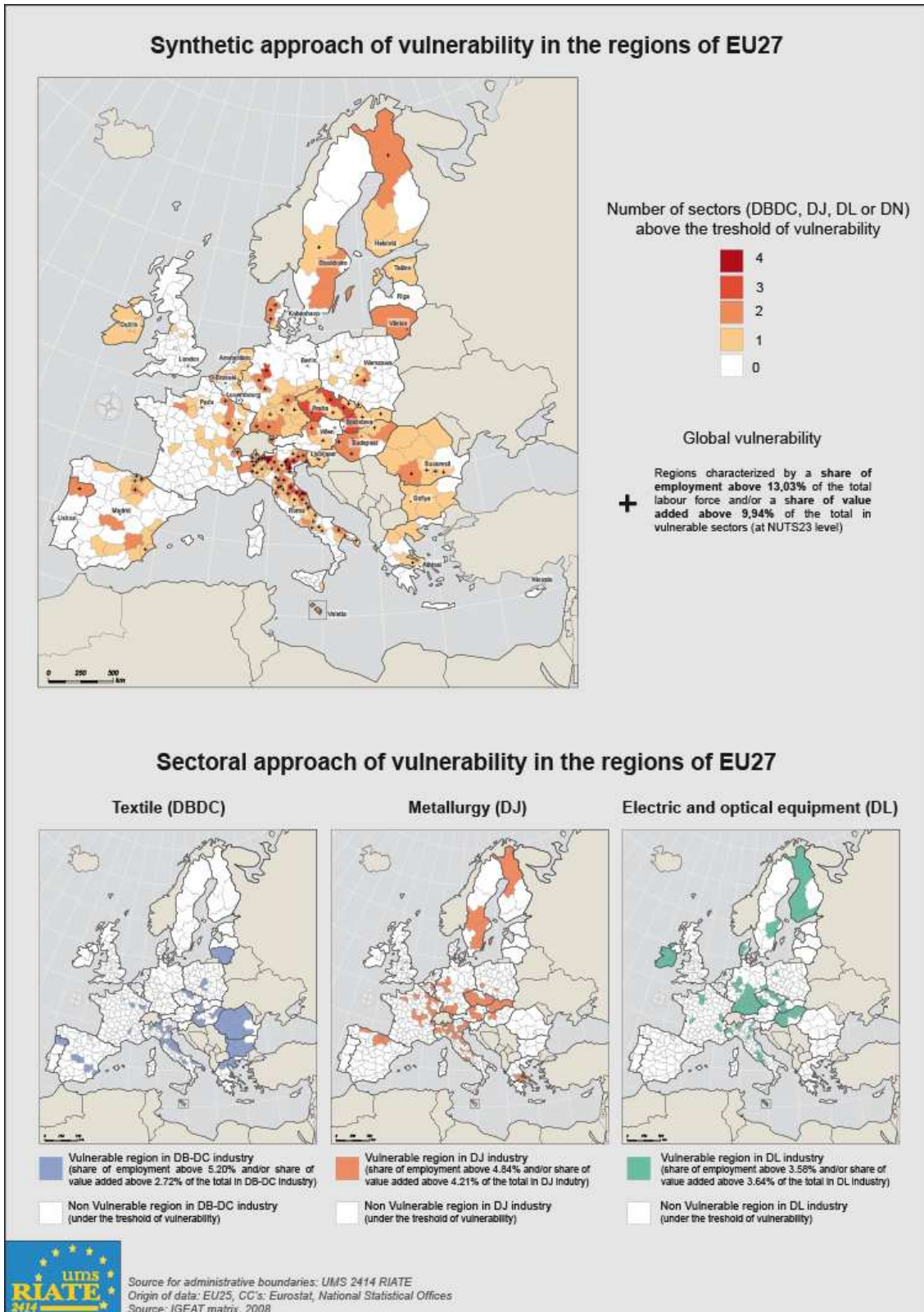


Figure 6a. Typology of the vulnerable regions according to the sectoral component of vulnerability, in 2002. NUTS2-NUTS3 version

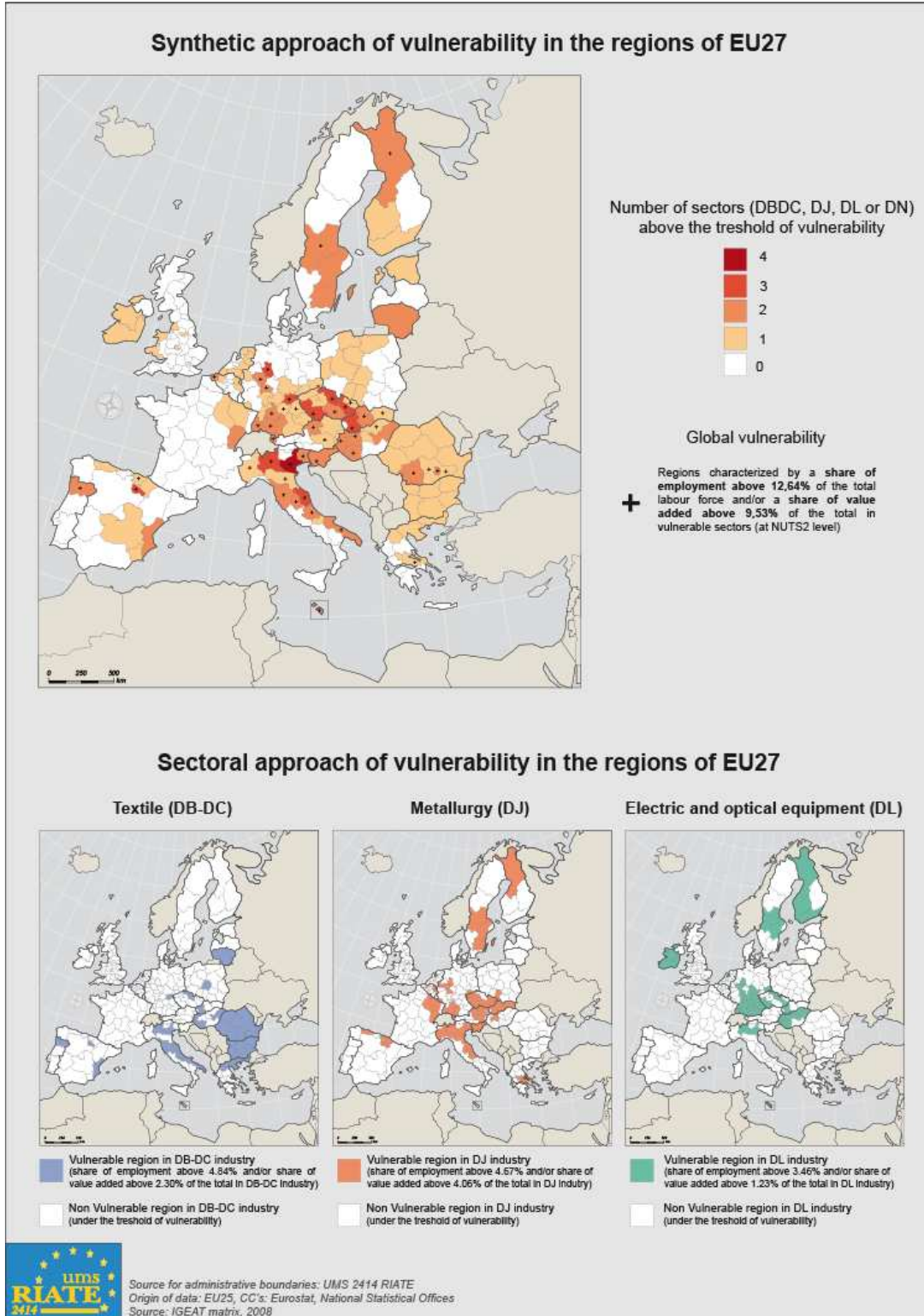


Figure 6b. Typology of the vulnerable regions according to the sectoral component of vulnerability, in 2002. NUTS2 version

Important remark: Differences in regional classification on both versions are related to the fact that the threshold of vulnerability has been defined on the base of European average and standard deviation, and the latter is varying regarding the number of regions.

3. Spatial diversity of performances regarding vulnerability

In the first section of this study, we have shown that extra-European competition has important consequences on employment and production at sectoral level for the whole EU, thus justifying the identification of vulnerable sectors. However, in this study we are interested by the situation of regions, not of the EU as a whole. In this section, we will thus explore whether this relationship also holds at regional level. In other words, can we correlate the territorial performances at regional scale to the sectoral vulnerability as defined in section 1?

In chapter 1 we studied the correlation between the evolution of trade and the evolution of performance. However, trade statistics are not available at regional level for the EU-space. We thus begin by evaluating the correlation between sectoral trade performances and economic/employment growth at national level (3.1). This provides us with a first view of the spatial distribution of this correlation. We then explore the complex relationship between the economic structure, and mainly the share of vulnerable sectors, and the economic performances at regional scale, based on the implicit (rough) hypothesis that regional trade in a sector is somewhat correlated with its specialisation in that sector (3.2). We explore the impact of regional specialization in vulnerable sectors on regional performances both in the relevant vulnerable sector (3.2.1), in all industrial sectors and in the entire regional economy (3.2.2)? On the basis of the results of that exploration, we propose classifications of the vulnerable regions according to economic performances (3.2.3.). Finally, expanding from the purely economic definition of vulnerability, we also look into the social impacts of this vulnerability at regional level (3.3).

3.1. The impact of trade on economic growth at national level

In this section, we will examine whether the trade performances of a country in a defined sector affect its employment or added value growth in this same sector. This is a central issue for this study since we supposed trade evolution, especially with extra-European countries, could affect national and regional economies.

We will mainly focus on the 1999-2005 period, for which we have the most complete series of data, with the trade indicators¹³ used in section 1.3 but in dynamic rather than static terms (indicator in 2005- indicator in 1999). As the evolution of the trade balance can hide increased sales to the world if they are accompanied by a parallel rise in imports, notably when taking into account the relatively gross sectoral divisions available, we also calculate correlations with exports only, based on the hypothesis that an increase of sales to the rest of the world can favour economic growth even if it also induces imports. The correlation between economic or employment growth and evolution of trade performances was calculated with all EU-27 countries as

13 Trade balance according to total trade; trade balance according to sectoral GVA.

observations. However, because of atypical evolutions of some NMS, we will also assess the correlation inside the EU-15 countries.

At national level, we find no stable correlation between the evolution of trade performances of a sector in a country and the economic growth¹⁴ in the same sector (Tables 8 and 9). This means that the impact of trade within the different sectors is very different according to the countries: in some countries, the deterioration of the trade balance is associated with bad economic performances in the sector, while in others this is not the case. If we consider only exports, we find significant and more stable correlations for EU-27 countries while not inside EU-15 countries (Table 9). We have to note that similar results are to be found when correlating with import growth rather than export growth. A possible explanation might be the specific evolutions of NMS which have seen both high economic growth and trade increase, imports as well as exports. In other words, growing exchange can be explained by a general economic growth linked to catching-up phenomena without necessarily revealing specific competitiveness in a sector.

Different reasons can explain the weakness of correlation between trade performances and economic growth:

- the weight of the intra-European market and of the domestic markets are one of them: it softens the impact of extra-European trade. However, we have to underline that the vulnerable sectors have by definition a very high import penetration ratio, which means that extra-European markets are significant compared to intra-European market and domestic demand at the national scale. It is however less true for the Metal sector (DJ), which is more intra-European market oriented;
- the complexity of trade evolutions. To a larger extent than before, trade is now related to intra-firms connections. In this context, growing imports for a textile firm in a certain country are not necessarily related to an economic crisis in the sector since this firm is now specialized in some segments (selling, marketing, conception, R&D) of production which are no longer in competition with the countries which have benefited from off shoring. Textile and electric and optical equipments have certainly evolved in this direction more than other sectors.

	EU-27			EU-15		
	extra-european	intra-european	Total	extra-european	intra-european	Total
Textile	-,432(*)	0,384	,442(*)	0,405	-0,132	0,132
Metal	-0,175	-,556(**)	-,602(**)	-0,084	0,189	0,032
Electric and optical equipment	-,421(*)	0,143	-0,244	-,573(*)	,563(*)	,574(*)
All sectors (including agriculture)	-0,242	-0,054	-0,281	0,051	0,097	0,02

Table 8. Correlation between evolution of added value and of trade balance* by sector, between 1999 and 2005.

14 Results are similar if we use employment as the dependent variable.

* $(X-M2005-(X-M)1999) / (X+M)1999$

(*) significant for 0.05, (**) significant for 0.01

The inversion of the correlation sign between EU-15 and EU-27 (for extra-European trade) in textile is only related to the atypical evolutions of Romania and Bulgaria.

	EU-27			EU15		
	extra-european	intra-european	Total	extra-european	intra-european	Total
Textile	0,389	,493(*)	,531(**)	-0,09	0,071	0,061
Metal	,790(**)	0,27	0,361	0,479	0,037	0,362
Electric and optical equipment	,545(**)	0,352	,413(*)	-0,101	-0,436	-0,45
All sectors (including agriculture)	0,884(**)	0,474 (*)	0,613(**)	0,471	0,033	0,074

Table 9. Correlation between evolution of added value and export growth by sector, between 1999 and 2005.

** including NMS

Note: No data on employment for Austria and Luxemburg

(*) significant for 0.05, (**) significant for 0.01

In conclusion, we found no stable correlation between trade and global economic performances in a sector, at national level, in the European space. This result is all the more significant since it means that bad trade performances do not necessarily result in a loss of jobs and production at national scale, notably because of the evolutions of internal demand. **This shows the complexity of the impact of trade performances when we look at different areas: countries do not react the same way to extra-European competition.** In other words, the hypothesis that degradation of sectoral competitiveness on the international markets leads to bad sectoral performances at the country level is not confirmed. Countries react differently to international competition, and even these different reactions are not simply related to sectoral performances (winning in trade is not winning in jobs or production).

Main result of section 3.1.

National trade performances in the vulnerable sectors have no clear impact on the national performances of this sector: in some countries, bad trade performances in the vulnerable sector correspond to bad economic performances in the sector, whereas it is not the case in other countries.

3.2. The impact of regional specialization in vulnerable sectors on regional economic performances

As illustrated in the previous section, trade performances do not have a homogeneous impact on sectoral performances across the European countries. In the absence of regional trade data, this section deals with the regional impact of the specialization in the vulnerable sectors. First, does it have an impact on the regional performances of the vulnerable sectors (3.2.1) ? Second, does it have an impact on the performances of the regional economy as a whole ? Finally, we propose two different classifications of vulnerable regions according to their global economic performances and industrial growth (3.2.3.).

3.2.1. The Effects of Regional Specialisation on the Performance of Vulnerable Sectors

Do vulnerable regions perform better or worse than the others in those sectors they are specialised in ? Or, to say it differently, do the sectors more affected by globalization forces perform better in their specialized regions?

It is essential to answer these questions to be able to analyse the structural features explaining economic dynamics in vulnerable regions. For example, this analysis allows us to highlight whether localisation effects, when present, help the sectors more heavily affected by increased world competition to better survive their challenges. This can be particularly true for some sectors, like the textile sector, for which, an old-dating and wide literature exists on the economic advantages of firm cluster areas with respect to others in this sector. The identification of structural success factors in a period of fast world integration allows one to design more adequate policies, keeping into account the positive or negative effects of regional specialization in these sectors.

Figure 8 includes four graphs representing the relationship between regional specialization, expressed by the location quotients of value added in 2002¹⁵, and the growth of value added in the period 1995-2002¹⁶. Each graph represents one vulnerable sector, for instance sector DB-DC (textile and leather) in Figure 8b, sector DJ (basic metals and fabricated metal products) in Figure 8c, and sector DL (electrical and optical equipment) in Figure 8d. In each graph, represented by squares are those regions which are vulnerable to that specific sector. Figure 8a has the same representation as the others, but expresses the sum of all vulnerable sectors. In this case the squares represent regions with global vulnerability.

15 Calculated as
$$LQ_j^r = \frac{2002 VA_j^r / 2002 VA^{EU27}}{2002 VA_j^{2002} / 2002 VA^{EU27}}$$
, where j is the sector and r the

region.

16 Specialisation is obviously not necessarily equal to concentration, nor agglomeration, which can be present in regions which are not specialised in a particular sector, but for most industrial sectors there is a high correlation between the two. The results of the analysis in this section have to be seen understood with this caveat in mind.

The first aspect that can be observed, common to all four graphs, is that the variance of the growth of value added decreases with the location quotient. This is mainly due to statistical effects, since for a region where a sector is scarcely represented, the closure or opening of just one establishment in a given sector can involve a very high percentage of change in the total regional value added of the sector.

As far as the total value added of all vulnerable sectors is concerned, there does not seem to be a significant positively or negatively sloped relationship (Figure 8a). The vulnerable regions are generally only very slightly above the average growth and no general trend is visible. Especially interesting is that, among the sub-group of vulnerable regions, those more specialized (i.e. with higher location quotients) have performed better: a relationship with an R2 close to 0.3. Positive outliers among the vulnerable regions are Gießen, Länsi-Suomi and Nyugat-Dunántúl, regions in which the specialization in vulnerable sectors has played a positive role in these sectors.

The same general pattern applies to sector DB-DC (textile and leather) (Figure 8b), where many vulnerable regions are above the average, but this is not enough to induce a significant relationship overall. In this case, also among the vulnerable regions, no significant relationship appears, since a linear interpolation is positive but with an R2 below 10%. In this sector, the vulnerable regions that clearly outperformed the rest are peripheral regions in UK, Bulgaria and Estonia.

Also for sector DJ (basic metals and fabricated metal products) (Figure 8c), there is no relationship between specialization and performance, and this also applies to the sub-group of vulnerable regions. In this case, the best performers among vulnerable regions belong to central European countries, like Niederösterreich, Vorarlberg, Chemnitz, Haute-Normandie, Franche-Comté, Rhône-Alpes, Vzhodna Slovenija and Zahodna Slovenija.

The situation is different for the last sector investigated (DL): “electrical and optical equipments” sector (Figure 8d) is clearly a case of positive relationship between specialization and value added growth. In this case, almost all vulnerable regions, more specialized, have a higher than average performance. These over-performing regions belong to many different countries and are hence signaling that this pattern does not reflect national specificities. Even if we take into account all European regions, the relationship is clearly positive.

In the electronic sector only, therefore, regional specialization is positively associated with economic performance. This is probably due to the fact that in this sector low-tech is less developed than in the others, and interactions and spatial concentration can play significant positive effects on the performance of firms. The vulnerable regions which outperformed the rest belong principally to central, Eastern and Northern countries, for example: Jihozápad, Tübingen, Oberfranken, Dresden, Etelä-Suomi, Länsi-Suomi, Pohjois-Suomi, Nyugat-Dunántúl, Dél-Dunántúl and Západné Slovensko. All these regions appear to have exploited their specialization in the electronic sector as an advantage.

From this analysis, it clearly appears that vulnerable regions have had very different growth dynamics in their specialization sectors. Some regions in particular have been successful, whereas others have been lagging behind, and specialization is very weakly associated with performance, except, apparently, in the electrical and optical equipment sector.

Main result of section 3.2.1.

Regional specialization in vulnerable sectors does not have a clear impact on the regional growth of the vulnerable sector, except for “electric and optical equipment” where concentration appears to be a comparative advantage.

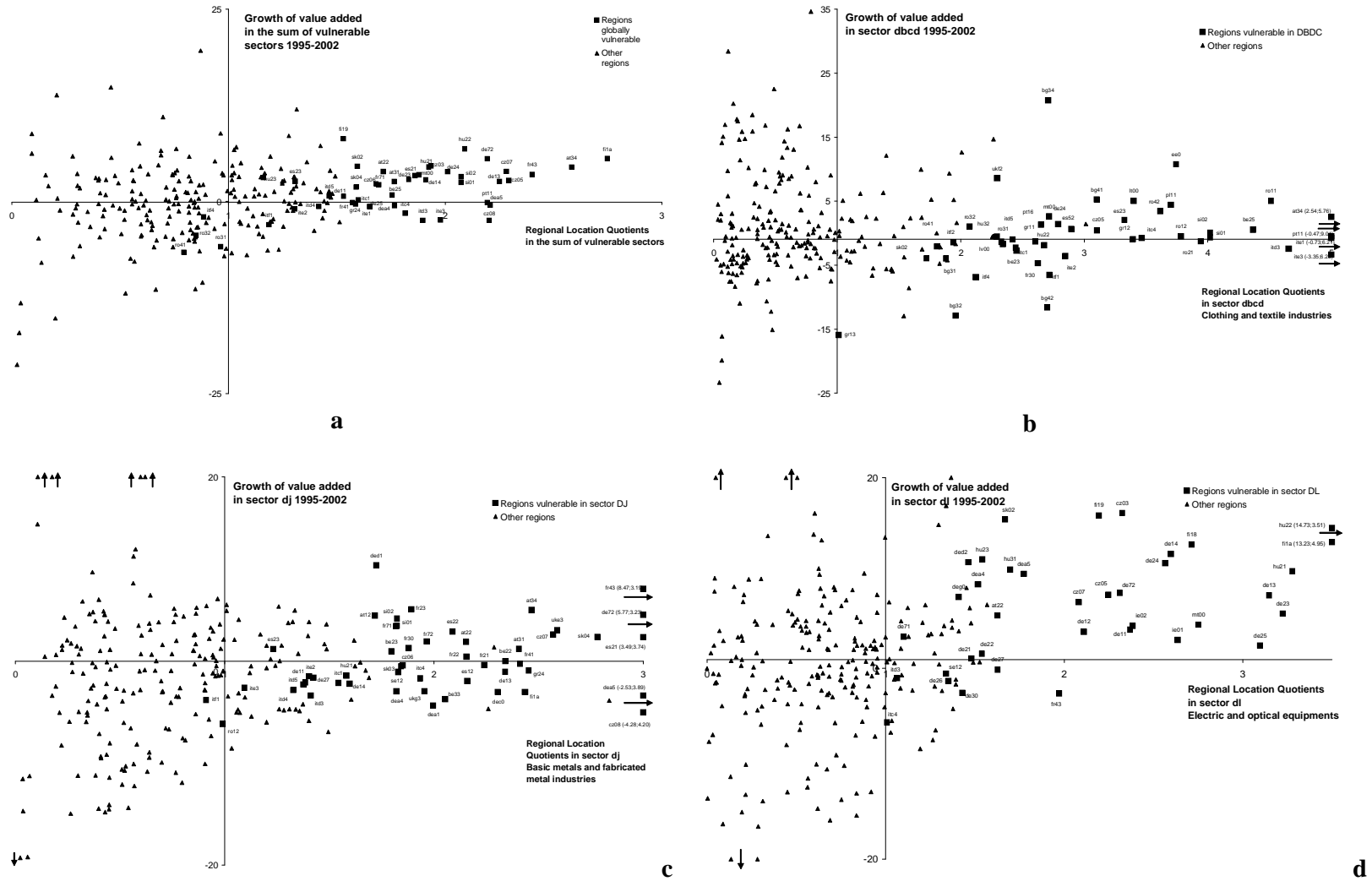


Figure 8. The relationship between value added growth and specialization in vulnerable sectors.

3.2.2. The impact of regional specialization in vulnerable sectors on global regional performances

After studying the link between sectoral specialisation and sectoral performance, it is now interesting to evaluate whether this specialisation might have an impact on the overall economic performance of the region. In other words, do vulnerable regions perform worse than others when looking at performance across all sectors together? This is obviously linked to the weight of the vulnerable sector(s) in the regional economy, especially since thresholds used to define vulnerable regions (see table 7 in chapter 2) represent fairly low percentages of the total employment and/or GVA, and the evolution in other sectors might more than compensate for the losses in the vulnerable sectors. This section thus explores whether sectoral vulnerability might have any structural impacts on a region's economy, even beyond the specific sector determining this vulnerability.

We will first make some simple comparisons of the performances of vulnerable and non vulnerable regions (3.2.2.1) before assessing in a more systematic way the correlation between specialization and regional performances. More precisely, we will look into the relationship between the share of vulnerable sectors and global economic performances and see whether this relationship is stable according to the sectoral specialization as well as across space, for example by differentiating Eastern and Western Europe (3.2.2.2).

3.2.2.1. Descriptive comparison of the performances of vulnerable and non vulnerable regions

To achieve this comparison, we consider three indicators and we distinguish between EU-15 and the New Member States (NMS): employment dynamics; GDP growth in relation to EU and national averages.

In EU-15, the level of GDP/inhab in the vulnerable regions is lower than the average (Table 10). When considering the sectoral specialization of vulnerable regions, we find some significant differences: while textile, and to a lesser extent metal regions, are poorer than the EU-15 and national averages, the reverse is true for regions specialized in electric and optical equipment (DL).

In terms of performances, vulnerable regions globally have worse economic performances than non vulnerable sectors:

- employment growth is lower, notably for industrial employment which is decreasing;
- economic growth is also lower, whether compared to EU or national averages.

If we look into the different types of vulnerable regions, employment and GDP indicators appear to show contradictory results. While textile regions perform best in terms of employment, GDP growth shows exactly the reverse.

In the New Member States, vulnerable regions are less affected by job losses, whatever the sectoral type, whereas their GDP growth is globally worse. However, to compare the performances of economic growth by types of vulnerability, it is more relevant to look into the indicators according to national averages because the types of vulnerability are very different from one country to another. In doing so, it appears that textile and metal regions have lower growth than electric/onic regions.

In conclusion, differences are not always very important between vulnerable and non vulnerable regions, and we will see that vulnerable regions are showing high diversity in terms of economic performances, even when specialized in the same vulnerable sector. However, the regions specialized in electric and optical equipment have higher GDP/inhab than average, and show better economic performances during the 1995-2004 period.

		Total employment	Industrial employment	Gross Domestic Product			
		Average annual growth between 1995 and 2004 (%)	Average annual growth between 1995 and 2004 (%)	GDP/inhab. 2004 EU-27 =100	GDP/inhab. EU 2004 - 1995	GDP/inhab. 2004 country = 100	GDP/inhab. Nat 2004 - 1995
EU 15*	Non vulnerable regions	1,53	0,22	112,0	0,4	101,4	0,3
	Globally vulnerable regions (1)	1,05	0,06	105,2	-10,3	98,4	-1,2
	Textile regions**	1,23	0,49	96,1	-10,8	94,5	-2,3
	Metal regions**	0,95	-0,33	107,8	-9,2	98,4	-1,7
	Electr. Regions**	0,98	-0,50	121,0	-8,2	108,3	-0,4
	EU-15 average	1,35	0,02	111,3	-2,7	-	-
New Member States	Non vulnerable regions	-1,67	-2,53	55,0	9,1	104,4	0,9
	Globally vulnerable regions (1)	-1,33	-0,70	58,8	6,6	89,4	-2,3
	Textile regions**	-1,25	-1,04	49,0	8,6	95,7	-1,2
	Metal regions**	-0,90	-1,29	58,6	3,7	83,7	-0,4
	Electr. Regions**	-0,18	-0,69	63,1	6,0	83,1	0,3
	NMS average	-1,46	-1,55	57,0	7,1	-	-

Table 10. Performances of vulnerable regions according to the types of vulnerability

Source: Eurostat

Notes:

* Eastern Germany not included (included in NMS)

** those regions could be included in (1)

3.2.2.2. Descriptive analysis of the relationship between the share of vulnerable sectors and the regional economic performances

In previous sections, we have studied the general growth tendencies of different types of vulnerable regions with purely descriptive statistics. In order to better understand the relationship between specialization in vulnerable sectors and economic performances at regional level, we propose here a simple regression analysis. The analysis will be refined by taking into account the vulnerable sector (textile, metal...) and the variation of this relationship in the different parts of Europe (Eastern, Nordic...).

Analysis

We thus propose to correlate the variations of regional GDP and industrial employment on the period 1995-2004 with the regional sectoral structure through two very basic models:

Equ.1: $Y = \text{Share of vulnerable sectors 1995} + \epsilon$
--

$$\text{Equ. 2: } Y = \text{Textile 1995} + \text{Metallurgy 1995} + \text{Electric and optical equipment 1995} + \text{Miscellaneous manufacturing industries 1995} + \epsilon$$

Eq. 1 tests for the overall correlation between a global notion of vulnerability as defined above and regional growth (Y). Eq. 2 allows to separate the individual effects of each sector. ϵ is the regional residue, i.e. all other factors correlated to the regional growth rate differential to the national growth rate.

However, regional economic development is heavily dependant on the general national trends in growth. We have, therefore, repeated the same analysis adding national growth rates as an explanatory variable, thus isolating a bit more the effect of regional vulnerability as opposed to general national vulnerability (reflecting the logic of the “regional shift” of the MASST model presented in chapter 5).

$$\text{Equ.1: } Y = \text{National average of GDP growth (1995-2004)} + \text{Share of vulnerable sectors 1995} + \epsilon$$

$$\text{Equ. 2: } Y = \text{National average of GDP growth (1995-2004)} + \text{Textile 1995} + \text{Metallurgy 1995} + \text{Electric and optical equipment 1995} + \text{Miscellaneous manufacturing industries 1995} + \epsilon$$

As we do not expect these relations to be stable across Europe, we test them for different sub-regions of Europe, in order to identify geographical variations. This is linked to the hypothesis of the existence of different territorial patterns of vulnerability across Europe related to a spatio-temporal diffusion of value-chain and industrial branches. It means that the consequences of the importance of vulnerable sectors could be different if we consider a part of European Union or another. More precisely, we can imagine that the impacts are not the same at the same time because relocations are following space-time patterns.

The regional typology chosen for the analysis of the geographical variations of the bivariate relations is an extract of the recent work of Christian Vandermotten (*L'identité de l'Europe, 2008*) (Figure 9). It takes into an account a lot of factors: socio-economic or demographic structures, historic and geographical proximities. It delivers a synthetic typology where we can distinguish 5 main socio-economic combinations: the Core, the Western Semi-Peripheries, Mediterranean Europe, Northern Europe and Eastern Europe.

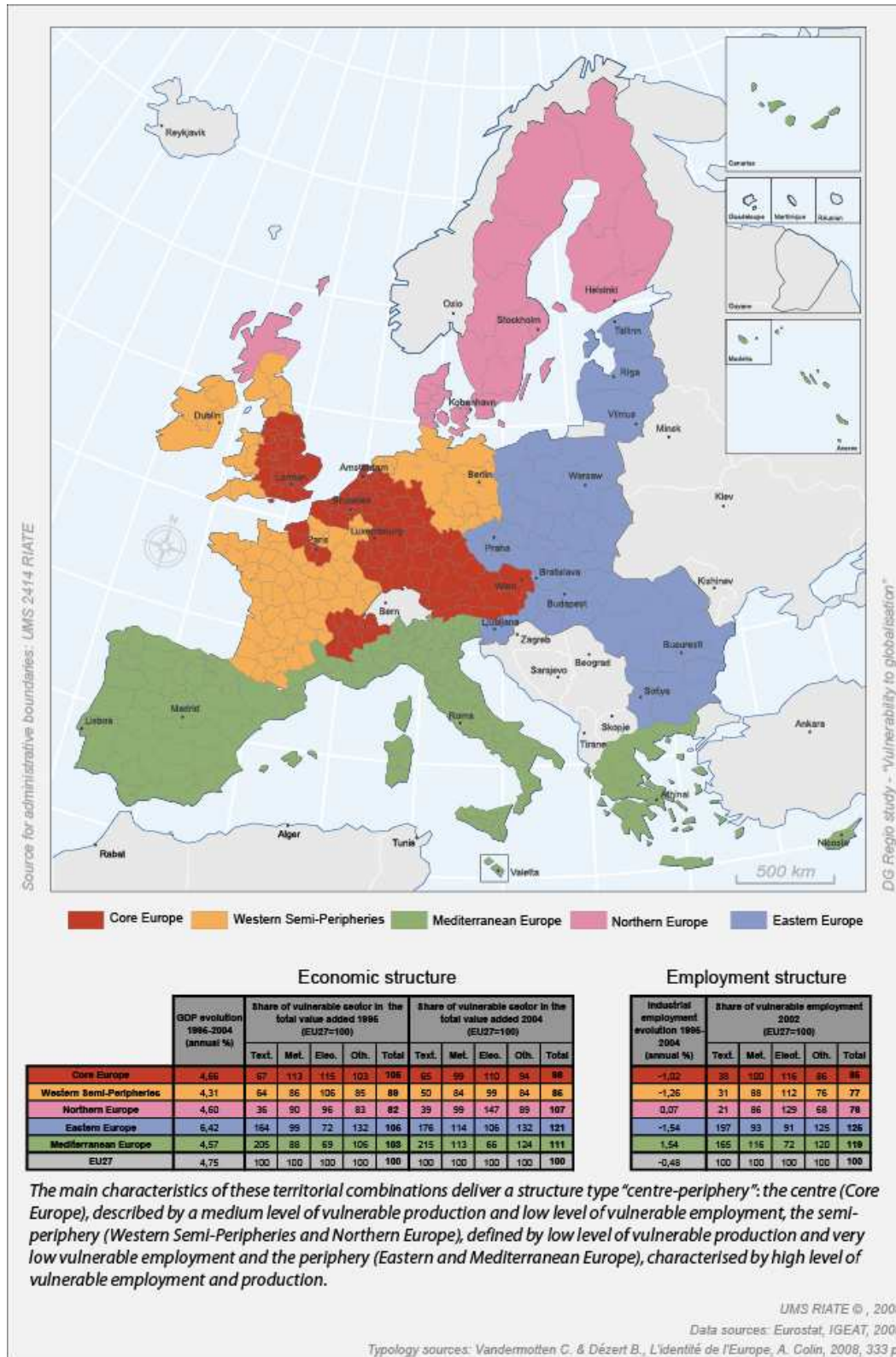


Figure 9: Typology of regions used for the analysis and basic statistical description of these combinations

Source : Vandermotten, 2007

The impact of vulnerable sectors on GDP Growth (1995-2004) (Figures 10 and 11)

The effect of general vulnerability (Eq. 1): The basic assumption of our global model is verified at EU27 level as the regional variation of GDP between 1995 and 2004 is correlated to the share of vulnerable sector, *also with a control for national trends*. If we compare two regions of the same country, we can thus expect that regions with a high share of activity in vulnerable sectors have generally experienced a lower growth of GDP. The conclusions are the same if we analyse subgroups of regions based on Vandermotten's typology. In nearly all cases, the effect of vulnerable sectors on GDP growth is negative. However, when not controlled by national trends, the share of vulnerable sector is positively correlated to GDP growth in the Western Periphery: this is probably explained by the Irish case which combines high share of electric and optical equipment and exceptionally high growth rate. If we control by national trends, this "Irish effect" disappears.

Variations according to individual sectors (Eq. 2): Metallurgy is the vulnerable sector that produces the only significant effects on GDP growth at EU27 scale and this effect is always negative, whatever the territorial context. The other vulnerable sectors do not produce significant effects on GDP growth, but only in some territorial contexts and not necessarily with the expected influence. An important share of electronic sector will produce positive effects on GDP growth in core regions and northern Europe, and non significant effects in eastern and Mediterranean Europe. This result can be interpreted by the fact that electric/-onic regions in central and northern regions are specialized in high technological segments in the sector but also in other sectors: as a consequence, they benefit more than suffer from the globalization process. The effect in Western semi-peripheries is contradictory when controlled or not by national trends, to be related with the so-called "Irish effect" explained above. Another important point is the situation of Mediterranean regions where the impacts of the vulnerable sectors are the most negative, when not controlled by national trends. We interpret this as their "in-between" situation: not enough specialized in the high technological segments but too expensive to still benefit from delocalization in the low technological segments as it is the case in Eastern Europe. However, when controlled by national trends, this Mediterranean vulnerability disappears, which we can interpret by the global vulnerability of countries like Italy and Portugal.

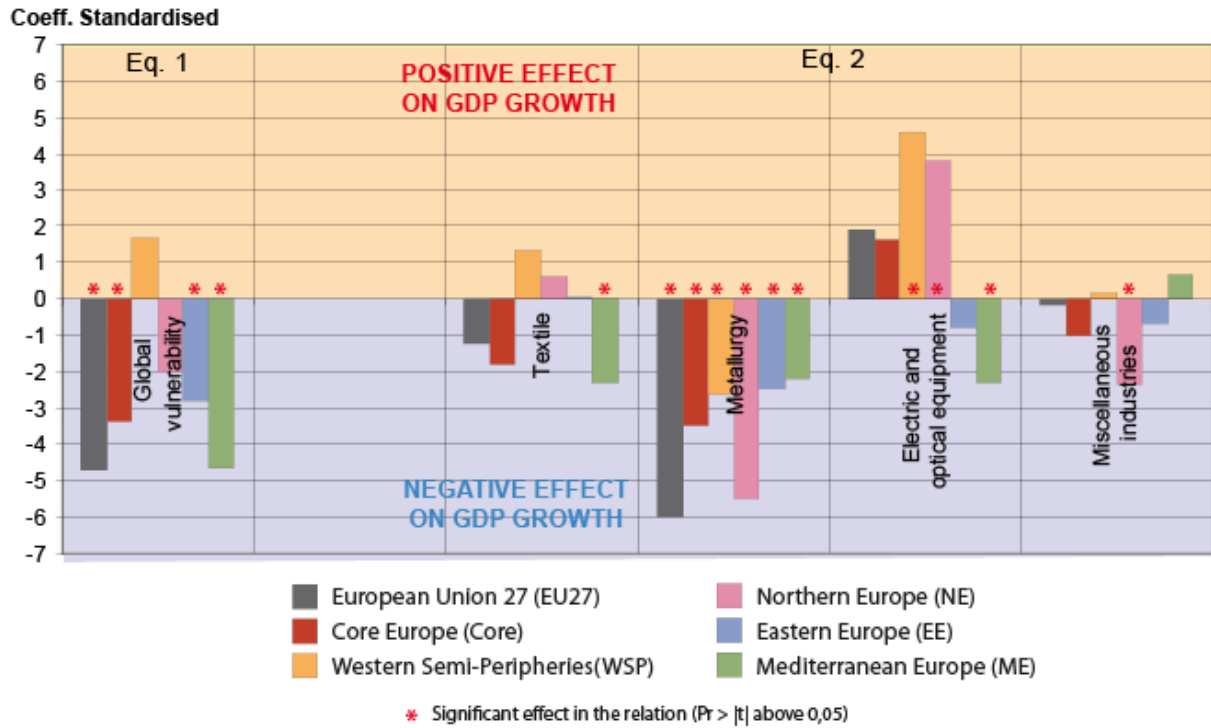


Figure 10. Impact of vulnerable sectors on GDP growth, without control for national trends (1995-2004)

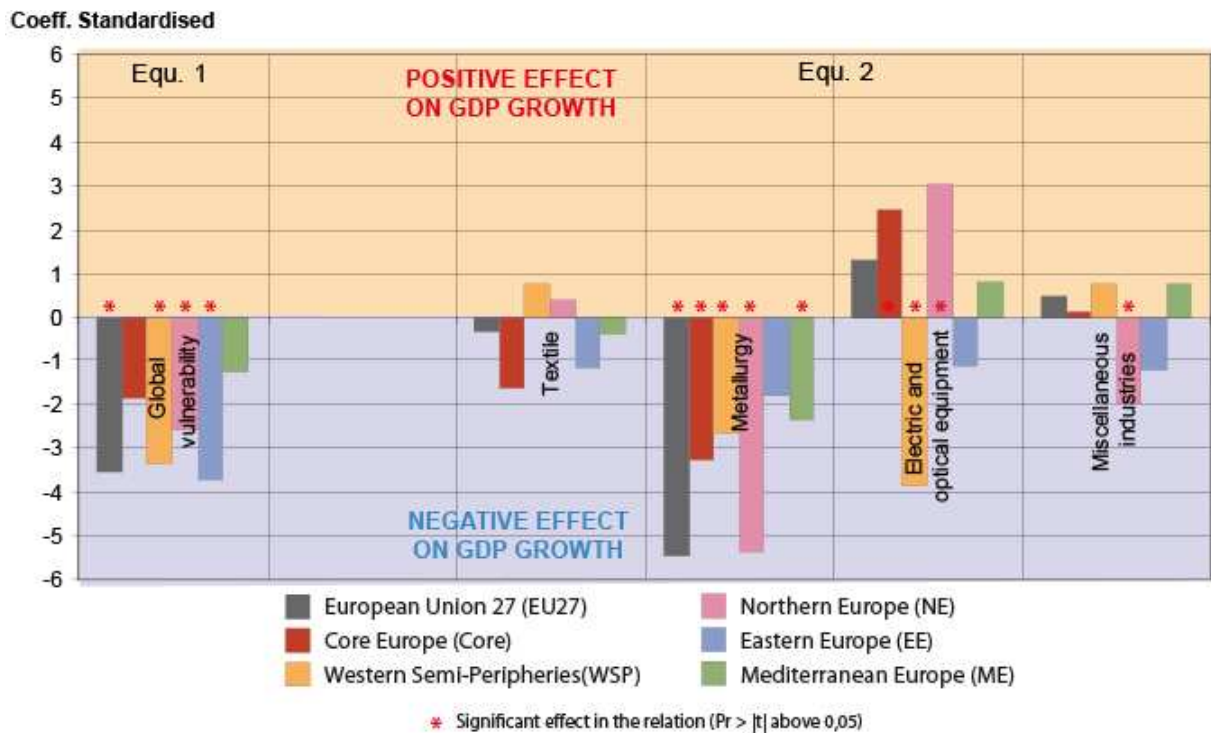


Figure 11. Impact of vulnerable sectors on GDP growth, with control for national trends (1995-2004)

The impact of vulnerable sectors on Industrial Employment (1995-2004) (Figure 12)

In the case of the variation of industrial employment between 1995 and 2004, we have applied the same model but the share of the vulnerable sectors was evaluated in % of total employment instead of % of GDP. Unfortunately it was not possible to obtain the share of employment in vulnerable sector in 1995 and we were obliged to use the share of vulnerable sector in 2002 as predictor of the evolution 1995-2004 which is less consistent. Results are quite similar when controlled or not by national trends.

Our global model reveals a surprising result: **the share of vulnerable sector appears to have a positive effect on the evolution of industrial employment, all things being equal with national trends.** The explanation of this paradox could be that vulnerable sectors are not necessarily negative for employment in all territorial and economic contexts. For example, we already observed the employment growth in textile regions despite the crisis (3.2.2.1). In “electric and optical equipments” as well, we already showed the positive impact of specialization in core and Nordic regions.

The effect of general vulnerability (Eq. 1): The effect of an important share of vulnerable sector on industrial employment is positive in Eastern Europe and negative in Mediterranean Europe and we can imagine that this is related to different steps of relocation. But it is more difficult to explain why this effect is also positive in the core and the northern Europe, except if we consider that relocations took place a long time before in this area. The residual part of vulnerable sectors would be therefore very competitive as confirmed by the fact that this positive effect is mainly related to “electric and optical equipment”.

Variations according to individual sectors (Eq. 2): The analysis by branch of the vulnerable sectors indicates that “Electronics” and “Miscellaneous industries” are generally associated to positive and significant effects of industrial employment and that textile and metallurgy are not significant. But the situation is more complicated when we combine branch and territories. For example, the sector “Electric and optical equipment” has a significant positive effect on the regions of the Core and the significant negative effects on the regions of Mediterranean Europe.

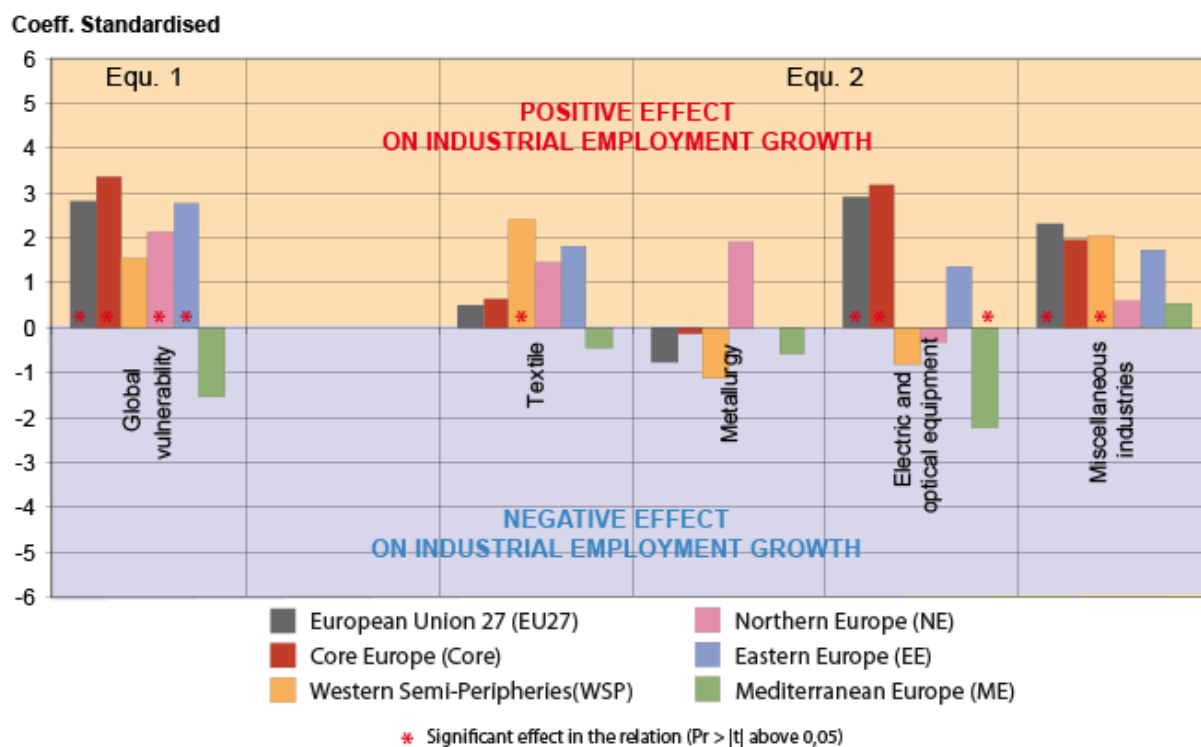


Figure 12. Impact of vulnerable sectors on industrial employment growth, with control for national trends

Main results of section 3.2.2

- We found no clear impact of regional specialisation in vulnerable sectors on global regional economic performances
- In general, the share of vulnerable sectors has a negative impact on GDP growth, compared to national or European averages, but not on employment growth.
- We observe differences between vulnerable sectors in their impact on regional performances:
 - . textile has a negative impact on GDP growth, but a positive impact on employment;
 - . metal has a negative impact, especially on GDP growth;
 - . electric and optical equipment has a positive impact on GDP growth and employment.
- We observe differences across Europe in the relationship between the share of vulnerable sectors and economic evolutions at regional level. Main differences are found in the impact of “electric and optical equipment”, very positive in core and Northern Europe, where it corresponds to high technological level, but negative in western semi-peripheries.

Remark: these results present rough correlations or comparisons and are not to be read in causal terms since they have not been controlled by other effects.

3.2.3. Classifications of vulnerable regions according to their economic performances

In the previous sections (3.2.1 and 3.2.2), we have shown that the regional share of vulnerable sectors does not influence in a clear way the regional economic performances. This is due to the highly diversified economic performances inside the group of vulnerable regions, even when considering the sectoral vulnerability. In order to provide a framework for analysis, but also for policy reflections, we propose here to illustrate this diversity by two different classifications of vulnerable regions: the first focuses on the global performances (3.2.3.1.) while the second deals only with industrial restructuring processes (3.2.3.2.).

3.2.3.1. Typology of performances of vulnerable regions

Despite significant differences between vulnerable and non vulnerable regions, especially when taking into account their specialization, heterogeneity inside vulnerable regions is still considerable. By crossing sectoral specialization with performances in the vulnerable sectors and global performances, we come to a typology described in table 11. The main question behind this classification is whether the decline in vulnerable sectors is globally offset by other sectors in the “losing regions” (types a or c), and whether the growth in vulnerable sectors leads or not to global economic dynamism (types b or d).

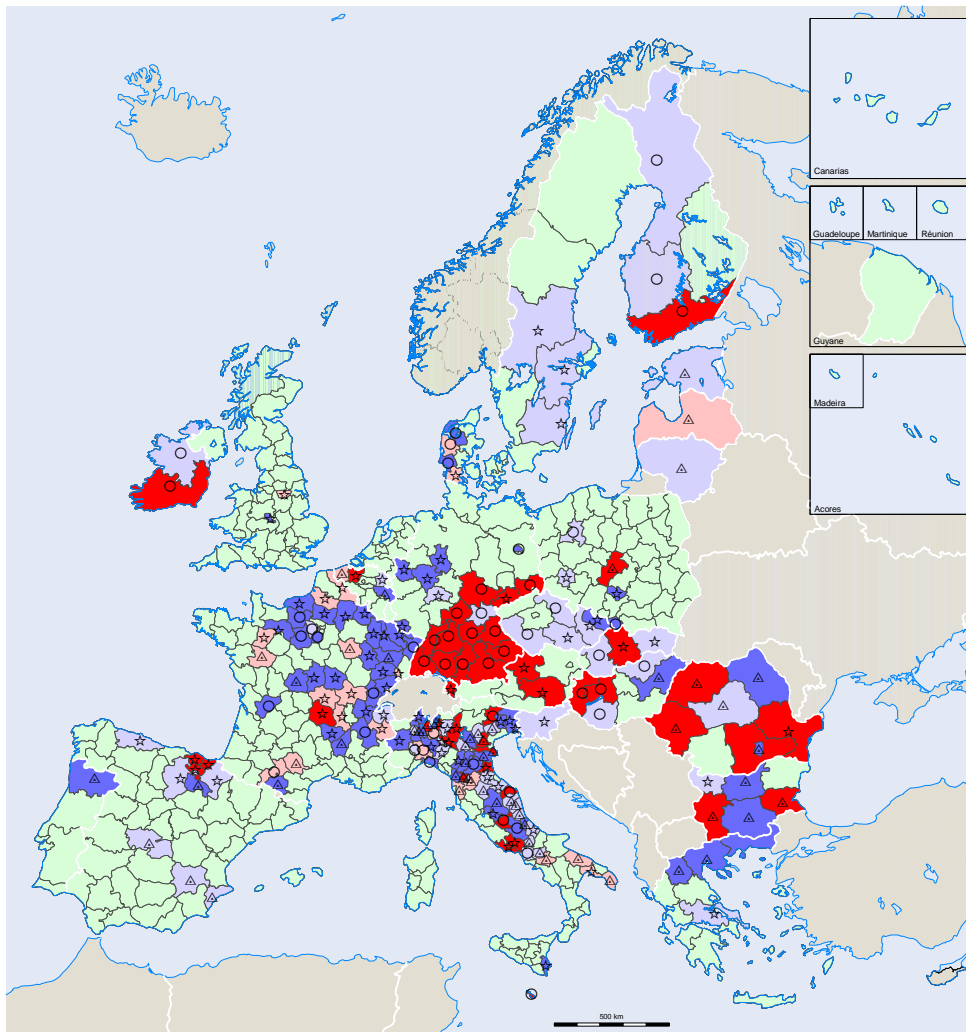
Regions were classified by the sectoral component of the vulnerability and the economic performances. Regarding the first criterion, the classification has been simplified: in case of more than one sector beyond the threshold of vulnerable sector in a region, the most important sector has been selected. In terms of performances, two variables were used: global economic growth compared to the national average (1995-2004); growth in the vulnerable sectors (decrease or increase between 1995 and 2004). Economic growth is compared to the national average because national differences have been very huge during 1995-2004: this criterion thus allows us to put into the fore the regional rather than the national dimension of growth. For the vulnerable sectors, we prefer using European rather than national averages as a reference, since we can estimate that in the vulnerable sectors, firms are operating under the same global economic constraint due to globalization. Figures 13a/b geographically situate the typology.

		Type of vulnerable sectors		
		Textile	Metal	Electric
GVA growth (1995-2004)	Negative	type1a	type2a	type3a
	Positive in the vulnerable sectors	type1b	Type2b	type3b
	Positive	Type1c	Type2c	Type3c
	Positive also in vulnerable sectors	Type1d	Type2d	Type3d

Table 11. Types of vulnerable regions according to the sector of vulnerability and performances

From this typology, it clearly appears that vulnerable regions perform quite differently in terms of employment as well as GDP growth (Figures 13a and 13b). Indeed, many of these

potentially vulnerable regions show better economic performances than national or European averages.



© EuroGeographics Association for the administrative boundaries

Origin of data: EU 27 : Eurostat, National Statistical Offices 2004

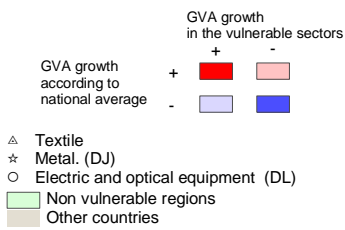


Figure 13a. Typology of vulnerable regions according to economic performances and sectoral specialization, 1995-2004. NUTS2/NUTS3 version.

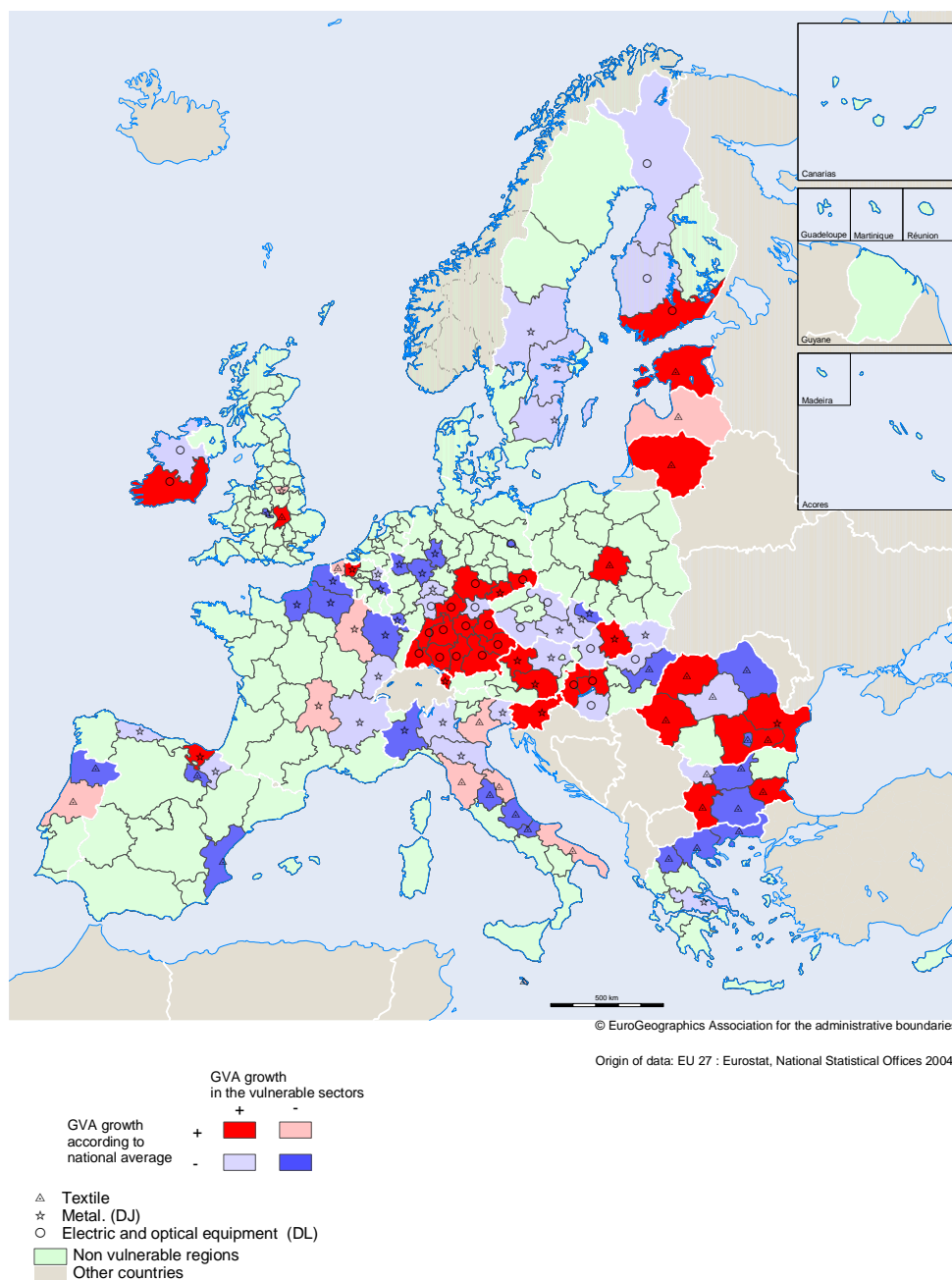


Figure 13b. Typology of vulnerable regions according to economic performances and sectoral specialization, 1995-2004. NUTS2 version.

3.2.3.2. Industrial Growth Patterns of Vulnerable Regions

Faced with increased external competition in their sectors of specialization, regions can adopt three different strategies, each of which implies different consequences on their economic performance and structure:

1 – The first possible strategy consists in *increasing productivity* in the same sectors of specialization. This purpose can be reached by means of new technologies, organizational and

managerial innovation, or, in some cases, corporate adaptation, especially vertical (with suppliers and customers) and horizontal (with similar firms in order to achieve economies of scale) integration. This strategy is the only one that keeps unaltered the regional specialization and its employment levels. Due to technological (i.e. lack of knowledge to implement new technologies) and market constraints (i.e. beyond a certain level, further integration does not add to productivity), such a strategy can not always be achieved.

2 – The second strategy to deal with increased external competition consists in the *reconversion of regions to higher phases of the production process*, i.e. decentralizing the low level production phases toward areas with lower wages and production costs. Such a strategy preserves the regional specialization (especially in terms of value added) but not always all the jobs. This attitude is all the more effective as regional firms are able to exploit the advantages of de-localization of phases to increase their competitiveness and market shares so that the jobs lost in lower value added phases are won back in higher phases and the total number of jobs in the region remains stable.

3 – The third strategy consists in *the reconversion of regional sectoral structure*, from low value added sectors to high value added sectors, leaving the production of the sectors most affected by competition to the newly arrived competitors. The implementation of this strategy requires the region to have the technological and managerial capability to enter into new high-value-added productions as well as an endogenous ability to deal with change.

If none of the three strategies is implemented, regions can only remain competitive by limiting production costs through either wage or employment decrease, the latter through firms closedown. On the contrary, if put in place, these strategies are expected to lead to positive and dynamic growth patterns for local economies.

The alternative growth patterns of local economies can easily be synthesized on a graph, on which the relative (with respect to the EU mean) growth of industrial productivity and the relative (with respect to the EU mean) growth of industrial employment are plotted, respectively on the vertical and horizontal axes (Fig. 14). This representation has an interesting feature: a 45° negatively sloped line crossing the origin is the locus where the value added of a region grows at the same rate as the EU average. All local economies that position above the 45° negative slope register a value added growth rate above the EU average.

On the same graph it is therefore possible to control for three indicators at the same time, which together highlight six different patterns of growth:

1. *virtuous cycle*, when higher than average productivity growth generates good performance in both employment and output;
2. *restructuring*, when a higher than average productivity growth is reached through severe employment cuts, leading nevertheless to good output performance;
3. *dropping-out*, when productivity growth is reached by closing down inefficient production units, generating lower than average production growth;
4. *de-industrialization*, defined as a vicious cycle in which employment cuts are unable to restore competitiveness, a condition that perpetuates job losses and low output growth;

5. *industrial conservatism*, when poor productivity growth is accompanied (and sometimes explained) by a better than average employment growth, generally due to public assistance and industrial rescues;
6. *sheltered development*, when explicit or implicit assistance policies spur the initial development of the areas, notwithstanding low productivity performance.

Figure 14 reports the industrial growth patterns of European vulnerable regions over the period 1995-2005. The graph also contains the sectoral reallocation of each region: squares represent regions with higher than average sectoral reconversion, triangles represent regions with lower than average sectoral reallocation.¹⁷

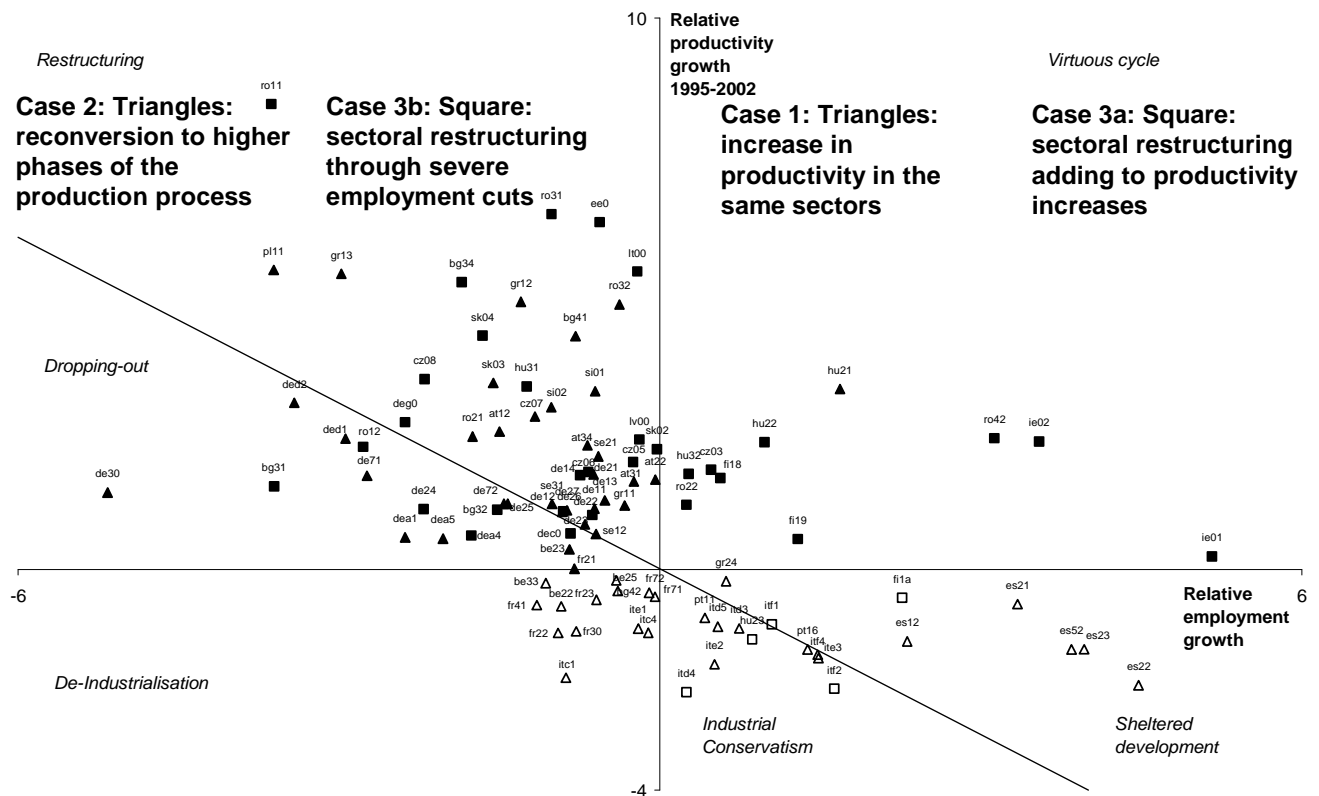


Figure 14. Industrial growth patterns of vulnerable regions – 1995-2002

¹⁷ The change in sectoral composition (*SCR*) of manufacturing value added for each region is calculated as half of the sum of the absolute values of the differences between the share of value added in each sector in the beginning and in the ending year:

$${}_{1995-2005}SCR_r = \frac{1}{2} \sum_j \left| \frac{2002VA_j^r}{2002VA^r} - \frac{1995VA_j^r}{1995VA^r} \right|$$

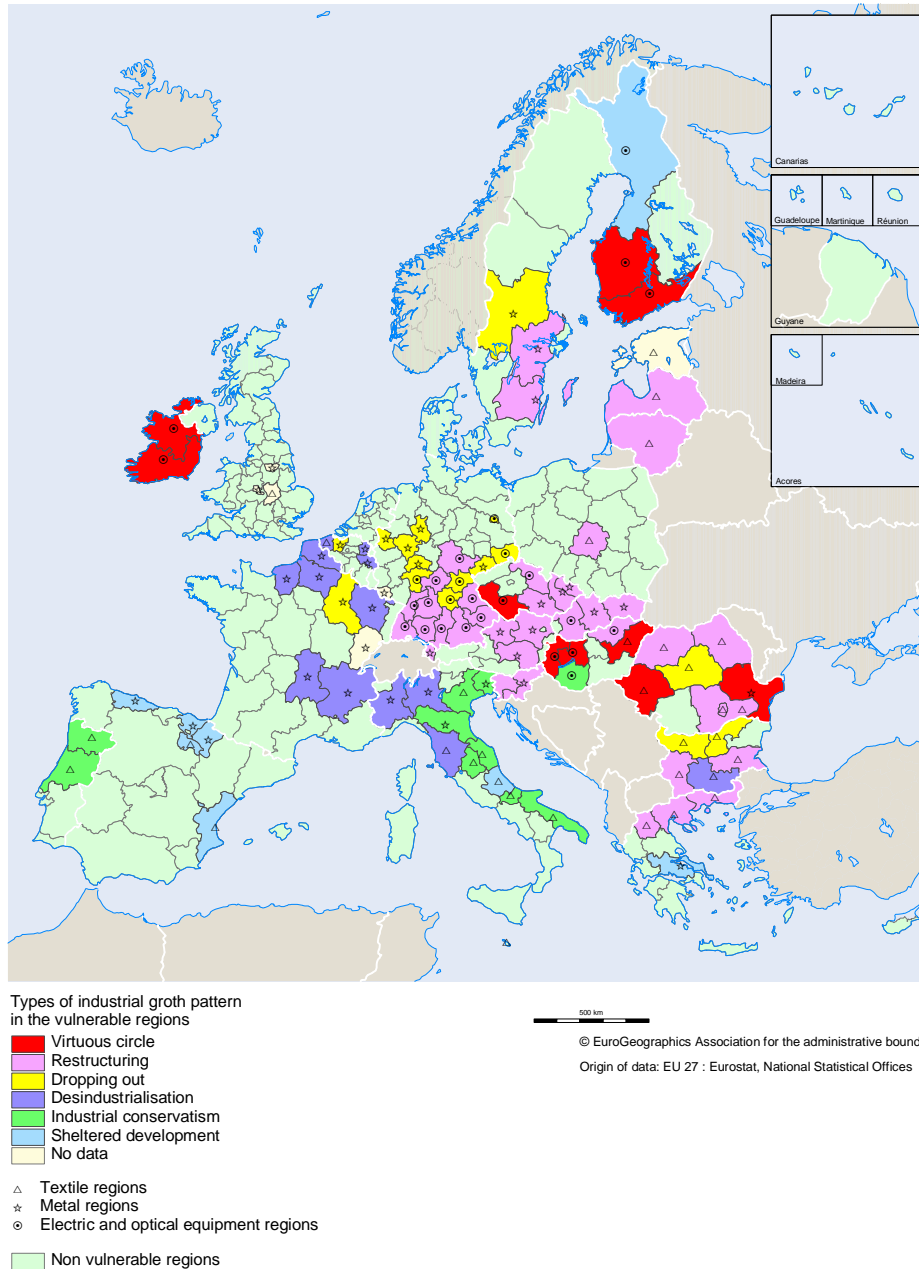


Figure 15. Industrial growth patterns of vulnerable regions – 1995-2002. NUTS2.

Figures 14 and 15 show the following:

- in terms of productivity and value added growth, among vulnerable regions a relatively low number has suffered from globalization over the period 1995-2002. On the contrary, a higher number has suffered from industrial employment decline, accompanied in some cases by a decrease in industrial productivity growth and by high decrease in industrial value added growth;
- however, vulnerable regions in a virtuous cycle of development, i.e. regions coupling industrial employment and productivity growth, are relatively few and most of them from Eastern countries. Exceptions in Western countries are regions from Finland and Ireland;

- vulnerable regions in the virtuous cycle of development have a low sectoral reconversion, suggesting that the increase in productivity in the same sector is the most applied strategy in Eastern countries;
- the deindustrialisation phase is typical of vulnerable regions of Western countries;
- all vulnerable regions in the deindustrialization phase have a lower than average degree of sectoral reconversion; globalization produces strong industrial employment and productivity losses if regions remain specialized in the same industrial sectors, especially in Western countries.

Each quadrant in figure 16 contains the structural features that proved statistically different between the group of regions belonging to that quadrant and all other vulnerable regions.

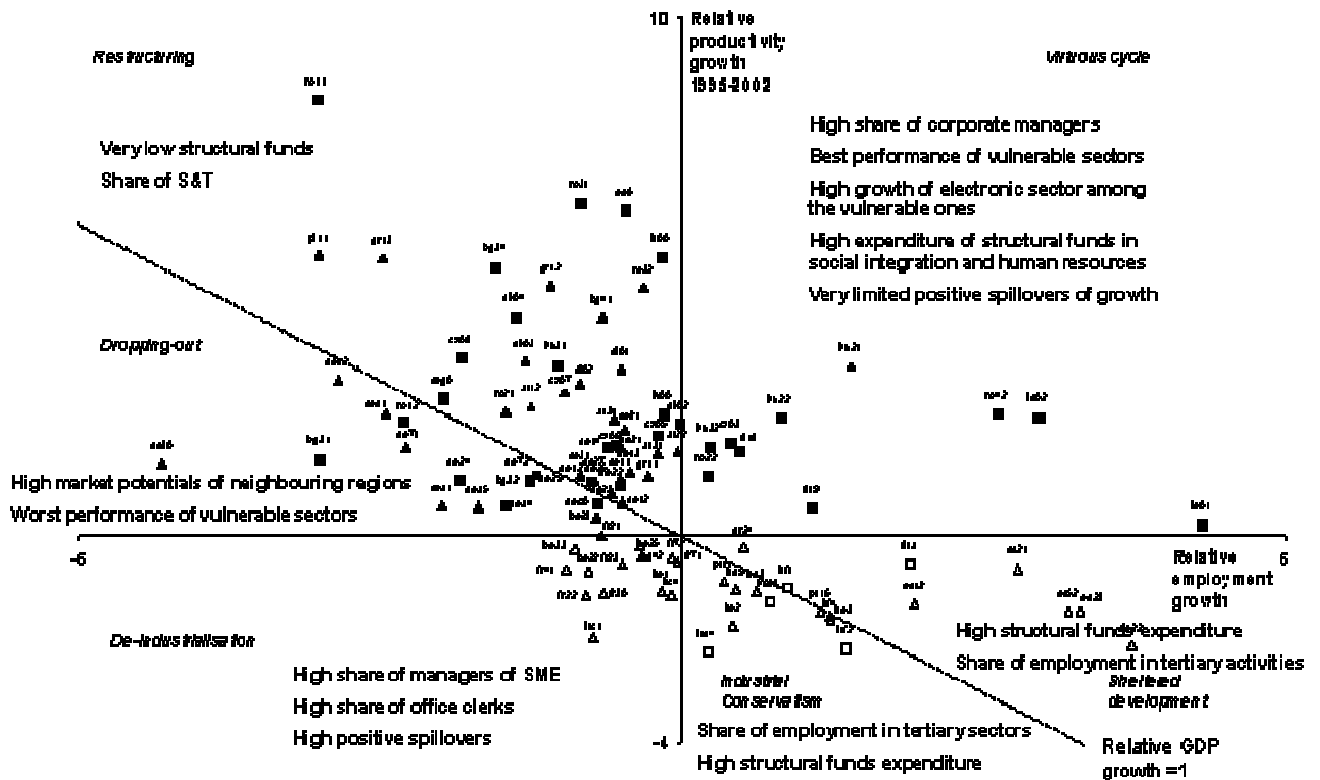


Figure 16. Structural features associated with each industrial growth pattern

Vulnerable regions associated with a virtuous cycle of development are characterized by high value added functions (high shares of corporate managers), the best performing vulnerable sectors - and in particular the high increase of the electric and electronic sector-, as well as significant expenditure of structural funds in social integration and human resources. Moreover, these regions act as donors, more than receivers of growth: in fact, they grow less if they are close to growing regions.

A high share of science and technology and low expenditure in structural funds characterize the regions in restructuring; employment losses are considerable – probably also because of low structural funds expenditure – while innovation helps industrial productivity increases, registering a higher than average value added growth. The dropping out situation, in which productivity increases are not sufficient to offset employment losses, is typical of vulnerable regions with a very low performance in the vulnerable sectors and with neighbouring regions

benefiting from a high market potential: the growth in these regions seems to result from the existence of a large market in neighbouring regions.

Vulnerable regions suffering from deindustrialization - industrial employment crisis, industrial productivity losses and value added decrease - are associated with high shares of public employment and managers in SMEs. Moreover, these regions' growth is characterized by significant positive spillovers of growth: their growth depends on their geographical proximity to growing regions.

Industrial conservatism and sheltered development are both typical of vulnerable regions characterized by large structural fund expenditure and a high share of tertiary activities; this can be a sign that both financial support and the development of the service sector act on industrial employment dynamics but not on industrial productivity growth.

Main result of section 3.2.3.

Economic growth is very heterogeneous among vulnerable regions, even if we distinguish between regions according to their main specialization. It means that vulnerable regions react in different ways to the growing global competition. To help the understanding of regional performances in the vulnerable regions, we proposed here two different typologies of vulnerable regions according to their performances.

3.3. The evaluation of the social consequences of vulnerability to global competition

Up to now we have dealt with vulnerability and performances in a purely economic perspective. However, a healthy economy is obviously not a goal in itself, but a means to reach or maintain a certain standard of living. In this perspective we propose here a brief analysis of the social “performances” of vulnerable regions. However, to evaluate in a systematic way the social consequences of regional vulnerability to global competition is not an easy task. We, therefore, focus on the labour market, in order to explore whether vulnerable regions show specific behaviours in terms of the capacity to integrate people in their labour markets and to offer them decent conditions of work. We will work on two main hypotheses.

The **first hypothesis** is that vulnerable regions have seen the labour market situation worsen because they have to face global competition more than other regions. The **second hypothesis** is that the vulnerability to globalization will first hit the least qualified persons, and increase the gap between low and high skilled on the labour market.

In order to test the first hypothesis, we will use several indicators:

- unemployment rates in the active population ;
- the share of different forms of precariousness among employed people: temporary jobs, part-time jobs, and persons looking for another job.

None of these indicators are totally satisfactory: non temporary jobs do not guarantee the permanency of jobs since it also depends on the easiness to break off permanent contracts (this is so easy in some countries that there is no reason for signing temporary contracts); part-time jobs are not really a sign of precariousness since most of them are voluntary, but, at least, they bring a kind of correction to the unemployment rate; persons looking for another job are certainly the most interesting indicator since this indicator not only gives some idea of the dissatisfaction at work, but can also reflect low unemployment rates, which facilitate the search for another job.

The comparison between vulnerable and non vulnerable regions clearly shows that for nearly all social indicators, the situation is better, in the vulnerable regions, than the average (Table 12): unemployment rates are lower, even when compared to the national average, part-time and temporary jobs are less developed (except in electronic regions), and people are less often looking for another job. The situation is different if we consider involuntary part-time jobs, which are a bit more numerous in vulnerable regions, essentially in metal and “electric/onic” regions. However, vulnerable regions do not constitute a homogeneous group according to the social indicators on the labour market we are dealing with: most of the vulnerable regions do not differ from the neighbourhood or national environment.

In conclusion, our hypothesis is not confirmed at all, and we can at least assert that vulnerable regions do not distinguish themselves by worse social indicators on jobs precariousness. Moreover, as far as unemployment is concerned, vulnerable regions are characterized by lower rates, though not all of them. It means that the global competition they have to face does not, apparently, produce a specific degradation of the conditions on the labour market. How can we interpret this result? First, as we already stated, the national labour market is still

the major factor to explain regional situations, with clear border effects. Second, as regards unemployment, marshallian textile districts are definitely characterized by the lowest rates, because of a very flexible labour market; in electric/onic regions, the good general economic wealth of most of them could explain lower unemployment rates; in metal regions, only the old industrial regions are affected by high unemployment rates.

		Unemployment rate %	Unemployment rate according to national average	Share of active looking for another job %	Share of temporary jobs %	Share of part-time jobs %	Share of involunray part-time jobs %
EU 15*	Non vulnerable regions	7,56	1,04	5,42	14,73	21,59	3,68
	Globally vulnerable regions (1)	6,62	0,80	4,71	13,35	17,92	4,12
	Textile regions**	6,47	0,86	4,96	14,64	14,44	3,89
	Metal regions**	6,88	0,81	4,82	13,01	19,74	4,25
	Electr. Regions**	7,09	0,79	4,43	12,22	22,15	4,07
	EU-15 average	7,46	0,97	5,13	14,36	20,79	3,85
New Member States*	Non vulnerable regions	12,83	1,08	5,34	20,26	9,95	3,40
	Globally vulnerable regions (1)	8,14	0,90	1,49	6,66	5,52	1,44
	Textile regions**	7,75	0,95	2,05	6,51	7,98	3,15
	Metal regions**	10,99	1,16	2,76	9,89	8,22	3,18
	Electr. Regions**	10,64	1,16	3,58	10,46	9,60	4,76
	NMS average	10,88	1,07	3,80	13,57	9,09	3,48

Table 12. Indicators of employment precariousness among vulnerable and non vulnerable regions

* Eastern Germany non included (included in NMS)

** Those regions could be included in (1)

Source : LFS 2006, Eurostat

The second hypothesis is that the vulnerability to globalization will first hit the least qualified persons, and increase the gap between low and high skilled on the labour market. Indeed, whatever the reaction of the vulnerable regions to global competition, we can imagine that the most vulnerable populations (low qualified) will be first hit by the delocalization of the low technological segments of production, and this, to a higher degree than in the other regions.

To test this hypothesis, we will use two levels of analysis. First, we will examine the job career of the people employed in the vulnerable sectors; second, we will compare vulnerable and non vulnerable regions as to their capacity to integrate the most unqualified workers into the job market.

Who are the first victims of job losses in the vulnerable sectors? The answer can be found in Table 13: in all vulnerable sectors, low skilled people represent a higher share of those who lost (or changed) jobs in the past year compared to the initial workforce. However, this is also true of the whole economy, but to a lesser extent than in the vulnerable sectors: while low qualified workers represent 29% of the initial workforce, they reach 36% of those who lost their jobs whatever the initial sector in which they were working.

If we compare the different sectors, textile employs a majority of low skilled workers. However, it only reflects the initial share of low qualified workers. In relative terms, in the textile sector, the share of low skilled workers is indeed lower than what can be observed in the other two sectors, especially the “electric and optical equipment” sectors. This may be the consequence of a faster process of qualification and development of technology in the electric and optical sectors than in textile, which, on the whole, remains a low qualified sector.

		Textile (DB-DC)			Metal (DJ)			Electric and optical			Whole economy		
		Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Share of the different graduation level in the initial workforce (1)	EU-15	57	33	10	37	50	13	20	49	31	36	46	18
	New Member States	13	81	6	7	83	10	11	74	14	11	80	9
	EU-27	39	53	8	30	58	12	18	54	28	29	55	16
Share of the different graduation level in those who lost their jobs (2)	EU-15	64	31	6	43	49	8	26	54	19	41	43	15
	New Member States	18	79	3	16	79	5	24	71	5	22	70	8
	EU-27	46	49	5	36	57	7	25	59	15	36	50	14
Relative level of exclusion regarding the graduation level (2/1)	EU-15	1,12	0,93	0,56	1,16	0,97	0,64	1,30	1,11	0,62	1,13	0,94	0,86
	New Member States	1,44	0,96	0,52	2,19	0,95	0,55	2,12	0,95	0,36	2,05	0,88	0,87
	EU-27	1,18	0,94	0,55	1,17	0,99	0,61	1,40	1,08	0,56	1,25	0,90	0,88

Table 13. Comparison of the share of lowly educated in the total workforce and in job losses, 2006

Mediterranean countries include Portugal, Spain, Italy and Greece; Scandinavia includes Denmark, Sweden and Finland; North-Western Europe, all the other countries of EU-15

Source: LFS 2006, Eurostat

Are vulnerable regions different from the others in their capacity to integrate the least qualified workers into the employment market (table 14)? First, unemployment rates are lower than the average in vulnerable regions as regards all types of qualification. Second, the types of vulnerable regions can vary: while global unemployment rates are very similar in the different types of regions, textile regions have relatively low unemployment rates for low skilled, and electric/onic regions for high skilled workers. This situation can be explained by the structural differences characterizing those types of regions: textile regions are specialized in low or medium technological production despite the recent evolutions, while regions specialized in “electric and optical equipments” are generally highly innovative and reach a high level of technology, which facilitates the integration of a highly qualified workforce. These data are perfectly coherent with what could be observed in table 9, which shows that the textile sector makes relatively less unskilled workers redundant than the “electric and optical equipment” sector. Third, we can observe that the gap between low skilled and other workers has increased more in the vulnerable regions than in the others, especially in the New Member States (see last column of Table 14). However, vulnerable regions seem quite diversified as regards their capacity to integrate low qualified workforce.

		Unemployment rate according to the level of graduation (%), 2006				Specificity of unemployment rate of low graduate, 2006 (a)	Unemployment rate according to the level of graduation (%), 2000				Specificity of unemployment rate of low graduate, 2000 (b)	Relative evolution of unemployment rate of low graduated, 2000-2006 (a/b)
		Low	Medium	High	Average		Low	Medium	High	Average		
EU 15*	Non vulnerable regions	11,19	7,07	4,57	7,56	1,48	12,52	7,67	4,87	8,66	1,45	1,02
	Globally vulnerable regions (1)	8,86	6,03	4,33	6,62	1,34	7,95	6,02	4,33	6,46	1,23	1,09
	Textile regions**	7,46	5,83	5,50	6,47	1,15	7,48	7,45	4,94	7,12	1,05	1,10
	Metal regions**	10,06	6,18	4,28	6,88	1,46	9,80	6,10	4,23	6,98	1,40	1,04
	Electr. Regions**	11,57	6,64	3,67	7,09	1,63	8,92	5,08	3,21	5,68	1,57	1,04
	EU-15 average	10,82	6,93	4,56	7,46	1,45	11,29	7,18	4,66	8,03	1,40	1,03
New Member States*	Non vulnerable regions	20,76	13,80	5,22	12,83	1,62	18,50	15,52	5,93	14,53	1,27	1,27
	Globally vulnerable regions (1)	15,84	7,60	3,16	8,14	1,95	11,44	9,74	3,52	9,45	1,21	1,61
	Textile regions**	11,53	7,89	3,49	7,75	1,49	9,85	11,91	5,65	10,44	0,94	1,58
	Metal regions**	20,60	10,65	4,51	10,99	1,87	14,46	12,96	4,67	12,17	1,19	1,58
	Electr. Regions**	20,74	10,50	5,38	10,64	1,95	16,85	11,67	5,16	11,27	1,49	1,30
	NMS average	17,17	11,40	4,69	10,88	1,58	14,45	13,91	5,75	12,75	1,13	1,39

Table 14. Unemployment rate according to the graduation level in 2000 and 2006.

* Eastern Germany non included (included in NMS)

** those regions could be included in (1)

Source : LFS 2006, Eurostat

This short analysis shows that our second hypothesis is only partially confirmed.

On the one hand, the situation of the low qualified is not worse in vulnerable regions than in other regions. How can be explained that low qualified are not “vulnerable” in the most vulnerable regions? First, globalization can also hit first the low qualified people in the other regions, specialized in non vulnerable sectors but also growing up at the technological level. Second, in many vulnerable regions, especially marshallian textile districts, unemployment rates remain low, and the development of basic services seems able to absorb most of the jobs losses (this can equally be drawn from the case studies). Third, even in the most specialized regions, vulnerable sectors represent only a moderate share of the employment as compared to the services sector for example.

On the other hand, the situation of the low qualified workers has worsened more than average in the vulnerable regions, yet to a moderate extent, and with a high heterogeneity notably related to the national regulations on the labour market. This evolution could be explained by the competition with low cost labour countries in the low qualified segments of production.

Main results of section 3.3

- Vulnerable regions do not significantly differ from the others in terms of precariousness on the labour market.
- Vulnerable sectors eject more low qualified workers than the rest of the sector.
- We observe significant differences between the types of vulnerable regions according to their capacity to integrate low qualified workers: the unemployment gap between low qualified and highly qualified is very reduced in textile regions, but higher than average in electr(on)ic regions.

Main results of chapter 3

- Sectoral vulnerability does not have a clear impact on economic performances across the European space, whether at national or regional level.
- However, textile and metal specializations seem to have a negative impact on regional performances while electr(on)ic regions perform better than the average.
- The main result, regarding to what we expected in this study, is that vulnerable regions have very divergent performances, even when considering the vulnerable specialization. Chapter 4 is dedicated to the explanation of these differences.
- Vulnerable regions do not differ significantly from the others according to the social labour market indicators. However, textile regions show a better integration of low qualified workers, contrary to electr(on)ic regions, where integration appears to be more difficult than the average.

4. Success factors of vulnerable regions

The previous chapter has highlighted the diversity of performances of vulnerable regions, which are not hit in the same way by globalization and showed important differences amongst the sectors of vulnerability (textile, metal or electric and optical equipment) in the way regions specialised in these sectors react to globalization. At the same time, we have seen, however, that sectoral structure in itself is not enough to explain the differences.

In order to provide politically useful conclusions, we have to take a step further and try to understand the origin of these differences, in other words, to gain a deeper understanding of the factors of success or failure of the vulnerable regions.

To tackle this major issue, we use three complementary methods:

- a descriptive comparison of vulnerable and non vulnerable regions on different indicators often related to regional economic performances (4.1);
- a statistical analysis putting into the fore the main explanatory factors of success at regional level, in terms of employment, GVA and productivity growth (4.2) ;
- a qualitative analysis based on 16 case studies in order to highlight qualitative factors of success such as historical background or governance structures (4.3).

The results of these different analyses are then synthesised into a typology of regions at risk, combining the sector-based vulnerability with their sensitivity to this vulnerability (4.4).

4.1. Structural features of vulnerable regions

The objective of this part is to isolate some potentially important factors explaining the economic performances of regions. We only intend here to evaluate whether vulnerable regions differ from the others in terms of innovation, qualification of the workforce and size of enterprises.

From this general comparison of vulnerable and non vulnerable regions, it appears that vulnerable regions do not clearly distinguish themselves from the others on such important variables such as innovation, productivity, or size of enterprises (Tables 15 and 16). These factors seem to depend more on the geographical environment in which regions are embedded (EU or NMS; national contexts; surrounding regions) than on their potential vulnerability itself.

However, when we consider the specialization of the region, innovation indicators are very discriminating (Table 15): textile regions are less productive and less innovative than the average, Electric/onic regions are clearly above the average in terms of patents, R&D and productivity, and metal regions are close to the average on all indicators. Once again, we find that electric/onic regions are very specific and have structural features that make their vulnerability ineffective: while the “electric and optical equipment” sector is vulnerable for the whole EU, the most specialized regions in this sector are often not vulnerable because of their specialization in the high technological segments of this sector. These differences

between types of regions are strongly correlated to the global qualification of the workforce, much higher in regions specialized in “electric and optical equipment” than in textile.

Moreover, there is a strong diversity inside these types of regions. This diversity cannot be reduced to a centre/periphery model, even if this dimension is clearly present: innovation is generally very low in NMS and Mediterranean regions. Nevertheless, some peripheral regions are nowadays very productive and innovative, mainly in Northern Europe and Ireland, while some old industrial regions of the centre lack innovations.

As will be shown later in the analysis of the case studies, firm size can also play an important role in shaping a region's development, often linked at the same time to the share of self-employment. Textile regions are characterized by a much smaller size of enterprises and a higher share of self employed than electric/onic regions (Table 16). It is interesting to note that these smaller firm sizes concern the non-textile sectors, whereas in the textile sector itself, these regions often have bigger enterprises than average. In the metal regions, we also observe a large firm size in the metal sector, while in the other activities, the size of enterprises is close to the average. So generally speaking, the specialization in a sector leads to bigger enterprises in this sector. In the NMS, the picture is rather different since textile regions have the biggest average size of enterprises in all sectors. However, this is essentially due to the large, mainly foreign, firms present in Romania, the country which concentrates most of the textile regions. If we look at the figures by sector, it appears that enterprises are bigger in textile regions whatever the sector, but still more in the textile activities themselves. As for metal and electric/electronic regions, enterprises are bigger in the sector in which regions are specialized.

The main features can be synthesized as follows:

- textile regions are less productive and innovative than the average and, at least in EU-15, have a smaller size of enterprises and higher shares of self-employed ;
- Electric/onic regions are much more productive and innovative than other regions and have much bigger enterprises, especially in the DL sector;
- Metal regions show more average indicators. However, in terms of innovation, this results from considerable differences between old industrial regions, not innovative, and what we could call metal/electric regions, among the most innovative in Europe (Finland, Southern Germany...). Metal regions do not distinguish themselves by the big size of enterprises in general, except in the metal sector itself.

Though useful, these analyses remain limited because they are purely descriptive and do not take into account the geographical context, and the factors which could hide behind apparent similarities or differences between vulnerable regions and the others. The next chapter will fill this gap.

		patents per 10000 active persons	Share of human resources in science and technology (%)	Share of R&D in GDP (%)	Share of low degree in the active population (low secondary degree)	Share of medium degree in the active population (high secondary degree)	Share of high degree in the active population (higher school or University degree)	Labour productivity (GVA per employed) in the manufacturing sector in 2004
EU 15*	Non vulnerable regions	2,3	23,4	1,9	29,03	42,63	28,34	58,5
	Globally vulnerable regions (1)	3,6	19,6	1,8	33,02	47,06	19,93	53,1
	Textile regions**	1,7	15,4	1,1	42,89	39,12	17,98	47,6
	Metal regions**	3,5	20,8	1,7	28,60	49,76	21,65	56,3
	Electr. Regions**	5,5	24,8	2,5	23,41	52,71	23,88	64,3
	EU-15 average	2,8	22,5	1,9	29,58	44,23	26,19	57,6
New Member States	Non vulnerable regions	0,3	17,9	0,9	11,97	66,92	21,10	18,7
	Globally vulnerable regions (1)	0,2	15,4	0,6	14,11	71,95	13,94	14,1
	Textile regions**	0,1	16,0	0,6	18,31	63,28	18,41	10,3
	Metal regions**	0,3	16,0	0,9	13,27	70,76	15,97	18,7
	Electr. Regions**	0,9	19,5	1,3	11,33	68,80	19,88	24,6
	NMS average	0,3	17,5	0,8	14,00	66,15	19,85	16,2

Table 15. Innovation and labour productivity in vulnerable and non vulnerable regions.

Source: Eurostat

Notes: all calculations have been made on the base of NUTS2 definitions of vulnerable regions

* Eastern Germany non included (included in NMS)

** those regions could also be included in (1)

		Size of enterprises (employed per enterprise)				Share of self-employed in the employment (%)
		All manufacturing	Textile, clothing, leather (DB-DC)	Metal (DJ)	Electrical and optical equipments (DL)	
EU 15*	Non vulnerable regions	14,2	8,0	10,7	18,7	13,9
	Globally vulnerable regions (1)	14,4	10,6	13,0	17,9	18,0
	Textile regions**	10,7	10,1	9,2	10,5	23,2
	Metal regions**	16,6	11,4	15,4	18,3	15,1
	Electr. Regions**	21,8	12,1	15,4	29,6	14,0
	EU15 average	15,3	9,6	12,6	20,2	14,9
New Member States	Non vulnerable regions	12,2	10,8	9,6	9,8	20,0
	Globally vulnerable regions (1)	14,8	22,3	9,3	16,8	16,7
	Textile regions**	24,9	37,6	15,6	28,5	20,4
	Metal regions**	14,1	15,1	12,2	12,5	12,8
	Electr. Regions**	15,0	19,9	8,3	24,0	11,2
	NMS average	15,9	20,7	11,3	14,7	18,9

Table 16. Average size of enterprises (employed per enterprise) in the vulnerable regions according to their main specialization, in 2004.

Sources and evaluations: Regional data on employment and number of enterprises are extracted from SBS (Eurostat) for the year 2004; regional data have been adjusted to national average size of enterprises from the "Annual enterprise statistics on industry and construction" (Eurostat).

Notes: all calculations are based on NUTS2 definitions of vulnerable regions

* Eastern Germany non included (included in NMS)

** those regions could be included in (1)

4.2. Success factors of vulnerable regions through regression analysis

Going a step further than the descriptive comparison between vulnerable and non-vulnerable regions as well as between vulnerable regions in the previous section, we present here the results of a regression analysis which allows a more detailed view of the interactions between factors and designates those variables which have a significant relationship with the performance of regions. In order to identify the specificities of vulnerable regions, the same regressions were run for all regions and for vulnerable regions only. We present here the major results of this regression analysis, details can be found in annex 4.2 of the annex 1 report. These regressions are based on two conceptual lines of thinking: the potential positive strategies of regions identified in section 3.2 and general regional growth theory.

Successful strategies for vulnerable regions are at least in a number of three: 1) an increase in productivity in the same industrial sectors, through innovation 2) a rationalization of low value added activities in favor of higher value added activities; 3) a sectoral reconversion.

Given data restrictions, we are unable to analyze which strategy is the most successful. However, from these three strategies, some of the expected success factors of vulnerable regions can be highlighted:

- *innovation*, as a proxy for a strategy of productivity gains;
- *composition of the labour force* (share of high value added functions), as a measure of a rationalization of low value added functions in favour of higher ones;
- degree of *sectoral reconversion*, as an attempt to reorganize activities towards new sectors.

Based on regional growth theory (which obviously also includes the above factors, notably innovation and human capital), other success factors can be added:

- the degree of *regional specialization*; when specialization takes place in the most successful sectors, it becomes a driver of growth, through multiplier effects on consumption and income generated by an increase in export. In the same way, a specialization in non-dynamic sectors can lock a region into a vicious cycle of development;
- the *relative geographical position* vis-à-vis other regions; regional economies being open economies, highly integrated with one another, their growth patterns depend on the dynamics of other regions, the weight of which obviously depends on their distance;
- the *settlement structure of a region*, which can hide economies or diseconomies of agglomeration once a region is characterized by a high agglomeration structure;
- *European policies sustaining regional growth* through structural funds expenditures.

These success factors are tested on both vulnerable and non-vulnerable regions, for different performance indicators: employment, value added and productivity dynamics are analyzed for the total economic activities and for the industrial sector in particular. Table 17 reports the results of the analysis on the factors that explain economic and industrial dynamics.

Summarizing the results (described in more detail in annex 4.2) we can conclude that general success factors for regional dynamics are:

1. innovation;
2. share of high qualified workers;
3. structural funds;
4. regional specialization (only for industrial value added and productivity growth);

Interestingly enough, all these factors impact more on employment growth rather than on value added growth. The result of this is that none of them is able to explain a positive increase in labour productivity growth.

For what concerns *industrial dynamics in vulnerable regions*, the main messages that can be drawn from the analysis can be the following:

- 1) regional specialization penalizes industrial employment dynamics, but not value added growth. For this reason, it is positively related also to productivity growth;
- 2) structural funds seem to be non-significant in explaining industrial employment dynamics;
- 3) high value functions explain employment growth, but not productivity gains.
- 4) sectoral reconversion has a positive effect on industrial productivity growth and industrial added value growth;
- 5) sectoral reconversion appears as the only winning strategy.

When focusing on the specificities of vulnerable regions, we find that in vulnerable regions success factors of total employment are not different from non vulnerable regions. Factors are different when looking at industrial employment growth in that in vulnerable regions innovation and structural funds are no longer significant, while regional specialization has a negative effect. Analysing total value added growth, it emerges that the main differences in vulnerable regions with respect to non vulnerable ones lie in the non-significance of the presence of high qualified workers, in the negative effect of the relative geographical position of regions, and in sectoral reconversion which is positively related to the value added growth. We find that factors explaining the differences in total value added growth, explain also the industrial value added dynamics, except for the relative geographical position of regions with respect to other regions which plays a negative role in both vulnerable and non vulnerable regions, and innovation which is not significant in vulnerable regions.

The analysis on success factors repeated for productivity shows that in vulnerable regions the factors accounting for the total productivity growth also explain the industrial productivity growth, except for the relative geographical position of regions which has on the latter a non significant effect. Moreover, if only vulnerable regions are considered, the main factors that are different in explaining industrial productivity growth with respect to the total productivity growth are the non significance of spillover of growth and the positive impact of regional specialisation.

		All regions			Vulnerable regions only		
		Positive effects	Negative effects	Non-significant	Positive effects	Negative effects	Non-significant
Δ total employment	- innovation ;	X			X		
	- share of high qualified workers;	X			X		
	- structural fund.	X			X		
	- regional specialization;			X			X
	- spillover of growth.		X			X	
	-sectoral reconversion		X			X	
	- agglomeration economies			X			X
Δ total value added	- innovation ;	X			X		
	- share of high qualified workers;	X					<i>O</i>
	- structural fund.	X			X		
	- regional specialization;			X			X
	- spillover of growth.			X		<i>O</i>	
	-sectoral reconversion			X	<i>O</i>		
	- agglomeration economies		X				<i>O</i>
Δ total productivity	- innovation ;		X				<i>O</i>
	- share of high qualified workers;			X			X
	- structural fund.		X				<i>O</i>
	- regional specialization;			X			X
	- spillover of growth.			X		<i>O</i>	
	-sectoral reconversion			X	<i>O</i>		
	- agglomeration economies			X		<i>O</i>	
Δ industrial employment	- innovation ;	X					<i>O</i>
	- share of high qualified workers;	X			X		
	- structural fund.	X					<i>O</i>
	- regional specialization;			X		<i>O</i>	
	- spillover of growth.		X			X	
	-sectoral reconversion		X			X	
	- agglomeration economies		X				<i>O</i>
Δ industrial value added	- innovation ;		X				<i>O</i>
	- share of high qualified workers;			X			X
	- structural fund.			X			X
	- regional specialization;	X			X		
	- spillover of growth.		X			X	
	-sectoral reconversion			X	<i>O</i>		
	- agglomeration economies			X			X
Δ industrial productivity	- innovation ;		X				<i>O</i>
	- share of high qualified workers;			X			X
	- structural fund.		X				<i>O</i>
	- regional specialization;	X			X		
	- spillover of growth.			X			X
	-sectoral reconversion			X	<i>O</i>		
	- agglomeration economies			X		<i>O</i>	

Legend: factors in italics and marked with *O* apply to vulnerable regions only.

Table 17. Factors explaining the economic and industrial performance of European regions

On the basis of these results and the typology of regional strategies presented in chapter 3, the success strategies for regional dynamics can be summed up as follow:

1) an increase in productivity, through innovation:

For industrial sectors in vulnerable regions, innovation does not explain neither value added growth nor employment growth, consequently it does not explain productivity growth. Whether one considers the effect on total performance, innovation is again not significant in explaining productivity growth and it is even of detriment for total productivity growth in non vulnerable regions. In non vulnerable regions, innovation positively impacts on total employment growth and total value added growth, witnessing the implementation of both product and process innovation.

2) a rationalization of low value added activities in favor of higher value added activities:

The reconversion in favor of high value function allows maintaining or increasing both total and industrial employment in non vulnerable regions. Moreover, it has a positive effect on total value added growth. In vulnerable regions this strategy does not affect the industrial performances and it only influences positively the total employment growth.

3) a sectoral reconversion:

In non vulnerable regions this strategy never has positive effect whilst it negatively affects employment growth rates. It is interesting that in vulnerable regions sectoral reconversion always has a positive and significant effect on value added and productivity, through a decrease in employment dynamics. This shows that in vulnerable regions the only winning strategy for industrial sectors put in place is the sectoral reconversion.

4.3. Qualitative factors of success of vulnerable regions through case studies

With the help of 16 case studies, we intend now to deepen our analysis to put into the fore more qualitative factors of success based on concrete regional expertise. In particular, these analyses should enable us to evaluate the impact of historical and cultural backgrounds, the restructuring process in the vulnerable sectors focusing on the ways in which firms act in the new competitive environment, the global restructuring process for the whole region, as well as governance factors that could have an impact on these processes.

The objective is to complement the systematic statistical analysis of the previous section in order to reinforce the main conclusions and to apprehend new types of factors of success.

Our case studies have been selected in order to ensure the diversity of reactions in facing the growing international competition (Table 18): we take into account metal, textile and electric/onic regions; successful and non successful regions; a balanced geographical distribution across EU-27. We also have to underline the huge diversity in the scales of the case studies, which are not all restricted to statistical/administrative areas but focus more on functional homogeneous territories.

4.3.1. Main structural features of the vulnerable regions

On the basis of the results of the case studies, we propose to classify vulnerable regions by some structural opposition which could explain their position in the European and world markets. These structural features are of major importance when trying to understand the restructuring process and governance factors: public and private strategies can only build on existing structures, something sometimes forgotten by public policies. These structural features can be synthesized as follows:

- most of, but not all, vulnerable regions base their specialization on a **long term tradition and know how**;
- the **endogenous aspect of economy** is related to the ownership structure of the firms: is it mainly dominated by local capital or are big international firms the main driving force of the regional economy ? This supposes very different territorial rootings of the economic actors since local actors often do not act like global actors: while local actors could also off-shore some segments of the production, they still maintain commanding functions and qualified segments of production within the region ; global actors remain unchanged as long as the factors of attractiveness are present (labour cost, fiscal reasons, know-how...). Marshallian textile districts such as Herning or Prato are typical of endogenous economies, while Western Hungary and North-western Romania have their development paths dominated by foreign investments of big firms;
- the **size of firms and/or establishments** reflects very different processes of development. The regions dominated by big firms strongly depend upon these, while networks of small and medium enterprises are often a sign of dynamism. However, small and medium firms do not always have the same capacity of R&D and innovation as big firms. In general, textile regions

are characterized by small and medium firms, while metal regions have big firms at the heart of their productive system;

- **innovation and moving up in the value chain** is the main response to vulnerability but all regions have not been able to produce such a response: while Finnish regions appear very innovative, it is certainly not the case for Western Hungary or Northern Portugal. We will however distinguish between innovations and technological skill. For example, to a certain extent, we could consider some Marshallian textile districts (Prato, Kortrijk area) as innovative (marketing, ...) but with limited technological progress;

- innovation is clearly related to the existence of **an entrepreneurial spirit** (Schumpeter) which, for example, leads people to create their own business (and others to see it in a positive way) or entrepreneurs to find solutions to new market configurations. The existence or not of this entrepreneurship is strongly related to historical factors (see for example Bagnasco, 1997 for Italian textile districts).

These structural features have strong relationships with each other, but are not necessarily correlated.

On the basis of the main structural features and of the expert views on their regions, we produce a qualitative typology of vulnerable regions. Table 17 synthesizes this classification, and the next sections describe the process of restructuring in these different types of regions.

	Case studies	Main structural features
Textile marshallian districts	Kortrijk area, Prato, Carpi, Herning	Tradition, endogenous, small and medium firms, entrepreneurial spirit, innovative with limited technologies
Old industrial metal regions	Liege, Ruhr, Asturias, Czestochowiskie	Tradition, big firms, low entrepreneurial spirit, medium technologies
Electric/onic innovative regions	Oulu, Vaasa, Toulouse area, (Ivrea area)	High technologies, big firms with subcontractors of low and medium size, entrepreneurial spirit
Exogenous development regions	Norte Portugal, Western Hungary, North-West Romania	Exogenous, low technologies and innovation, no tradition

Table 18. Classification of the case studies according to the qualitative typologies and main structural features.

Notes:

Franche-Comté has not been classified because of internal diversity between the Jura (non textile) districts and areas dominated by big firms in automotive or metal industries.

The classification of Ivrea is far from evident because it certainly suffers from a lack of innovation and from the collapse of the main enterprise (Olivetti).

4.3.2. Marshallian textile districts (Herning-Ikast, Courtraisy, Prato, Carpi)

Marshallian districts are a very dynamic territorial system characterized by a dense network of interconnected and very specialized small and medium enterprises, generally oriented toward light industry (Colli, A., 1998). In most of them, we can identify from the literature

several common characteristics which could explain the emergence of such specific local industrial network. Firstly, most of these districts have a long tradition in the textile industry, clearly anterior to the industrial revolution (shaving in Carpi, line industry in Flanders, knitting wool clothes in Herning, softening of wool clothes in Prato). Secondly, these regions have built a dense network of small and medium interconnected enterprises using subcontracting and building up strong informal relations. These enterprises are thus fully engaged in a complex dialectical process of cooperation and competition. This very flexible organization is able to answer quickly to the changeable demand of the market. Finally, we observe in most of these areas specific social features, notably what we could call an interclassist “common agreement”. It means concretely that from the worker to the manager, there is the same social and ideological framework. For example, the “Kortrijk area” (south of Western Flanders) is dominated by what could be called the social-Christian pillar, while in Prato, the (ex)-communist hegemony guarantees the social cohesion even in business.

Restructuring process in the textile sector

From the beginning of their emergence, these districts have been able to strengthen their initial success thanks to a process of rising in the technological value chain of textile industry, with innovations that could disperse through the entire regional industrial network. They could consequently evolve to the most promising segments of the textile, or even diversify in other sectors strongly linked to the textile value chain, such as metal production often developed on the basis of textile machinery (Scherrer F., Vanier M., 1995).

The recent liberalization of trade in the clothing and textile industries (Agreement on Textiles and Clothing, Multifibre arrangement) produces a new crisis in all textile regions. Production and employment have severely dropped and local firms had to adapt to survive. We describe here the strategies firms and regions have put in place in the most recent periods.

Firm strategies are to a certain extent similar in these different marshallian districts. They are synthesized as follows for the Prato case study, but have been observed with small differences in all 4 regions:

- “1) Production shift to higher level production (i.e finishing or technological textiles) and integrate import of basic yarns or fabrics from lower cost countries (Asia, North Africa or East Europe). It supposes the off-shoring of the low qualified segments of production
- 2) Exploitation of niches through strong product innovation strategies (especially in design and collections)
- 3) Move along the value chain, leaving the production and focus only on trade and services
- 4) Vertical integration and increase in size.” (Prato case study in Annex 2)

These strategies, while often successful from the firms’ point of view, have not allowed avoiding the crisis and its social consequences. Of course, the textile decline is, to some extent, exaggerated by the facts that some firms have now been classified in other sectors than textile (wholesale, services such as design), while they are indeed still strongly connected to the sector.

Regional restructuring and the role of public policies

In some areas, the diversification of the industrial economy is already an old story. In the Kortrijk area for example, where this process has been the most accomplished, it took two different directions: first, the development of other light sectors in which big international

groups were not interested (wood and furniture for example); moving up the value chain, for example by the development of a mechanical industry. In the Modena province, the same processes could be observed. In West Jutland, we also notice the development of furniture, but an electronic industry is present, as well as a renewed production of windmills; the latter activities have however no connection with the initial specialization in textile. Comparatively, the Prato has shown a much weaker diversification of its industrial base. However, services have certainly absorbed most of the job losses in these textile districts, where levels of unemployment remain very low. As a matter of fact, in these areas without any important city, high level services have gone through a rapid development, mostly related to the industrial cluster: for example, the local banks which traditionally financed the enterprises of the district.

However, one should not exaggerate the development of high level services and of high technological industries: the textile districts remain highly specialized in low or medium technological industries. So, despite the restructuring of the key-sectors and the economic diversification, these districts have gone through a relative decline regarding the European and national average: this is particularly true in the Italian districts, while the Danish and Belgian districts have been stagnating rather than declining.

These real evolutions contrast with the persisting entrepreneurial and innovation spirit we observed in all these regions. Where does such a paradox come from? We could say in a very simple way that marshallian districts are not metropolitan areas and, as a consequence, lack what makes the success of the big cities. Mainly, we can identify three major weaknesses in the marshallian textile districts:

- the insufficient size of firms, notably in terms of financial capacities and R&D, even if recent evolutions have favoured the development of bigger firms;
- because of the small size of firms and specialization in traditional sectors, the districts are characterized by a relatively weak level of R&D;
- finally, the diversification process is confronted with the insufficient size of the district, which can remain competitive only if highly specialized.

In this context, what did public policies result in? According to the authors of the case study, public policies have never been decisive in the success of the marshallian districts. But, on the other hand, we could argue that governance factors, understood in a broad sense, have been decisive. This means success can be explained by different governance processes: cooperation between economic actors, often institutionalized, a social consensus which makes every worker a potential entrepreneur (at least in mind), existence of an education system strongly connected to the needs of firms, notably through the development of training inside firms, and public policies. In this context, public policies have naturally accompanied this success story, yet never as their main driving force. To a certain extent, we could consider that the textile districts have accomplished a model of governance for business, even in the objectives of “clustering policies” aiming to create specialized competitive areas. However, we have to notice it was possible only because of a specific cultural context created on a very long term perspective and is certainly not easily replicable in other contexts.

4.3.3. Old industrial metal regions (Liege, Ruhr, Asturias, Czestochowskie)

Those old industrial regions have a common history: precociously industrialized (second half of the nineteenth century except in Czestochowskie), they constituted the heart of their

respective industrial nation, before entering in a long and structural crisis from the fifties. The origin of industrialization is based on primary resources, mainly coal and, to a lesser extent, iron ore. On this basis, a strong basic metallurgy is born, sometimes based on traditional know how in proto-industrial metallurgy (Ruhr, Liege), as well as diversified activities of fabricated metal products. Czesochowskie evolved rather differently: relatively marginal in the context of industrial Silesia, major developments of heavy industries –while not absent before- took place after WWII, under the communist regime.

Against this common background, the crisis was general and the relative decline continued during the 1995-2005 period. Simultaneously, unemployment remained considerable for nearly three decades. The major causes of the crisis were common to the different regions, but with a different timing:

- the sectoral crisis of coal as early as the 50s, and of the basic metal industry from the 70s. Due to the strong specialization in those sectors, the sectoral crisis has become here a regional crisis, especially from the 70s, with the deterioration of the global economic context. To a certain extent, the Ruhr economy, because of its size, appears to be more diversified than the other regions we are focusing on ;
- the domination of big firms, often external to the region or even the country, with the notable exception of the Ruhr area, where firms are still in the hands of local capital. In the other three regions, basic metal industry was sold by the state, which had acquired it during the crisis, to big international firms (Mittal in Asturias and in Liege, Industrial group of Donbass in Czesochowskie). The lack of local capitalism has weakened the regional economies, because of the absence of regional embeddedness of the major actors;
- the weaknesses of high level services in these traditionally mono-industrial regions, except, to some extent, in the Ruhr area. In none of these areas, we find a metropolitan area with international functions;
- the lack of entrepreneurship is also a general feature: the early and massive salarization has completely destroyed the reservoir of entrepreneurs (small artisans, merchants, or even farmers);
- the poor image of the regions, because of deteriorated landscape, and sometimes the bad reputation of the workforce.

The restructuring process and public interventions

The restructuring process of industrial activities is an old story in these regions, except in Czesochowskie, where it suddenly began after the collapse of communism. Generally, it was dictated by the evolution of the market, severely declining from the seventies. Most of the restructuring process has consisted in the progressive closure of the least profitable activities and in progresses in productivity, to the detriment of employment. In this process, the state and public bodies have in general played an important role through nationalization (except in the Ruhr) and early retirement. In this context, public bodies were decision makers in the whole restructuring process, lessened to some extent by financial injections. Both trade unions and public bodies favoured a relatively defensive restructuring strategy, trying to maintain as long as possible what could be maintained. This policy was probably the only possible because of the specific balance of powers in these regions. Moreover, it has limited the social impact of the economic crisis.

At the same time, the diversification of economies has been the main preoccupation of regional policies. However, in these old industrial areas, priority has often been given to the

attraction of industrial firms by improving infrastructures and providing industrial parks which have often multiplied rapidly from the 70s. Successes have generally been weak in this process of economic diversification: big firms (automotive...) were reluctant to invest in those areas, in spite of the existence of a competent specialized workforce (aeronautics in Wallonia, machinery in the Ruhr and Asturias...) in some specific activities. As a consequence, deindustrialization was very fast: the Ruhr areas and the province of Liege are now less industrialized than the national average, while the specialization of Asturias in the manufacturing industries is to be confronted with the under industrialized Spanish economy. In Czesochowskie, the picture is rather different, since the lateness of the restructuring process has not yet erased the industrial specificity of the region. As a result, old industrial areas are now dominated by services activities but the nature of these differs from one region to another, and only the Ruhr area has been able to develop high level services. The existence here of a local capitalism and the critical mass of this multipolar metropolitan area have certainly favoured this diversification through high level services.

The recent years have seen the acceleration of a specialization/technological process in the basic metal activities. Massive new investments in all regions focused on the latest technologies and very specific segments of production as a result of the new world context with a growing demand of steel from emerging economies, especially high quality products of the European metal industry. However, the recent recovery of the metal industry was not reflected in an employment growth: at best, employment has been maintained with a fast growing production. Unemployment is still a major challenge for these regions.

New policies and governance structure

Traditional responses to the crisis in the old industrial areas focus on the physical infrastructure, especially transport and industrial parks. The rehabilitation of industrial areas has been a priority for all these regions, given the large surfaces degraded. The expansion of the education system has also been a main target of these policies, even if professional training has remained very high and concentrated on declining professions. As a result, the Ruhr expert notices that “all these long-term programmes have led to an excellent infrastructure, even when compared to other European regions, but they all failed to create new jobs in the secondary sector”. The same could be said about the Liege and Asturias provinces, but certainly not Czesochowskie in Poland.

Public policies and planning have followed the same paths at least in the three old western industrial areas. Special focus has been put on four major fields:

- technology and innovation. For example, 13 centres of enterprises and innovation have been created in the industrial part of Asturias in the recent years, financed by local government and European Union. What we could call cluster strategies have been highly promoted in the Ruhr area and the Liege province, focusing on follow-up industries of metal rather than the metal sector itself. In the Ruhr area, “the selection of those ‘sunrise industries’ is based on criteria like the impact on the employment market and the economic structure, knowledge and technology orientation or orientation on SME”: from 2007, it includes the sectors health, nutrition, logistics, advanced materials, nano-, micro-and bio-technologies, automotive, machinery and plant engineering, synthetics, chemicals, environmental technologies, energy, IT, media and cultural economy;
- the education system and, in accordance with the precedent objectives, the cooperation between Universities and the regional firms;

- entrepreneurship. The lack of entrepreneurial spirit is a major concern of regional policies which have tried in different ways to promote business creation;
- unemployed people. Major evolutions have been the development of further education for low qualified unemployed ejected from industries. Programmes of “entrepreneurship” promotion were also aimed at this population.

However, major weaknesses are probably to be found in the more informal structures of cooperation, notably because of the industrial structure dominated by big international firms. To a certain extent, we could generalize the statement made for the Ruhr area that “it has not been enough to simply provide new areas for commercial and industrial use or to build technology centres without caring about the creation of new networks of firms, lines of business and products.”

4.3.4. Innovative « electric and electronic » regions (Oulu, Vaasa, Toulouse, Ivrea)

Despite the specialization in a vulnerable sector, the most specialized regions have performed better in the “Electric and optical sector” than the others. Obviously, a concentration process is occurring in this sector, as shown in three of the case studies – except Ivrea.

Oulu and Vaasa districts as well as the Toulouse area have remarkably performed in high technological industrial activities related to electronic or electric equipment and globally. Despite the distance and the difference in scale and structure, some common features can explain those performances:

- they are specialized in a globally growing sector, even if vulnerable to international competition and rather weak in Europe ;
- those regions are characterized by a specific firms structure, dominated by a few (or one) big firms which are at the centre of a network of different layers of subcontracting firms, often of small or medium size. Their dependency is tempered by the local embeddedness of the firms and the need for the know how of the local firms. In Toulouse, the dependency is however more accentuated, because the aeronautics firm Airbus is a giant whose location also results from political decision: this sector is by far the first client of the electronic industry in the region. In Ivrea, the collapse of the Olivetti firms has been a hard blow to the local economy; but it is interesting to note that a real electronic district made of small and medium enterprises has risen from the Olivetti ashes. This proves that the regional know how, originally initiated by the big firm, the specialized education system and workforce are some major factors that explain the maintaining of a competitive technological sector despite the collapse of the main enterprise initiating the cluster;
- high education level is certainly a decisive factor. The Finnish districts benefit from the general success of the national education system, while Toulouse is characterized by the importance of its universities as well as the high education level (the Midi-Pyrénées is the second national pole for education and research). In all cases, the local education system provides a specialized workforce to local enterprises;
- Policies have been decisive in these regional success stories - and not only through the education system -, yet in very different ways in Finland and in the Toulouse urban area. In Oulu, “the Triple Helix cooperation between the university, business and public sector in electronics, ICT and electric-related industries has played a fundamental role”. The Triple Helix practice was implemented as early as the 1950s.

“The cooperation intensified in the 1970s and 1980s. The development of technology was supported also by the local authorities. In 1982, the first technology park of the Nordic Countries was established in Oulu. Soon, the local authorities proclaimed Oulu as the technology city and a state research centre was opened... The 1990s witnessed a rapid transformation. Nationally designed regional and innovation policies supported the growth and internationalization in electronics and clustered globally relevant technologies. The Faculty of Technology in Oulu grew very fast and provided skilled labour to Nokia mobile phone R&D.” In Midi-Pyrénées, especially Toulouse, decisive public intervention came from the national state rather than local governance structure, especially through decentralization process from the 60s, which made Toulouse the aeronautics pole in France and later in Europe. Meanwhile, regional know how and a good education system have also favoured the location of new national (cancéropôle) or European programmes (Galileo).

However, because of their high connection with world markets, these regions could still be considered as vulnerable. The collapse of Olivetti in the centre of the Ivrea district during the 90s has had economic impacts for years. More essentially, the regions are very dependent on the state of the markets: they all deeply suffer from the 2000-2003 crisis in new technologies; the electronic industries in the Toulouse urban area are very dependent on the Airbus wealth facing a difficult competition with Boeing. Over this period, big Finnish enterprises, especially Nokia, accelerated the process of delocalization, mainly of the lowest segments of production (but not only since even R&D has been developed on the Asian markets). This delocalization process had social consequences for the low qualified labour.

4.3.5. Exogenous development regions (Western Hungary, North-Western Romania, Northern Portugal)

The name of the type refers to the importance of massive foreign investments during a certain period in a specific sector, which makes the development of those regions dependent on big or medium-sized transnational firms. The attraction of foreign investments relies most of the time on some comparative advantages:

- low wages, or good quality/price ratio of the workforce;
- tradition which explains the presence of existing plants bought by foreign firms;
- good location according to the investors and/or the main markets.

The quality/price ratio of the workforce seems to be the most attractive factor for the labour intensive activities developed in these regions.

However, these regions follow three different development paths and have attained different levels of development nowadays.

Norte Portugal is a traditional textile area. However, from the 80s, foreign investments, with the entry in the EU, have accelerated the development of the clothing and footwear industry, while textile was declining. The crisis in textile industry from the late 90s explains a part of the blocking of the catching up process. Yet, the relative decline of the Porto metropolitan area, in comparison with Lisboa in terms of commanding functions for example, also played a role in this relative decline of Northern Portugal. Contrary to traditional marshallian districts, the model of small enterprises was associated with a high outside dependence (most of the firms are subcontractors of foreign firms), and, as a result, the firms network is not controlled by local firms. Despite these unfavourable factors, some signs of diversification exist. In the

case of manufacturing, we can observe the development of electric and automotive industries. Simultaneously, services developed but, as already mentioned, high level services are increasingly located in Lisboa, whereas tourist developments mainly benefit Southern Portugal.

To a certain extent, both Eastern regions followed the same path: high attractiveness for foreign investments followed by a decrease of comparative advantages, especially regarding the cost of labour.

In Western Hungary, massive investments in the electronic industry have been favoured by the location near the Western market. Western regions of Hungary were the first destination for massive investments in the labour intensive segments of production of the biggest electronic transnational firms (Siemens, Philips, IBM...): cheap and relatively qualified labour has been a decisive factor, with the proximity of West European markets. However, tax exemptions, the main policy accompanying this process, progressively came to an end, notably with the entry in the EU. These investments explain the rapid development of Western Hungary: Nyugat-Dunántúl has levelled up from 52 to 62% of the GDP/inhab. European average, while the rural region of Dél-Dunántúl stagnated around 42 to 44% of this average. From 2004, we observe a slowdown of this process but also relocations of industrial establishments outside the region. The initial comparative advantages progressively vanished, especially for the lowest qualified segments: labour became more expensive, the proximity to Western markets less decisive, and tax exemption came to an end. Relocations are observed towards Eastern Hungary, Romania and mainly Eastern Asia. If the remaining production process has been upgraded, these “developments mean a dramatic situation in some smaller towns in Transdanubia, where the only job opportunity was provided by the leaving electronics plants”.

The same process has affected north-western Romania, where textile developed from the late nineties, due to foreign investments, especially from Italian firms. During the recent years (from the end of the 90s), growth has been high in the region, but from a very low level (24 to 34% of the European average), that is to say the same pace as the average growth of Romania, but rather faster than Eastern regions of Romania. How can the recent years of growth in North-western Romania be explained? As for Western Hungary, yet some years later, the western location inside Romania explains that the region became a privileged destination for foreign investments. However, these investments in the textile industry rely on a much more underdeveloped economy with less qualified workforce than in the Hungarian situation. Moreover, after some years of boom, the textile cycle already seemed to come to an end around 2004-2005: the cycle was even shorter than what was observed in the electronic industry in Western Hungary. The causes are similar to those in Western Hungary: end of tax exemptions, more expensive labour in those segments of production compared to Eastern Asia, which attracts most of the recent investments. However, it seems that a new cycle has taken over in the region, with the concentration of foreign investments in the low qualified segments of the electric and electronic equipments.

As a conclusion, foreign investments have been the major factor of development in all those regions, which have known significant growths in their period of major attractiveness. To a certain extent, these regions have been for a time in the benefiting group of globalization in the vulnerable sectors, by attracting delocalization rather than suffering from it. However, this very dependent model of development quickly came to an end when the initial factors of success disappeared, especially when the workforce became too expensive. This in-between

situation characterizes Northern Portugal, unable to sustain an endogenous technological development or to attract high technologies, but already too expensive to attract new investors in the low qualified segments. Western Hungary seems able to upgrade the production process, though still in a very dependent way. However, the region has already locally suffered from relocations of low qualified segments. In North-Western Romania, it is probably too early to see if the regions will still benefit from foreign investments after the apparent end of the “textile cycle”.

4.3.6. Conclusions

From the analysis of the case study regions, several factors of success related directly to firms emerge.

First, the sector of activity is decisive: while textile regions are suffering from the growing international competition, despite their positioning in technological segments or in commanding functions, electronic regions benefit from a growing world demand, even if the regions have to abandon the low technological segments. Second, the size of firms is an important element. Big firms certainly suppose regional dependency, but small and medium enterprises sometimes suffer from insufficient financial capacity and R&D. Of course, to a certain extent, the existence of networking and collaboration between firms is a considerable factor of success -and could compensate for the insufficient size of enterprises in some regions- , notably because it allows the diffusion of technologies, but also for commercial penetration strategies. In the literature, but also in the case studies, marshallian districts are often seen as the epitome of collaboration, but regions with big firms can also obtain efficient networks of enterprises through chains of subcontracting. Finally, the firms’ embeddedness as well as the endogeneity of development also play a significant role in facing structural change. For example, exogenous big firms in Eastern Europe (Western Hungary, North-Eastern Romania) are clearly not embedded in the industrial tissue of the region. This is certainly not the case of Nokia in Northern Finland, which depends upon the technological skill of the local industry as much as the local industry depends on Nokia. Another example is illustrated by the difference between big metal firms of the Ruhr, clearly embedded in the area, and big transnational firms controlling metal activities in the Liege or Asturias areas: when the first decide to abandon some industrial segments, something remains inside the area, especially the highest functions, while it is not the case for the second. Marshallian districts also show this opposition: “weak marshallian districts”, such as Norte Portugal or Jura districts of Franche-Comte, are suffering from the importance of external capital and consequent insufficiencies of local know-how, while in the most successful marshallian districts (Herning, Kortrijk area, Prato), strategic functions do not leave the region. In any case the origin of capital does not seem the decisive factor, since even foreign firms do not easily leave a region which remains attractive in terms of structural characteristics.

This leads us to a second range of success factors related to the structural context in which firms are embedded. The quality of the workforce is a central element to keep investors, at least in the high segments of production. It supposes a good education system and in many cases a connection between the education and institutional research system and the industrial network. Too much specialization of the education system is however a potential problem when the sector is in crisis. Labour costs have also been an important factor of attractiveness but certainly not of embeddedness, since the firms can leave as soon as they find lower labour costs somewhere else. Another contextual factor of success is the entrepreneurial spirit, whose

historical origins are not easy to apprehend. Such a spirit, combined with a local know how, has for example limited the consequences of the Olivetti collapse in Ivrea. This factor clearly differentiates old metal regions and textile marshallian districts: in the first type of regions, the precocious attraction of workforce in the mining and metal industries has destroyed the reservoir of entrepreneurship of small merchants and artisans.

Of course, this is not an exhaustive list of structural factors of success in vulnerable regions, but a selection of those most frequently mentioned by local experts.

In this context, what have been the public policies and which impacts did they produce on the regional welfare?

We could first mention regional policies which were favoured all over Europe. They have been implemented to create favourable conditions for economic growth and to improve the regional environment in which firms are acting. The focus on education characterizes such policies, at least in recent years. Finland, because of high general performances in education, and Toulouse, because of the concentration of education structures, are clearly two cases where this factor has led to economic success. However, the way it has been implemented, and the impacts on the regional welfare are certainly beyond the framework of this study. The promotion of institutional research and the collaboration between Universities and local industry is another example of structural policies put in place all over the regions, for example through the promotion of spin-off or technological centres. However, one could hardly say if the success in Northern Finland or Toulouse could be explained by such policies, or if this collaboration results from general positive dynamics. The accent on entrepreneurship is also a common feature, especially in the old heavy industrial regions, but with little success, especially when programmes focus on the most vulnerable population.

More precisely, almost all these vulnerable regions place their industrial policies in the “cluster paradigm”. The will is to create a critical mass in some sectors or segments of production mainly through the development of small and medium enterprises, the promotion of collaboration and networking between them and the improvement of the connection with the education research institutional system, with the idea that the critical mass gained helps to remain competitive through the diffusion of innovation. To a certain extent, local and regional policies try to promote what the marshallian districts already offer, generally without any decisive public intervention. Old industrial regions and Franche-Comté clearly demonstrate how these policies are limited by structural obstacles such as the lack of entrepreneurship or the external dependence. Moreover, despite the will to concentrate on some specific sectors, the reality is often different and the human resources and financial means are too often scattered, as can be observed in the Ruhr or in Wallonia.

However, in some of the successful regions, public interventions, thanks to direct investments, have been decisive, like in Northern Finland and the Toulouse area – yet a bit less in the first case. The promotion of Oulu as a technology city, proclaimed by local authorities, was concretely supported by the National state. Toulouse has been politically chosen as the main aeronautics pole in France and Europe and has produced a strong technological cluster related to this activity, combined with investments in education. The locational decision of public powers has also been favoured by structural features, such as a good environment and level of education. Its relatively (within the national context) lagging nature also helped create positive structural features as the region had no negative heritage of heavy industrial or other declining structures. Finally, it has created long term development

and a local know how which makes very unlikely the departure of the major firms, even if certain segments of production could be off-shored. Of course, these successes are not easily reproducible: first, they build partially on structural features; second, large public investments are limited.

4.4 Typology of vulnerable regions according to risk

In this chapter, we showed that vulnerable regions have very divergent performances and do not constitute a homogeneous group of regions. We have put into the fore by qualitative and quantitative methods some important factors to explain these performances related to innovation, entrepreneurship, sectoral structure and qualification of the workforce. Indeed, some regions defined as potentially vulnerable because of their specialization in vulnerable sectors are in fact not at risk, due to their structural assets: good education level, high technologies, high level services or entrepreneurship.

The objective is thus to produce a typology of vulnerable regions according to these main structural assets to evaluate the real risk in those regions.

We base our typology on seven indicators associated to the success of vulnerable regions in the preceding sections (Table 19). In a second step, we synthesize these indicators by principal components analysis (PCA)¹⁸. In a final step, we make an attempt of classifying the vulnerable regions according to the main structural success features synthesized by the three first components of the PCA.

Figure 17 shows the result of the typology and the main structural features of each type are synthesized in table 20.

Type 1 is the most important in terms of population and number of regions. It is an average type with a relative internal heterogeneity. Most of the regions are located in core or semi-peripheral parts of Europe, but it also includes peripheral metropolitan areas such as Sofia and Bucarest (as well as Estonia and Lithuania). Their main structural feature is that these are industrial regions, mostly specialized in metal and related industries and with weaknesses in the high level services. Since this type is the most diversified, it could have been divided; however, it seems that most of the internal diversity cannot be easily apprehended by our indicators. All other types show clear structural patterns.

Type 2 groups together most of the eastern vulnerable regions, except Slovakian regions, Western Hungary and metropolitan areas (including two Baltic countries where data is not regionalised). They mostly include textile regions but this type transcends sectoral specialization to include nearly all Eastern vulnerable regions. Their main characteristics are associated with structural weaknesses in high level services, - which are in Eastern Europe mostly concentrated in the capital regions-, in technological level and level of education. They also show weak entrepreneurship associated with relatively large firms, even though textile specialization is often related too small firms. The latter indicators confirm the exogenous development of these regions. We could consider these regions at risk because the exogenous development is associated to low cost production.

¹⁸ For methodological aspects, please refer to annex of the section 4.4.

Type 3 is the strongest type and should not be considered as at risk: these regions reach high technological levels, with a high share of highly educated active persons and of high level services. Despite the high average size of enterprises, the entrepreneurship indicator is not bad, similar to the European average. It concerns mainly electric/onic regions of Southern Germany and Finland, but also southern Ireland, the Bask Country, and Berlin.

Type 4 is a weak variant of the precedent type, nearly exclusively present in Germany, including old industrial regions of the Ruhr and Sarre, as well as one French region (Franche-Comté). Their specialization is equally in metal and electric and optical equipment. Compared to the previous type, they mainly show weaknesses in high level services, notably because they do not include major cities. The share of highly educated is also weak in these central and still very industrial regions. The average size of enterprises is even bigger than in type 3.

Type 5 is mainly associated with metal and textile industries. The regions in this type show some weaknesses related to a relatively low share of high level services and highly educated people, as well as a moderate technological level. In these regions, we could argue that the risk is associated to the persistence of relatively low qualified segments of production which are in competition with lower cost regions. However, the metal regions of northern and central Italy are still specialized in strong industrial sectors, such as machinery or certain segments of metallic industry. This is why we could argue that, inside this type, textile regions are more threatened than metallic ones. A strength of type 5 is related to the high level of entrepreneurship mostly dominated by local capitalism but we have to say that it is also associated with small firms which are limited in their capacity to reach higher technological level.

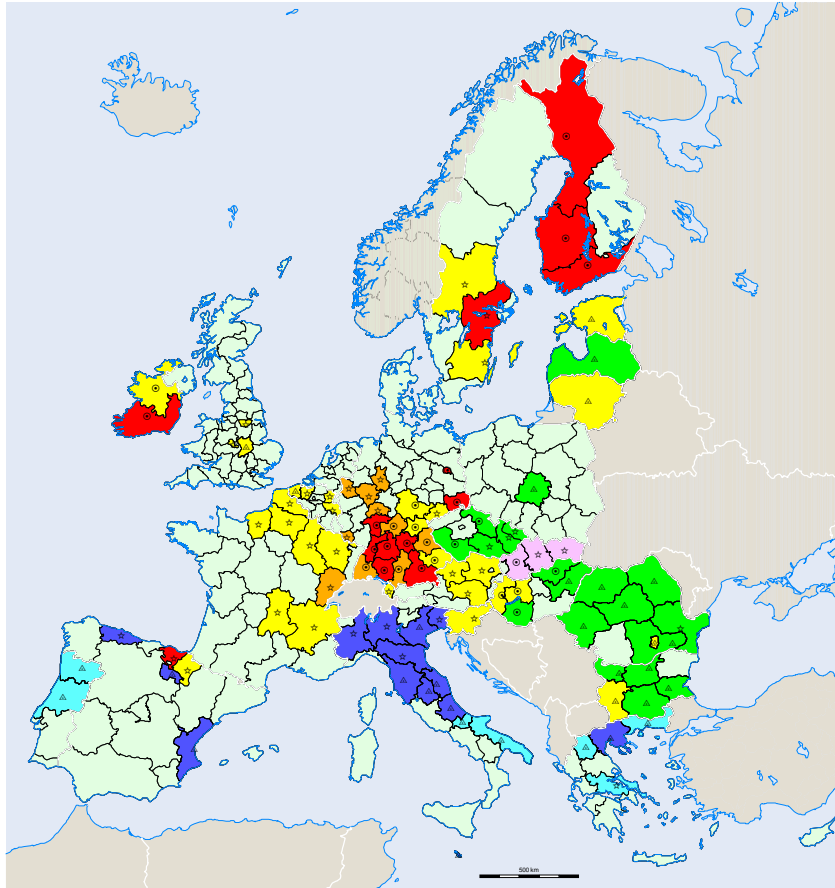
Compared to the previous type, type 6 is much weaker: they are mostly specialized in textile and low level services; technological level is quite weak, similar to Eastern Europe; the share of lowly educated is very high. These Mediterranean regions are typically the “in-between regions” because they are unable to either compete with low cost regions, of Eastern Europe and extra-European countries, or to move up in the technological level. They could be considered declining type at risk.

Finally the three vulnerable Slovak regions are isolated from the rest of European regions mainly because of the very high size of enterprises, notably in electronic and metal industries (and not textile) as well as the very low share of lowly educated people. Other indicators show the same weaknesses than the other Eastern vulnerable regions.

Given these strong structural differences among vulnerable regions, it appears thus necessary to take them into account in the elaboration of any policies.

	Indicators	Synthetic indicator	Source
Sectoral structure	Sectoral structure at NACE digit-1 level (with industries subdivided)	Components 1 and 2 of a Principal component analysis on the sectoral structure	IGEAT matrix 2004
Technological level	Patents per inhab., R&D in regional GDP, Share of scientific personal, industrial productivity	Component 1 of PCA on the four indicators	LFS, Regional data of Eurostat 2006
Education level	Share of high and low graduated level of education		LFS 2006
Size of enterprises	Average size of enterprises by sector	Standardized size of enterprises	Eurostat 2004
Entrepreneurship	Share of independants with employees in the total work force		LFS 2006

Table 19. Indicators of the typology according to the main dimensions of regional success



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- Types**
- Type 1. Average type
 - Type 2. Risky Eastern type benefiting from delocalization
 - Type 3. Non risky type because of their technological advance
 - Type 4. Limited risk despite structural weaknesses
 - Type 5. Mediterranean type with limited risk. Strong entrepreneurship.
 - Type 6. Mediterranean risky type.
 - Type 7. Slovak type.
 - Non vulnerable regions
- Main specialization in vulnerable sectors**
- △ Textile (DB & DC)
 - * Metal. (DJ)
 - Electronic and optical equipment (DL)

Figure 17. Typology of vulnerable regions according to the structural features related to success.

	Share of the total EU-27 active population	Number of regions	Number of Textile regions (DB-DC)	Number of Metal regions (DJ)	Number of Electric and optical equipment regions (DL)	Economic structure-component 1*	Economic structure - component 2**	Share of low graduated	Share of high graduated	Technological level	Share of independents with employees	Standardized size of enterprises
Type 1	11,2	33	12	22	8	0,94	0,29	22,0	25,1	-0,093	4,0	1,39
Type 2	7,5	20	14	4	5	1,78	-0,82	18,5	15,3	-1,158	3,0	1,05
Type 3	7,6	14	0	5	13	-0,33	1,27	18,6	32,1	1,780	4,6	2,00
Type 4	4,3	10	0	8	8	0,38	1,52	20,3	19,7	0,569	4,9	2,73
Type 5	7,8	14	12	10	3	0,70	0,22	40,2	17,9	-0,435	7,6	0,72
Type 6	2,4	7	6	1	0	1,16	-1,31	65,1	12,5	-1,276	6,8	0,71
Type 7	1,0	3	1	2	1	1,26	-0,42	7,9	13,3	-1,260	3,4	4,62
All Vulnerable regions	41,9	101	45	52	38	0,50	0,61	26,1	21,7	-0,034	4,8	1,16
Non vulnerable regions	58,1	153	-	-	-	-0,32	-0,39	25,7	26,8	0,025	4,4	0,85
EU-27	100,0	254	0	0	0	0	0	25,9	24,6	0,000	4,6	1,00

Table 20. Structural features of the different types of vulnerable regions

* negative scores are associated to high share of high level services; ** positive scores are associated to high share of medium and high technological industries and negative scores to high share of agriculture and/or basic services

Main results of chapter 4: synthesis of qualitative and quantitative analysis

The following factors of success have been highlighted by the analyses in this chapter. While some of them are specific to vulnerable regions, the most important seem to be common in vulnerable and non vulnerable regions.

Innovation is certainly a major reason of success in European regions. Qualitative analyses give some indications as to which factors allow some regions to be more innovative: **a good education system and a strong collaboration between public powers, universities and enterprises**. However, these elements are not sufficient. Our case studies in Finland and Midi-Pyrenees put forward that the long duration of this collaboration as well as the intensity of public interventions have been decisive. But **the size of enterprises also seems to play an important role**. On the one hand, networks of small and medium enterprises do not always seem to be able to invest enough in R&D and to reach the necessary level of innovation. On the other hand, big (successful) enterprises seem to play a positive role thanks to their capacity to invest in R&D, but only if they can rely on a network of small and medium local subcontracting enterprises, which allows a real embeddedness of the big enterprises in the regional industrial tissue.

This leads to the second success factor: **entrepreneurship**. It is important to notice that this factor mostly plays a positive role in terms of employment growth rather than added value. How can this be interpreted in the light of the case studies? Entrepreneurship has been put to the fore by all case studies on textile marshallian districts: on the one hand, it certainly allows maintaining a high level of employment despite the job losses in the manufacturing sector, as well as a very low level of unemployment due to frequent individual reconversion as self employed; on the other hand, we have seen the limits of small entrepreneurship when it comes to innovation, and consequently added value or productivity growth. But, as illustrated by old metal industrial regions, a lack of entrepreneurship can represent a real obstacle to economic diversification and can partially explain the high level of unemployment. However, evidences from the case studies suggest that public bodies have little margin with respect to this factor since it sometimes depends on long term cultural backgrounds.

Concerning **regional specialization**, quantitative analyses do not provide evidence of a univocal impact on regional performances. Our analyses have shown the importance of the sectoral specialization: for example, electric/onic regions perform better than the other vulnerable regions. We can find two sets of reasons for this: first, the sector itself is an expanding one, contrary to textile for example; second, specialization in electric and optical equipment corresponds to specific regional structures, notably high level of technology.

Finally, as far as **public policies** are concerned, quantitative analysis has shown positive but not systematic effects of structural funds, whereas the case studies highlight that **public policies can have an effect on contextual factors to favour the local or regional embeddedness of firms**. In this framework, case studies have demonstrated the importance of past and current education and research policies in all successful regions. Cluster policies certainly show some limits as soon as they concentrate only on small and medium firms. Big firms are also sometimes associated to successful regions.

On the basis of these conclusions, we propose a typology of regions **at risk** as opposed to **vulnerable**. This clearly shows that only a subset of those regions identified on the grounds of their sector structure actually are likely to suffer from globalisation, which is important to take into account in any prospective policy analysis.

5. Prospective analysis: regions at risk

The previous chapters have analysed the past behaviour of regions in light of their specialisation in those sectors deemed vulnerable based on their past evolution. These analyses have allowed highlighting the fact that it is mostly generic factors that determine the actual risk a region faces, more than its sectoral structure, although the latter does play a role.

Understanding these past evolutions and the lessons to be learned from them is a necessary step towards the elaboration of adequate policies. However, it is not sufficient as policy, by definition, targets the future. It is, therefore, necessary to develop foresight in order to gain a vision of possible evolutions and their consequences. It is not so much a question of prediction, as this would be impossible, but more of raising awareness about some of the factors that might make a difference in the future and to attempt to identify some of the possible levers for policy to influence these factors.

This chapter presents such an attempt at foresight, based on mind games concerning possible strategies of different relevant actors which are then fed into a quantitative model to simulate the consequences of these strategies for Europe's regions. As highlighted in the introduction to the report, we do not propose a crystal ball approach to predict which sectors will be vulnerable in the future, but rather a focus on which types of regions (defined, amongst others, on the basis of their sectoral structure) might win or lose depending on a series of hypotheses at the start.

We begin by presenting the general assumptions which lay the basis for the hypotheses upon which the scenarios are built (5.1) to then go on and describe the actual scenarios (5.2). Section 5.3 presents the results of these scenarios, including an analysis on the basis of the risk typology of chapter 4. We then highlight some of the driving forces behind these results (5.4) before we summarise the main findings (5.5).

5.1. General scenario assumptions

Quali-quantitative scenarios on possible future alternative growth patterns in Europe are presented in this part of the report, in order to highlight regions at risk under the different scenarios assumptions. Based on the MASST model, developed by the Politecnico of Milan under the ESPON 3.2 Spatial Scenarios project and revised for this project, the intention is *not* to provide precise estimates of future GDP levels, and GDP growth rates, but rather to highlight *the main tendencies, major adjustments to change, relative behavioural paths* that will be at work, given some conditional assumptions about possible globalisation patterns that may occur in the next 10 to 12 years. The basic structure of MASST is presented in Box 1. Details of the scenario methodology and of the MASST model are described in details in Appendices 5.1 and 5.2 respectively. In this part, we will concentrate on the scenario building methodology and on the scenario description we would like to develop in details for this project.

Box 1. The structure of the MASST model

To produce scenarios for this project the new version of the MASST model (Capello and Fratesi, 2008) is used.

As in the first version of MASST (Capello, 2007b, Capello et al., 2008), also in this version regional growth is the sum of two components: the national growth and a regional differential shift, where the former mainly takes account of demand effects, whereas the latter considers mainly supply-side effects. Regional growth is hence given by the following equation:

$$\Delta Y_r = \Delta Y_N + s; r \in N \quad (1)$$

In this box, described is the aggregate structure of the new model, where an expanded role is attributed to sectoral, social and international variables, as illustrated in Figure 17. For details, the reader can refer to the Annex.

As already mentioned, the final economic effect generated by MASST is regional growth as the sum of a national component of regional growth and a regional differential component (Figure 1 in the middle).

The national component is on the left side. The national block is specified as a “standard” macro model for each of the 27 European Union countries. With “standard” we refer to the type of structural macro-econometric models that were extensively used in the 1970s and 1980s by many Governments and Central Banks as programming and policy devising tools. There is, however, a major difference with respect to other full fledged macro models: only the goods and services market is specified in MASST, and prices, wages, interest rates and exchange rates are taken as exogenous variables. Although this may be considered a limitation of MASST, the fairly simplified macro model that we use fulfills our need to focus all our attention on the determination of real growth as a function of all those variables that are, in fact, policy instruments (interest rates, exchange rates, as well as government expenditures) or policy targets (such as inflation).

Taken into account in the national block are the regional growth effects of national macroeconomic variables: for instance the components of aggregate GDP, i.e. internal consumption, investments, imports, exports and public expenditure. This last one is the only exogenous variable in the macroeconomic part of the model, being left for scenario assumptions. All the other macroeconomic GDP components are endogenous and determined by mechanisms which are mainly Keynesian and demand side, but which also have some supply-side aspects. GDP growth positively influences internal consumption, investments and imports. Interest rates negatively influence the national investments. Productivity, by contrast, has a positive influence on investments and also a positive influence on national exports. Foreign direct investments (FDI) have a positive influence on total investments and also, because they are attractors of semi-manufactured goods, on imports. A higher inflation rate, owing to its effects on the relative prices of domestic and imported goods, increases imports and decreases exports. For the same reason, a devaluation of the nominal exchange rate decreases imports and increases exports.

Export growth rates are made explicitly dependent on the growth of the external world, in particular on the growth of the most important extra-European trade countries, the USA, Japan, and the BRICs countries (Brazil, Russia, India and China), with the latter group expected to become more important in the future.

Depicted on the right of Figure 17 is the regional differential component of new MASST. Consistently with Equation 1, this is estimated as a shift of regional growth from national growth, and this shift is dependent on five main components, of which two are exogenous and three endogenous.

The first component is the *sectoral component*: employment growth in respectively manufacturing and services is endogenous, being modelled in two different equations.

The sectoral component is explicitly modelled so as to take account of both the industrial mix and the intra-sectoral differential effects of a traditional shift-share analysis. In this way, it is possible to grasp intra-sectoral productivity effects. The increasing/decreasing returns to scale within a certain sector, or intra-sectoral productivity effects, are measured by a particularly efficient performance of that sector.

This is captured by the link between the degree of specialisation (or its variation) in a particular sector in a region; a certain industrial specialisation provides advantages/disadvantages to absolute industrial employment dynamics. Specialisation is measured through a location quotient (LQ) traditionally calculated as the share of employment (or value added) in a certain industry i in region r on total employment with respect to the share of employment (or value added) in the same industry at the European level. Moreover, increasing/decreasing returns may also be due to the presence of value added functions of that sector in that region, measured in terms of share of employees engaged in high or low professions.

In the simulation part of the model, for both industrial and tertiary growth rates, through a decomposition, it is possible to introduce the increase of total industrial (or tertiary) employment in a region due to an exogenous increase in the European employment growth rate in a certain sector, taking into account the specialisation of the region in the sector and the weight of the sector on total European total activities. In the logic of a shift-share analysis, this represents the real MIX effect.

The second main component is *inter-sectoral productivity*: this component is exogenous and is intended to measure the difference in regional productivity, notwithstanding the same sectoral specialization. For this reason, considered here are factors which are expected to affect productivity in every sector: innovativeness (detected by human resources in science and technology), accessibility (measured in terms of infrastructure), different value added functions (captured by different skills of the workforce) and energy resource availability.

The third component is the *social component* as measured by the regional level of trust, whose inclusion has been made possible by the availability of data in the European Value Survey Database.

The fourth component is the *demographic component*. Population growth is needed in the MASST for computation of per capita GDP, but it is not expected to have important GDP growth effects on European regions, where it is inserted more as a correction of possible bias. Population growth is made to depend on exogenous birth and death rates, and on endogenous migrations which, as in the previous version of the model, are dependent on (exogenous) unemployment rates and settlement structures and on the differential GDP of regions, which is obviously pre-determined by the model (i.e. it is an outcome from the previous simulation run of the model).

The fifth component is the *spatial and territorial structure*. This is characteristic of the MASST model and involves spillovers differentiated on regional settlement structure typologies and territorial dummies.

The last important aspect of Figure 17 to be pointed out is the dotted arrow which links regional differential components to macroeconomic national elements. As the MASST model is a top-down and bottom-up model, the top-down element of regional growth is clearly due to the national component of regional growth. The bottom-up element conversely depends on the fact that regional competitiveness is assumed to affect consumption and investments at national level - through respectively a Keynesian multiplier and an accelerator mechanism - so that the regional sub-model not only distributes national growth among regions but is also able to boost national growth when regions are virtuous. This is achieved in the simulation algorithm extensively explained in Capello et al. (2008).

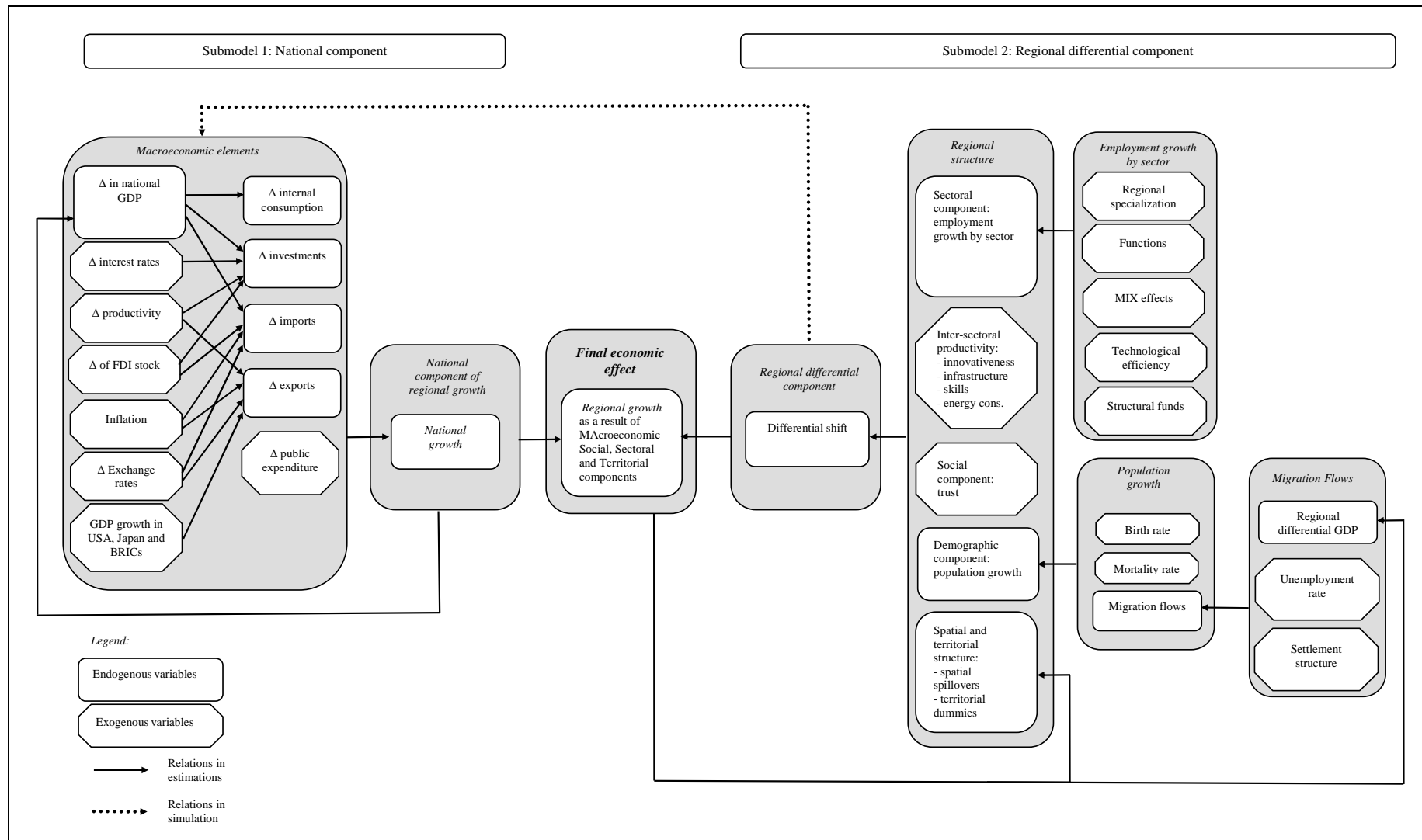


Figure 18. The structure of the new MASST model (source: Capello and Fratesi, 2008)

Two scenarios are built according to two opposite strategies that the emerging countries can put in place: a more risky, and probably more expansionary strategy based on the willingness to compete on a world scale by undertaking strong and decisive internal restructuring, reconverting and modernising processes, competing in new sectors, both high and low value added sectors, that are at present not highly involved in a strong competition. The second strategy is a more protective strategy whereby BRIC reinforce present tendencies (Figure 19), and therefore where sectors already highly vulnerable today will be strongly affected. A comparison on future opportunities and risks of growth for European regions will be investigated.

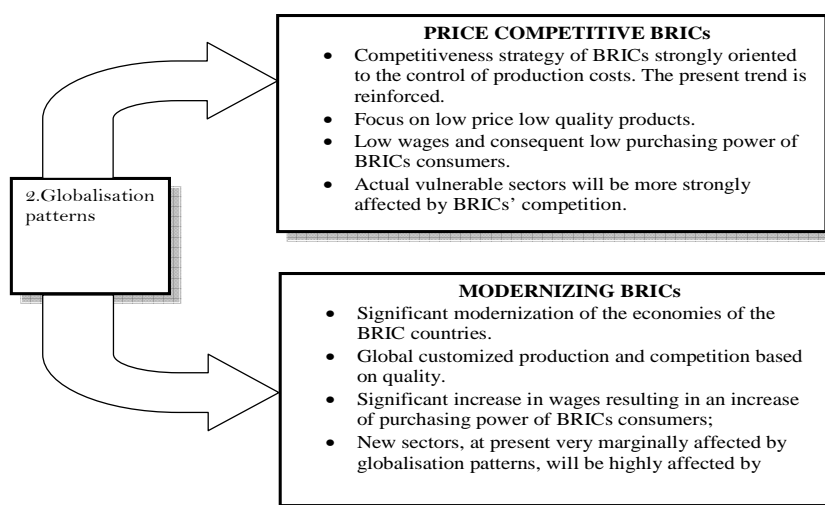


Figure 19. Future alternative trajectories in globalisation patterns

To these external strategies, the framework of an analysis will add the strategies that the EU Member States will put in place. One can foresee a defensive strategy aimed at protecting the internal market against international competition through curbs on economic integration with the external world, the establishment of trade barriers, and limits to the movement of people between the external world and Europe. The opposite strategy is an aggressive one which views external countries as potential markets for European goods and is based on the lifting of barriers against trade and migration flows (Figure 20).

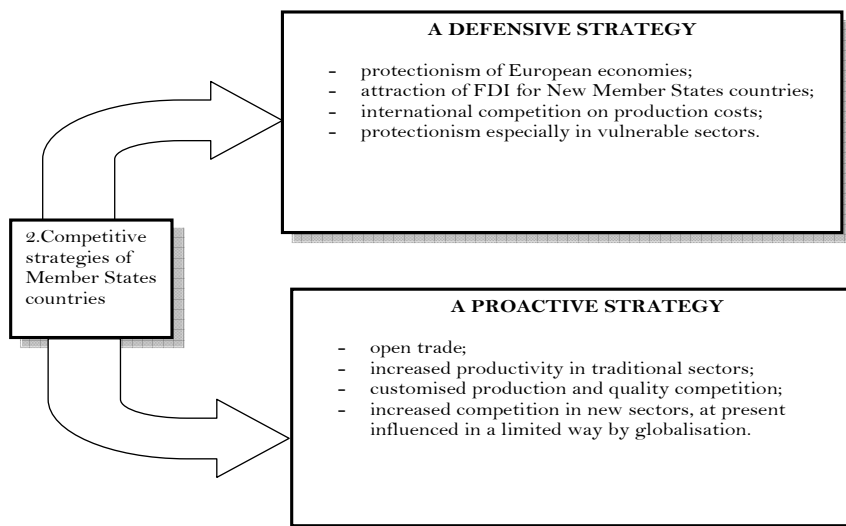


Figure 20. Future alternative trajectories for European member States strategies

The third main assumptions regard the alternative strategies that can be put in place by the European Commission (Figure 21).

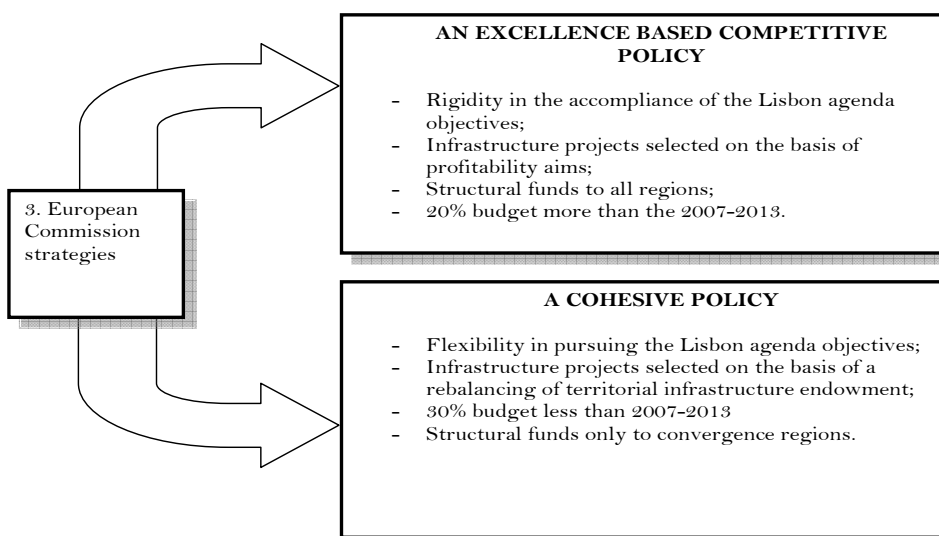


Figure 21. Future alternative trajectories for European Commission strategies

The first strategy is an “excellence based competitive policy”, aiming at increasing competitiveness of the EU without denying a cohesion strategy, with rigidity in the compliance of the Lisbon agenda objectives, 20% budget more than the 2007-2013 structural funds, distributed to all regions, including the core ones. The opposite is a cohesive policy, based on a management of structural funds based on flexibility in pursuing the Lisbon agenda

objectives, and 30% less of the 2007-2013 structural funds budget devoted only to convergence regions.

The possible trajectories of the various economic, institutional and political driving forces are combined and integrated with the strategies of the two groups of countries and the EU strategies to produce consistent scenarios. The results of the simulation procedure show the advantages and costs (in terms of regional growth and disparities) of each strategy chosen by each group of countries, on the assumption that other groups choose a particular strategy. Interesting policy implications arise from these scenarios.

The courageous strategy is expected to be more expansionary, *coeteris paribus*, and therefore to represent the best solution for each block of countries when analysed in abstract terms. However, when the analysis considers a complex game among three global players with different strategies, the final result may be very different, since it depends on the influence of each strategy chosen by each block of countries on the others. Of the eight possible scenarios, the following two are of especial interest (Figure 22):

1. a scenario combining a reactive strategy by the Member Countries, a modernising strategy by BRIC, and a competitive strategy by the European Commission, i.e. *a scenario of an aggressive Europe in a high-quality competitive world (scenario A)* (Fig. 22a);
2. a scenario based on opposite strategies: defensive Member States, a price-competitive strategy by BRICs, and a cohesive strategy by the European Commission, i.e. *a scenario of a defensive Europe in a price-competitive world (scenario B)* (Fig. 22b);

These two scenarios have been chosen because of their political, institutional and economic importance. The ‘*aggressive Europe in a high-quality competitive world*’ scenario allows one to measure the advantage of a European courageous strategy compared to a similar strategy put in place by the external world. In other words, the concern is to identify the advantages for Europe of undertaking a high-profile competitive strategy based on a large degree of openness when the external world is competing with the same degree of openness (Fig. 22a).

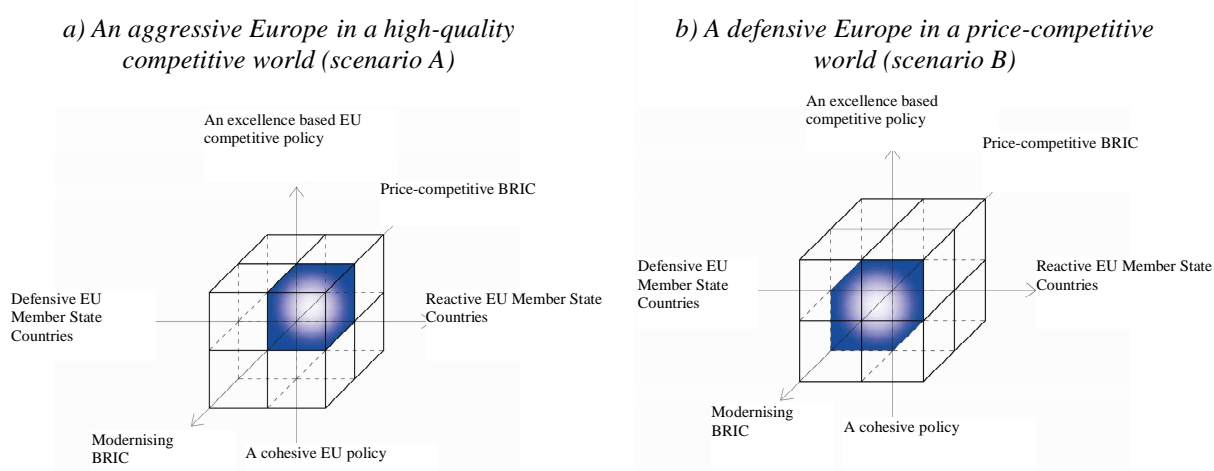


Figure 22. The selected scenarios

A scenario of ‘a defensive Europe in a cost-competitive world’ highlights the risk to Europe when a defensive strategy *vis-à-vis* external competition entails closure and protectionism while global competition is based on pure cost elements. Analysis of these competitiveness strategies is even more interesting when also EU Member countries pursue such a low profile strategy: their cost-competitive strategy may prove weak in front of similar strategies undertaken by large emerging countries (Figure 22b).

The two scenarios will be compared with a baseline scenario, based on the assumption that the present trends affecting growth and the associated policies put in place will continue in the future. This scenario will act as a benchmark for the two alternative scenarios presented. Its assumptions are presented in Table 20, and compared to the assumptions of the two scenarios.

5.2. Scenarios description

The first scenario, *an aggressive Europe in a high-quality competitive world*, is a scenario in which BRIC countries no longer compete on prices, as they do at present, but endeavour to upgrade the quality of products and labour. Integration between external and internal resources gives rise to an increase in endogenous development capability; high-tech industries are increasingly developed, and BRICs decisively enter high-quality product markets in new sectors generating wide effects on global trade flows and factor movements. But this new situation in product markets has an interesting counterpart in global income distribution: the wages and purchasing power of the local populations of emerging countries increase, and the currencies of these countries revalue, opening up a huge potential new market for advanced European products. Global competition is increasingly based on product innovation, customised production and international specialisation; under these conditions, there is huge potential for worldwide development and increasing welfare in all three blocks of countries.¹⁹

In this scenario, the Member countries adopt a reactive strategy whereby they compete on external markets on the basis of product innovation. Open trade with external countries in agricultural, industrial and service products is seen as an opportunity for growth more than a risk. In this scenario, the New 12 member states change their production structure, moving decisively from agriculture to industrial and tertiary activities. Economic growth is based on endogenous, material and non-material, resources and internal production capacities, and not just on exogenous investment and production. Wages increase as an effect of an increase in human capital quality, and so does the purchasing power of households, creating a growing local market for international products. The increase of market size for European high-quality products in non-vulnerable sectors is limited by the increase of competition by BRIC production in new sectors.

The European Union puts in place a competitive strategy with the aim of achieving a balanced territory. This is reflected in several decisions, like: i) fulfilment of the goals set by the Lisbon agenda pursued as a ‘must’ for all European countries; ii) an increase in the 2007-2013 structural funds budget of 20%; iii) EU budget devoted to all regions.

¹⁹ A more detailed description of the scenarios is contained in Appendices 5.3 and 5.4, respectively for the first and the second scenario.

On the basis of these hypotheses, the way in which the other driving forces develop seems straightforward (Table 21). Virtuous public spending and strict compliance with the Maastricht parameters are part of the reactive strategy of the Member states; economic growth is mostly based on private investments, and in general on efficiency principles. Public investments are mainly devoted to R&D and value added functions.

Driving forces	Baseline scenario	An aggressive Europe in a high-quality competitive world	A defensive Europe in a price-competitive world
Quality of global competition	Cost-competitive strategy of BRIC countries; Global cost competition on products; Low purchasing power in BRIC countries.	Significant modernisation of BRIC countries; Global customised production and competition on quality; Significant increase in wages and in purchasing power in BRIC countries.	Significant cost-competitive strategy of BRIC countries; Global cost competition on product. Low wages and low purchasing power in BRIC countries.
European competitiveness strategy	limited opening to extra-EU trade; cost-competitive strategy of New 12 countries; an innovation strategy of the EU 15, only partially successful. persistence of world demand crisis partial decrease in the concentrated development in New 12 countries	free trade; significant modernisation of new 12 countries; innovation strategy in entire Europe; customised production and quality competition; lower demand crisis than in the baseline partial recover of world demand crisis partial decrease in the concentrated development in New 12 countries	protectionism of EU15; cost-competitive strategy of New 10+2; low-cost production competition. partial recover of world demand crisis partial decrease in the concentrated development in New 12 countries
Management of public finance	decrease of public expenditure growth rates in EU15, and in New 10+2; control on Maastricht parameters.	virtuous public expenditure: significant decrease in its growth rates; strict respect of Maastricht parameters.	high increase of public expenditure growth rates; lower respect of Maastricht parameters.
EU infrastructure policy	budget as in 2007-2013	0% increase with respect to the 2007-2013 budget distributed to all regions	0% decrease of the 2007-2013 budget distributed only to convergence regions
Globalisation of markets	no change with respect to present situation	Decisive trade increase due to increase in wages and purchasing power in BRIC countries Increasing competition of BRICs in new productions and new sectors, limiting European growth rates in non-vulnerable sectors.	Limited trade increase due to limited increase in wages and purchasing power in BRIC countries reinforcing competition of BRICs in traditional productions and sectors, limiting European growth rates in present vulnerable
Globalisation of production (supplier/producer re-organisation effects)	no change with respect to present situation	Limited decentralisation of phases of production to areas with low labour cost, due to BRICs modernisation and New12 restructuring	High decentralisation of phases of production to areas with low labour cost, both BRIC and New12
Globalisation of ownership (mergers and acquisitions)	No change with respect to present situation	Increase of FDI thanks to the European strong currency Consolidation of production in fewer plants (economies of scale) and modular assembly processes thanks to a strong European currency in highly specialised central areas in non-vulnerable sectors Disruption of social tissue due to strong transformation processes in successful central areas as well as problematic areas (specialised areas in non-	Increase of FDI due to low cost area attraction Consolidation of production in fewer plants (economies of scale) and modular assembly in highly specialised areas in vulnerable sectors Disruption of social tissue due to strong transformation processes in successful New12 areas as well as in problematic areas (Old 15 specialised areas in vulnerable sectors)

		vulnerable sectors)	
Socio-demographic trends	Increasing external in-migration growth rates counterbalancing population ageing.	Openness to external in-migration; Greater natural population growth due to higher fertility rates of immigrants; High unemployment rates due to the restructuring of the economies.	Relative closure to external in-migration; Low natural population growth; Low unemployment rate due to an increase in public demand.
Energy sources	Persistence of traditional energy source dependence. Ready increase in energy prices.	Introduction of energy-efficient technologies; Diffusion of renewable technologies and lower dependence on traditional energy sources; Significant increase in energy prices because of higher oil demand by BRIC countries.	Persistence on traditional energy source dependence. Low increase in energy prices.

Table 21. Present trends and alternative scenarios

Another consequence of the decisive and vital development strategy of EU countries is a positive attitude towards economic integration, trade openness and market penetration in the external world. Open trade and lower barriers to in-migration stem from this attitude, the consequence being an increase in the natural population growth rate. Socio-economic costs, such as high unemployment in non-core areas, characterise this scenario as a result of all the restructuring processes taking place in the economies.

In this scenario, efficiency strategies also influence the energy industry. They induce the increasing adoption of new energy technologies and renewable energy sources, with a consequent lower dependence on traditional energy sources. But the modernisation of BRIC countries generates additional pressure on the oil market because of the increase in production, but also in household use, with the consequence of increasing oil prices.

The second scenario, a *defensive Europe in a price-competitive world*, implies trends in the driving forces of change which are almost the reverse of those in the previous scenario. BRIC countries adopt a price-competitive strategy, producing low-cost products in low-tech manufacturing industries. International competition in this scenario is based on local low-cost resources (land and labour) which allow for low-price products; competition accentuates in the present vulnerable sectors.

The member countries develop a defensive strategy through closure to the external world and through protection of their internal markets, also through indirect measures like the support of European firms and sectors. In this strategy, the New 12 countries also focus on a cost-competitive strategy, their aim being to attract foreign direct investments and to become Europe's manufacturing belt.

These reaction strategies influence the way in which the other driving forces develop. The member states countries are increasingly oriented towards solving internal problems, and towards an economy where public investment is mainly intended to achieve balanced regional development and territorial cohesion, even at the expense of strict compliance with the Maastricht parameters. The member states countries' attitude towards global trade and competition reflects the view that it is more a risk than a market opportunity.

Structural funds budget will decrease by 30% and devoted to convergence regions, while the achievement of the Lisbon agenda goals is flexible. The importance of cohesion also determines the choice of the new TINA and TEN networks, which are selected in order to rebalance the territorial infrastructure endowment.

Closure characterises in-migration strategies, with the result of lower natural (and total) population growth. Unemployment is kept under control, and it decreases mainly due to the development of the public sector.

Persistence with traditional energy sources may generate a higher increase in energy prices with respect to the baseline scenario, but this effect is counterbalanced by the lower growth rates of oil demand by BRICs.

To simulate the scenarios in MASST, any qualitative assumption has to be translated into quantitative values, with the procedure described in Box 2.

Box 2. Moving from qualitative assumptions to quantitative levers in the MASST model

The methodology used to construct the quali-quantitative scenarios requires the qualitative assumptions to be ‘translated’ into quantitative levers to be introduced in the MASST model in order to simulate future growth.

We describe here the link between the qualitative and quantitative assumptions summarised in Table 21. In particular, it states the quantitative assumptions behind each scenario that represent the levers of the model. Technically speaking, these represent the target variables to which the model tends in 2020.

Although the quantitative assumptions on the target values of the exogenous variables of the model are defined subjectively, they respond to a very strict logic and to solid constraints. General consistency is required – and pursued – in the entire logical chain linking the general characteristics of each scenario to the potential trend of the main macroeconomic, technological and social variables – our so-called ‘driving forces’.

The competitive strategies adopted by European countries influence their internal macroeconomic conditions through intertwined changes in unit labour costs, in exchange rates, in inflation rates and in public expenditure growth rates. A devaluation implies an increase in inflation rates; a devaluation assumption in Europe has to be adjusted for the assumption of the behaviour of BRIC countries. Reactive, restructuring and modernising strategies are in general expected to couple with virtuous public expenditure, revaluation of the currency, a consequent containment of inflation, and an increase in the interest rate due to increased demand for financial capital and a slight increase in unit labour cost variations. The opposite trends are expected to arise from defensive, cost and price-competitive strategies.

More aggressive strategies conceptually imply a larger share of employment in high-value added activities, this being implemented in the model through the share of science and technology employment and the share of tertiary activities. By contrast, under more defensive strategy assumptions, these activities are expected to grow to a lesser extent.

Qualitative assumptions	Quantitative levers of the model
Competitive strategies of BRIC	
Change in purchasing power which leads to:	
- change in the external markets for the EU;	- change in GDP of US, Japan and BRIC countries;
- change in energy prices at world scale;	- change in energy prices in the EU;
- change in financial capital demand;	- change in interest rates in the EU;
- change in FDI attractiveness of these countries, and therefore of European countries;	- change in the share of FDI attracted by Eastern countries
- changes in the trends of world demand;	- change in the European growth rate of specific sectors.
- changes in the spatial development of New 12 countries (more or less concentrated)	- change in the constant of the consumption growth equation
	- change in the dummy for agglomerated and mega regions in New 12
Competitive strategies of Europe	
Macroeconomic conditions	- change in cost competitiveness, i.e. change in unit labour cost;
	- change in exchange rates;
	- change in inflation rates;
	- change in the growth rates of public expenditure
	- change in the European growth rates of specific sectors.
Production changes	
Globalisation of markets (change in the external market for the EU)	- change in GDP of US, Japan and BRIC countries;
Globalisation of production (supplier/producer reorganisation effect)	- change in the composition of the labour force at the regional level;
Globalisation of ownership (mergers and acquisition)	- change in regional sectoral specialisation;
	- change in the share of FDI attracted by Eastern countries
	- change in trust
Strategies of the European Commission	
1) Lisbon	- change in the share of tertiary activity;
	- change in the share of S&T employees.
2) European infrastructure policy choices	- change in the km of transport infrastructure in each region.
3) Institutional decisions	- change in the amount and spatial distribution of the structural funds spent;
	- change in the amount and spatial distribution of CAP Pillar 2 expenditures.
Degree of openness	- change in the exogenous growth component of the population growth equation that influences both fertility and mortality rates;
	- change in the exogenous growth component of the export and import equation.

Table 22. Link between the qualitative and the quantitative assumptions

5.3. Scenario results

5.3.1 Aggregate results

In Table 23A and B, represented are the aggregate results of all three scenarios. In particular, in the baseline scenario the New 12 have a higher growth rate than the Old 15 members, although this is not as higher as it was in the past. The growth rate of the EU 27 is very similar to the one of the Old 15, due to their much higher weight in terms of population and, more markedly, GDP.

A- Aggregate results, and disaggregated results by vulnerable typology

	baseline scenario			scenario A			scenario B		
	GDP growth	Industrial employment growth	Tertiary employment growth	GDP growth	Industrial employment growth	Tertiary employment growth	GDP growth	Industrial employment growth	Tertiary employment growth
EU-15 Countries									
All vulnerable	2.41	-0.97	1.38	0.66	-0.09	0.22	-0.20	-0.11	-0.31
Non vulnerable regions	2.80	-0.64	1.45	0.74	-0.08	0.40	-0.20	-0.05	-0.35
Globally vulnerable regions	2.52	-0.92	1.47	0.67	-0.09	0.21	-0.20	-0.13	-0.29
Textile regions	2.58	0.00	1.82	0.66	-0.09	0.24	-0.22	-0.13	-0.35
Metal regions	2.42	-1.14	1.31	0.65	-0.10	0.20	-0.20	-0.11	-0.29
Electronic regions	2.41	-1.86	1.38	0.66	-0.10	0.20	-0.19	-0.10	-0.27
EU-15 average	2.65	-0.79	1.43	0.71	-0.08	0.33	-0.20	-0.07	-0.34
	baseline scenario			scenario A			scenario B		
Mew Member State Countries	GDP growth	Industrial employment growth	Tertiary employment growth	GDP growth	Industrial employment growth	Tertiary employment growth	GDP growth	Industrial employment growth	Tertiary employment growth
All vulnerable	2.42	0.24	2.29	0.84	-0.10	0.29	-0.36	-0.15	-0.55
Non vulnerable regions	3.18	-0.57	1.50	0.99	-0.07	0.42	-0.92	-0.06	-0.54
Globally vulnerable regions	2.40	-0.32	2.41	0.86	-0.13	0.32	-0.30	-0.21	-0.57
Textile regions	2.57	0.64	2.27	0.85	-0.11	0.27	-0.48	-0.13	-0.53
Metal regions	2.67	-0.71	2.51	0.88	-0.11	0.32	-0.36	-0.22	-0.57
Electronic regions	1.78	-2.49	2.31	0.82	-0.10	0.36	-0.06	-0.33	-0.64
NMS average	2.87	-0.06	1.94	0.93	-0.09	0.35	-0.70	-0.12	-0.54
	baseline scenario			scenario A			scenario B		
All 27 Countries	GDP growth	Industrial employment growth	Tertiary employment growth	GDP growth	Industrial employment growth	Tertiary employment growth	GDP growth	Industrial employment growth	Tertiary employment growth
All vulnerable	2.41	-0.59	1.58	0.67	-0.10	0.24	-0.21	-0.12	-0.37
Non vulnerable regions	2.82	-0.63	1.46	0.75	-0.08	0.40	-0.23	-0.05	-0.37
Globally vulnerable regions	2.51	-0.77	1.66	0.68	-0.10	0.24	-0.21	-0.15	-0.35
Textile regions	2.58	0.28	1.99	0.68	-0.09	0.25	-0.25	-0.13	-0.42
Metal regions	2.43	-1.08	1.44	0.66	-0.10	0.21	-0.21	-0.12	-0.32
Electronic regions	2.40	-1.94	1.48	0.66	-0.10	0.22	-0.19	-0.13	-0.31
EU-27 average	2.66	-0.61	1.51	0.72	-0.09	0.34	-0.22	-0.08	-0.37

*Legend: baseline results are in absolute values, while results for scenario A and B are differences with respect to the baseline scenario.

B- Results disaggregated by risk typology

EU-15 Countries	baseline scenario				scenario A			scenario B		
	number of regions	GDP growth	Industrial employment growth	Tertiary employment growth	GDP growth	Industrial employment growth	Tertiary employment growth	GDP growth	Industrial employment growth	Tertiary employment growth
Average type	26	2.17	-1.10	0.87	0.62	-0.10	0.20	-0.20	-0.09	-0.30
Risky Eastern type benefitting fi	0	none	none	none	none	none	none	none	none	none
Non risky type because of their	14	2.63	-2.46	1.48	0.68	-0.10	0.22	-0.20	-0.06	-0.28
Limited risk despite structural w	10	2.09	-2.25	0.69	0.66	-0.11	0.19	-0.20	-0.09	-0.27
Mediterranean type with limited	13	2.67	-0.19	2.08	0.67	-0.09	0.22	-0.23	-0.12	-0.33
Mediterranean risky type	7	1.84	0.93	1.38	0.69	-0.08	0.36	-0.07	-0.14	-0.52
Slovak type	0	none	none	none	none	none	none	none	none	none

New Member State Countries	baseline scenario				scenario A			scenario B		
	number of regions	GDP growth	Industrial employment growth	Tertiary employment growth	GDP growth	Industrial employment growth	Tertiary employment growth	GDP growth	Industrial employment growth	Tertiary employment growth
Average type	8	2.65	-0.22	2.45	0.87	-0.09	0.31	-0.49	-0.17	-0.56
Risky Eastern type benefitting fi	20	2.33	0.54	2.19	0.82	-0.11	0.28	-0.30	-0.13	-0.54
Non risky type because of their	0	none	none	none	none	none	none	none	none	none
Limited risk despite structural w	0	none	none	none	none	none	none	none	none	none
Mediterranean type with limited	1	2.58	-3.79	1.31	0.94	-0.01	0.35	-0.67	-0.38	-0.54
Mediterranean risky type	0	none	none	none	none	none	none	none	none	none
Slovak type	3	1.96	-0.92	2.56	0.84	-0.09	0.31	-0.13	-0.22	-0.58

All 27 Countries	baseline scenario				scenario A			scenario B		
	number of regions	GDP growth	Industrial employment growth	Tertiary employment growth	GDP growth	Industrial employment growth	Tertiary employment growth	GDP growth	Industrial employment growth	Tertiary employment growth
Average type	34	2.20	-0.83	1.28	0.64	-0.10	0.23	-0.22	-0.12	-0.37
Risky Eastern type benefitting fi	20	2.33	0.54	2.19	0.82	-0.11	0.28	-0.30	-0.13	-0.54
Non risky type because of their	14	2.63	-2.46	1.48	0.68	-0.10	0.22	-0.20	-0.06	-0.28
Limited risk despite structural w	10	2.09	-2.25	0.69	0.66	-0.11	0.19	-0.20	-0.09	-0.27
Mediterranean type with limited	14	2.67	-0.21	2.07	0.67	-0.09	0.22	-0.23	-0.12	-0.34
Mediterranean risky type	7	1.84	0.93	1.38	0.69	-0.08	0.36	-0.07	-0.14	-0.52
Slovak type	3	1.96	-0.92	2.56	0.84	-0.09	0.31	-0.13	-0.22	-0.58

*Legend: baseline results are in absolute values, while results for scenario A and B are differences with respect to the baseline scenario.

Table 23. Aggregate results in 2020*

Vulnerable regions register in the baseline scenario a lower GDP growth rate than all others. This is true for both Western and Eastern Countries. In Western Countries, however, this low GDP growth rate is accompanied by a very high loss of industrial employment (-0.97%) and a lower increase in tertiary employment growth than the other regions. The same is not true for Eastern Countries. Vulnerable regions specialized in the electronic sector register the lowest GDP growth rate than all other regions specialized in vulnerable sectors; they are also the ones registering the lowest industrial employment growth, and this is true for Eastern and Western Countries. Finally, vulnerable regions in the textile sector are among the different types of vulnerable regions the ones which perform the best, both in Western and in Eastern Countries. These trends are similar to the ones of the past, as could be expected.

The behaviours of vulnerable regions are also different according to their risk typologies (Table 23B), despite the fact that these typologies are not used as such to enter the target hypotheses in MASST. Among the vulnerable regions, two groups have a GDP performance which is about the same of the EU average, not surprisingly these regions are the less weak and less risky among vulnerable regions: the non risky type because of their technological advance and the Mediterranean type with limited risk and strong entrepreneurship. All other vulnerable regions are clearly outperformed by the non-vulnerable ones, especially the Mediterranean risky type.

Manufacturing employment is mostly lost in the central European regions belonging to the categories of non risky type because of their technological advance and limited risk despite structural weaknesses. Among these, only the first ones are able to compensate manufacturing employment loss with productivity growth and employment in service sector.

Interestingly enough, service employment growth is highest in the Eastern vulnerable regions belonging to the risk categories of risky Eastern type benefitting from delocalization and Slovak type.

The scenario of an aggressive Europe in a high-quality competitive world is more expansionary for the EU 27, providing a GDP growth rate 0.72% higher. This was expected given the proactive strategy of its members and the advantages of the modernization of BRICs. For Old 15 countries, where EU policies are lower in per capita terms, this scenario is more expansionary (0.71%). For the New member countries, where EU policies are stronger in per capita terms, this scenario results as much as 0.93% more expansionary.

What emerges clearly from this scenario is that the relatively good dynamics of the economy is accompanied by a relatively better performance of the tertiary sector employment: the industrial sector registers a lower industrial employment growth in all kinds of regions.

In this scenario, regions that register a higher increase in GDP growth rate are the non-vulnerable regions, notwithstanding the increase in competition in non vulnerable sectors that is assumed in this scenario. This result can be explained by the relatively high sectoral diversification that characterizes these regions, which allows them to overcome relatively fiercer competitions in some sectors present in their region. Non-vulnerable regions register at the same time a higher increase in tertiary employment, and lose relatively less in terms of industrial employment. Regions that are vulnerable in different sectors behave in this scenario relatively in the same way.

Looking at the risk classification, the risky Eastern type benefitting from delocalization and the Slovak type are those whose increase of growth with respect to the baseline is highest, but this depends on the fact that they are mostly located in the East and, hence, are situated in higher growth contexts.

The scenario of a defensive Europe in a price-competitive world results less expansionary than the baseline for the EU 27, providing a GDP growth rate which is 0.22% lower. However, much different is the situation of Old 15 and New 12 member countries. While the former have a GDP growth rate which is only 0.20% lower, the latter have a growth rate which is 0.70% lower. For the EU 15 the decrease is mainly due to their defensive protectionist strategy. For the New 12 member countries, added to the previous consideration are two factors that reinforce the less expansionary trend: 1) competing on low production costs, they are more subject to competition from the BRICs – which also compete on low price and low costs – and, 2) cohesion policies are reduced in this scenario and this affects more the countries which are more in need of them.

In this scenario the relatively lower GDP growth rate is accompanied by a relatively lower increase of employment in both tertiary and industrial sectors; differently from scenario A, in this scenario also the tertiary sector has a relatively lower increase in employment growth rates.

The difference between GDP growth rate in this scenario with respect to the baseline is rather similar in all kinds of regions of Western Countries, while Eastern ones there is a remarkable difference between non-vulnerable and vulnerable regions, the latter losing much more than vulnerable. Mediterranean risky regions are those among vulnerable regions which lose less in this scenario, whereas Eastern ones those that lose more, even if their loss is still considerably less than their non-vulnerable counterpart.

Industrial employment losses are clearly stronger in vulnerable regions of both Eastern and Western Countries, as was expected given the assumption of increased competition in vulnerable sectors. The same difference is not registered for what concerns tertiary employment growth, which is similar in vulnerable and non vulnerable.

In the following sections, the aggregate results will be described at regional NUTS2 level in order to evidence the territorial differentiations that the three scenarios bring to Europe.

5.3.2. Baseline scenario

In figure 23, depicted are the regional annual average GDP growth rates in the baseline scenario. It is possible to observe that:

- there is a centripetal development throughout Europe, both in the Old 15 countries and, even more evidently, in the New 12, implying that the core areas within their respective countries are generally outperforming the rest of the country. In particular, strong growth clusters are present in northern Germany, in northern-central Italy and in southern Britain;
- the regions with a capital city have a very good performance. This is evident in the cases of Paris, Madrid, the Inner London, Amsterdam, Stockholm, Athens and, in eastern countries, of Prague, Bratislava, Budapest, Bucharest and Sofia;
- within the peripheral areas of Europe, a good performance is only achieved in the northern countries, in northern Great Britain. In the south of Europe, a relatively strong growth rate is only achieved by regions which have a capital or another important city such as Barcelona or Porto;
- there is not a clear pattern for what concerns the vulnerable regions; some are within the best performers at European level, while others are decisively lagging behind. As it was evidenced in the previous sections of the report, the performance of these regions does not stem automatically from their vulnerability but some are able to react to threats better than others. This is confirmed also in the future for the baseline scenario.

In figure 24, we represent the GDP per person in 2020 in the baseline scenario. It is possible to observe that:

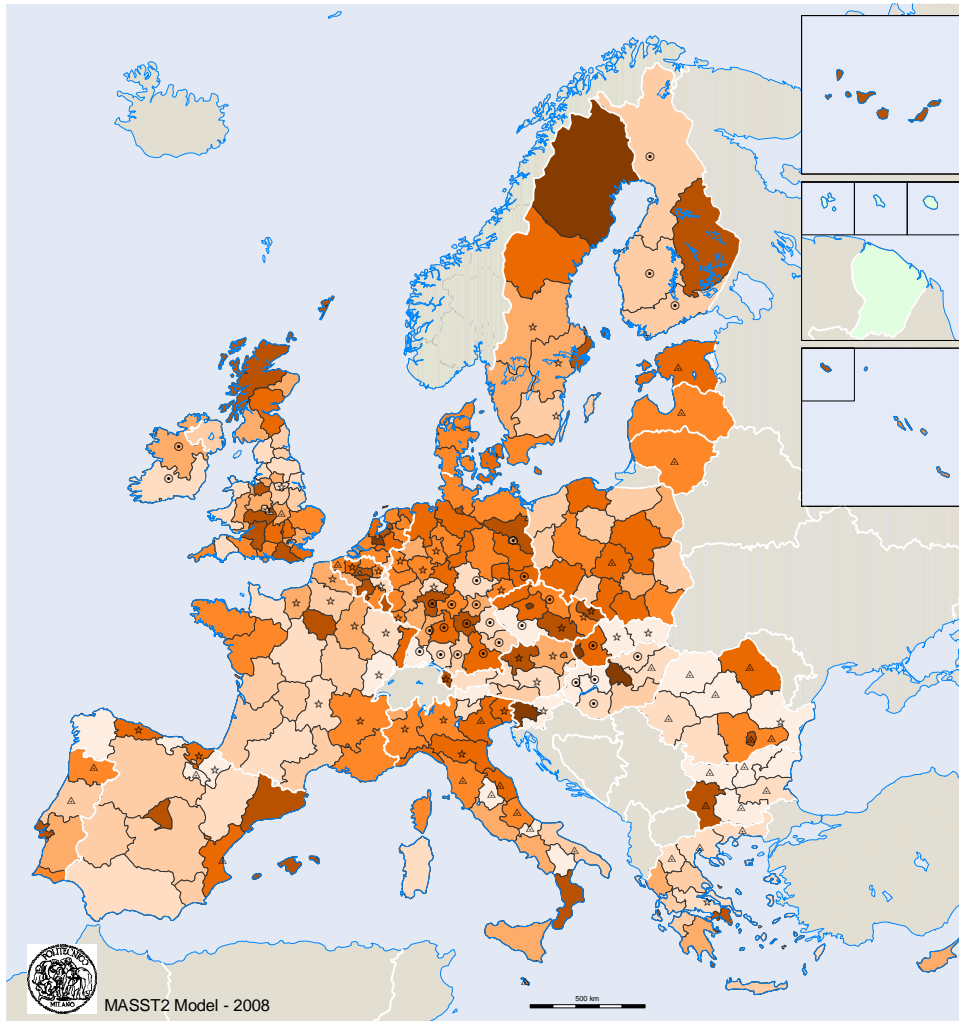
- the catching up of eastern countries to western countries levels in terms of welfare is incomplete. Almost all regions belonging to New 12 member countries remain below the values of the Old 15 countries, despite a weak process of convergence;
- the European per capita income remains very uneven across space, since within countries the metropolitan areas continue to have a much higher GDP per capita with respect to the rural and peripheral regions;
- as far as vulnerable regions are concerned, it is possible to observe that they are present both among the richest regions of Europe, with cases such as Rhone-Alpes, Oberbayern, Darmstadt and Lombardy, as well as within lagging western regions and poorer Eastern ones.

Figure 25 presents the results for the average employment growth rate of the industry sector. Some results emerge and in particular:

- as one could expect, the industry growth rate is quite negative, and especially in the regions with capitals, since their growth no longer relies on manufacturing but on advanced services;
- employment growth in industry sectors is negative in Old 15 member countries, as expected, but also in most New 12 countries, with the exception of the Baltic republics and of the two most recent members, Bulgaria and Romania. This pattern is actually a prosecution of the present trends, which generally sees the growth of GDP in the east being high but not because of sustained employment growth but rather because of very strong productivity increases. Industrial restructuring, in fact, implies the set up of more productive firms, being them domestic or foreign owned, and this brings productivity increases; however, at the same time, there is the possibility of closure for other activities with lower value added per employee, which are not able to deal with the increased wages. Wage increases, finally, can decrease the comparative advantages of the east;
- on average, within western Europe, performing better than the others are the regions which are at the same time peripheral and rural;
- concerning the vulnerable regions, there is mixed evidence, since they are generally performing bad, but positive exceptions exist both in the New 12 countries, especially in Romania and Estonia, and in the Old 15 countries, for example in central Italy, La Rioja (ES), West-Flanders and northern Portugal.

In Figure 26 depicted are the results for the average employment growth rate of the service sector. Among the results which emerge it is interesting to observe that:

- a strong tertiarization process is taking place, since service employment growth is positive in all European countries. Especially strong this appears to be for Spain, Greece, norther Italy, parts of Austria and all New 12 member countries, with the only exception of Poland;
- especially strong is tertiary employment growth in capital and core areas, for example Paris, Frankfurt, Hamburg, the Inner London, Brussels, Prague, Bucharest;
- service employment growth is only negative in some peripheral areas of Sweden, the United Kingdom, Belgium, Denmark and eastern Germany. It has however to be remarked that employment growth and GDP growth are not strictly linked, since these areas are generally experiencing a positive GDP growth rate. The composition of employment, in fact, plays a very important role and it has to be remembered that in Europe the service sector has often acted as a compensation of the losses of manufacturing employment;
- the vulnerable regions are generally performing well both in absolute and in within-country terms, probably because their service sector absorbs employment dismissed by manufacturing.



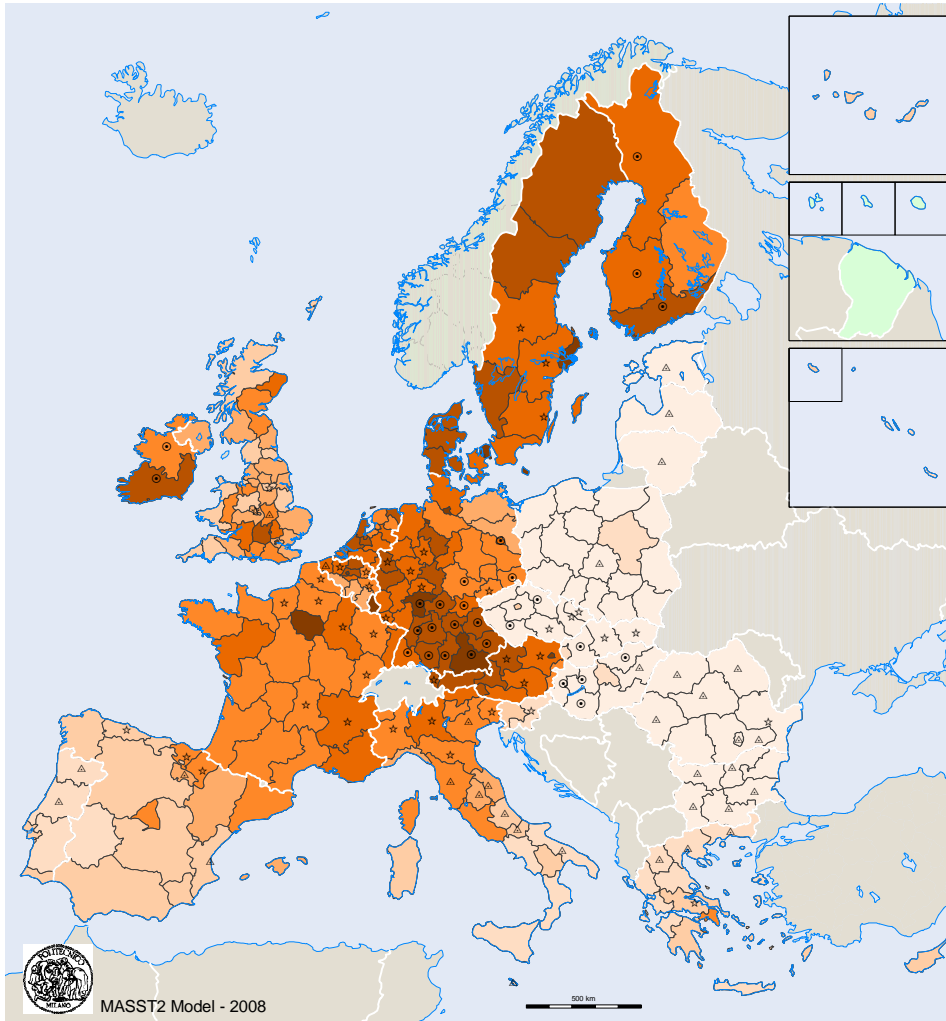
Annual average GDP growth rate 2005-2020 - Baseline scenario

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- 0.03 - 0.86
- 0.86 - 1.48
- 1.48 - 1.92
- 1.92 - 2.37
- 2.37 - 2.87
- 2.87 - 3.47
- 3.47 - 4.41
- 4.41 - 5.65
- No data

- △ Textile regions
- ☆ Metal regions
- Electric and optical equipment regions

Figure 23. Average annual GDP growth rate 2005-2020 – Baseline scenario



GDP per person in 2020 - Baseline scenario

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- 1.07 - 5.07
- 5.07 - 11.63
- 11.63 - 15.33
- 15.33 - 18.67
- 18.67 - 22.11
- 22.11 - 26.62
- 26.62 - 34.23
- 34.23 - 56.79
- No data

- △ Textile regions
- ★ Metal regions
- Electric and optical equipment regions

Figure 24. GDP per person in 2020 – Baseline scenario

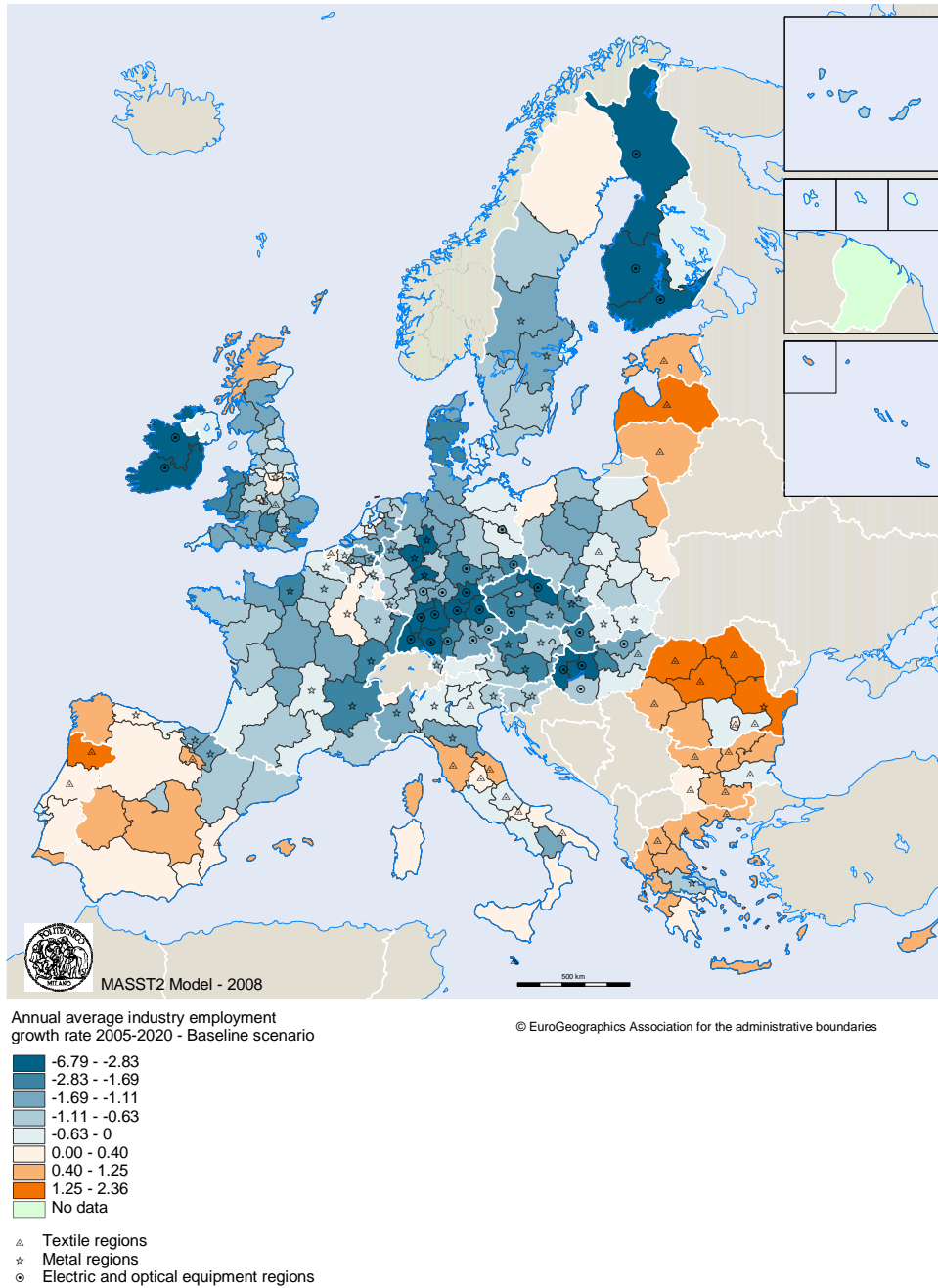


Figure 25. Average annual industry employment growth rate 2005-2020 – Baseline scenario

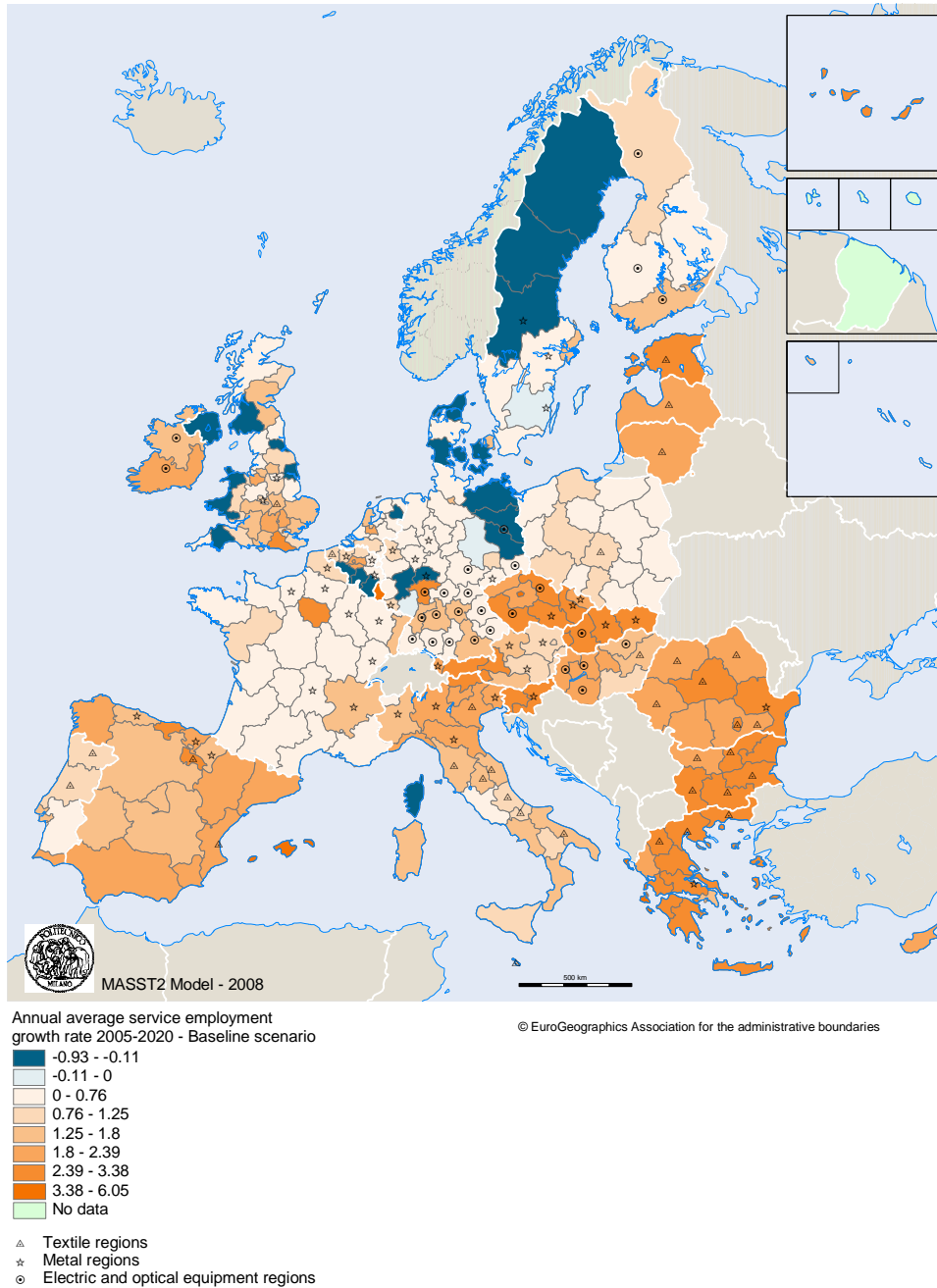


Figure 26. Average annual service employment growth rate 2005-2020 – Baseline scenario

5.3.3. Scenario A - An aggressive Europe in a high-quality competitive world

In figure 27, depicted is the increase of regional annual average GDP growth rate implied by the scenario “an aggressive Europe in a high-quality competitive world” with respect to the baseline. From this map, it is possible to observe that:

- this scenario is more expansionary for all European regions and countries, both in the west and in the east;
- some regions take advantage of the increased opportunities of this scenario more than the others. In particular, in the New 12 member states, the regions with the highest growth rate are the most central and especially those with the capitals, so reinforcing the centripetal effects which were already present in the baseline scenario;
- also in Old 15 countries the core areas have a better performance, but less remarkably than in the east and examples of regions strongly benefiting from globalization can also be found in north western France, southern Italy and northern Germany;
- the regions which are less prone to take advantage of globalization are the rural ones, and this also applies to vulnerable regions; within these, in fact, the increase of growth with respect to the baseline is very low in rural areas, whereas the others are much more dynamic and can be among the best ones.

Figure 28 represents the increase of income per capita which is implied by this scenario with respect to the baseline. It is evidenced that:

- the convergence process is incomplete despite strong cohesion policy. This is due to the fact that the New 12 countries outperform the Old 15 members, but this takes place through a much faster growth rate in the capital and mega regions with respect to the others;
- as far as vulnerable regions are concerned, the evidence is mixed: those in the west appear on average as having a good outcome from this scenario, since they are often endowed with a stronger urban and service structure. Those in the east, on the contrary, are generally outperformed by the - non vulnerable - capital regions.

Figure 29 presents the results for industry employment growth of the scenario “an aggressive Europe in a high-quality competitive world” with respect to the baseline. The results show that:

- with only two outliers, the growth of industry employment is in this scenario lower than in the baseline, both in the East and in the West. The highest GDP growth rate registered in this scenario with respect to the baseline is therefore due to tertiary sector dynamics and inter-sectoral productivity increases;
- the regions with capitals and largest cities are generally losing less employment and this is probably due to the fact that their structure generally concentrates on advanced sectors for which globalization represents more an opportunity than a threat;
- the vulnerable regions show mixed evidence and some are also among those who lose more. Taking into account the scenario hypothesis – assuming higher competition in non-vulnerable sectors - the fact that many non vulnerable regions are less inclined to lose industrial employment can probably have two explanations: either these are tertiary regions where the effect of globalization on manufacturing is filtered by the service sector, or they have an ample sectoral composition which allows them to mitigate the effects.

In figure 30 the difference of service employment growth with respect to the baseline is presented, evidencing that:

- the service employment grows more than in the baseline in all regions of Europe. In particular, this growth is high in the eastern countries, with the only exception of Bulgaria and Romania, independently of the regional structure;

- in the west, particularly positive is the difference of service growth rate for Spain, Portugal, Greece, the south of Italy, Eastern Germany and the north of Britain;
- the vulnerable regions of the Old 15 countries are among those where the increase of employment is lower, meaning that they do not appear able to replace industry with tertiary activities. In the New 12 member countries, on the contrary, there is mixed evidence on the performance of vulnerable regions.

5.3.4. Scenario B - A defensive Europe in a price-competitive world

Figure 31 presents the difference of GDP growth rate of the scenario “a defensive Europe in a price-competitive world” with respect to the baseline. Within the results, one can observe that:

- this scenario is less expansionary in general with only a limited number of regions having higher performance with respect to the baseline. The areas in which this scenario is more expansionary are generally peripheral and rural;
- in the eastern countries, the performance is particularly negative in the few regions which are not “convergence” ones, and this was expected since they are assumed not to be eligible to EU funding in this scenario;
- central areas such as western and southern Germany, southern Britain, Denmark and northern Italy are generally performing quite bad, since they miss the opportunities of globalization. Even worse are performing the central areas of more peripheral countries, including Madrid, Barcelona, Valencia, Athens, Lisbon;
- overall, the vulnerable regions appear to have a lower variance of performances, especially in the west, where most of them are close to have a difference of 0. On the contrary, in the east there are regions, such as in Hungary, which are among the most benefiting from this scenario.

Figure 32 is the map of the difference in GDP per person between the scenario of “a defensive Europe in a price-competitive world” and the baseline. It can be evidenced that:

- the convergence process is almost absent, since only a few, within the Eastern regions, gain from this scenario with respect to the baseline; convergence is more evident within countries, where the capital areas are generally outperformed by the more peripheral areas;
- the exception to this straitened situation is represented, in the Old 15 countries, by some rural regions, especially belonging to peripheral countries such as in Spain, Portugal, Greece, northern Sweden, northern Britain; in the east, the exception is represented by Hungary, where a much lower income per capita in the Budapest area is counterbalanced by an higher income per capita in the other rural regions of the country.

In figure 33 depicted is the difference of industry employment growth between this scenario and the baseline. It is possible to observe that:

- in all regions of Europe there is a loss of industry employment with respect to the baseline;
- this loss of employment is much stronger in the vulnerable regions and the countries with more vulnerable regions. Linking this result with the assumption made that in this scenario, industrial dynamics at the European level is assumed to be negative for

vulnerable sectors, important messages emerge: 1) contrary to non-vulnerable regions, vulnerable ones are more sensible to the dynamics of their sectoral specialization, 2) if competition increases in vulnerable sectors, the capacity of reacting (or pro-acting) by vulnerable regions reduces;

- at the territorial level, the regions with capitals are the least negatively affected by this scenario. This probably depends on their tertiary specialization and the fact that they are under-represented in vulnerable sectors.

Finally, in figure 34, represented is the difference of service employment growth rate of the scenario “a defensive Europe in a price-competitive world” with respect to the baseline. One can evidence that:

- there is a loss of employment in all European regions with respect to the baseline. This loss is more marked in the more peripheral areas and countries of Europe: New 12 member states, the northern regions of Sweden and Finland, Spain, Portugal, Greece and Southern Italy;
- in the Old 15 member countries, the vulnerable regions are the least affected: the loss of manufacturing employment is compensated by a relatively strong performance of service employment. In New 12 countries, on the contrary, vulnerable regions are the most negatively affected by this scenario;
- there is an evident effect of the loss of structural funds on the creation of service employment, since the areas which get more of them in the baseline scenario also are those which lose more employment in this scenario where structural funds are reduced.

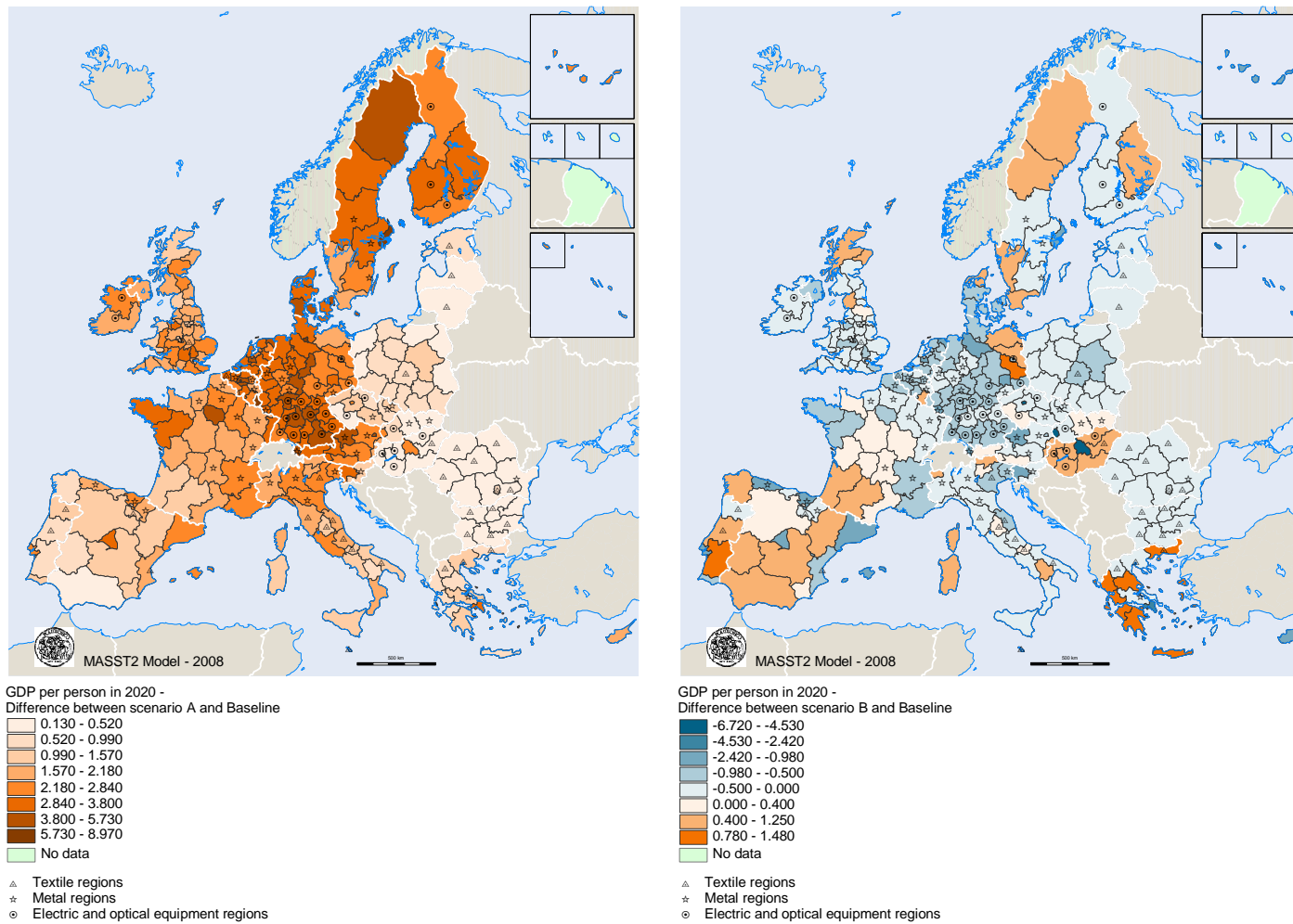


Figure 27 (left) and 31 (right).– GDP per person in 2020 - Difference between the scenario A and baseline (left) and scenario B and baseline (right)

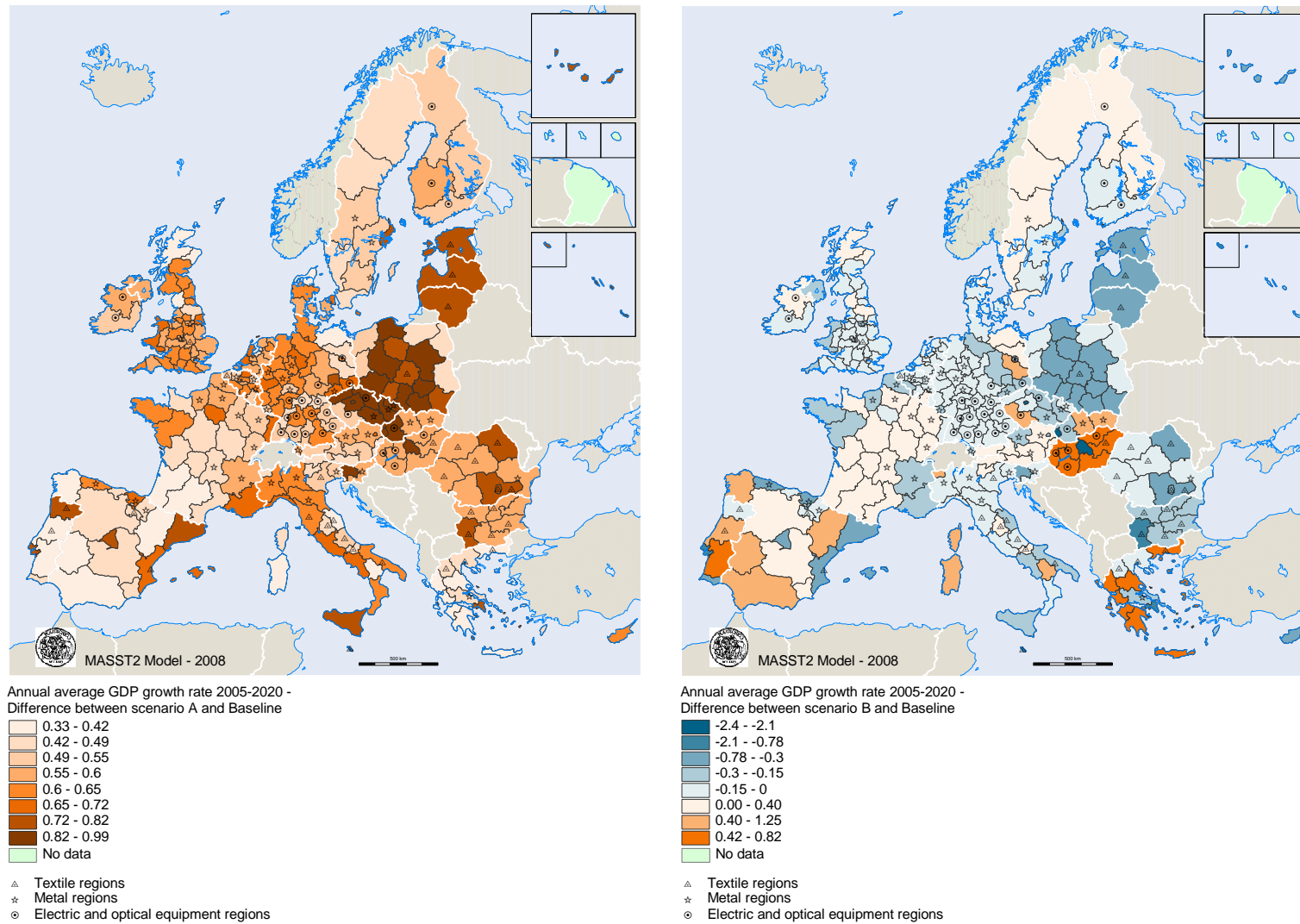


Figure 28 (left) and 32 (right). Average annual GDP growth rate 2005-2020 – Difference between the scenario A and baseline (left) and scenario B and baseline (right)

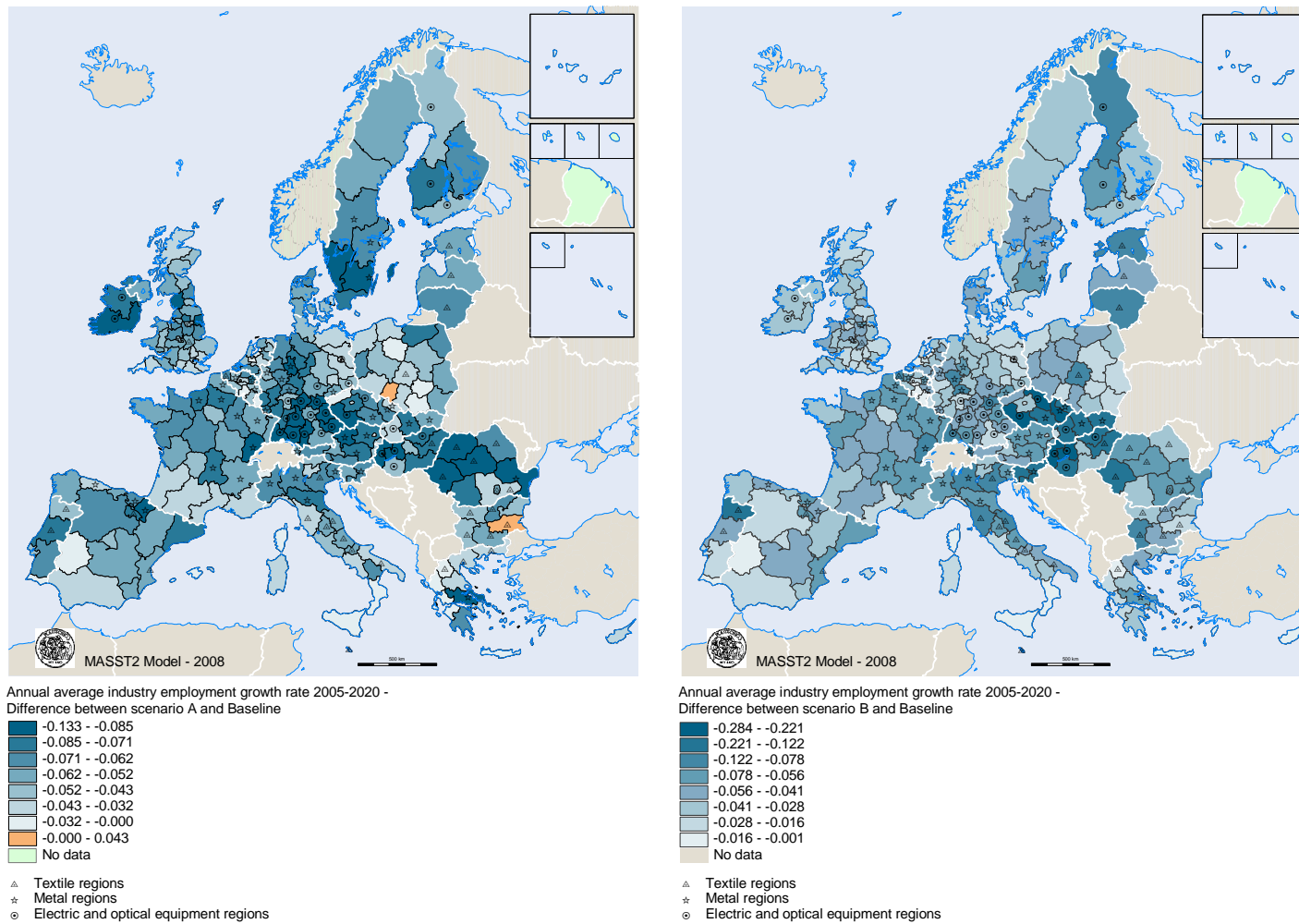


Figure 29 (left) and 33 (right). Average annual industry employment growth rate 2005-2020 – Difference between the scenario A and baseline (left) and scenario B and baseline (right)

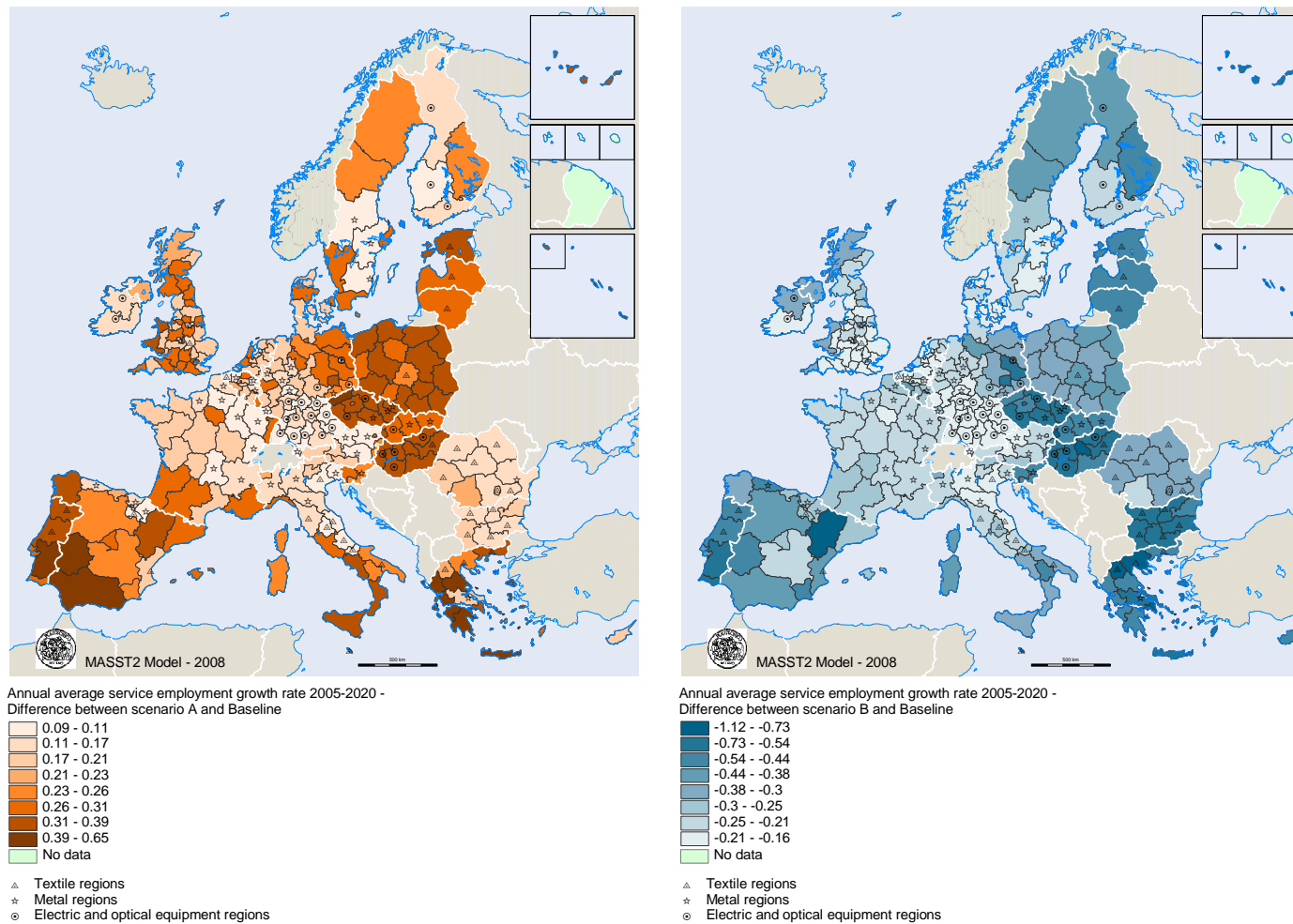


Figure 30 (left) and 34 (right). Average annual service employment growth rate 2005-2020 – Difference between the scenario A and baseline (left) and scenario B and baseline (right)

5.4. Disentangling the specific effects behind general trends

The description of the two scenarios has shown that scenario B is much more recessionary than scenario A and the baseline. An interesting and legitimate question is to understand which reasons are behind this general negative trend: in particular, the interest lies in finding out what is the role of an EU intervention (i.e. new decisions in structural funds) with respect to international macroeconomic trends.

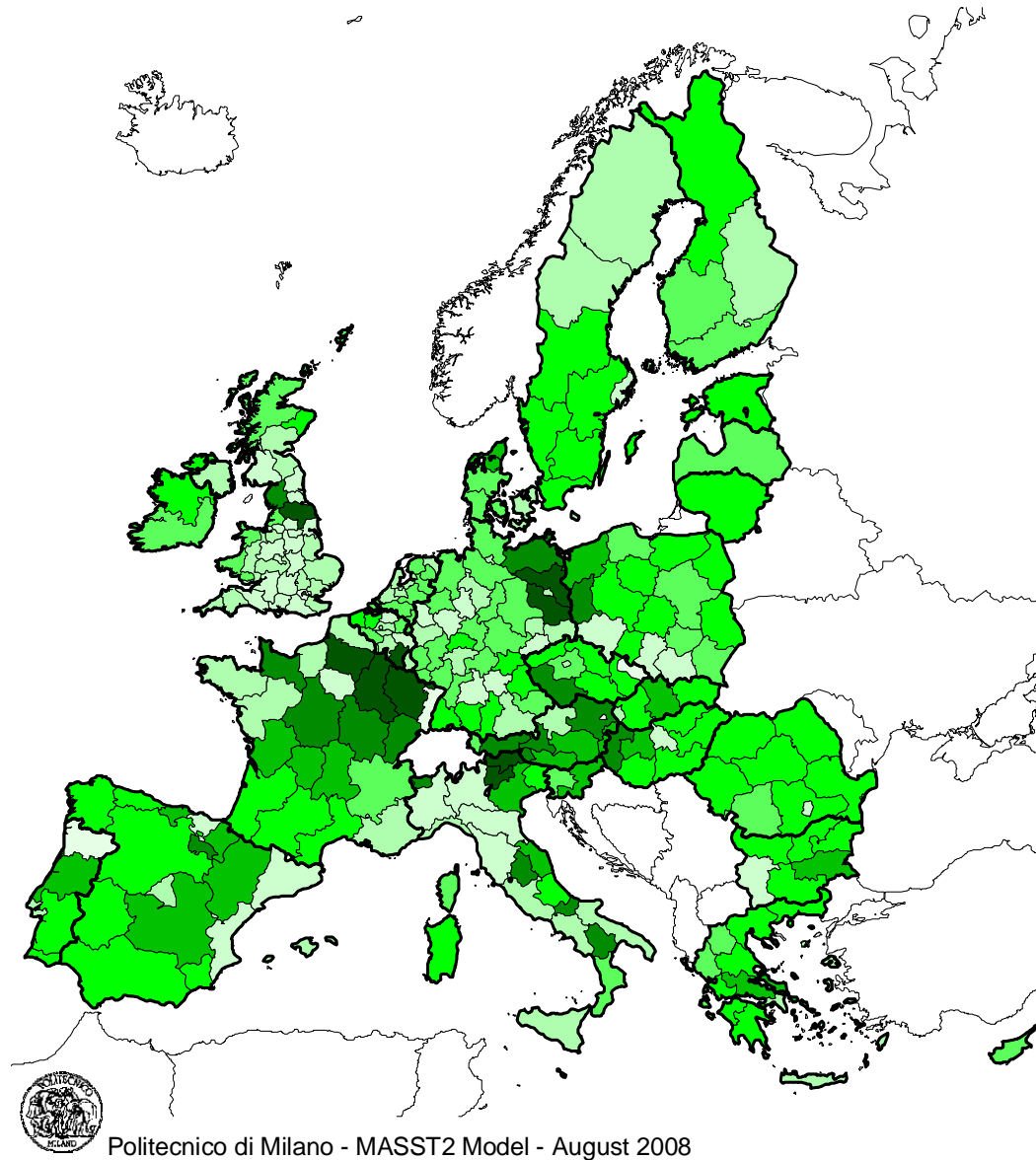
The simulation exercise we conducted is able to provide pictures of what scenario B would look like if we assume some of the assumptions to remain the same of the baseline. In this way, what is mapped is the difference in regional growth rates due to the assumptions kept constant to the baseline scenario (see Appendix 5.3 for a technical discussion of the methodology and the caveats).

This exercise has been run for different groups of variables, namely for assumptions related to:

- the competitive strategies of BRICs (Figure 35);
- the competitive strategies of Europe (Figure 36);
- the European conditions at the production level (Figure 37);
- the structural and cohesion funds (Figure 38).

Figure 35 shows the differences between scenario B and a scenario in which the competitive strategies of BRICs would remain the same as in the baseline; in particular, the map shows the effects of a more contained GDP growth in US, Japan and BRICs, a more contained interest rate, a relatively more limited attractiveness of FDI, a more contained price energy increase and a greater competition in vulnerable sectors of Europe (see Box 2 for the list of variables affected).

These assumptions are restrictive assumptions, as shown in the map; the effects of a cost-competitive strategy of BRICs are of detriment and sizeable for all European regions, in both Eastern and Western countries, including some in the centre of the continent. The least affected regions are the agglomerated regions, and, in general, the most urban and tertiary ones; this result can find an explanation in the fact that growth in the tertiary sector is in fact more dependent on indigenous demand than exogenous one. Moreover, the capacity of creating the conditions for endogenously driven sustainable development is higher in the most advanced regions, which have less than the others to rely on demand and conjuncture. It is also for this reason that even regions of the same typology are differently affected. One can finally observe that the assumption of a cost-competitive strategy of BRICs affects regions in Europe that are more directly in competition with the BRICs, i.e. manufacturing or rural areas.



Average annual GDP growth 2005-2020 - Effects of competitive strategies of BRICs

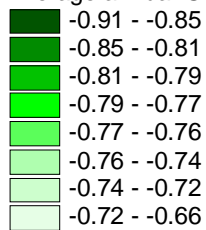


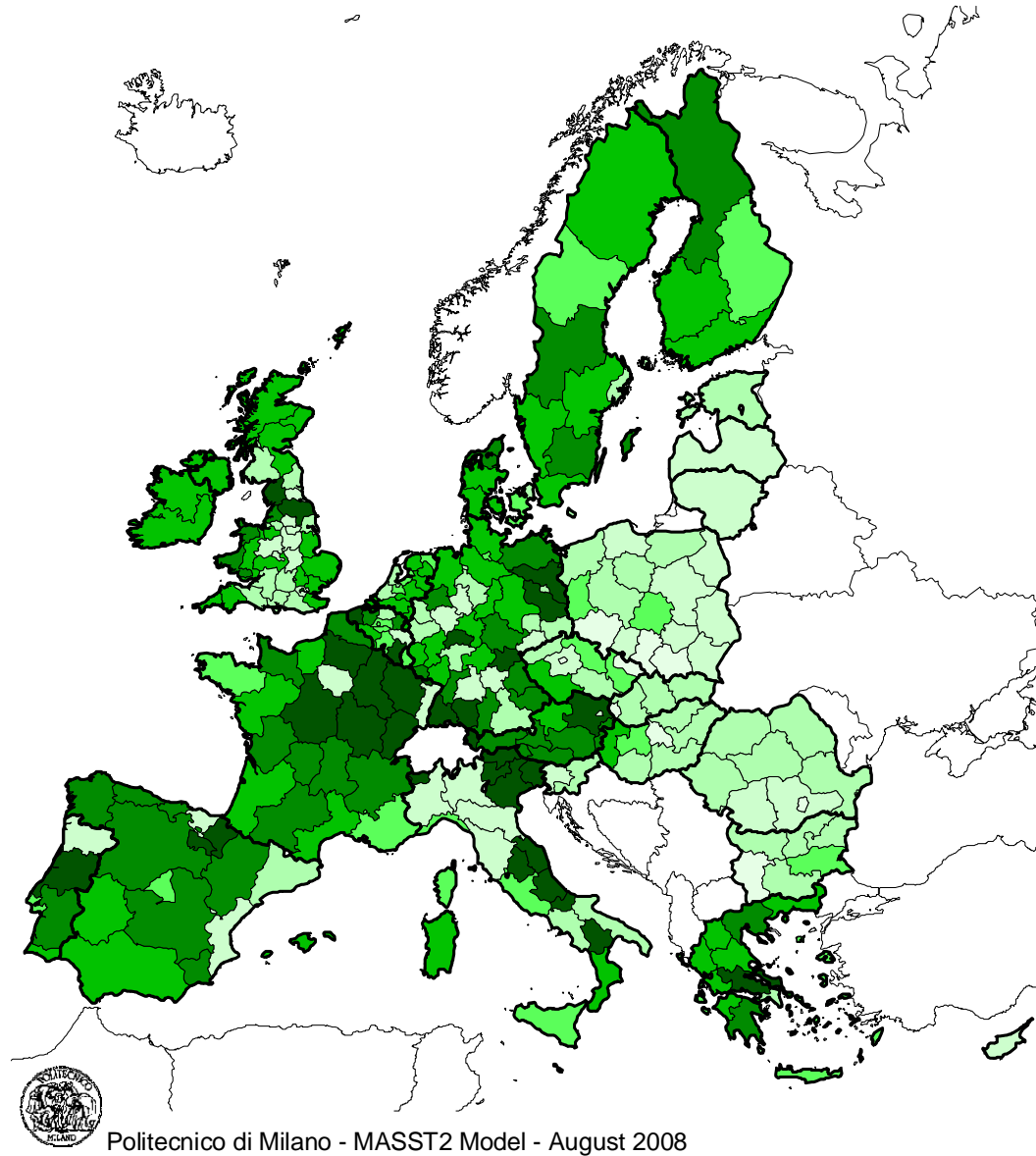
Figure 35. GDP per person in 2020 – Effects of the competitive strategies of BRICs on Scenario B

In figure 36, represented are the effects of the *competitive strategies of Europe* adopted in scenario B. In fact, mapped is the difference between scenario B and a scenario with assumptions related to the competitive strategies of Europe kept like in the baseline scenario; the effects of macroeconomic conditions like a higher cost-competitiveness, a higher

devaluation of the European exchange rate, a higher inflation rate and a more expansive public expenditure growth rate in scenario B are presented in map 2.

The overall effects of these macroeconomic assumptions are negative, although less than in the previous case. Moreover, one can immediately observe that, differently from the previous case, the effects are consistently smaller in the East than in the West.

In Eastern countries, more affected are those regions and those countries which are closer to the Old 15 member states. This group of assumptions of this scenario is hence less restrictive for the East of Europe. In the West, there are no great differences between peripheral (i.e. Mediterranean or Nordic) and central countries. The least affected regions within each country are generally the core ones, indicating also in this case that the development capacity of these regions is exogenous. It is noticeable, however, the fact that not all these regions have exactly the same behaviour and the capital regions are not necessarily the least affected; for example in Spain Valencia is less affected than Madrid, In Portugal Porto is less affected than Lisbon and, in Italy, Milan is less affected than Rome.



Average annual GDP growth 2005-2020 - Effects of competitive strategies of Europe

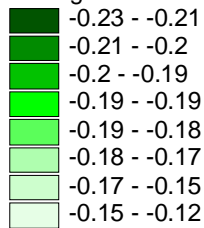


Figure 36. GDP per person in 2020 – Effects of the competitive strategies of Europe on Scenario B

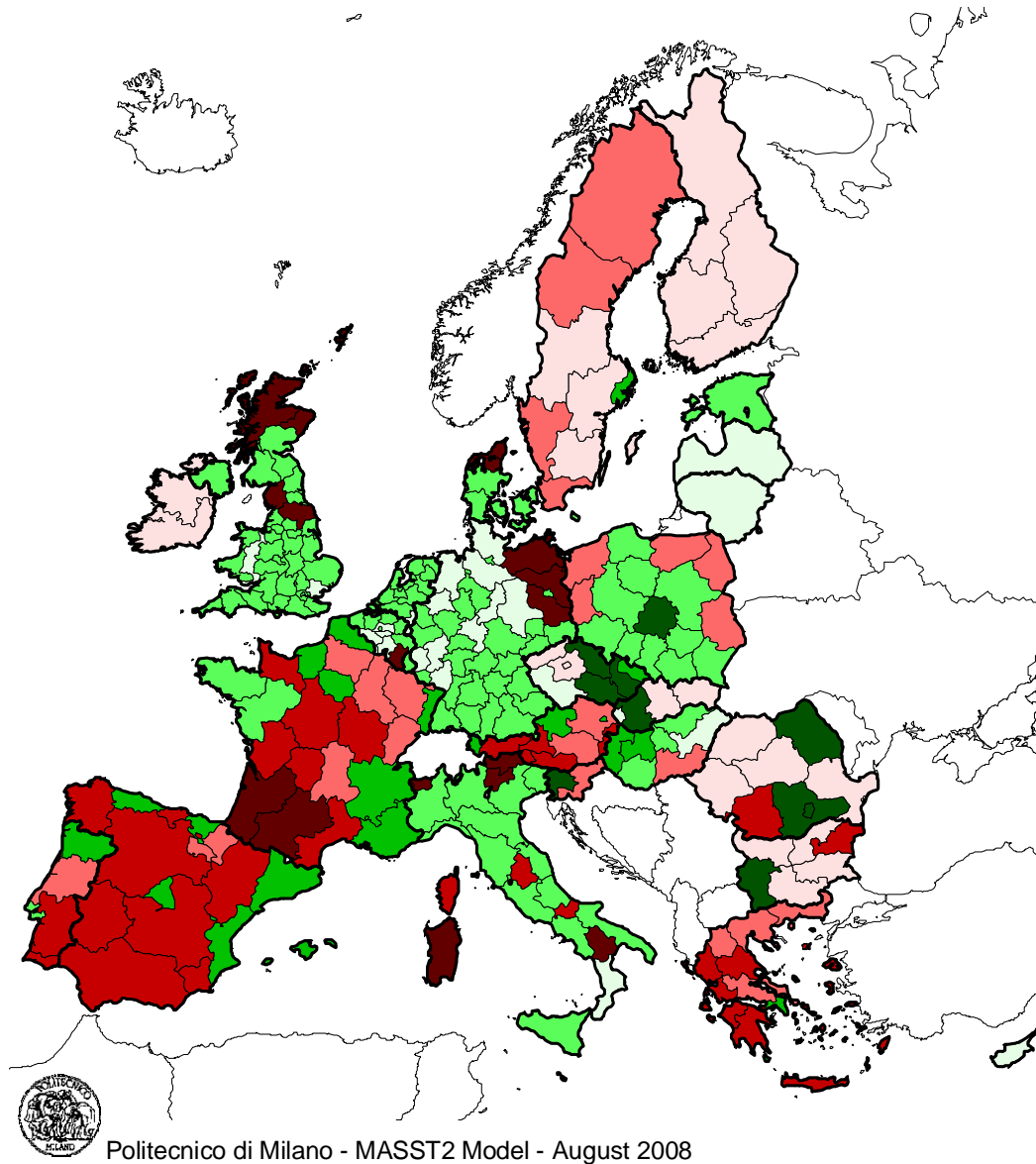
In Figure 37, represented are the effects of the *European production conditions* assumed in scenario B with respect to the baseline. In other words, mapped are the effects of an increase

in lower value added functions, especially in Eastern countries, of an increase in the specialisation of regions in vulnerable sectors, especially in Eastern countries, of a lower increase in inward FDI, and of a loss of trust in regions affected by more competition.

From the map, one can clearly see that the effects of changes in European production conditions are not necessarily negative for all regions, though on aggregate their effects are clearly negative. In fact, if the most populated and the core regions have a negative effect, other less densely populated and peripheral regions have a positive effect. This happens within almost all countries, in the Old 15 and in the New 12.

In particular, it is possible to observe that the vulnerable regions have on average a much more negative effects than the others, since they are those where the vulnerable sectors are located and competition in these sectors is stronger in scenario B than in the baseline. Moreover, it is possible to observe that the rural regions have on average a more positive effect than the others, since they are less affected by the hypotheses on production conditions in this scenario and in particular do not suffer from the fact that service activities are growing less.

The result is that the assumptions on European production conditions have a clear spatially redistributive effects, in favour of some (not all) of the poorer and peripheral areas. This effect, though, does not favour the New 12 member states, but only takes place within countries.



Average annual GDP growth 2005-2020 - Effects of European production conditions

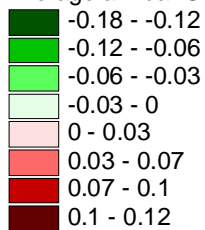


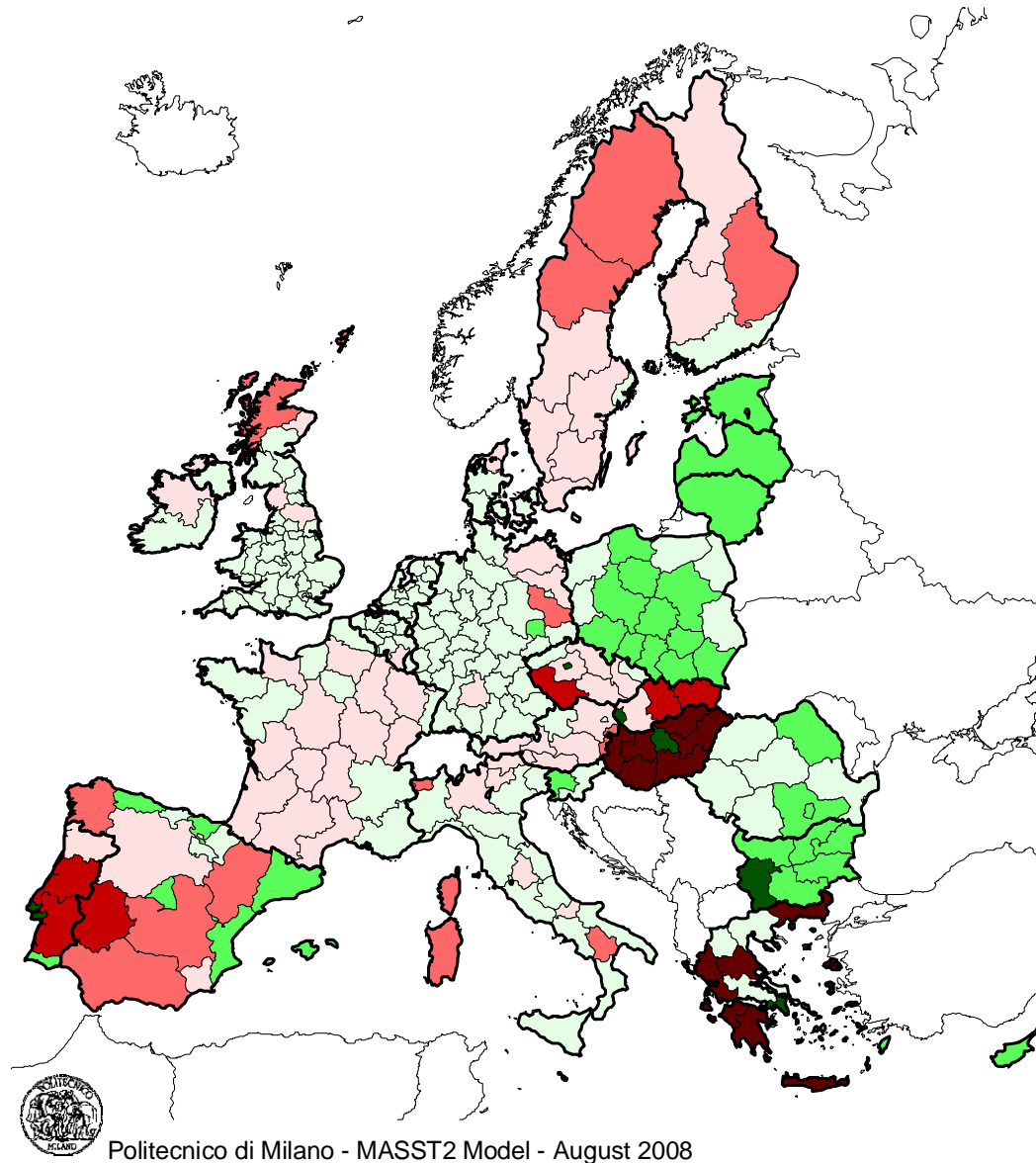
Figure 37. GDP per person in 2020 – Effects of European production conditions on Scenario B

In Figure 38, the effects of the changes in the assumptions on *structural and cohesion funds expenditure* are represented; in particular map 4 shows the different growth rates due to the assumptions of a more limited amount of structural funds, allocated only to convergence regions.

Also in this case, the overall effect for the European Union is negative, but the redistributive effects seem in many cases to prevail, given the high variance in regional growth rates registered. In fact, the model, as the real regional economic growth within countries, has a generative and a distributive effect. The generative effect is negative in this scenario, since funding is lower. This effects is clearer in countries such as Poland, Romania and Bulgaria where all regions lose from the assumptions of scenario B.

For other countries, however, the fact that convergence regions are the only ones to continue to get funds, is more important than the fact that they get less money. For this reason, they are able to capture a larger share of the national economic initiatives and this allows them to get a positive effect from the new distribution of EU funds. This can be observed in countries such as France or Italy.

For other countries, where growth has been polarized for years, this polarization effect of the assumptions on structural funds is even stronger. In Greece, Spain, Portugal, Hungary, Slovakia and the Czech Republic, the redistributive effect is very strong and, the core areas (Athens, Madrid, Barcelona and Valencia, Lisbon, Budapest, Bratislava and Prague) sum the negative effect from becoming unassisted from the EU with the negative effects of seeing a development which spreads over the other regions of their respective countries which continue to be assisted. The latter, in turn, become able to grow more in this scenario because their amount of structural funds, even if lower than in the baseline, is enough to allow them attract activities and investments which otherwise would remain in the respective core areas.



Average annual GDP growth 2005-2020 - Effects of Structural Funds assumptions

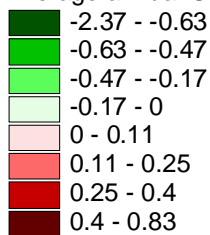


Figure 38. GDP per person in 2020 – Effects of Structural Funds assumptions on Scenario B

To sum up, we have seen in this section that the scenario is shaped by the effects of the various assumptions in a non-additive way. Macroeconomic assumptions (Figures 35 and 36) translate into lower growth rates for all Europe; this is true especially for some countries and regions which are less able to grow on endogenous capability and more reliant on spillovers and external demand conditions.

The negative assumptions related to changes in production conditions, being strictly linked to sectors, affect more those regions which are specialized in the sectors which are negatively hit in the scenario, for instance, in this case, vulnerable regions (Figure 37). Finally, redistributive effects are at place at the same time of generative ones. For this reason, some regions which are less negatively influenced by a scenario hypothesis, can even, in a limited number of cases, turn out to get a plus from that assumption; this takes place when they are able to attract growth from other regions which are more negatively influenced in the same hypothesis. This effect can be seen for production conditions (Map 3) and, more evidently, in the case of structural funds (Figure 38).

Structural funds assumptions play a very important role in explaining the results of scenario B. They have two important effects; first of all, a generative regional growth effect, in that they allow, when present, a high increase of GDP growth rate. Secondly, more important, they play a vital role in redistributing growth across regions of Europe, an effect which is not at all generated by the other assumptions in a so strong way.

5.5. Main findings for the vulnerable regions

In the prospective analysis two scenarios have been presented, chosen on the basis of their political, institutional and economic importance. An *'aggressive Europe in a high-quality competitive world'* scenario allows one to measure the advantage of a European courageous strategy compared to a similar strategy put in place by the external world. In other words, the concern is to identify the advantages for Europe of undertaking a high-profile competitive strategy based on a large degree of openness when the external world is competing with the same degree of openness. A scenario of *'a defensive Europe in a cost-competitive world'* highlights the risk to Europe when a defensive strategy *vis-à-vis* external competition entails closure and protectionism while global competition is based on pure cost elements. Analysis of these competitiveness strategies is even more interesting when also EU Member countries pursue such a low profile strategy: their cost-competitive strategy may prove weak in front of similar strategies undertaken by large emerging countries.

If we look at the most courageous scenario, in which competition increases in the non-vulnerable sectors, the prospective analysis reports the following results for the vulnerable regions:

- vulnerable regions would benefit, as all others, from the scenario of a courageous strategy more than from a scenario of protectionism. Within vulnerable regions, the ones taking less advantage from a courageous scenario are the rural ones;
- in terms of GDP per capita, vulnerable regions follow mixed patterns, also because this typology contains both "global vulnerable regions" and regions "vulnerable in one sector". Those in the west appear on average as having a good outcome; their endowment of urban and tertiary structure is probably its winning feature. Vulnerable regions in the East, on the contrary, are generally outperformed by the – non-vulnerable – capital regions;
- interesting enough, in the courageous scenario vulnerable regions show mixed evidence in terms of industrial employment dynamics, but in general they are the ones

which lose more. This is a scenario in which vulnerable sectors are less affected by external competition than now: given this assumption, our result suggests that the more tertiary and less specialized structure of non-vulnerable regions help them in growing even in front of a high competition in non-vulnerable sectors;

- vulnerable regions are the ones gaining less in terms of tertiary employment. They seem not to be able to replace industry with tertiary activities.

If we look at a less courageous and more protective scenario, in which however competition increases in the vulnerable sectors, the most interesting results for the vulnerable regions concern:

- different sensitivity in terms of GDP growth between Eastern and Western vulnerable regions; the former have higher variance in terms of GDP growth than the latter;
- the decisive loss in industrial employment growth in vulnerable regions;
- the relative lower loss of service employment growth in vulnerable regions with respect to the others.

6. Conclusion

From its outset, this study was laid out to explore the influence of sectoral structure, and notably the specialisation in those sectors in which Europe seems to have lost some of its competitiveness, on the economic performance of regions. We have identified the relevant sectors and regions and then subjected the data concerning the regions to a series of tests in order to understand how important sectoral structure might be, moving from a descriptive to an analytic approach, using both diverse quantitative tools and qualitative case studies. In the following we present both our scientific and our policy-oriented conclusions.

6.1 Major scientific conclusions

The major conclusion from the study is probably the difficulty in using sector structure as an indicator of regional vulnerability to globalisation, even though at a EU27 scale such structure might be relevant to analyse the vulnerability of the EU economy as a whole.

At EU27 scale and above we can quite clearly observe the evolution of geographic production and trade cycles where certain types of production move from one macro-region to another during the life-time of a product cycle. These types of production can then often be linked to specific economic sectors, explaining the clear sectoral vulnerabilities observable at EU27 scale.

At regional scale, however, the issue is more complex. It is undeniable that some regions have lost sectoral employment and value added in the medium term. This is most evident in textile and metal regions. However, the regional reactions to these evolutions have been very diverse, and so it is difficult to infer a general regional vulnerability from a sectoral structure.

This is due to several issues:

- Limited statistical tools: Although this may sound like the classical excuse of researchers for not giving definitive answers, it is important to remind ourselves that at least two aspects of the data seriously hamper the analysis: a) limited sectoral resolution and b) the absence of regional trade data. It is thus often difficult to isolate the precise sectors which are subject to more intense competition than others and to analyse the actual dependency of a region's economy on trade, notably extra-European trade, in those sectors identified as vulnerable. This means that a similar sector structure can hide very different regional realities concerning the role of this sector.
- An important factor is not the sector structure in itself, but rather the segments of production (or segments of the value chain) within that sector which are present in the region. When we speak of vulnerability to globalisation, we actually mostly mean vulnerability to competition based on the possibility to “taylorise” production in specific segments, i.e. to reduce complexity and thus increase transferability of the production process to lower cost parts of the work force, be it locally, or globally. It is, thus, not sufficient to identify those regions active in a specific sector without also differentiating by segment of production. Some sectors might concentrate some types (e.g. generally low qualifications in textile), and so a link can be established, but this

is not automatic.

- Sector structure is not sufficient to explain the general economic system of a region as many other, tangible and non-tangible, factors contribute to a region's performance, even within a specific sector. The dialectic relationship between sectors and “territorial capital”, with certain forms of territorial capital favouring specific sectors, but also specific sectors influencing factors such as firm size, entrepreneurship, informal cooperation structures, etc, also contributes to complicating the issue.
- Finally, in the perspective of a prospective analysis, it seems quite hazardous to isolate specific sectors as being potentially vulnerable in the future, as any choice will by definition be speculative and, thus, bear the risk of “betting on the wrong horse”, especially in the context of the data limitations mentioned above. In addition, as the analysis has shown, it is often not a sector as a whole, but specific segments of production within this sector, which are vulnerable.

These issues do not mean, however, that the analysis by sector does not reveal a series of interesting elements that can be useful in supporting the reflection about appropriate policy instruments and we will go into these a bit further on. It does mean, however, that once controlled for (a detailed) sector structure, general theory about factors of regional competitiveness is probably more relevant for the understanding of the success or failure of regions to deal with their vulnerabilities.

This seems very much in line with the growing body of theory concerning evolutionary economic geography which tries to explain the phenomena of regional path-dependency and lock-in, with the “key question as to why some regional economies become locked into development paths that lose dynamism, whilst other regional economies seem able to avoid this danger”.²⁰ The development paths of the vulnerable regions as defined through sectoral vulnerability to global trade thus seem dependent on many other factors than those linked to this specific vulnerability, and are, thus, more linked to the general question of regional development on which the body of literature is very large without coming to definite answers.²¹

A second important issue is that the relationship between evolution of GVA and evolution of employment is not straightforward at regional level. For example, textile regions have lower total GVA growth but higher employment growth than other vulnerable regions. Dominant economic theory has it that rising GVA should lead to rising employment levels. However, it is not clear whether this holds true as much on a regional level as it might on macro-economic scale. Politically, this thus raises two important questions: a) If the relation GVA-employment is true at regional scale, what needs to be done to favour a positive impact of GVA on employment? And b) If it isn't true, which of the two should be of higher priority at regional scale? These questions are obviously linked to the general issue of the social impacts of different economic paths, notably linked to the levels of qualification of the work force in relation to the types of jobs lost and created. It seems quite obvious that low-qualified persons

20 R. Martin and P. Sunley, “Path Dependence and Regional Economic Evolution”, Papers in Evolutionary Economic Geography #06.06, Utrecht University.

21 DG Regio already has the results of the study on « Factors of regional competitiveness » prepared by Cambridge Econometrics, Ecorys-NEI and R. Martin in preparation of the Third Cohesion Report and which deals to a great extent with this general question.

suffer most from negative impacts of globalisation, but this is true for all regions, not specifically the vulnerable ones.

6.2 Major policy conclusions

We can, therefore, conclude that there is a great heterogeneity amongst those regions which are designated as “vulnerable” according to criteria defined at EU27 scale. This also means that any policies will have to be sufficiently differentiated to respond to this heterogeneity. It is very important to note that the differences between regions are to a large part not defined by their sectoral structure, but that a combination of this sectoral structure with more general factors of regional growth will have to be taken into account. In this context, we provide below some tentative conclusions that we can make concerning some specific aspects of the vulnerability of regions, based essentially on the case studies with support from the quantitative analyses.

- **Embeddedness of development**

An important criterion concerning the resilience against the impacts of specialisation in vulnerable sectors seems to be the level of embeddedness of firms, notably large firms, in the region. Regions which are dominated by large companies in vulnerable sectors without being able to anchor these firms in their local tissue are very vulnerable to the increased mobility of these firms, especially if they are foreign-owned. Anchorage in this sense means that the large firm is made dependent on very specific factors of the region, mostly specific forms of cooperation. An example which is often observed is that of cooperations between industry and research, although it is not always easy to discern whether this cooperation is a consequence or a cause of the rise of this sector in the region. Such anchorage seems, however, to be very difficult to achieve in the context of highly mobile FDI. The example of Airbus in Toulouse can, however, be considered as a region of this type, linked to heavy public investments, notably in education and R&D. This does not mean that such a region would not suffer from the departure of the large firm (although there is some level of hope that the newly created local tissue is beginning to be “self-sufficient” enough), but only that this departure is made less likely. Another example, but of a different kind is the one of Nokia and its impact on regional development in Finland. Here, however, the cooperation structures have grown endogenously with the firm, and links are thus even stronger, making the departure of the firm even less likely and making a reproduction of the case by political means very difficult.

On the other side, the examples of Western Hungary and Romania show the extreme vulnerability of regions which have not been able to create such anchorage because of the lack of time and the lack of investments stimulating the development of endogenous factors linked to the foreign firm. These cases provoke the question whether it is politically possible to create these anchorages, combining the factor of time (encouraging firms to stay longer) with the factor of money (investments in supporting factors). It does seem obvious, however, that a policy of attraction of FDI based on low labour costs does not allow a sustainable development of these regions if it is not accompanied by intensive policies aiming at embedding the foreign firms.

- **Profiting of spill-overs**

In cases where it is not possible to embed a firm sufficiently in a region, efforts are necessary to at least ensure that the regions profits of the income, innovation and learning that the presence of large firm provides, by using these resources to support the development of endogenous capacities. In light of the very short cycles in the most vulnerable regions, this means that policies would have to act very quickly and decisively, implying significant investments in education, innovation, etc. Often, however, these regions do not have the financial means to launch such investments, ever so much as their attractiveness is often not only based on low labour costs, but also on low levels of taxation.

- **The fragile successes of SME clusters**

The scientific and political literature of the last decades has strongly emphasised the importance of clusters in the explanation of regional development. In the vulnerable regions identified in this study, the capacity of classical cluster regions (notably in textile, such as Western Flanders and the Third Italy) is not as clear cut. Many of these regions have suffered significantly and current total regional value added growth levels are often (relatively) lower than they have been in the past. The main conclusion that can be drawn from the case studies is that the specific forms of cooperation and flexibility that characterise these clusters has provided them with a certain level of resilience, but that these factors are only marginally influenced by policy. Rather, these regions are a very clear example of path dependency with most of their intangible structures being the product of centuries of historical developments.

One weakness of these regions is that while they show a very high level of innovation in terms of procedures or new product lines, their technology content is often fairly low and the R&D into decisive new technologies limited. In a global context where the control of new technologies becomes one of the major sources of revenue (in the form of so-called “intellectual property”), channelling important proportions of the total value added created in a value chain, this limited technological innovation constitutes a potential problem for these regions. Political actions thus might be possible in the support to these regions in that field, although generally this requires significant investments normally engaged by large companies.

- **Education**

The level of education seems to be a quite decisive factor in the possibility of regions to either embed firms into their local tissue, to favour spill-overs from large firms to the region or to ensure the functioning of clusters. In this context, it is often the quality of the basic levels of education (up to the end of the secondary degree) which seems highly influential, as this provides the basis for the absorption of new knowledge, more so than different forms of vocational training (which bear the risk of actually reinforcing a region's dependency on specific types of production) or tertiary education.

- **Protection of territorial capital**

Regional decline is often a heavy and long-term process as general inertia of people and structures, but also the sunk costs of physical infrastructures can be very important weights that slow down any efforts in reconversion. At the same time, as both the recent literature and the case studies highlight, a very important aspect of regional development is reflected by the

notion of “territorial capital” or “sense of place”²², reflecting the idea that a series of intangible elements rooted in the specific territory are drivers of the economic development of that territory. In that context, it seems worth looking at the experiences of some declining regions (e.g. the Ruhr area) more in detail to study how some forms of public interventions have helped these regions to protect some of that territorial capital and how policies aimed at regional restructuring can be thought in such a way as to maintain it.

22 See, amongst others, R. Camagni (2008), *Regional Competitiveness: Towards a Concept of Territorial Capital*, in R. Capello et al, *Modelling Regional Scenarios for the Enlarged Europe*, Springer, pp. 33-47, and R. Bolton (1992), 'Place Prosperity vs People Prosperity Revisited: An Old Issue with a New Angle', *Urban Studies*, 29:2, 185 – 203.