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"Europe/ESPON and world regions"

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Introduction

The objective of this working paper is to present the solutions explored to build world regionalization in order to compare the position of Europe in the world with the position of other world regions. The main constraint of the exercise is to produce comparable entity or comparable groups of countries in order to describe the resemblances and difference between ESPON region and other world region on the competitiveness and cohesion criteria.

This working paper will start by the presentation of the theoretical background of the world regionalization and then we will propose two main approaches to assess the position of Europe in the world. In the first one, we try to build two other challenging world regions based on the European Union definition and we describe the position of those regions in some indicator and also their internal disparities. In the second approach we choose to deconstruct Europe and to build world regions in order to see what will be the spatial extension of Europe and other world regions if they construction is based on the same method and following two main scenarios : the competitive scenario and the cohesion scenario.

This working paper is a draft version. As we faced numerous methodological obstacles, we are late on numerous parts. However, the problems are identified and sometimes solutions have been found. However we did not have the time to implement them. Those situations and future improvement are identified in “green” paragraphs in this working paper.

1. Theoretical background: world regionalization

The act of dividing the world in different parts is absolutely not a neutral one. Building spatial units is a manifestation of the representation or even appropriation of the space, even when this space is the world. It is often the projection of a vision of the world, classifying the different places of the world according to a specific point of view (ex. the division of the world between “East”, “West” and “non-aligned” during the cold war). It is also a reduction of a large space into smaller parts, in order to make it more convenient for its management and its control.

Many divisions of the world coexist and they belong to different kinds. According to the literature reviewed two types of world divisions can be identified. First, some conceptual divisions of the world based on meta-geographies, i.e. “set of spatial structure through which people order their knowledge of the world” (Lewis & Wigen, 1997). Then, functional divisions of the world, that seems to be more neutral, but that are often also based on meta-geographies. Between those two kinds of divisions, a third intermediate one can be identified: the continents division of the world.

1.1. *Review on existing divisions of the world*

Cognitive divisions of the world

Based on a conceptual specific point of view of the world, divisions of the world placed in this category are both results and instrument of ideological power, as they are intensively used by politicians, diplomats and military strategists... (Gentelle 2008) As stated before, the

East/West divisions of the world belong to this category but also the “North/South”, “developed/under-developed”. We should also add in this category the division of the world based on “civilizations” proposed by S. Huntington, mainly because of the correlative message of conflict associated with them. In these approaches the regions used are often quite simple stressing an opposition between two or three parts of the world and they reflect merely some stages in the geopolitical situation of the world in a globalization context for these reasons. This kind of divisions of the world cannot be used in this project.

An ancient subjective division of the world often used as operational neutral one: the continent

Facing the world realities, the continent seems too simple and they are built on the medieval European conception of the world in three parts according to the Bible, even if the discovery of America and later Australia make necessary the invention of new continents. Those historical constructions often seem neutral and even “innocent” but they raise more and more problem in the organization of information at the world level (Grataloup, 2009). They also raise the problem of the survival of a kind of geographical determinism as the social facts are interpreted within the continental framework (Lewis & Wigen, 1997). Despite this they are often used in statistical compilations at world level (mainly in UN, World Bank, WHO etc. statistical publications), with sometimes some refinements often based on a “civilizational” aspect as the separation between “Black” and “North” Africa. This world regionalization is the most anchored in cognitive representation of the world and it is nearly universally shared. Beyond the problems stressed below, the division of the world into continents raises the question of their limit: they are both variable (especially for Europe) and “fixed” (America /Africa separated by the Atlantic Ocean) according to the academic traditions and the variation of ideological points of views.

“Administrative” operational divisions of the world

The only universally accepted (or almost) division of the world is the state level. It is the base of the international relations, but it is not very relevant to conduct geographical analysis at the world level: sometimes it is necessary to compare group of states, sometime we would like to have more information on the infra state level, especially when the countries are large and heterogeneous (Russia, Brazil, India, China etc.).

As far as grouping of states are considered, regionalization is a division of the world that emerges with the signature of cooperation treaties (mainly in trade). (in this case) Regionalization is the building of regional economic groups of countries resulting from the signature of preferential agreements between their members. In 2004, 158 regional agreements were signed. The Treaty of Roma signature in 1957 between six European countries, and three years later the creation of the European free trade association were followed by the setting up of other agreements mainly in Latin America and Africa. Today the regions formed represent more than 80% of the world trade. But those functional divisions of the world are not really operational for a geographical analysis at the world scale because some of them are overlapping and in the same time some spaces are excluded. In addition, it is difficult to use these groups because the situation is quite different in each “region” as far as the level of economic and politic integration is concerned.

Mixed divisions: administrative and global oriented divisions

The United nation statistical division proposes two main divisions of the world on its web page “Composition of macro geographical (continental) regions, geographical sub-regions, and selected economic and other groupings”¹ but unfortunately, the website does not explain how these divisions were built. The first division proposed is a hierarchical division in 4 levels. The first level is the world, the second one is called “macro regional” (continental) regions, the third one (geographical sub-regions) and the fourth one is the state. As stated before the “macro regional” division is a “continental” division in six parts with Africa, Americas, Asia, Europe and Oceania. Sub regions division is done following an apparently objective geographical perspective : the names used to describe the area are often the orientations (Eastern Europe, Northern Europe, Southern Europe, Western Europe), even if the indication of the direction do not solve the problem of the choice of the limits. In some cases other names are used for regions that are often considered as “natural regions” (Melanesia, Micronesia, Polynesia). In this first division, geography is mobilized to provide a division that seems neutral and objective. The other divisions proposed are grouped under the name “selected economic and other grouping”. The first one classifies the geographical regions seen previously according to their level of development. Two “regions” are proposed: “developing regions” and developed regions. This quite simple division of the world is commented by a note stating that there is no “established convention for the designation of “developed” and “developing” countries or areas in the United Nations system” and restringing then the decision taken “in practice” concerning one particular country or region. This simple division in two regions is accompanied by another classification but with only one criterion for each of them (two regions are build that way: one corresponding to the criteria and one grouping the rest of the world countries). Those categories are: “Least developed countries”, “Landlocked developing countries”, “small island developing states” and finally “transition countries” that gather the countries “in transition from centrally planned to market economy”.

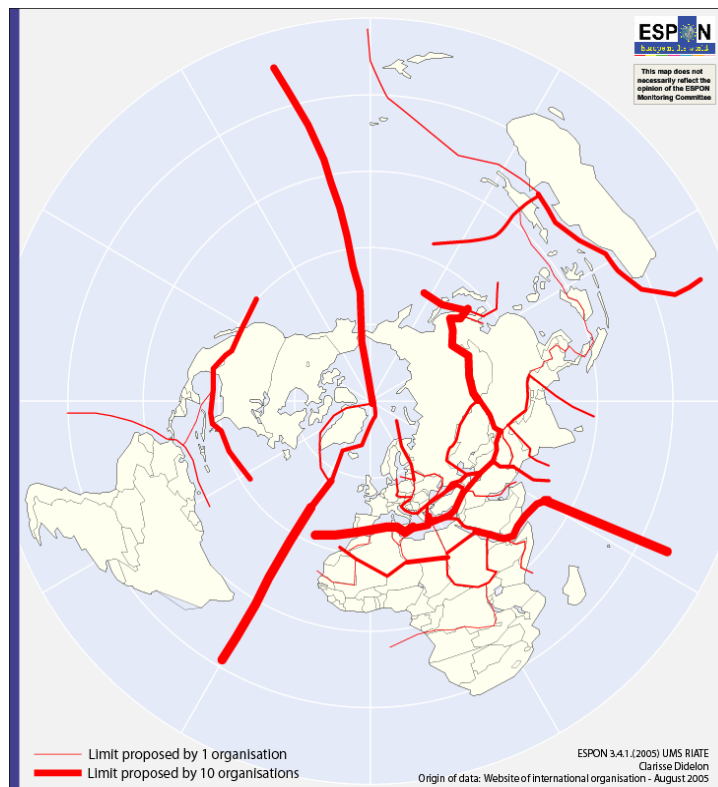
The **divisions of the world proposed by the World Bank** mix an economic, geographical and maybe cultural approach. On the page “countries and regions” of the World Bank web site² six are proposed; one exists and is not visible. The latter gather USA, Canada, Australia and developed countries in Europe in maybe a category “developed” economies”. The rest of the world is where the World Bank deploys its activities. It is split in 6 regions (Africa, East Asia and Pacific, Europe and Central Asia, Latin America & Caribbean, Middle East & North Africa, South Asia) that seem to be built on geographical and cultural criteria.

Those are only two examples, but they are significant of the variation of administrative divisions both in term of limits but also of meaning of those divisions. Each firm of the world (Didelon, 2011), each country diplomatic service, each international organization develops its own world division (Didelon, 2006) that leads to a high variety of limits, even if some of them are very recurrent (Figure 1). This situation leads to the accumulation of artificially different visions of the world. It also makes it difficult to make regional comparisons and for actors at global level to coordinate together if necessary.

Figure 1 : international organisations limits

¹<http://unstats.un.org/unsd/methods/m49/m49regin.htm>

²<http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/0,,pagePK:180619~theSitePK:136917,00.html>



Functional divisions of the world

Finally, some other kind of regionalization exists at world level, based on functional approach. They may also be rooted in strong theories (Marxism, for instance)). Here, the homogeneity criterion is not the most important one, but the complementarity or dependency between spatial units interlinked by flows of different nature. In this functional approach, we can firstly notice a “conceptual or ideological” vision of the world: the one that classifies world places in cores, semi peripheries and peripheries. This vision is roughly limited to an economic view of the world where places are more or less dominant in the production of goods and in the exchange flows. However, this division of the world can also be associated with development categories (Reynaud, 1981, Amin S., 1973) or with historical and geopolitical vision (Braudel, 1988, Wallerstein, 2006).

Secondly, we can notice a “functional” and “operational” division of the world: the one concerned by the areas of regional integration. Those areas are build buy the signature of treaties on specific topics (mainly trade agreements) between some countries, generally on contiguous relationships. Those regions (ASEAN, EU, NAFTA, MERCOSUR etc.) have a concrete existence, but they are difficult to use in a comparison objective, because the integration level in not the same at all between the regions, and the treaties have not the same contents and objectives. Moreover, many integration regions co-exist and some countries could belong to two or more regions. The integration areas could then overlap and this is not very useful for comparisons.

“Researchers operational divisions of the World”

All the previous divisions of the world described above are used in specific context (cognitive or operational) and they reveal often not very useful for analyzing phenomenon at the world

level and for conducting comparisons between world regions. So, some attempts have been made by researchers to build their own world regionalization that could be useful in different context.

WUTS in ESPON. Some efforts exist to propose new **operating divisions** of the world but it is mainly in the academic world and those divisions are not very diffused. The WUTS (World unified territorial system) set up by the ESPON 3.4.1. “Europe in the World” is an example of academic operating division of the world (Didelon & Grasland, 2006). It is a proposal of harmonized hierarchical division of the world based on the example of NUTS (Nomenclature of Territorial Units for Statistics) created by Eurostat. This division of the world has purely statistical and cartographical objectives and it is organized in 5 hierarchical levels, from the level of States (WUTS5) to the level of the World (WUTS0). This WUTS system has been built through a participative method with all partners implied within the ESPON 3.4.1 project. A first proposal of division of the world has been proposed to discussion. The comments have been synthesized into a new proposal. This process went on until a consensus emerged on each particular case among the members of the team.

The WUTS system proposes 5 hierarchical levels, plus the world level:

- WUTS 0: the world
- WUTS 1: three global regions (EurAfrica, Americas, AsiaPacifica)
- WUTS 2: seven macro regions
- WUTS 3: seventeen meso regions.
- WUTS 4: twelve micro regions (only at the level of European Union and its neighbors).
- WUTS 5: States

One of the main advantages of the WUTS is the correlated comprehensive creation of nomenclature that allows aggregating or disaggregating easily the spatial units. That is very convenient for statistical and cartographical purposes. However the major critic that could be address to the WUTS is the methodology of building them. The first proposal was based on a “mixture” of conceptual visions of the world but also with some functional preoccupations. It used both the continental vision (visible in the names used), the north/south vision (making the WUTS 1 region as the grouping of a developed core and its “natural” semi peripheries and peripheries), but also a kind of civilization vision with for example the aggregation of “Latin America” on a language criteria and the apparition of a north African / Western Asian area that isolate the “Muslim world” that have merely the same extension has Huntington ones even if the authors stress that the economic and demographic dynamics have been the main criteria to build this area. As an example of “functional” criteria used in the constitution of WUTS, is the decision assumed by the authors to use the criteria of aggregate “which could be relevant for the elaboration of European policy recommendations or for the development of strategic Plans”. This operating perspective is even more stressed by the flowing division in micro region that is only proposed for European Union and its neighbors. This Eurocentric way used to build world divisions was implied by the project orientation but it is quite damageable in global perspective.

Last but not least, some even more subjective points of view have been mobilized for the elaboration of the WUTS. First the division in seven meso-regions takes into account the results of the survey on the vision of the world of the ESPON program participants (made in

Luxembourg in May 2005). But also, some of the comments made by the partners during the process of proposals and feedbacks were clearly based on representations.

1.2. Regionalization principle and time problems

The concept of regionalization is ambiguous because it is twofold. The first sense relates to the way one divides the global space. The second sense focuses the growing interaction between geographic neighboring territories, at different scales. They are three types of spatial regionalization:

- Regions may be considered as objects of mental spatial representation
- Functional regionalization is based on the growing exchanges and interactions between contiguous territories (Balassa, 1961, Baldwin, 1997)
- A homogeneous region is characterized by the combination of human, social, natural characteristics, whatever the size of the considered part of the earth surface is.

Thanks to its ambiguity, the concept of region is convenient because it can be applied at different scales, from the local to the global. As such, regions cannot be taken for granted. They are not given once for all. The regionalization is by definition an ever ongoing multifaceted process. It cannot be addressed without considering the time dimension. The limits of these regions are fuzzy and unstable over time. Consequently, in this report the study of world regionalization spans over a period of almost twenty years (1989-2009).

The first sub-period starts in the 1980s, precisely at the moment when the global economy shifts from internationalization to globalization (Michalet, 1984). Besides, this moment is marked by the end of the cold war, which symbolizes the end of the two closed economic blocks and the progressive emergence of a polycentric world no more based on the traditional division of the world in “three” ensembles: the liberal and capitalist world, the communist world and the developing world. It also the moment when the closed regionalism is progressively replaced by an open regionalism (Gemdev, 1999)

The second sub-period (1995-1999) is marked by several economic and political dynamics: the acceleration of the transition of former communist countries to liberalism, the rapidly increasing number of regional agreements notified to the WTO, the extension of the scope of regional agreements from economic – first and foremost trade - to political issues,

The third sub-period (2005-2009) is marked by the emergence of polycentric world, on the economic and political points of view with the relative economic decline of the USA and European Union and with the arrival emerging economies on the global stage. It is also the moment when internationalization is replaced by globalization and open regionalization, with growing financial flows. This process is combined with a political one: emerging countries are more and more claiming for a new distribution of power at global scale and for better balanced relations.

1.3. Regionalization for comparison

Two main approaches can be used in order to build divisions. The first approach is “a priori”. In this case the existence of geographical ensembles are acknowledged at the beginning of the process and then to identify the limits of those ensembles. The second approach is “a posteriori”. This approach is allowed by the progresses in statistical and cartographical

analysis. In this case, one phenomenon (or more) is studied and the aim is to identify thresholds in its variation in order to build regions that will be then defined.

A priori regionalization

In this approach the regions are defined on the basis of their names and then the spatial units are allocated to a region if they fit the definition of the region suggested by the name. For example, one can wish to define a “Central Europe” region (Sinnhuber, 1954). The name given a priori to the region implies some criteria for belonging or not to “Central Europe”. Those criteria could be based on social, economic or cultural definitions of what is “central Europe” or even in physical criteria. Those criteria could be mobilized individually or together in the checking of the region limits in order to decide which country, or infra-national space could belong to this region.

This approach leads generally to the definition of the “core” of the region, i.e. the places that always belong to that region, but also to the definition of some margins describing how much the places belonging to the regions on all the criteria. This method then, very often leads to build fuzzy regions, as the limits drawn could be different for each indicator used in the definition of the region.

In a perspective of comparison of world regions, that kind of region building implies strong hypothesis on what we want to compare, because that will influence the criteria mobilized for building the regions. In the framework of the TIGER project, we have to compare the ESPON space with other “challenging” spaces. This approach will be used in the part II of this paper.

A posteriori regionalization

In this approach regions are built using some indicators and some methods, often statistical, based on two main concepts that define the region. Spatial units should be contiguous and as much homogeneous as possible to be grouped in the same region.

Contiguity is one of the first characteristic that regions should respect (Haggett, 1973, Dumolard, 1975, Béguin, 1979). When spatial units are not contiguous but joined in a same group by a statistical analysis the result is a classification or a typology but not a regionalization. The criterion of contiguity implies that the spatial units grouped can be considered as a coherent upper level spatial unit.

Homogeneity is the second most important criterion used in regionalization methods. It implies a relatively high level of similarity between the spatial units grouped in the same region. However the measure of homogeneity raises some problem, whatever the scale of the analysis, because of the variation of the definition and the shape of spatial units (MAUP, Openshaw, 1984) but also because that the homogeneity level decrease with the scale of observation: on a criteria, for example demographic behavior, a French department is more homogeneous than France and European Union. More, homogeneity implies some specific relations between the spatial units that are sometimes not sufficient to define a region. Homogeneity implies cooperation between the spatial units grouped in the region, when heterogeneity implies complementarity (Pumain, Saint Julien, 1997), as it is the case in the definition of functional regions. Finally, the definition of thresholds on the indicators used to measure the homogeneity is an important issue, because it will have a great influence in the shaping of regions.

Then, when the regions are formed, they are analyzed thanks to the description of the distribution of the indicators used, and then defined: a name can be given to them or, sometimes only a short description. It is very important to be very careful in the choice of indicators because they will define the “theme” of the region formed and then the regions.

In this approach, the regions obtained will be comparable because they are built in the same way. What will be compared is the relative variations of the indicators between the regions, but also the shape and extension of regions.

2. ESPON compared with two “comparable world regions”

One main objective of our work package is to analyze the position of Europe in the world, and the evolution of this position and more precisely with world regions perceived as “challenging” one. In a first part we will present how we chose the regions and then present some results comparing ESPON region with other world regions.

2.1. *An empirical solution: choice of regions & method*

One first possible approach to try to assess the ESPON region within the world is to build empirically comparable regions. Many solutions are possible, but from a “competitive”

perspective it was clear that the ESPON region should be compared with the traditional challenging countries of European economies: the USA and Japan³. However it does not seem very relevant to compare one group of countries in one hand and single countries on the other hand as the challenge faced by the two kinds of geographical objects are quite different. The solidarity ideal of the European Union at stake in the majority of ESPON countries belonging to the European Union and the cohesion perspective of the European regional policy could eventually be compared to what could happen in a single country like USA or Japan. But in Europe, economic and social policies are still very much conducted at the national level. One solution could be then to analyze groups of countries with European countries but in this case, the solidarity between countries does not exist in the other region. Anyway, it seems that the problem cannot be solved and European Union cannot be really compared with any world countries whatever its size or to other world regions because of its extreme particularities. But still we have to compare the ESPON region with other part of the world.

To conduct this comparison we decided to empirically build world regions based on the model of European Union, knowing they will be very imperfect, taking into account both competitive and cohesion perspective. So we examined what are the overall performances of the regions compared to EU countries ones, but also what kind of problems the other regions would face if they were as integrated as European Union, for example in term on internal disparities? To build those “comparable regions” we decided to take into account the following criteria:

- The countries should belong, at least partly to **regional trade area**. This criterion is used because the integration levels of European countries are very high and this is one of the main characteristic of the European region. In institutionalization regional organization countries agree of a number of rules that implies high level of intra block trade. We choose then, in order to have the two other challenging poles of the triad to focus on NAFTA (USA, Canada, Mexico) and on ASEAN+3. Indeed ASEAN groups together 10 countries (Indonesia, Malaysia, Philippines, Singapore, Thailand, Brunei, Vietnam, Laos, Myanmar and Cambodia). This regional block does not cover all the relevant countries for a comparison with ESPON region. We decided then to refer to the ASEAN + 3 organization that is a meeting that takes place during the ASEAN submits. The number 3 refers to China, Japan and South Korea that are important economic and politic actors of the region.
- The area should contain **industrialized and rich countries** as it is the case in Europe. This was one of the reasons why we decided to work on ASEAN+3: we wanted to take Japan and Korean into account, but also the rich and industrial coastal Chinese provinces.
- The area should be characterized by a **certain level of internal disparities** because disparities can be important on some indicators between the European countries. For example, the GDP per capita of Luxembourg was 17 times more important than the one of Bulgaria in 2009 according to the World Bank. This implies specific issues in the regional policy. If not “regional policy” is implemented in NAFTA or ASEAN +3,

³ And this was indeed clearly stated by the ESPON CU in the term of reference of the TIGER project

it worth to take the internal disparities of those regions into account, even in a hypothetical way.

- To keep close to the definition of region we finally chose to maintain a **high level of spatial contiguity**, even if it is more difficult to the ASEAN+3 regions that is characterized by the presence of many island countries.

Finally, the choice to compare ESPON space with NAFTA and ASEAN3 (Figure 2) seems the less imperfect one. We propose then to compare the ESPON space with a north American region (Canada, USA, Mexico) were indicators will be gathered a infra state level for USA and Canada. Those 3 countries belong to NAFTA that is not really comparable to EU in term of political agreement but still some trade agreement exists in the region. It is a region with rich countries and regions, with old industrialization (Easter coast of USA and Canada). Internal disparities exist even if they are less important than in the two other regions (Figure 3).

Figure 2 : world regions to be compared with ESPON

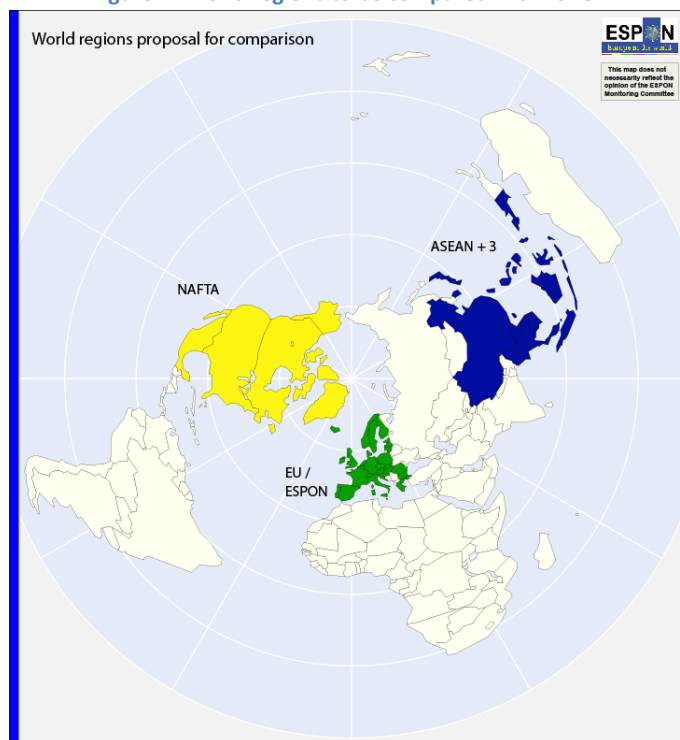


Figure 3 : comparison of the 3 world regions compared

	NAFTA	ESPON	ASEAN + 3
Nb of countries	3	32	14
Population	413 millions	566 millions	1989 millions
GDP / capita	22 500	15 000	5 000
Integration level	Not so high	Very high	Low
Disparities	x 4	x 12	x 20

The second region we would like to compare with the European Union is the Asiatic one. The ASEAN+3 regions have been kept in order to introduce rich and industrialized countries (Japan, Korea) and internal disparities. The contiguity criterion shows a specific figure

because of the importance of sea in the region but anyway there is a high level of regional trade. It is the poorest region of the group with the highest level of internal disparities.

The regions built allow first to conduct regional comparison on some indicators but more on the evolution of these indicators both on the thematic on competitiveness and social and territorial cohesion. The realization of graphic representing the evolution is quite interesting because it allow having a glimpse on figures values and on the trends at the same time. It also softens up the impact of possible low quality data reported from local levels. In some cases it allows to relative some discourses on the position of Europe in the world and on the challenge of other world regions, mainly the Asiatic one. We will take here four relevant examples, which illustrate the relevant domain of comparison: GP per capita, literacy rate, public expenditure in R&D and CO² rejected by GDP. More, in order to focus on the three regions internal spatial structure and to conduct more accurate comparisons than the one made at the regional level we choose focus on the intraregional mapping of some indicator and more to split the largest countries in regions, using the infra-national level to collect data and make maps. The three largest countries of our sample are China, USA and Canada, can be compared to a certain extend in term of surface to the ESPON space. They can face high level of internal disparities that could implied challenges that could be to a certain extent be compared to the challenges faced by the European Union in the framework of the regional policy. This approach reduces dramatically the number of thematic variables that can be used in the analysis, because of the lack of infra-national data and because sometime they are not built in the same way.

To conduct those regional comparisons we decided to map the indicators collected in a certain way detailed below:

- ⇒ We choose first to focus on the comparison between the three regions. To do so each indicator collected has been mapped using exactly the same categorization for the three regions. The system of the reference is the group of spatial units (mixing national and infra-national entities) of the three regions. The categorization chosen is by deciles that allow locating easily the 10% of the highest values and the 10% of the lowest. So, if a region appears in dark color it would gather the highest values and if it appears in light color it would gather the lowest. This approach does not take into account the rest of the world but it allows comparing quite precisely the trends and spatial organization of the three regions.
- ⇒ When it is possible i.e. when we succeed to find data at different dates we decided to map the growth rate of the indicators using the same method than the one described previously.
- ⇒ Finally we decided also to map the intraregional standard deviation for each indicator. Here the system of reference is each of the regions taken individually but the fact that the deviation to the average is standardized allows us to build comparable categories and to compare easily the maps obtained.

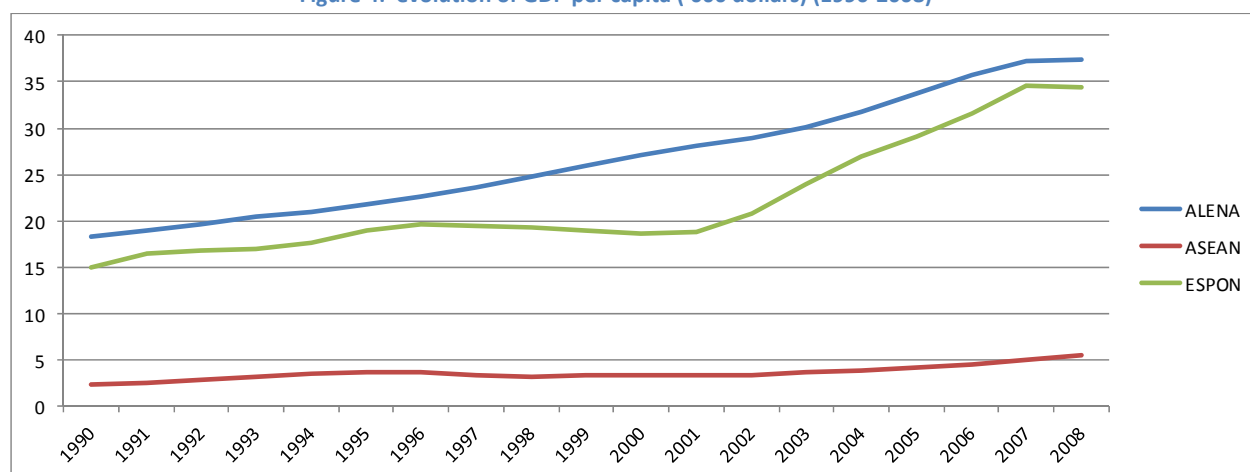
2.2. Comparison of EU in term of “competitiveness”

One possibility to assess the position of Europe in the world in terms of strength or weakness toward globalization trends is to concentrate the analysis on economic indicators (Foreign Direct Investments distribution, Gross Domestic Product etc...). However we assume that concentrating only on wealth comparison and trade opportunities for Europe in the world is a quite restrictive approach to the study of processes of globalization and that “international competition” should not be restricted to a competition based on wealth levels. If we want to keep strictly in line with the **competitiveness** approach of the Lisbon strategy we can, at least add to the traditional indicators on wealth (GDP, GDP per capita) and population, indicators that could take into account the “competitive knowledge-based economy” aspect. For example, indicators on telecommunication equipment levels and on education are available in world databases such as “International Telecommunication Union” and UNESCO, and often over a long term period.

The GDP per capita

The **GDP per capita** is one of the most used indicators in order to compare the position of one country or region in the world to the other. In the three world regions analyzed here (NAFTA, ASEAN, ESPON), the GDP per capita grown significantly between 1990 and 2008 (Figure 4). The GDP per capita observed here is obtained by making the relation between the total GDP and the total population of each region. In the three regions it has been multiplied by two or more between 1990 and 2008 (NAFTA: x 2; ASEAN and ESPON: x 2.3). However the figures of the beginning of the period are quite different. The GDP per capita of the ASEAN+3 region was around 2 400\$ per capita when the GDP per capita of NAFTA and ESPON reached values between 15 000 and 20 000\$. Therefore NAFTA is still the richest region compare to ESPON, and despite an important growth, the ASEAN region reach only 5 500\$ per capita in 2008. This differentiated situation in terms of GDP value is quite evident on the maps of this indicator (Figure 5 & Figure 6).

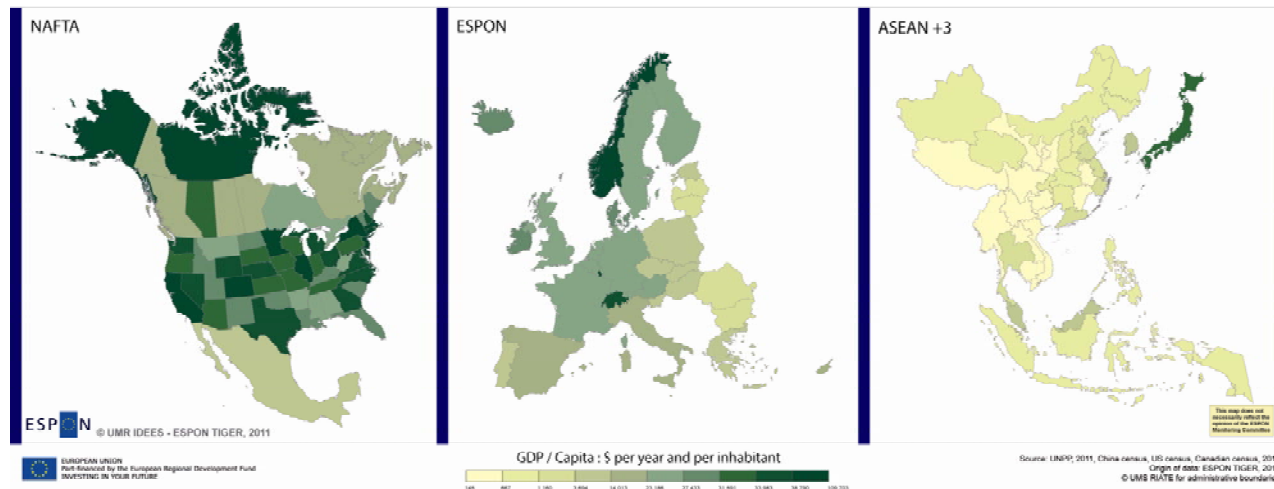
Figure 4: evolution of GDP per capita ('000 dollars) (1990-2008)



At both dates the mapping of the GDP per capita in a comparable way allows stressing the existence of important gaps of wealth between the three regions. Globally NAFTA and ESPON region appear in dark colors: they gather mainly all the richest spatial units. On the contrary the ASEAN+3 region appears in lighter colors that characterize the presence of the

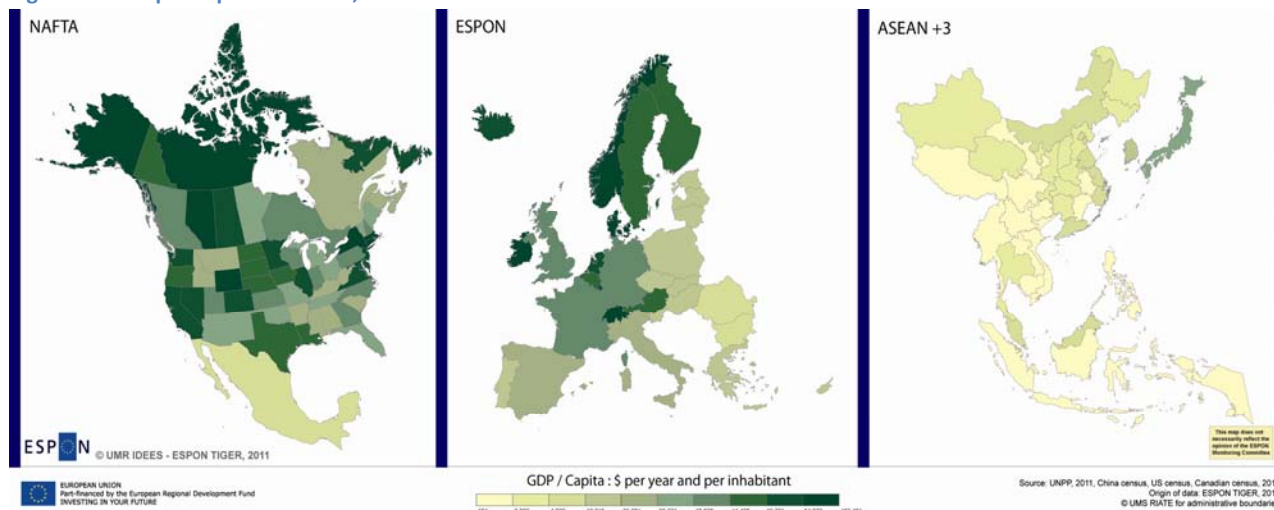
majority of the poorest spatial units with the exception of Japan. The richest spatial units of ASEAN+3 region (Malaysia, South Korea, and Shanghai) reach the level of Mexico or eastern (Estonia, Poland, Czech Republic, Slovakia and Hungary) and southern European (Greece and Portugal) countries.

Figure 5 : GDP per capita in NAFTA, ESPON and ASEAN +3 in 2001



The general structures are not really different in 2001 and 2008, but the situation seems relatively better for some Canadian provinces (Alberta, Northwest Territories & Nunavut in 01 plus Manitoba & Newfoundland & Labrador in 08) and European countries, especially northern European countries, Ireland and Austria in Europe that implied an increase of the differences between the European countries. On the contrary the situation seems relatively worse in ASEAN+3 region with the degradation of the relative position of Japan, but also of Malaysia, Indonesia that appear in lighter colors than in 2001. Some United-States States also experience a decrease of their GDP per capita like Arizona, Idaho, Montana or South Carolina for instance.

Figure 6 : GDP per capita in NAFTA, ESPON and ASEAN +3 in 2008



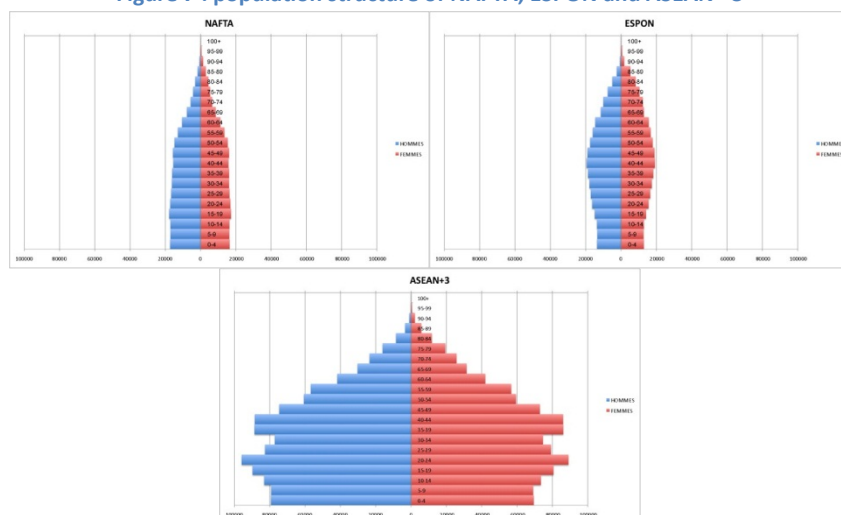
From the beginning of the 90s to 2010, as far as the GDP per capita is concerned, both in terms of value and evolution the EU and NAFTA situations are comparable, although internal disparities are important (see next section). Those two regions are undoubtedly richer and the

evolution allow to be confident to for the future, even is the financial crisis from 2008 could darken the perspectives.

Population and demographic trends

The population indicator can also be used as an indicator for competitiveness, not so much in term of total population (even if population weight is often considered as a good indicator for power), but for the trends of the demographic evolution. In term of total population, there is no doubt that the ASEAN+3 region is much more populated that ESPON and NAFTA. At this end of the first decade of the 21st century, ASEAN+3 region raised more than 2 milliard inhabitants when ESPON and Nafta reach respectively 507 and 442 million. The population structure is also quite different (Figure 7). The ageing of population seems more advanced in the ESPON region than in NAFTA. If some ageing trend can be also observed in ASEAN+3, the proportion of old people on the active population is still low. The median age indicator summarize well the situation: it is only about 31 years in NAFTA, nearly 40 years in ESPON and 35 years in NAFTA.

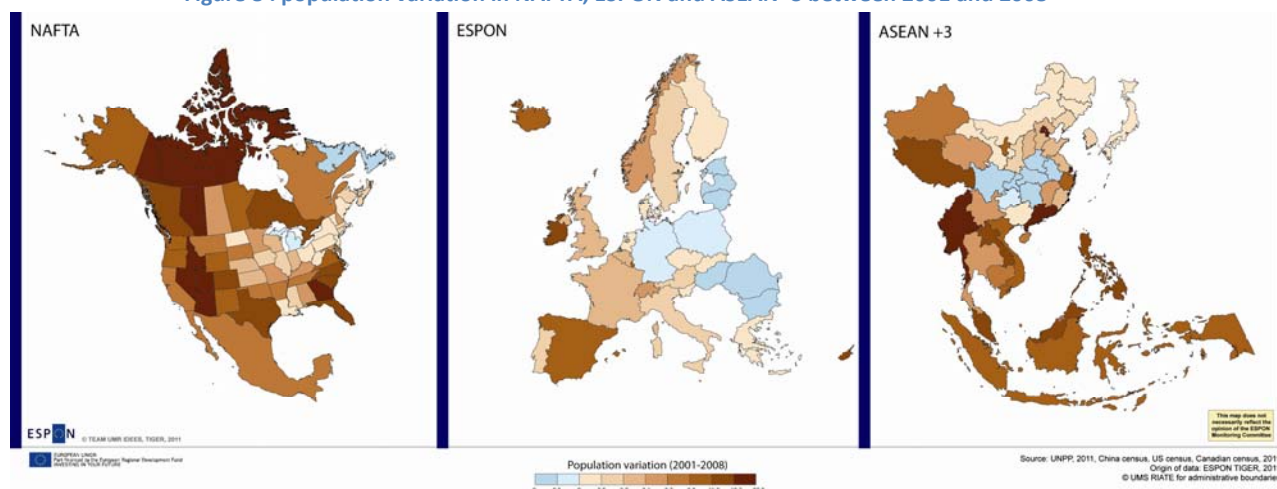
Figure 7 : population structure of NAFTA, ESPON and ASEAN +3



Source : UNPP, 2011

Conformed to those trends, the population variation of the three regions between 2001 and 2008 show some interesting trends. In the three regions, some countries or provinces or states experience a population decrease (Figure 8). The trend seems more important for ESPON were numerous eastern countries are affected but also Germany. In ESPON the decrease of population can be explained by the ageing population trend (Germany) and by the crisis that affected eastern countries after the end the soviet system. In ASEAN+3, only some central Chinese provinces are affected by population decrease. In those provinces the ageing trend could also have an influence, but the migration deficit can also explain the trend.

Figure 8 : population variation in NAFTA, ESPON and ASEAN+3 between 2001 and 2008



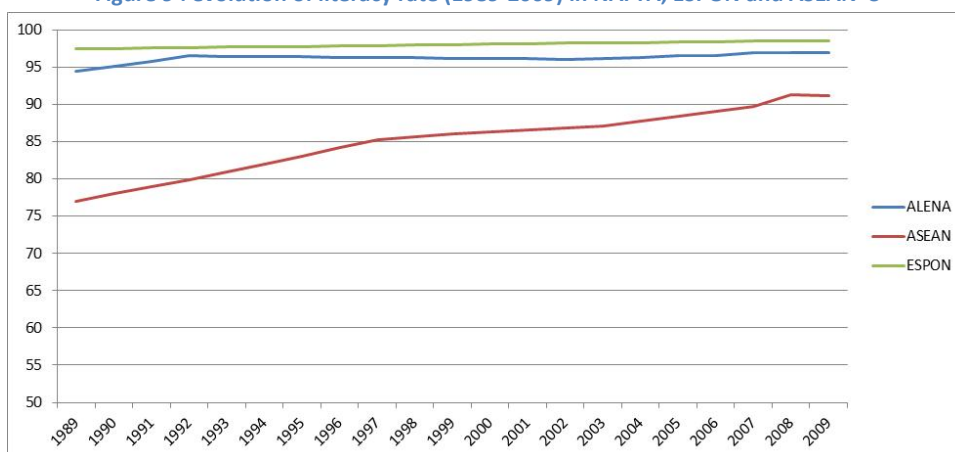
The knowledge economy

The knowledge economy paradigm is based on the idea that the production of knowledge could become the base of the economy, instead of industrial production in the context of de-industrialization of most advanced economies. Knowledge can be considered both as a tool or a product. It is based on three main pillars: education, research and development and information and communications technologies.

As far as education is concerned, the graph on the **evolution of the literacy rate** () shows that the ESPON space position is the best compared to the two other world regions and is the highest and the most stable on the all period. The high value of the ESPON space is not a surprise as in Europe, nearly all the population is literate⁴. In NAFTA, the lowest figure in 1989 is due to the low literacy rate of Mexico at the beginning of the period. But what is striking is the literacy rate of the ASEAN+3 region. In 1989 the literacy rate was not so high in the region (77%) with high disparities between the countries. Twenty years later impressive progresses have been made and the value reaches 91%. Yet it is still lower than the ESPON space literacy rate. But what is at stake as far as the literacy rate is concerned? A low literacy rate can be considered first as an indicator of a low level of social cohesion in the countries of the region analyzed because it could reveal some problems in the school system. That means that a certain share of children does not attend school or leave school very early in their life. Population non literate often earn low wages. That could be an advantage for the country that can maintain a certain level of competitiveness in low skill industrial jobs but it is also a problem as far as the high added values jobs are concerned. The literacy rate evolution could mean that for the while the competition is mainly between NAFTA and ESPON on “high value added jobs” and that the position of ASEAN has been to compete on a salary during a long time period but that the things are changing because the literacy rate is increasing in the region.

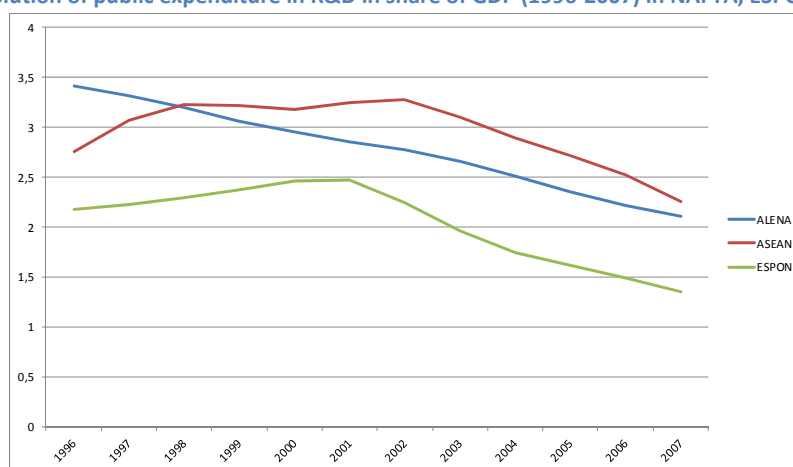
⁴ However there are still some problems, minimized by the European countries.

Figure 9 : evolution of literacy rate (1989-2009) in NAFTA, ESPON and ASEAN+3



What confirms the competition of ASEAN on the sector of high value added activities is the evolution of the **public expenditures in research and development as a share of GDP** (Figure 10). The share of public expenditures has dramatically decreased in all regions between 1996 and 2007 but what it is striking is the position of the ESPON space: it is here the lowest of the three regions compared both at the beginning and the end of the period. That is quite contradictory with the wish to make Europe the leader of the knowledge economy.

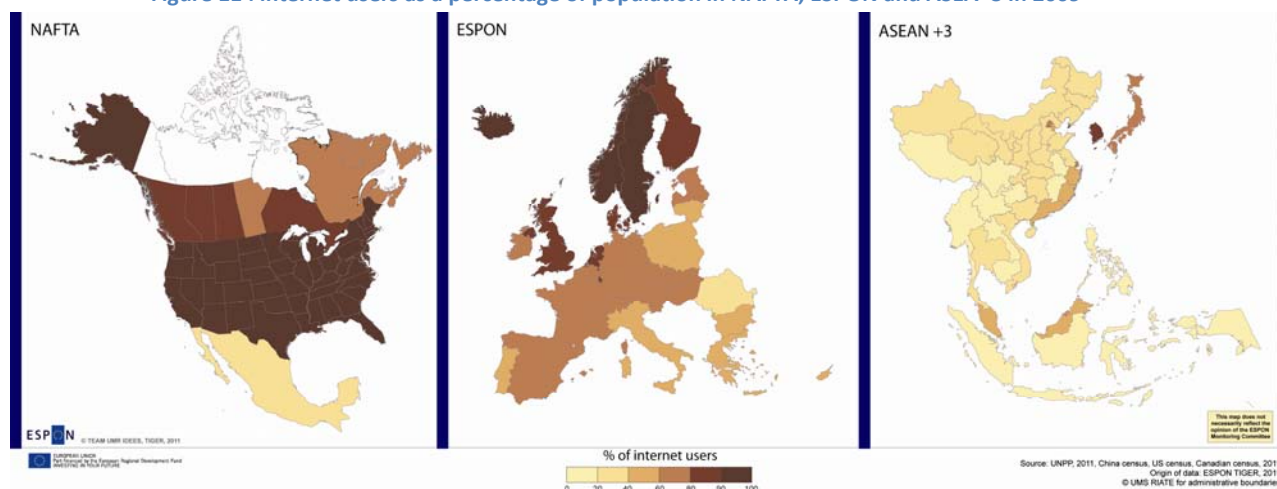
Figure 10 : evolution of public expenditure in R&D in share of GDP (1996-2007) in NAFTA, ESPON and ASEAN+3



The mapping of the **Internet user's rate** (

Figure 11) shows that EU is in a globally medium position between NAFTA where the rate is very high everywhere except in Mexico and ASEAN+3 where the rate is low everywhere expect in Korea, Japan, Malaysia and some coastal province of China. The situation is quite well differentiated and the position of EU is an average one. However on should keep in mind that the growth rate is quite differentiated also (see working paper) and that they are very high in Asia.

Figure 11 : internet users as a percentage of population in NAFTA, ESPON and ASEAN+3 in 2009



The situation of ESPON in term of knowledge economy is partly secured by the high literacy rate values that show the existence of a general access to education system and a relatively good rate of Internet users. However the investments of States in R&D are much lower than is other region. This is an argument to augur in favor of an increasing competition of other region and more precisely of the ASEAN+3 region in this domain.

2.3. Comparison of EU in term of territorial and social cohesion

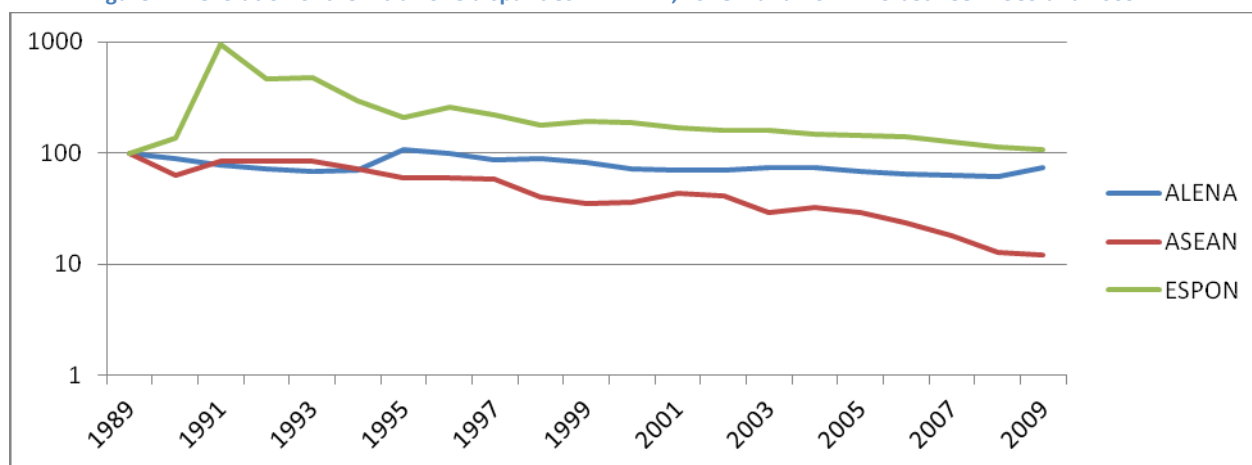
The competitiveness approach seems quite restrictive. The world is not only divided according to wealth or to economic opportunities, but also according to the social development level and levels of wellbeing of the population. The European Union territory is often perceived in the world as a space where life is “easier”. In term of globalization, this approach should not be neglected first because it is one of the factors that can explain world level mobility, then because it is a factor of stability that is also quite important in a globalization perspective, especially in a long term perspective. This is why indicators of **social cohesion** are also included in our analysis.

Disparities in term of GDP per inhabitants

The global growth of the GDP per capita of the three regions is impressive (see previous section) but still **great disparities can be observed** between the countries of the three regions in term of national GDP per capita. The disparities are measured here by the difference between the richest and the poorest country of the region at each date. The evolution of the intra region disparities are given here with a base 100 reference in 1989 (Figure 12). However it should be notice that the figures are quite different at the beginning of the period. In 1989, the Japan population was nearly 570 times richer than Cambodia (and 240 times richer than Vietnam the second poorest country of the region) when Switzerland was “only” 16 times richer than Poland and USA 8 times richer than Mexico. Within the period the intra region disparities decreased dramatically in ASEAN+3 (Asian development Bank, 2009) region as they have been nearly divided by 10. The Japan GDP per capita is “only” 70 times more important than the Myanmar one. The GDP per capita disparities between the countries of

NAFTA was stable during the all period with a low but irregular decrease. In the ESPON region the situation at the beginning and the end of the period is quite similar: the Luxembourg GDP per capita is 17 times more important than the Bulgaria's one in 2009. However between the two dates the ESPON region undergoes a very important increase of internal disparities that have nearly been multiplied by 10 between 1989 and 1991. It is due to the increasing difference between western European countries where the GDP per capita were still growing and the eastern European countries where the GDP per capita temporally collapsed after the fall of the Soviet empire and the reorganization (and liberalization) of the national economies. Yet, despite ESPON region faced a challenge like no other region of the world during this period, the disparities values of the region in 2009 reached nearly the value of 1989, showing the overall solidity of the region and its capacity to face internal challenges (mainly thanks to the process of enlargement of the European Union ?).

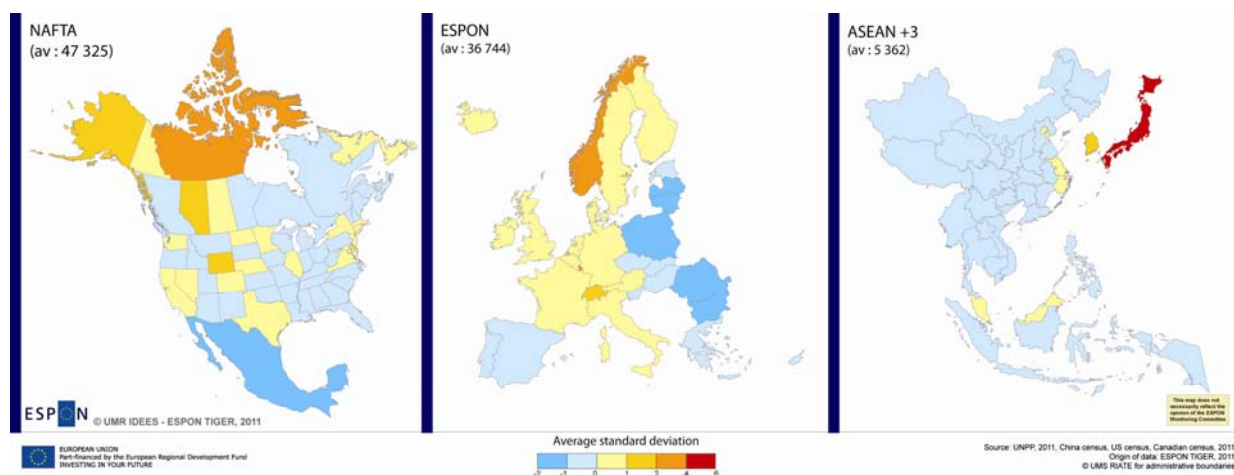
Figure 12 : evolution of the intra-zone disparities in NAFTA, ESPON and ASEAN+3 between 1989 and 2009



As far as intra-regional disparities (measured here by standard deviation) is concerned (

Figure 13), the situation in NAFAT and ESPON seems globally comparable with two “oil spatial unit” (Nunavut and Norway) quite different because of relatively high values of GDP per capita; but also with Mexico in one hand and Latvia, Lithuania, Poland, Romania and Bulgaria on the other hand even if quite different because of relatively low values of GDP per capita. But many countries are in light yellow or light blue showing light difference between the spatial units and the region average, which points out a certain level of homogeneity. In the ASEAN region the situation is quite different because the disparities between Japan and the rest of the spatial units is so important that nearly all spatial units are not differentiated and are colored in light blue. This stresses quite different situations. In the first one the spatial units are more differentiated but the disparities are not so high and the cooperation between spatial units could be less difficult in a regional policy perspective like in European Union. In the second one, spatial units are more similar, with one very much different that would imply that Japan would bear alone the efforts of a hypothetical regional policy.

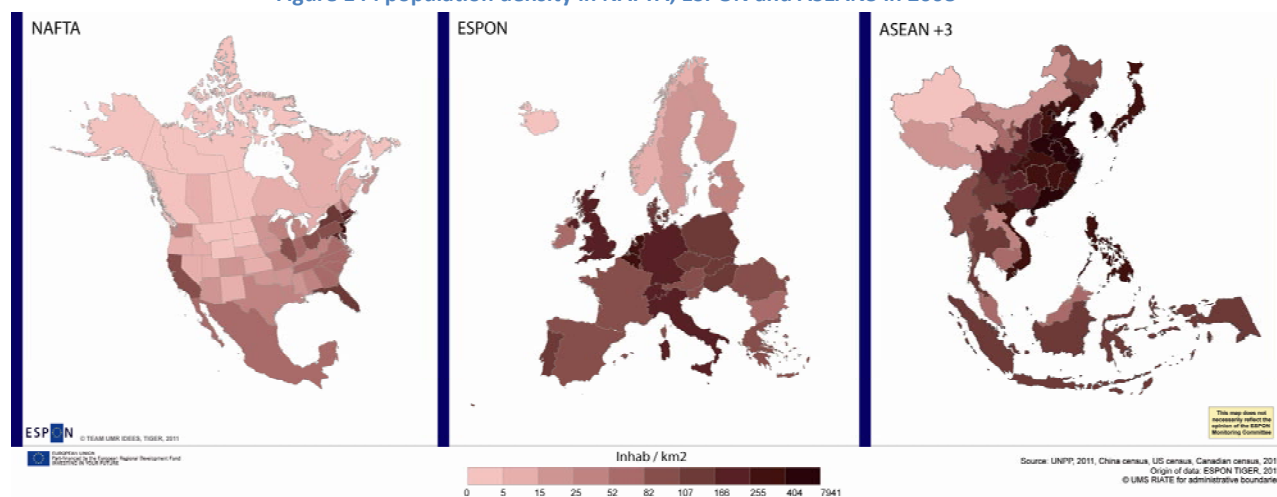
Figure 13 : intra-regional standard deviation to the GDP per capita average (2008)



Disparities in term of population repartition

Disparities in population repartition can be considered as a challenge for a territory, especially in the context of the European regional policy where the policies tend to make equal the access to infrastructure and services to all population. The population density of the ESPON region is relatively high compare to other world region and particularly NAFTA. Nevertheless the population density of ASEAN+3 region reach more higher values (Figure 14). The repartition of densities show less disparities (using the national level values) in ESPON than in the other regions mobilized for the comparison especially in China where the difference between the coastal region and north western Chinese provinces are very high.

Figure 14 : population density in NAFTA, ESPON and ASEAN3 in 2008

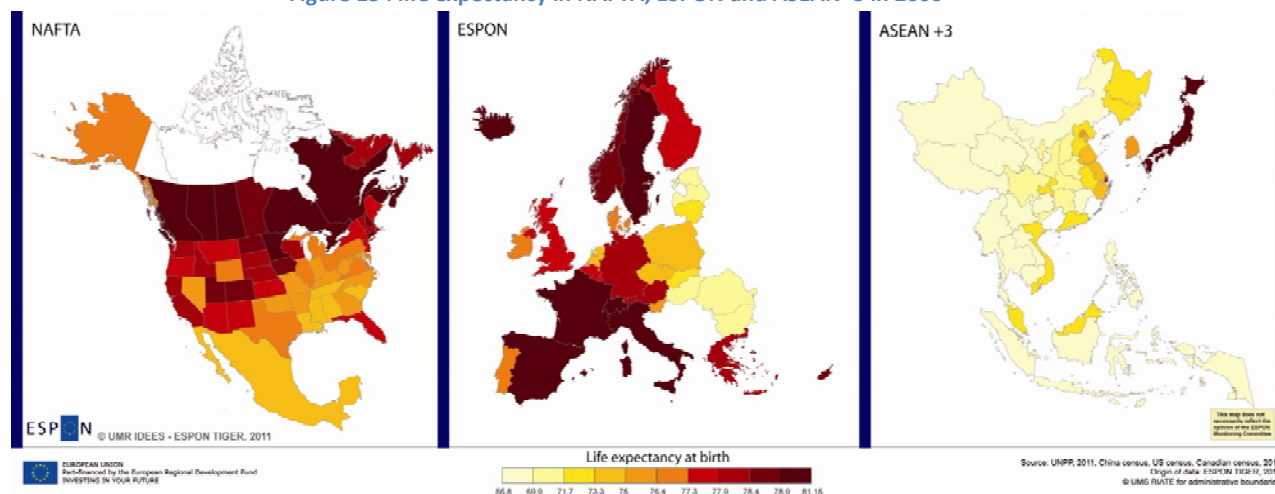


Life expectancy in 2000

Life expectancy is an interesting indicator because it reflects well the social and health situation of people in the different countries and the efficiency of the health system that is one important indicator for the analysis of cohesion. The mapping of life expectancy at birth in 2000 in the three regions built for the comparison show as in the previous case, the existence of important difference between the regions (Figure 15). NAFTA and ESPON show quite similar values, except rather low value in some eastern European countries (Estonia, Latvia, Slovenia, Romania and Bulgaria). However the variation of value in NAFTA and ESPON regions show a spatial structure quite different and more “organized” than in the case of the

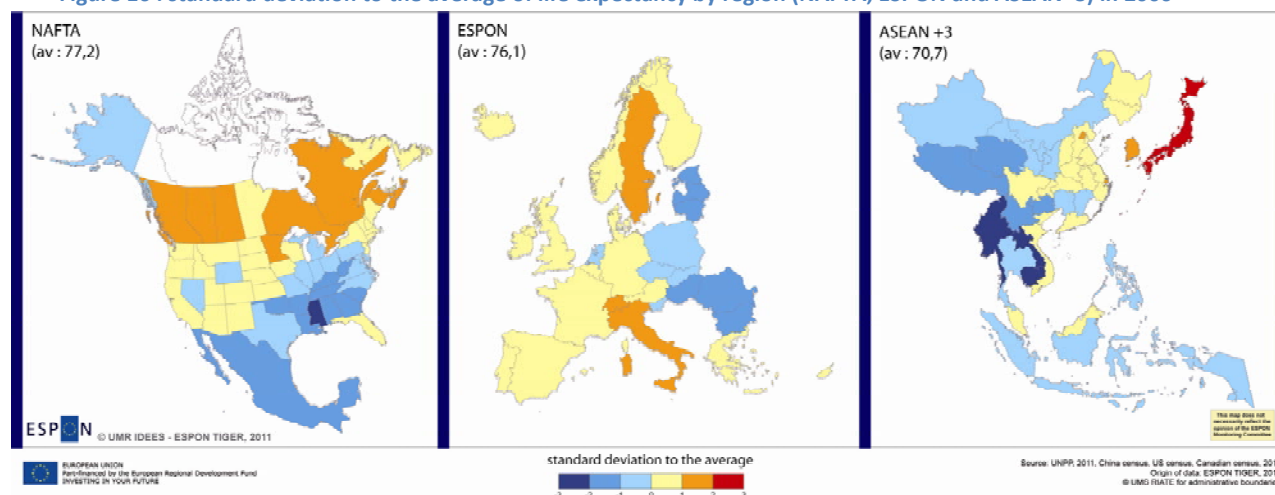
variation of GDP per capita. In NAFAT there is globally a decreasing of GDP per capita from north-west to south-east, where social disparities are high. In Europe, there is globally a decreasing for south-west to north-east with the exception of Scandinavian countries. In ASEAN+3, the situation is quite different: the majority of spatial units show relatively low values of life expectancy. With the expectation of Japan, the highest values in these regions are similar to the lowest values in NAFTA and ESPON.

Figure 15 : life expectancy in NAFTA, ESPON and ASEAN+3 in 2000



The mapping of the internal disparities (Figure 16) shows that the life expectancy disparities in NAFTA and ESPON are comparable between them, but also comparable with the disparities statistical distribution observed for GDP. In ASEAN+3 the situation is quite different with a very high level of internal disparities between Myanmar and Cambodia in one hand and Japan in the other hand.

Figure 16 : standard deviation to the average of life expectancy by region (NAFTA, ESPON and ASEAN+3) in 2000

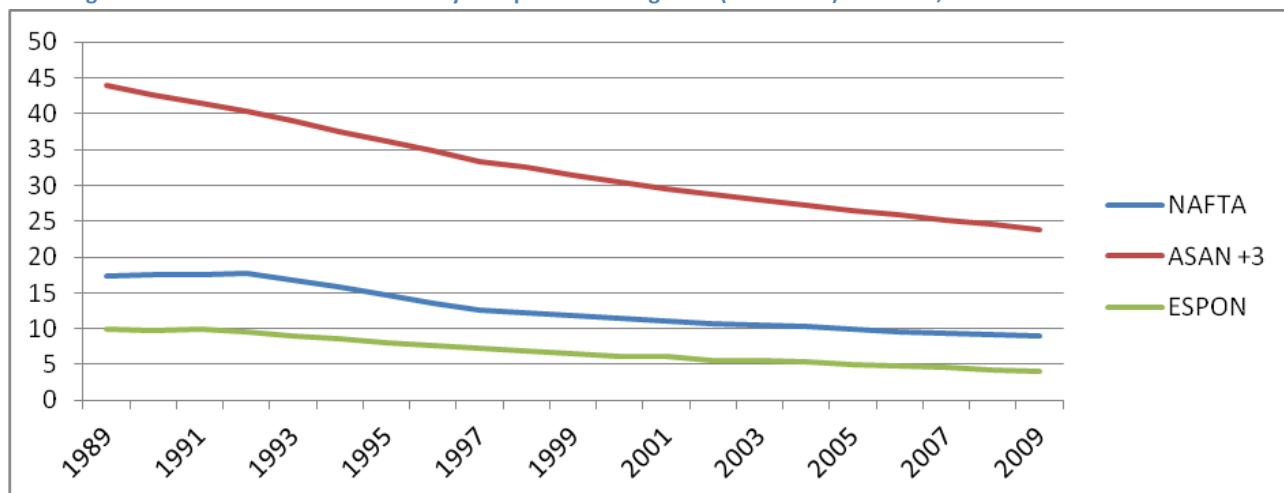


Child mortality

Another interesting indicator reflecting the sanitary situation of a territory is the infant mortality. It is an alternative indicator to measure the well-being (OECD, 2006), as well as the ability of the health care systems to prevent diseases of mothers and children. The graph of the evolution of this indicator between 1980 and 2009 (Figure 17) shows that the position of EU is the best with the lowest infant mortality rate and more, that the situation is still

improving. Globally those two indicators indicate that EU perform relatively well in the social cohesion domain even if the causal link between GDP per capita and sanitary situation cannot be denied. Yet, GDP per capita is correlated with a better health, at least in terms of averages, but the link between the GDP variation and the variation of these indicators is less strong.

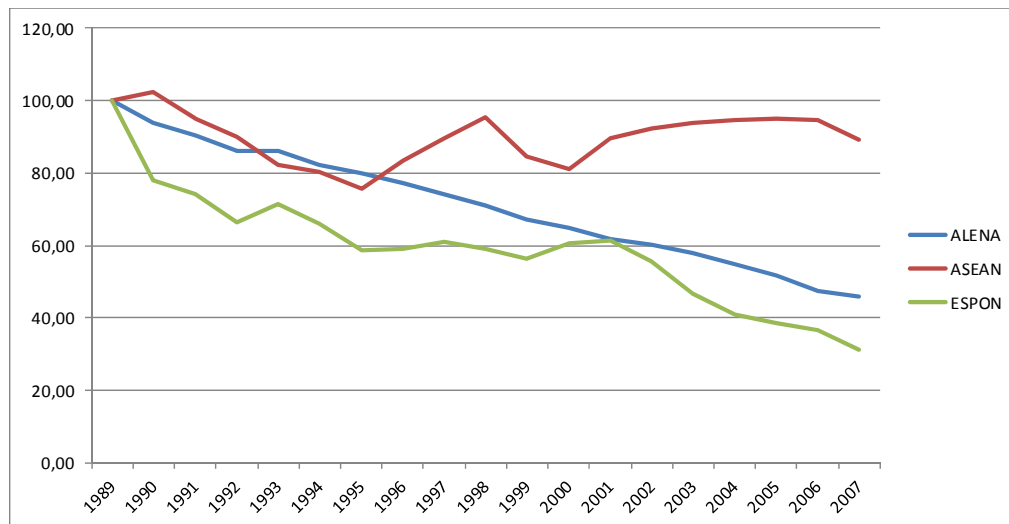
Figure 17 : evolution of infant mortality rate per 1000 living birth (1989-2009) in NAFTA, ESPON and ASEAN+3



Comparison of EU in term of environmental issues

A last indicator allows comparing the position of ESPON region with the two other challenging world regions. The environmental issue has been stress in most of the European Union publications and some environmental rules have been set up. An indicator could allow measuring the impact of efforts of each region in the environmental issue is the **ratio between the CO² emissions and the GDP** (Figure 18). It could be understand of the measure of “how much each region need to reject CO² to produce 1\$ of GDP. In the three regions the GDP increased during the period but the CO² emission varies differently: they have been multiplied by 2.3 in the ASEAN region, by 1.21 in the NAFTA region but they have decreased in the ESPON region (x 0.9). In consequence the CO² emission by GDP evolution is quite different in the three regions (base 100 in 1989). ESPON and NAFTA need less and less to reject CO² to produce GDP but ESPON countries decrease is the most important. ASEAN emissions by GDP are quite irregular by globally stable on the period. Those figure could be interpret as the fact that ESPON region make great efforts to reject less CO². In one sense it is true. But one should not forget than the delocalization of industry toward the developing ASEAN+3 countries also contribute to the delocalization... the CO² emissions.

Figure 18 : CO² emission by GDP (index 100 in 1989)



Globally the ESPON region performs well compare to the other regions on social indicator with a global good level of living that can be depicted by the access to health. However, the internal disparities are high within the ESPON territory. Those disparities can partly be explained by the backwardness of some of the former eastern countries in some domains and the crisis experience after the drop of the iron curtain. The enlargement process of the European Union and the regional policy set up in those countries after they became member States allow them to converge with the indicator levels of the former member States.

2.4. Conclusion and problems and limits

In this comparison of ESPON with other world regions, we choose the “a priori” regionalization approach. The construction of those regions is based on strong hypothesis that lead to introduce bias in the analysis. We defined what the ESPON space characteristics are and we tried to build comparable world regions.

The visions produced of the three regions are quite interesting because they allow giving a relative position of the each region compared to the other, both in time perspective (graphics) and spatial perspective (maps of the three regions). After this reviewing of some trends and situations concerning few indicators depicting both competitiveness and social and territorial cohesion, we can assume that the ESPON region has relatively quite good position according to the used indicators. This is quite important to relativize the discourse on the emergence of ASEAN. We cannot deny that ASEAN is an emerging space. However the indicators show that the gap is still high compared to NAFTA and ESPON and that its situation is somehow fragile on social aspects. For some economic indicators, the analysis of post 2008 economic crisis data could moderate or increase trends that are identified. They were unfortunately not available at the provincial or state levels yet.

This approach allows also, and it is maybe the most interesting, to compare the internal disparities of the regions build, that is, according to us, quite important because the European Union construction deals with the internal disparities, mainly with the regional policy, and that solidarity between European countries is a European specificity. It provides then a general framework for discussing two hypotheses:

- What would be the challenges faced by the other regions with the similar integration level?

- What would be the situation of ESPON countries if they would not be a member of the European Union?

Indeed, those questions are very important and very relevant because this way of comparing ESPON is quite artificial because it is very difficult to build objects really comparable to ESPON and more to European Union: the European space is very much specific because of the regional integration level and it is impossible to find strictly comparable spaces in the world.

3. Regionalization for comparison

European Union is a political and institutional construction that implies specific relations between the European infra level territories (i.e. countries or regions). The integration level is deeper in the EU and it implies solidarity processes between European regions, mainly through the regional policy: richest countries contribute, to certain extent to the development of the poorest countries of the region in an institutionalized way and that is one of the founding ideals of the European Union. This mechanism could happen, to a certain extent in other world countries but absolutely not at the supra national regional level. In consequence, in a global concurrence context, one could say that other competitive world countries have not to suffer to that kind of mechanism that dedicate a part of “the national wealth” to the development of other countries. But one could also argue that other poor or backward countries in the world do not benefit from the support from other countries.

This highlights the problem of the building of regions for comparison. So, to come back to this problem of comparison of Europe with other world regions we choose in this section to adopt a “non-politically correct” approach. We choose to build some synthetic indicators in order to build some regions and test them without any a priori spatial definition of the world regions we would obtain. That means that European Union / ESPON space is no more considered as a “sacred” space one should not shrink nor enlarge.

We will first present the method we implemented and then two brief example of the method used on rather simple indicators: GDP and HDI. Then we will explore possible regionalization with two approaches based on the ideas of competitiveness and cohesion. In the first situation we will use first the “competitiveness synthetic indicator”. The aim is to build block of countries that, put together could be very competitive on the world stage. In this approach countries will be selected to take part to a world region if the competitive indicators values are high (GDP, R&D etc...) and if there is not too much difference between them. What will be interesting in this hypotheses will be to check what are the countries we should “cut off” from the European Union / ESPON space to allow this region to be the most competitive on the world stage. In the second situation we will use the “cohesion synthetic indicator”. The aim is to build block of countries that imply a certain level of intra-regional mutual assistance. In this approach, the “cohesions” indicators will be used and we will allow aggregations with more differences between the countries. What will be interesting here will be to see what will be the spatial configuration of other world regions if they had the same “cohesion” ideal than European Union (but it is not sure that EU keeps its present spatial configuration).

3.1 Regionalization by aggregation to core with contiguity constraints

Method and implementation

To conduct this regionalization we decided to use spatial statistics and spatial analysis method and to explore the fuzzy classification methods. The fuzzy regionalization allows building “maximum” and “minimum” world regions. The “minimum regions” pattern shows what should be the spatial pattern of the « Competitive European Union » (what countries should we drop from the EU to be competitive). The “maximum regions” pattern shows what should be the spatial pattern of the other « cohesion regions » in the world. Different choices had to be made in order to implement test the scenarios described previously and to conduct regionalization. A software application has been built introducing our regionalization parameters in order to build regions⁵. The choices made to build this application are detailed here.

Local maximum: core » for regionalization

To conduct our regionalization we choose to start from the local maximum, i.e. the states that show the highest value of the indicator used to conduct the regionalization. In both scenario (competitiveness and cohesion) the local maximum appear as structuring spatial entity. It is a leader in the competition process and it is the main contributor in the cohesion process. The problem here is that the number of local maximum could be very important, leading to the building to a large number of world regions. We decided to introduce a threshold to the fact a specific country can be used as a local maximum. The reference will be a parameter of the indicator used at the world level (for example, the mean or the median), introducing the strong hypothesis that, to be the support of a kind a regionalization a country should be “strong enough” on the world scene; otherwise the structuring effect of a higher local maximum could interfere. The choice of the thresholds should have to be deepened. This parameter will be called: “the global reference”

Introduction of the contiguity constraint

The main constraint we choose to use intensively in order to build region is the contiguity criterion (see part one). It was introduced in the regionalization application first by a terrestrial contiguity matrix between states. The use of this matrix raised many problems. For example, Great Britain could only be “regionalized” with Ireland, because of a common border. More no world region could really emerge in South East Asia or Caribbean because of the importance of island countries in those parts of the world. However relations are very important in those countries and it would be non-sense to isolate them. So, in a second step we introduced a contiguity matrix with a maritime buffer zone of 450 kilometers. That means that, in a certain way, the countries that have a coastline are “increased” of 450 km. If their new border “meets” another border we will consider that the countries are contiguous. The maximum maritime distance between countries considered as contiguous is 900 km that allow maintaining intensive relations. For the while tests are somehow convincing to use this contiguity matrix; however the contiguity criteria still should be strengthen.

⁵ We thank you very much Patrice Langlois a retired but passionate researcher from UMR IDEES for its contribution in the building of this application. Without his help it would have been impossible for us, or it would have taken a very very long time to us to learn to write informatics codes.

Aggregation thresholds

The last parameter on which we have to take decision is the aggregation threshold criteria that are a measure of the difference between the countries.

In a first step the value of reference is the value shown by the local maximum. If a country is similar to certain extent to the local maximum it can be placed in the same region that will show a certain level of homogeneity. If both are too much different, they had to be placed in different region, or even not placed in any region, in order to preserve the homogeneity of the regions formed. This aggregation thresholds will vary according to the scenario tested. If the scenario is the competitiveness one, the threshold will be very discriminating and not so much difference will be allowed between the countries put in the same regions. If the scenario is the cohesion one, the threshold will be more “permissive” in order to allow a more important heterogeneity. Further than this general law, the threshold values still have to be fixed.

In a rather pedagogical approach we choose here to show some results of the regionalization method we implemented using the GDP per capita in 2009 and the HDI indicator in 2009. The results show here are quite “un-refined” but they can provide an indication of the kind of results we expect to obtain.

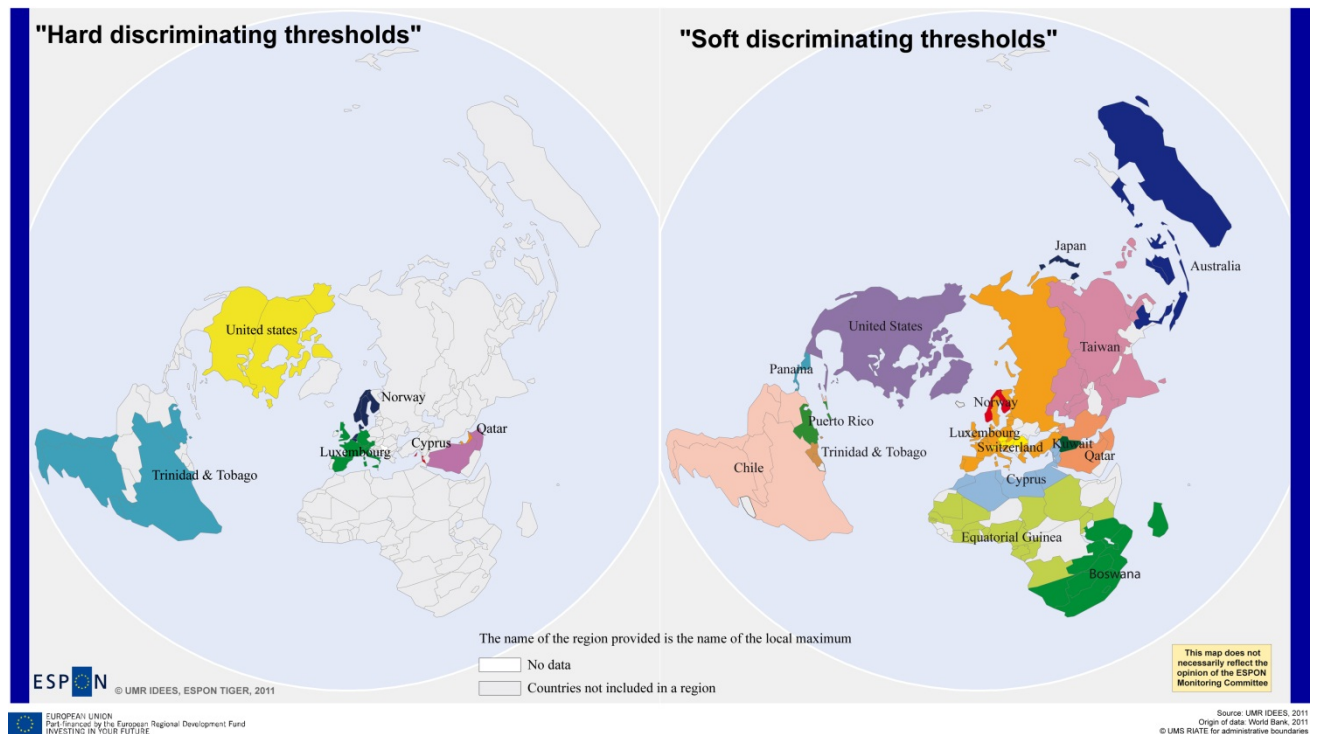
Example of regionalization using the GDP indicator

We used first this simple indicator (GDP per capita in 2009) because people are really used to it and the test implemented here will be easier to catch. We decided check how the region built vary according the thresholds chosen.

We first tested an approach with “hard” discriminating thresholds. The local maximums are kept in the test only if they belong to the 25% of the richest countries of the world (global reference). The contiguous countries are aggregated in the same class than the local maximum if the difference is equal or lower than 50%. That corresponds, for example to the difference between the second richest United-states state (Delaware) and the poorest one (Mississippi) (The district of Columbia, the richest state seems too much particular). The hypothesis is that region should be able to bear an internal difference at least equal to the national United-States disparity, because it is often seen as “competitive” and then we can make the hypotheses that the regions built could be competitive.

Then, we tested an approach with “soft” discriminating thresholds. The world median is chosen as the global reference and the local maximum is kept in the test only if they belong to the 50% richest countries of the world. The contiguous countries are aggregated in the same class than the local maximum if the difference is equal or lower than 95%. That correspond to the difference between Bulgaria and Luxembourg respectively the poorest and richest European countries. The hypothesis is that region built should be able to bear more important internal differences at least equal to the European Union internal disparities in term of GDP because the EU had set up a regional policy that aim to increase the internal cohesion. The implementation of the test provides the following results shown on the maps below (Figure 19).

Figure 19 : example of world regionalization for GDP



The differences between both maps are quite significant. On the first one, using the “hard discriminating threshold” only 6 world regions appear and a lot a countries are not included in a region. Europe Union countries are split in three parts: one grouped around Luxembourg and gathering richest western European countries. A second European region is built around Norway and gathers northern European countries: Belgium, Netherlands, Denmark, Sweden and Finland. The small third region is built around Cyprus and gathers Israel and Jordan. United States is grouped only with Canada; Japan does not appear as a center of region because it is too much different from its neighbors.

On the second map, using the “soft discriminating threshold” the number of regions obtained is quite more important (15) and only few countries of the world are not included in a region, being too poor compared to their neighbors. In Europe a fourth region appeared around Switzerland and gathering mainly central and eastern countries like Austria, Hungary and Romania. The western European previous region extends very far to include Russia and Turkey and the “soft threshold” regionalization allow “stealing” some countries to the Norway previously identified region. The Cyprus region extends very much to include the North African and Middle East countries.

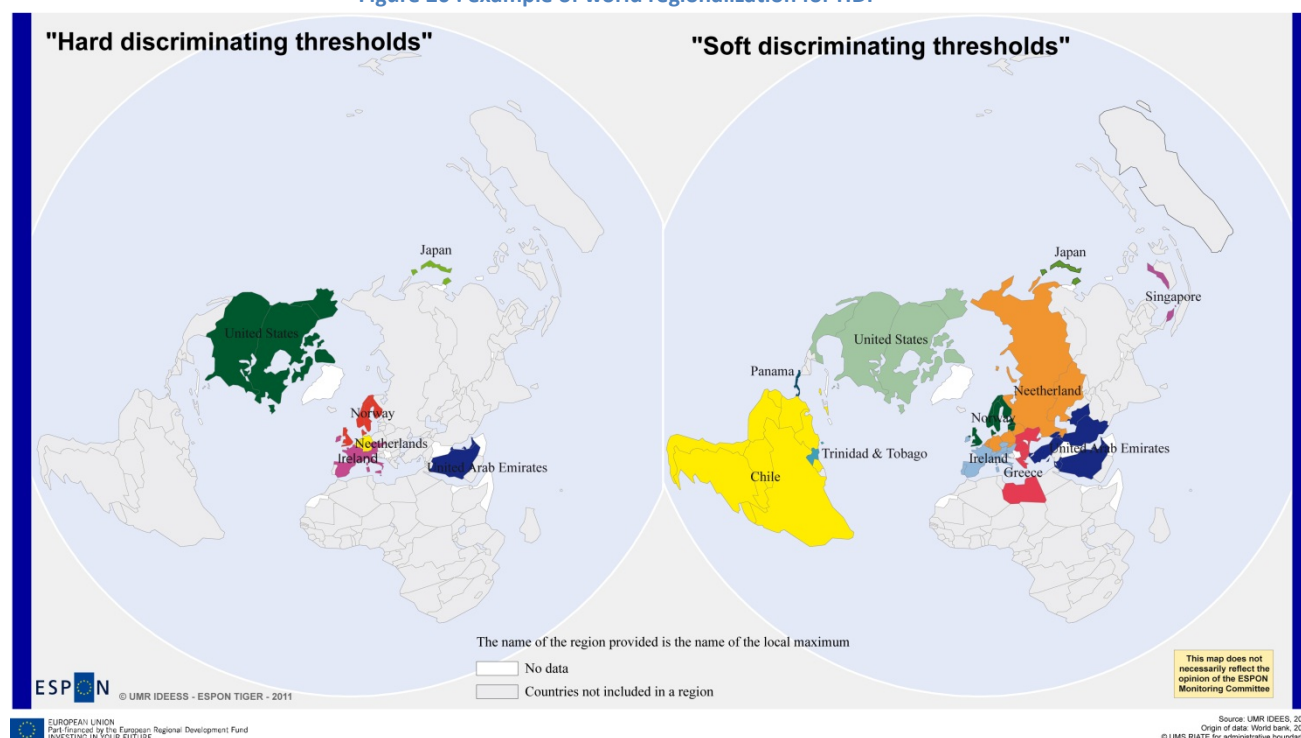
Example of regionalization using the Human development Index

We choose then to test the application with a more complex indicator that is an indicator summarizing three themes: life expectancy, education level and income index and that is close from the kind of indicator we would like to build. The same method has been used than for the previous indicator.

We first tested the “hard” discriminating thresholds. For the competitiveness scenario, the global reference is the 25% the most developed countries. For the aggregation threshold we choose to use the difference value between the most and least developed states of the United States (Connecticut and Mississippi): 10%.

For the “soft” discriminating thresholds, the global reference is the 50% most developed countries. For the aggregation threshold we choose the difference value between the most and least developed countries of the European Union in 2009 : Ireland and Bulgaria: 20%.

Figure 20 : example of world regionalization for HDI



In the first approach (Figure 20), only six world regions appear and 3 of them split the north eastern European countries in a Norway, Ireland and Netherlands regions. The three other regions, grouping few countries are built around United-States, Japan and United Arab Emirates. In the second approach, 11 world regions are formed but still a lot of world countries are not included in a region: the majority of them being in African and in Asia were the HDI values should be not high enough to constitute the core of a region or the HDI values being too much different between the countries. A fourth region appears in Europe, built around Greece and including Libya and Balkan countries. One more time, it is interesting to notice that, even if the aggregation threshold is based on the intra-European disparities, European Union is split in for world regions, two of them trespassing the admitted limits of Europe to Include Libya (Greece region) and Russia & Kazakhstan (Netherlands region).

3.2 Regionalization using cohesion indicator

The main approach here is to build a “synthetic” indicators being used as “cohesion indicator”. We will first explain the indicator construction. Then we will make some test on regionalization using different thresholds and then we will try to characterize and compare the regions obtained.

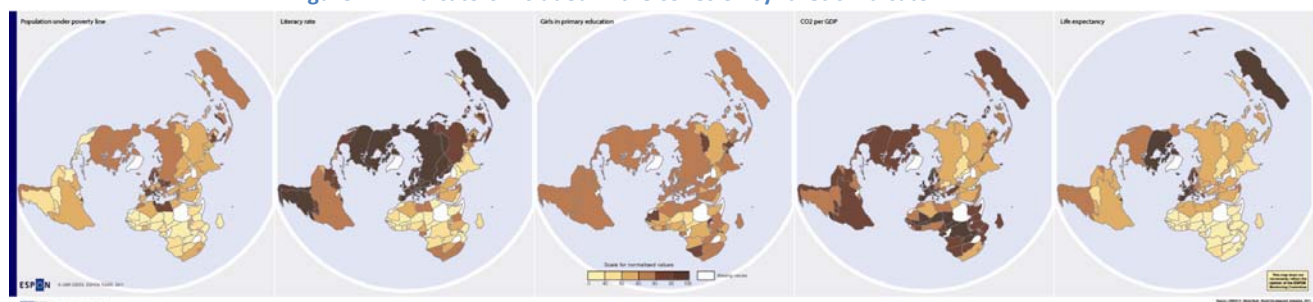
3.2.1. Building of the cohesion indicator

To build the cohesion synthetic indicators we first had to check on the database gathered in the TIGER project framework the available data around a specific date (2007-2009). We try to gather characters describing different topic, but one main difficulty was the lack of data for some countries or some dates. Taking those constraints into account we finally choose 5 indicators reflecting different social topics.

- ⇒ Population under the poverty line. This variable is used to describe the poverty and inequality level within the countries
- ⇒ Literacy rate. This variable is used to describe the access to primary education
- ⇒ Girls in primary education. This variable is used to introduce a gender approach in the index
- ⇒ CO2 per GDP. This variable is used to take into account the environmental issue
- ⇒ Life expectancy. This variable is used as an indicator of the countries health system.

The indicators have been normalized between their respective minimum and maximum values in order to make them comparable and make them have the same weight in the building of the synthetic indicator on cohesion. Some of those indicators seem correlated positively or negatively (Figure 21) and we can observe they introduce strong differences between the countries.

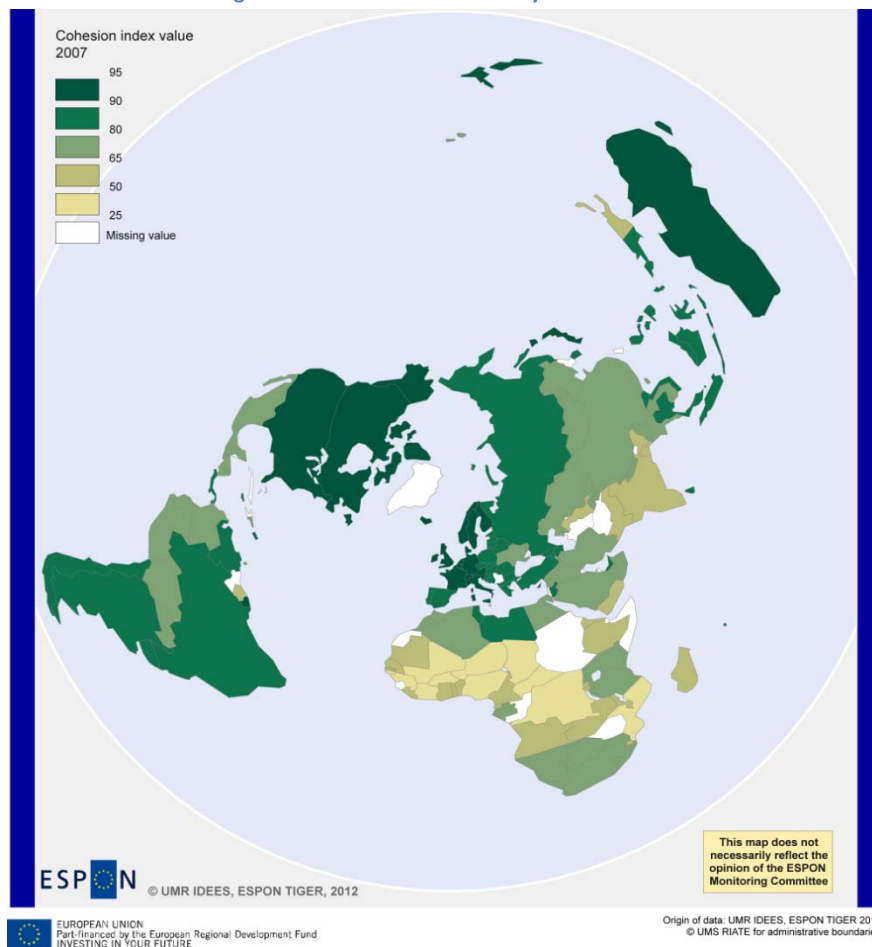
Figure 21 : indicators included in the cohesion synthetic indicator



The synthetic indicator is the average of all the normalized values of the characters listed above. Despite our efforts, we still can notice the existence of missing values (in Sudan and Somalia for example) that can influence the results of the analysis because of the contiguity constraint we introduce in the regions building. The mapping of the social cohesion synthetic indicator allows stressing the existence of important disparities at the world level (Figure 22). The situation in North American, Japan, Australia and north-western European countries is the best with high value of the cohesion index; the situation in central and western Africa is the worst with very low values of the index. Nevertheless we can observe that the structure of this index at this world level varies according a rather continuous figure. That means that it

will be possible to build some regions even if we introduced some constraints on contiguity between countries.

Figure 22 : the social cohesion synthetic index

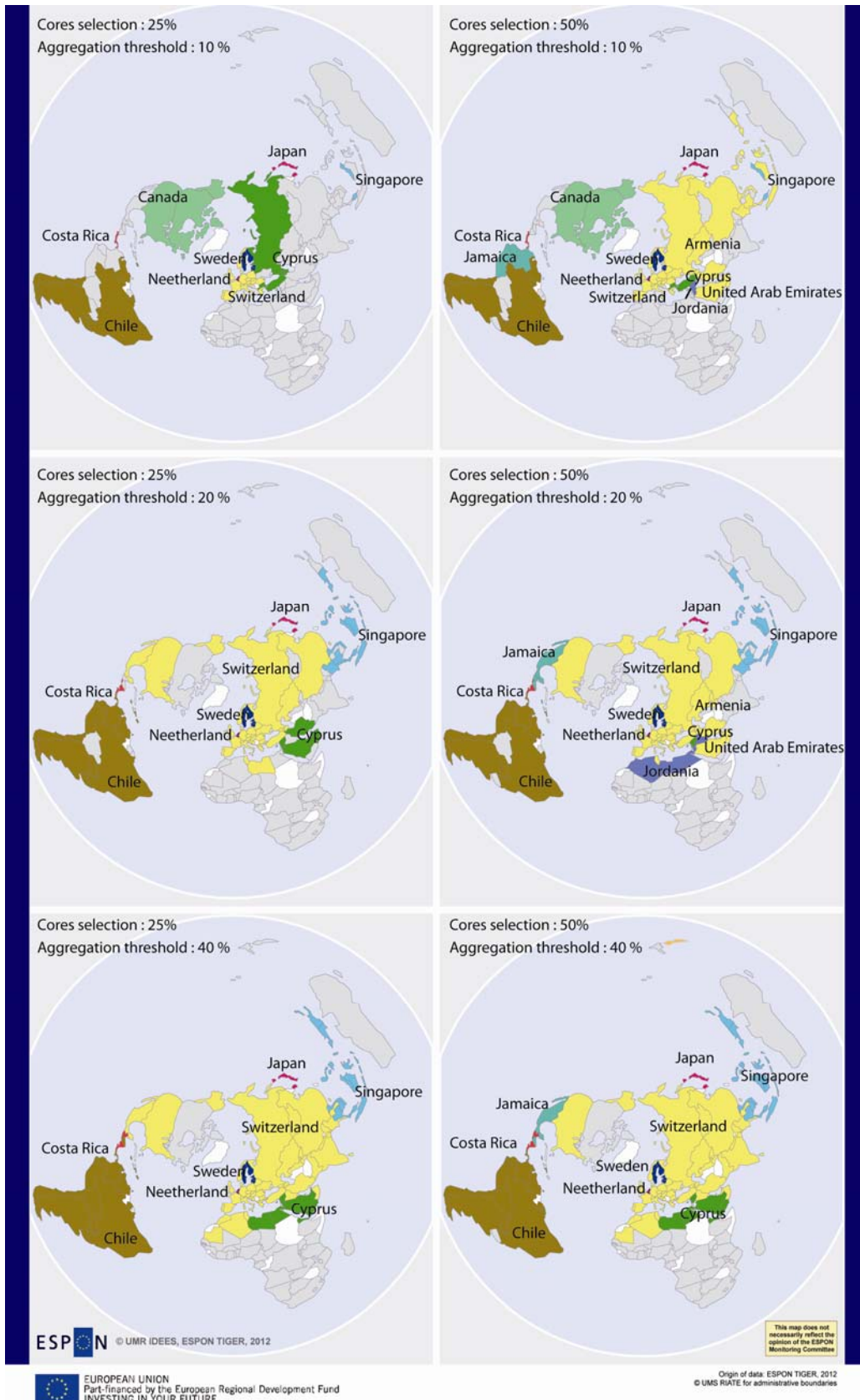


3.2.2. Variation of constraints for regionalization

Like in the example developed above for GDP and HDI, we decided to explore regionalization using different threshold for the choice of local maximum (the countries that will serve as “core” of classes) and also for the choice of the level of difference allowed in the aggregation process. On the left column of the next group of maps. Like previously the number and the shapes of regions vary very much in the process.

Figure 23) the threshold for the core selection is more discriminant as only one quarter of the countries that obtain the best value are “allowed” to be used to become a core. On the right column, half of the world countries could possibly become a local maximum. Then, the line show the variation of the threshold for the aggregation in term of percentage of difference allowed between the local maximum and the country that would obtain the lowest value of the region as far as the cohesion indicator is concerned. Like previously the number and the shapes of regions vary very much in the process.

Figure 23 : regionalization using the cohesion index



3.3 Competitiveness indicator

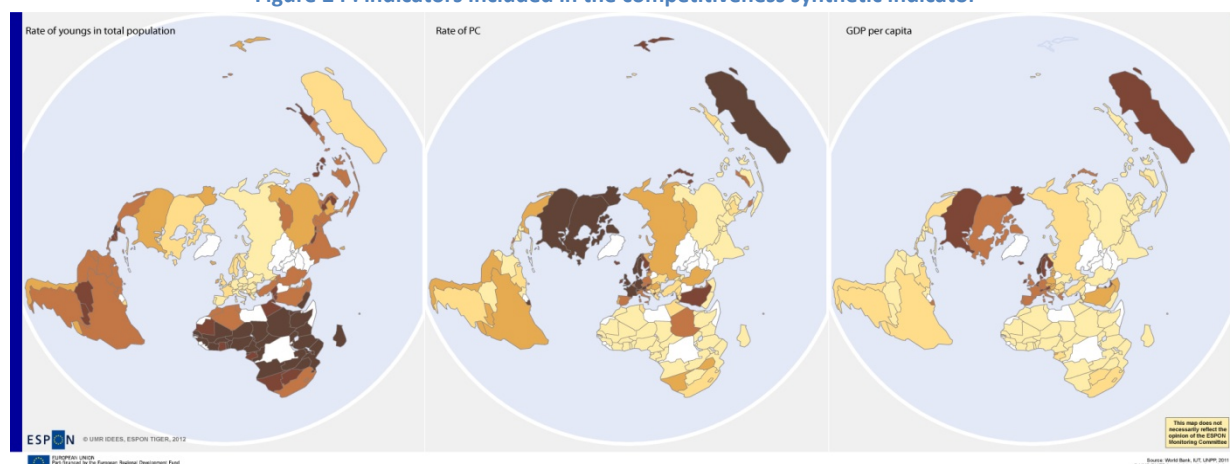
3.3.1. Building of the competitiveness indicator

Like in the previous situation, the main difficulty here is the selection of data completed enough to be used to build a global synthetic indicator on competitiveness. The most interesting data are not available for all countries, especially for labor cost and budget of public R&D and people working in R&D. We choose then three indicators:

- GDP per capita that is very often used as a competitiveness indicator
- Rate of young people in the population that allow making some hypothesis on the structure of employment and on the evolution of the ageing problematic.
- Rate of PC for 100 inhabitants. That gives an idea of the diffusion level of the high technology infrastructure.

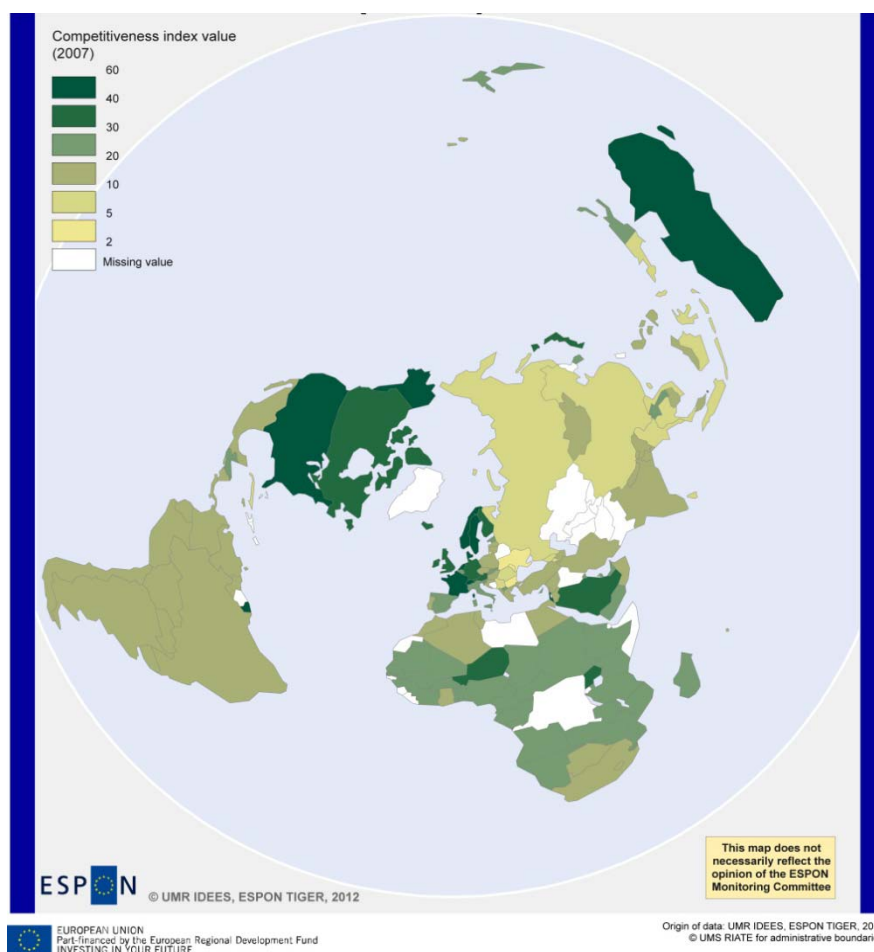
Those indicators are normalized (Figure 24) and the maps below show their spatial distribution. Rate of PC and GDP per capita are correlated positively and the situation is more complex for the relation with the rate of young. The maximum rate of young people can be observed in Africa that would imply that African countries will get an important score for competitiveness for this indicator.

Figure 24 : indicators included in the competitiveness synthetic indicator



The next maps (Figure 25) show the spatial repartition of the synthetic indicator. The most “competitive areas” are North America, and especially USA, North west European countries, Australia, Japan, Saudi Arabia. But we can observe that African countries also show a relatively high level of competitiveness on this synthetic indicator. This is due to the weight of the variable describing the rate of young people in the population. **This situation is problematic as it relies on a hypothesis that can be considered as fragile and on the potential of young population. Some solution should be finding. One solution could be to weight the variables introduced in the indicator. We could also try to find some other variable to complete the set of character used, even if it will be difficult due to the number of missing values. We will try to improve the quality of this synthetic indicator for the final version of the report.**

Figure 25 : the competitiveness synthetic index (2007)

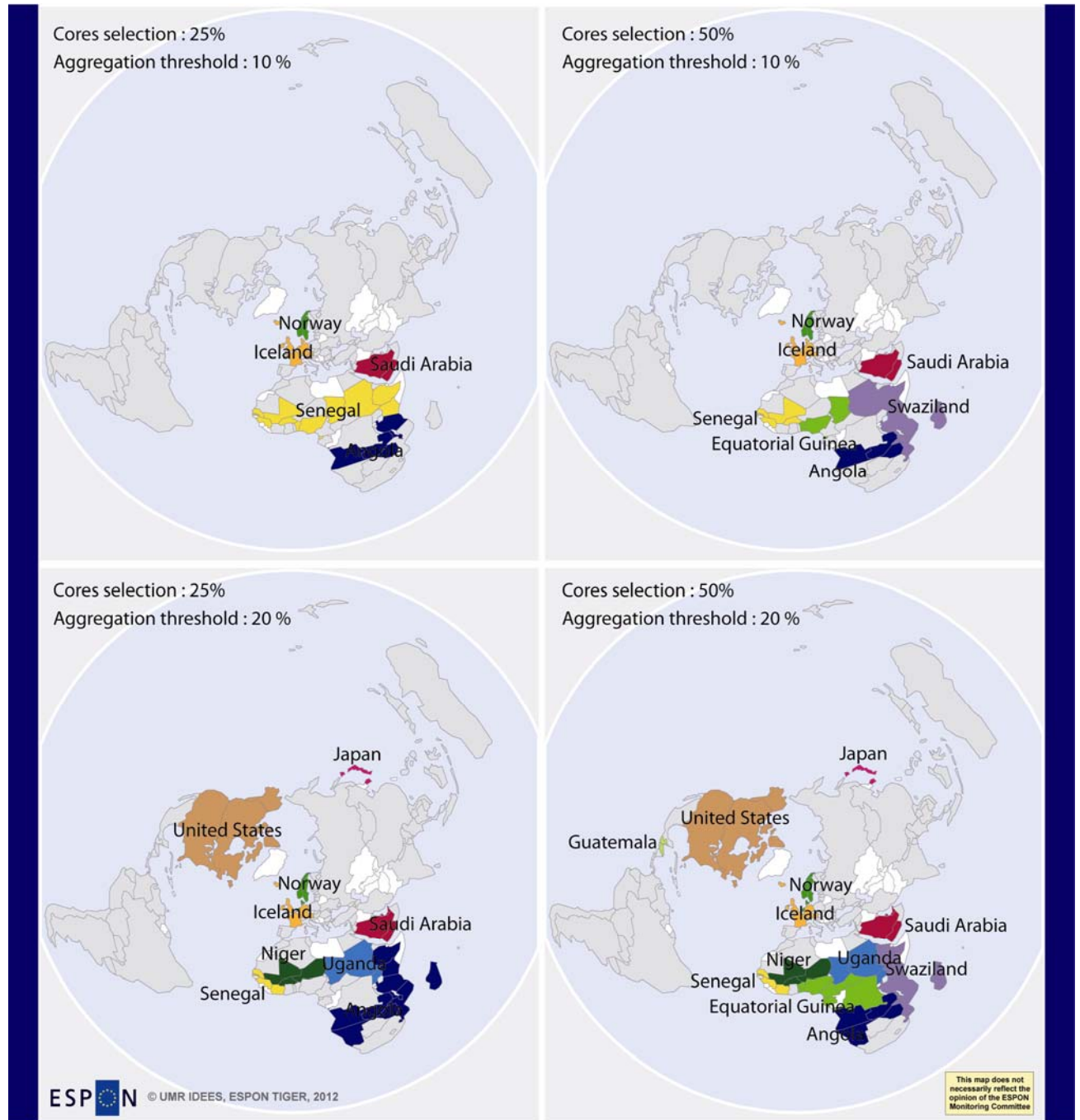


3.3.2. Variation of constraints for regionalization

Like previously we explored the regions obtained using this indicator making the threshold varies in term of selection of local maximum and in term of aggregation criteria. The columns show the variation of the core threshold selection and line the variation of the aggregation criteria. We can observe that few countries of the world are able to make a core for a region and when they can, other countries have too much difference with them to aggregate. In consequence, whatever the threshold used very few countries belong to a region. This is well illustrated by the apparition of regions when the aggregation threshold is lower.

But, as we anticipated it the main problem is that we can observe many regions in Africa, when no industrialized country except in Europe appears in a “competitive region”. This is due to the already stressed problem of the weight of young rate variable in the indicator building. It is also due to the fact that we did not allow region with single country and that the difference between the richer countries and their neighbors, especially is Asia, can be very important. We probably also have MAUP issues in this regionalization as some Chinese regions could serve as local maximum or at least be integrated in a region with Japan or South Korea. Those aspects will be explored in the final version of the working paper.

Figure 26 : regionalization using the competitiveness index



ESPON © UMR IDEES, ESPON TIGER, 2012

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

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

Origin of data: ESPON TIGER, 2012
© UMS RIATE for administrative boundaries

3.4 Problems and limits of the regionalization proposed

The objective of this last part was to go beyond the « a priori » regionalization that does not allow making relevant comparison even if it can be useful in the comparison of spatial structure of indicator value variation. Different scenarios are built and test in order to check the position of European countries in comparable world region. One main result is that often European countries are not included in the competitiveness scenarios tested here but, when they are Europe is can be split in three or four part. The deconstructive approach could be full of teaching when the application will be entirely ready and all the problems and delays evoked earlier will the solved.

- ⇒ One main limit in this regionalization method proposed is that it build only structural regions (based on the observation of the indicators values variation) and that it does not take into account of the functional aspects (trade and financial flows, migration etc.) that are quite important to define world region. More the belonging to institutional regions should also be taken into account.
- ⇒ One second important problem is related to MAUP at world level. We choose to keep the national level, but doing that we allow each country to become a local maximum: Luxembourg and USA for example. Even if both have high GDP per capita, the total GDP value is quite different and the country ability to be the center of a region is different.
- ⇒ More this approach has some limits for the building of regionalization's with the aim of comparison: the number and localization of local maximum varies according each indicator (there is a priori no reason that the GDP per capita observe strictly the same spatial variation than any other variable). More, it can vary in time with the evolution of the indicators. This not makes the comparison easy.
- ⇒ But the most important problem is that it is very are when this method allow to take into account all world countries. Most of the time a large number of countries are not included in region that do not allow to compare all world regions.

One of the problems is based the bad quality of some indicators and especially the missing values. Some indicators provided by international organization show as much as 50% missing value (labor cost etc...). Some indicators have less missing values, but they are still an obstacle for the analysis, because they lead us to take some countries out of the analysis, and that is an important problem in a regionalization method were the contiguity has an important role in the region building. We had explored some solution in order to complete indicator, but the method can be used only when few values are missing. We have done it for the cohesion indicator to be used for the regionalization in the next section but we did not have the time to correct that in this part of the report. This will be made for the final version.

4. Operational regionalization for comparison

One aim of this working paper is to propose a coherent world regionalization that could be operational and relevant for comparison. The two previous methods explored show their limits.

- When we try to build comparable regions on the European Union model it is quite impossible, because European union is much more particular in terms of institutional integration that imply specific links between the countries (like regional policy), that do not exist in other regions.
- When we try to build comparable regions without any a priori model, we have to face some problem, and the most important one, as far as European Union is concerned, we are never sure to have EU member states in the same region: the maps provided show indeed (Figure 23 & Figure 26) that European Union countries are always split in two regions or even more.

We decided then to try to build a specific methodology to build comparable world regions, limiting the risk of splitting European countries in different regions. The choices made and the method implemented is presented in the following sections.

4.1. Method for regionalization

As we have stated in the methodological part of the report, some concepts are very important in regionalization: contiguity and homogeneity. The previous method implemented shows the importance of those aspects, but also the importance to use a method that will not exclude some countries from the regionalization obtained. In order to build comparable regions, respecting those three conditions we decided to use different simple parameters in the regionalization.

The first parameter privileged is the **co-belonging of countries in Economic integration areas**. First, as in this part of the project we do not use flows data, we decided to use those areas because they often imply the existence of preferential trade or financial flows, or even migratory flows. More, those areas implied most of the time a high level of contiguity between the countries involved. Finally economic integration areas imply the sharing of a common project between the countries (from cooperation areas to monetary union passing by free trade zone) that mean that the regions built following this criteria could have a coherence in terms of effective existence. We then build a table of countries where their belonging to 37 existing economic integration areas (Figure 28) has been specified. Then, from this table, we build a matrix measuring the co-belonging of the countries to integration areas. The maximum number between two different countries is 5. That means that, for example, Egypt and Sudan or Tunisia and Libya are together in five different integration areas. As far as European countries are concerned the maximum is five. The matrix has been then normalized between 0 and 100 in order to be computed with other matrices. The minimum is 0 for the countries that belong to no integration area together (Brazil and Germany for example) or no integration area at all (Mongolia, Iran, North Korea etc.). **One main problem, as the part 2 of this working paper demonstrated, is that the economic integration areas do not have the same level of integration. For the moment we did not take this difference into account, but we plan to introduce those differences. More, some areas have members, but also associated countries and**

observer countries. For the while we took only members into account, but the analysis could be deepen introducing the later this different weights in the co belonging matrix.

The second parameter privileged is the **homogeneity parameter**. We first build a similarity matrix using the five variables gathered for the cohesion indicators implemented in the previous parts. This matrix allow to have a synthetic value for each couple of country describing how much they are similar or not as far as the 5 characters used are concerned. For the while, we only made a first attempt with the cohesion synthetic indicator build in the previous part of the report, because we implemented a method to complete the missing values of the indicators used. However this part must be refined in order to take also competitive indicator into account if we found a solution to improve the quality of this indicator.

In consequence we have then two matrices. The first one describes the co-belonging of couple of countries to economic integration area. The second one provides the similarity between each country two by two. Both matrices are normalized: the values of similarity and co-belonging vary between 0 and 100. The matrices have then absolutely the same format and can be used together in the next step. In order to obtain one single matrix we made the average of the two matrices.

⇒ For the while, a simple mean of the two values is used. But we will have in a next step to refine this approach, especially in exploring the effects of applying different weights to the matrices of co-belonging and similarity.

Finally to obtain regions, we applied a hierarchical cluster analysis that builds groups of countries according their level of resemblance. The observation of variance variation in the partition process allows assessing that the most significant partitions lead us to make 5, 8 or 10 cluster (Figure 27). The regions obtained are described in the next section.

Figure 27 : variance level in the partition process

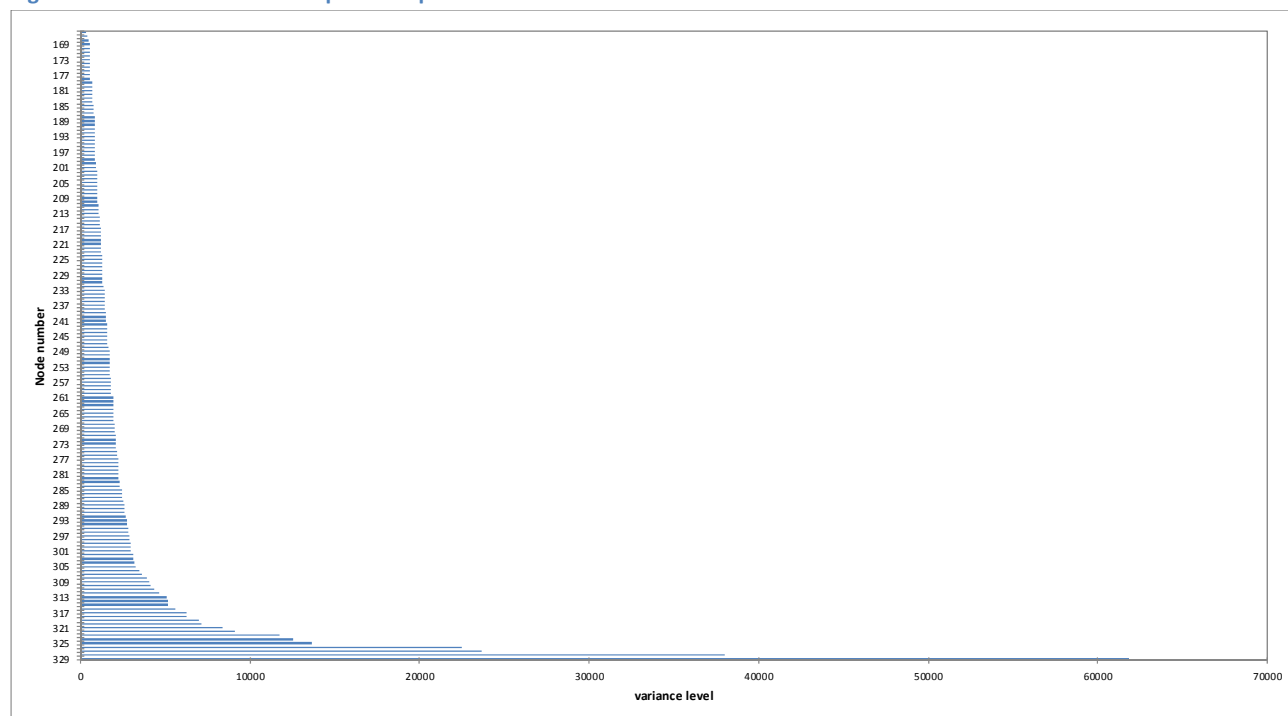


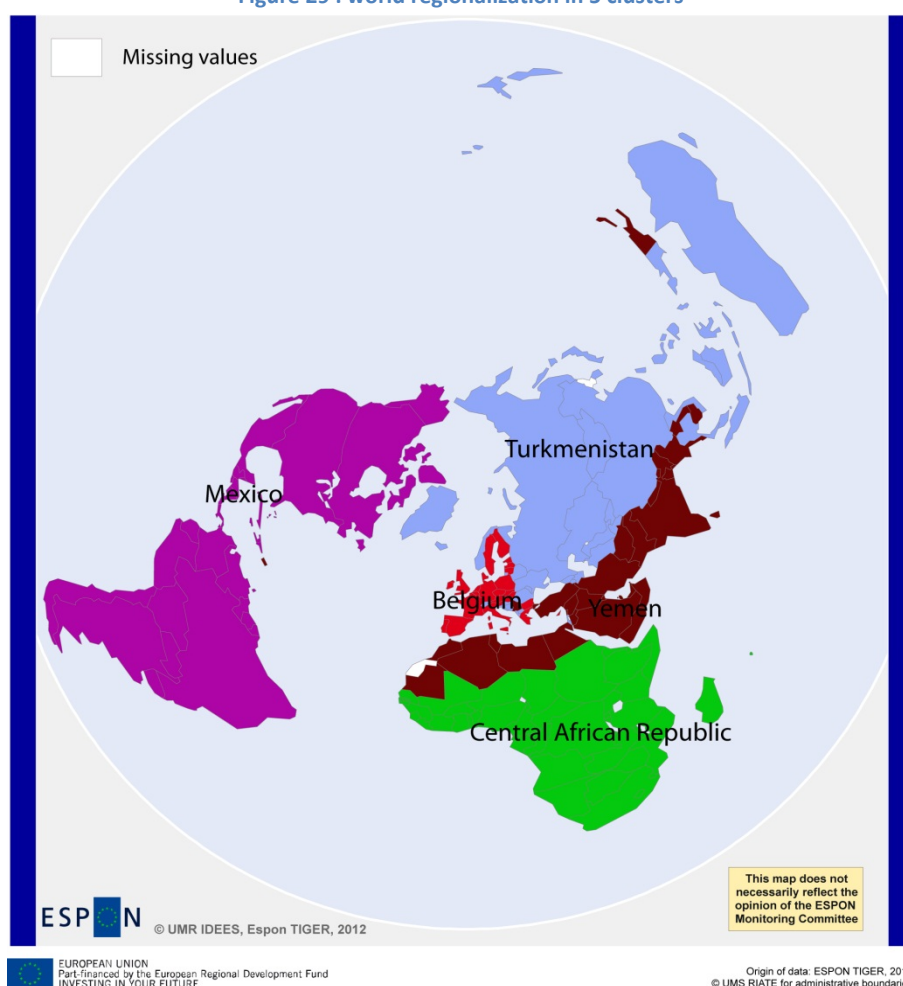
Figure 28 : table of economic integration area take into account in the building of co-belonging matrix

Acronym	Name	Date	number of			Level and kind of integration					
			members	associated	observers	1/ Association or cooperation	2/ Free trade area	3/ Custom union	4/ Common market	5/ Economic union	6/ monetary union
AL	Arab League	1945	23			yes					
ALADI	Latin American Integration Association	1980	12			yes					
AMU	Arab Maghreb Union	1989	5			yes					
ASEAN+3	Association of Southeast Asian Nations	1967	10				yes				
AU	African Union	2002	53			yes					
CAFTA	Central american free trade agreement	2003	7			yes					
CAN	Andean Community	1969	4	5	4			yes			
CARICOM	Caribbean Community	1973	15	5	8					yes	
CCASG	Cooperation Council for the Arab States of the Gulf	1981	6				yes				
CEFTA	Central European Free Trade Agreement	1992	8				yes				
CEN-SAD	Community of Sahel-Saharan States	1998	28			yes					
COMESA	Common Market for Eastern and Southern Africa	1994	20				yes				
EAC	East African community	2000	5					yes			
EAEC	Customs Union between Belarus, Kazakhstan, and Russia	2010	3					yes			
ECCAS	Economic Community of Central African States	1980	10						yes		
ECCU	Eastern caribbean currency union		6								yes
ECOWAS	Economic Community of West African States	1975	15						yes		
EEE	European economic area	1994	30						yes		
EFTA	European Free Trade Association	1960	4						yes		
EUCU	European Union custom union	1996	32					yes			
EURASEC	Eurasian economic community	1996	6		3	yes					
EuroZone	Euro zone	1998	17								yes
GAFTA	Greater arab free trade area	1997	18				yes				
IGAD	Intergovernmental Authority on Development	1986	7			yes					
Israel-Palestine	Israel-Palestine custom union	1994	2			yes					
MERCOSUR	Common Southern Market	1991	5	5	2			yes			
NAFTA	North American Free Trade Agreement	1992	3				yes				
OAS	Organization of American States	1951	35			yes					
SAARC	South Asian Association for Regional Cooperation	1983	8		31	yes					
SACU	Southern african customs union	1910	5					yes			
SADC	Southern African Development Community	1992	15			yes					
SAFTA	South Asian Free Trade Area	2004	8				yes				
SICA	Central american integration system	1993	7	1	8		yes				
Swiss-Lichtenstein	Swiss-Lichtenstein custom union	1924	2					yes			
TPP	Transpacific partnership	2005	4				yes				
UE	European Union	1992	27							yes	
UNASUR	Union of South American Nations	2008	12		2	yes					

4.2. Proposal of world regionalization

The method described in the previous section allows us to make 5, 8 or 10 different clusters. Regions are named according to the name of the central country of the class. The most interesting regionalization is obtained from the partition in 5 clusters: other regions obtained show a high level of discontinuity in some regions. In the world regionalization in 5 clusters, the regions obtained are rather contiguous, with the exception of “Yemen” region that have a Puerto Rico and Papua-New Guinea discontinuous extensions (Figure 29). One interesting result is the shape and extension of the “Belgium” region that correspond quite well with the European Union figure with the exception that the region obtain do not involve Romania, included in the “Turkmenistan” region.

Figure 29 : world regionalization in 5 clusters



Regions are quite different in terms of surface and the number of countries in each region can varies between 26 (Belgium region) to 43 countries (Central African Republic region). The quality of region should be tested. One solution could be to compare the intra-regional variation level compared to the world variation level. To do that the coefficient of variation of each class can be calculated and compared the world one. The table below (Figure 30) shows the value obtained for each region and each indicator used in the cohesion homogeneity matrix. The values higher than the world one are show in red color. Only two values are in red for the Central African Republic region showing that only this region shows a higher level of

disparity than the world level on two variables: the rate of girls in school and the literacy rate. For the rest of region obtained the values of intra-regional disparities are lower than the disparities at the world level, showing that level of homogeneity of those regions. This regionalization seems then acceptable; even if we do not doubt that it could be improve.

Figure 30 : intra region coefficient of variation compared to world one

Coefficient of variation	CO2perGDP_07	Life_Expect_2007	tx_girls_07	poverty life2000-09	Lit_07-09
Belgium	0,75	0,04	0,01	0,43	0,01
Turkmenistan	0,92	0,07	0,02	0,64	0,02
Yemen	0,54	0,11	0,05	0,46	0,21
Central African republic	0,81	0,08	0,09	0,64	0,24
Mexico	0,57	0,06	0,01	0,53	0,09
Coef. De variation monde	0,942	0,159	0,056	0,663	0,222

The fact that the regionalization obtained seems to be of rather good quality allow us to conduct some comparison between the regions. This can be done in showing the average of each indicator by region (Figure 31) or better, in calculating the standard deviation of each region to the world average (Figure 32).

Figure 31 : average of each region on the cohesion indicators used

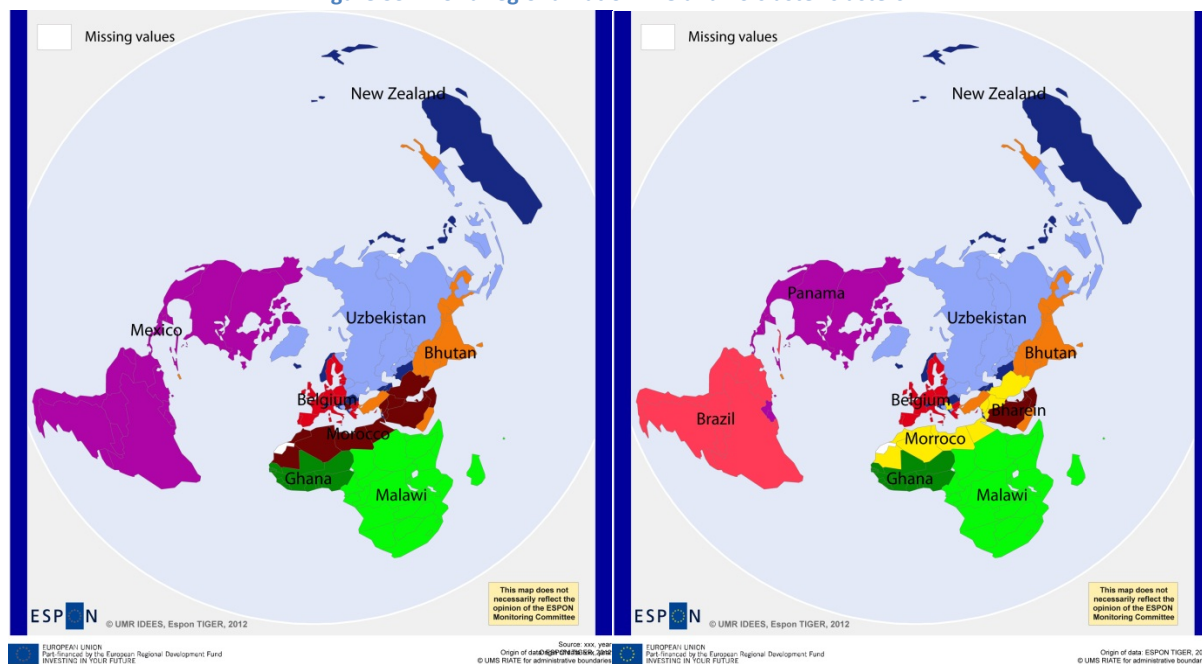
Average	CO2perGDP_07	Life_Expect_2007	tx_girls_07	poverty life2000-09	Lit_07-09
Belgium	3,64	77,89	48,46	12,10	98,55
Turkmenistan	10,78	73,35	48,24	17,11	97,91
Yemen	8,20	69,02	47,51	23,37	75,72
Central African republic	4,25	69,02	47,51	23,37	75,72
Mexico	5,69	73,01	48,49	34,86	90,50

Figure 32 : standard deviation to global average

Standard deviation to global average	CO2perGDP_07	Life_Expect_2007	tx_girls_07	poverty life2000-09	Lit_07-09
Belgium	-0,45	0,15	0,02	-0,59	0,18
Turkmenistan	0,64	0,08	0,01	-0,41	0,17
Yemen	0,24	0,02	0,00	-0,20	-0,10
Central African republic	-0,35	0,02	0,00	-0,20	-0,10
Mexico	-0,14	0,08	0,02	0,19	0,08

A quick glance to the figures allows assessing that the Belgium region seems to perform better than the other regions. However the other regions are quite larger and that can have a great influence in the value observed. One solution could be to use another regionalization that would propose a higher number of regions, like the regionalization in 8 and 10 clusters that are statistically significant. One problem is that the regions obtained show sometimes a high level of discontinuity that argues against their usage as coherent and useful world regionalization (Figure 33).

Figure 33 : world regionalization in 8 and 10 cluster clusters



Even if this method of regionalization allowed us to obtain interesting and promising results it should be improve again. We have first to check how it would be possible to introduce competitiveness indicators. Then, we have to deepen also the analysis on the weighting of the different matrices introduced in the analysis. More, maybe it would be also interesting to add a contiguity matrix in addition to the co-belonging to economic integration areas because some countries do not belong to a integration area and that could explain to a certain extend the fact that some regions split in non-contiguous parts like “Bhutan” or “New Zealand” regions for example.

More, when the regions obtained will seem stabilized, it would be interesting to check how they perform in world regional analysis compared to other world regionalization.

General conclusion

Even if they bring to new visions of Europe in the world, the regionalization of the world built in order to compare European Union / ESPON with other world region show some problem and limits that are inherent to the specificity of the European Union space and integration level. What one should add or take away is less the space that the European values and particularities. One can feel that enlargements and regional policy can reduce the general competitiveness level of the European Union. But they reflect best the European values and it is difficult not to take them into account when we want to compare European Union in the world. If one wants to assume plainly the competitiveness perspective he should not look the other way and admit to countries or regions should be taken away from European Union. So European Union, ESPON region can hardly be compared to other world region.

But one should also ask why we need to pit this particular object that is European Union against other non-relevant objects (countries, regions) with to non-relevant indicators for lack of anything better. This position is surely a sclerosing one and European Union should assume its own model combining cohesion (that give it its meaning) and competitiveness (that allow to support cohesion) and build its own indicators to evaluate its own performances and the performances of other parts of the world compared to it.

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Annex 01: atlas of competitiveness and social cohesion indicators in the world

1. Preamble : building the Data Base.

Searching the Data

Our first step in the construction of the DataBase (DB) was to find and to list indicators that the main issues of the Lisbon Treaty (or EU 2020 strategy) are dealing with: mainly competitiveness (economical aspect) and cohesion (social aspect). These two main themes guided the construction of this database and where then divided in sub-topic like Child Mortality and HIV in the Health theme. The second step was to try to find sources for those data browsing the web. Of course, the big and best-known data providers were the easiest accessible:

- World Bank
- UNESCO
- ONPP
- OEDC

One of the main qualities of those sources is their reliability. They are produced by organisms that collect and deal with data for decades and have a huge experience on that field. The data we did collect until now - for the most of them - is mainly completed, especially the usual indicators like GDP or Population for instance. Of course, some exceptions remain. Those are mainly the indicators who measure (relatively) recent phenomenon's like the numbers of internet users per country or the HIV prevalence.

Completing the Data

In our last Interim Report, we said that we wanted to find a way to enhance our database regarding lacking data.

To do so, we used the ESPON 3.2 *Data Navigator 2*, Part 1. In deed, this document gives a way to estimate data «on the temporal dimension» (Data Navigator 2, P. 53 - ESPON 3.2). There are 3 main methods we used:

- Interpolation
- Retrospective
- Prospective.

Since we also collected data with 5 years steps (ie Dependency Ratio or Median age - most of them are linked to population structure), we used one more method to complete those particular data: annual variation.

If we know 1990 and 1995, then $1991 = 1990 * (1 + ((1995 - 1990)^{(1/6)} - 1))$ and $1992 = 1991 * (1 + ((1995 - 1990)^{(1/6)} - 1))$.

Once we did complete the data this way, we were not always satisfied with the results we had. For the data where Retrospective was used till the first year of our period (ie 1989), we wanted to use a formula that could use a previous year the data may had registered. So, in the case of 1989 being an calculated year and 1985 & 1990 being a completed years, we used: $1989 = (1985 + ((1990-1985)/5)) * 4$

From stock data to ratio

Once we found and completed our stock data, we wanted to create our own ratios. We thought that it was easier - and more reliable - to create them than using ratios from several of sources.

the point of it is to have a link between our stock data and our ratios. We

build them and had an overview on how they were build. Indeed, some ratios provided by data providers are not clear on how they are made. For instance, to calculate the GDP per Capita, we used our data on GDP (ESPON DB 2013) and our data on Population (ESPON DB 2013). The ratio is calculated: $\text{GDP} / \text{Population}$

The never found data.

Also to notice is the fact that some data we wanted at the start were never found. This can be due to their specificity: labor costs are not measured in every country. We found this information for the OECD countries for instance, but not for less advanced ones. But there are also data we just gave up looking for. This has been the case for most of gender indicators like male female income for instance.

2. Competitiveness Indicators

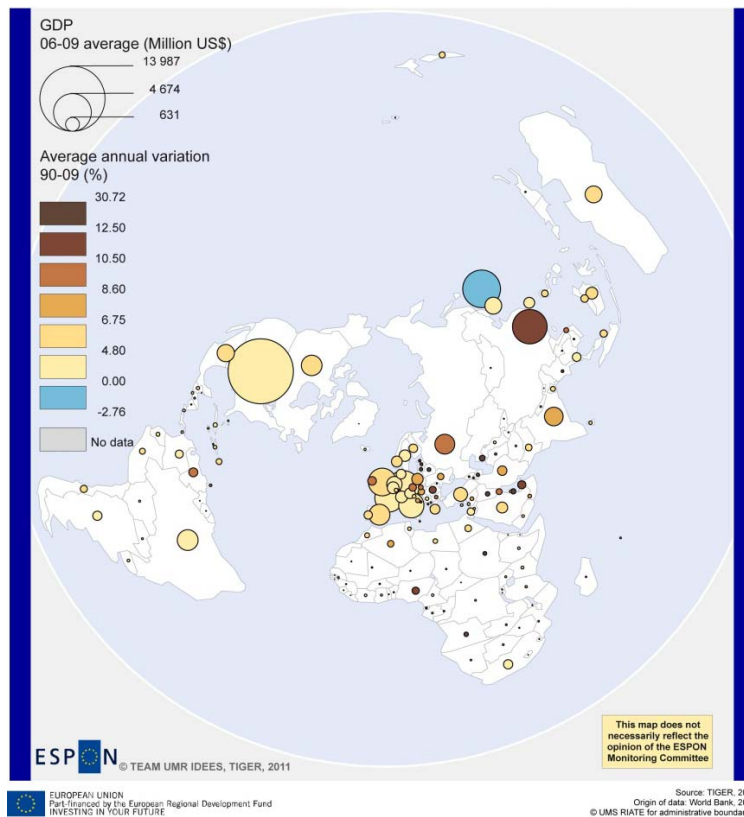
The justification of the choice of indicators will be detailed in the final version of the Atlas

More, data on labor are of very bad quality at the world level. We would like to try to improve them for the next version of the working paper and consequently we prefer not to display the maps obtain in this thematic.

2.1. Wealth and Growth

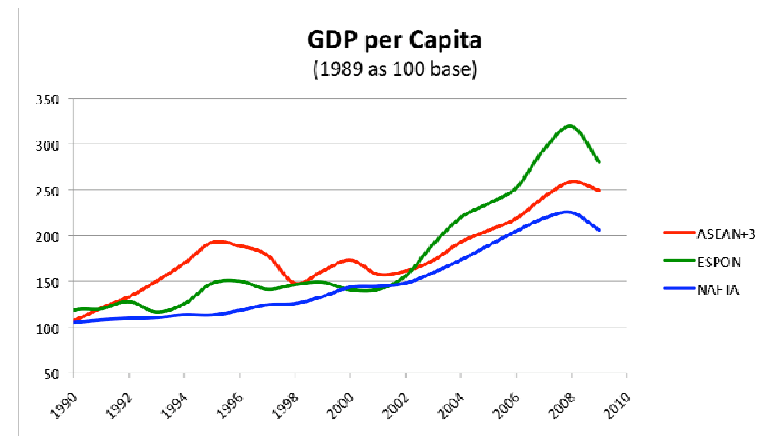
The countries wealth is most often measure by the GDP and the GDP per capita. The maps and graphs provided here are based on this indicator and show its evolution since 1990.

Figure 1 : Wealth in the world: the Gross domestic product



The Figure 1 describes the repartition of GDP by countries in the world. Three main poles of concentration of wealth can be identified and among them Europe, where despite their small size both in term of surface and population, countries have important GDP. The evolution of wealth is also rather positive for European countries, even if China, for example, faces a higher growth rate. The situation is the worst in Japan, where the GDP is decreasing. However the values are from 2009 and the situation may have change since this date.

Figure 2: GDP per capita evolution (1989 as base 100) for NAFTA, ESPON and ASEAN+3



Anyway, the situation seems rather similar when we consider the GDP per capita. The Figure 2 assesses that the evolution in the three main economic integration area follow a similar trend, with a growth since the beginning of the 1990's. The three regions face however a trend to decline from 2008 and the financial crisis.

The repartition of GDP per capita by country shows that the United States can be considered as the richest country in the world. The position of European countries is rather good in 2006-2009 (Figure 3) but the analysis of the annual variation of the GDP per capita since the 1990's (Figure 4) show that the situation of both United States and European countries can evolve. Indeed, it is in those regions, including Japan than the growth rates of GDP per capita are among the lowest of the world, with the exception of countries that had

Figure 3 : share of GDP per inhabitants (2006-2009 average)

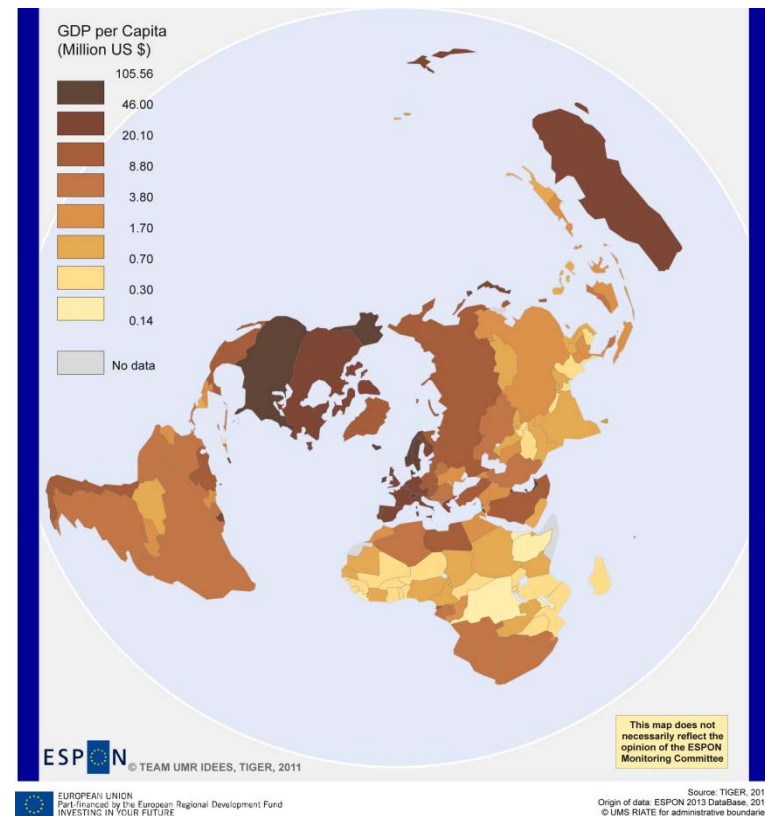
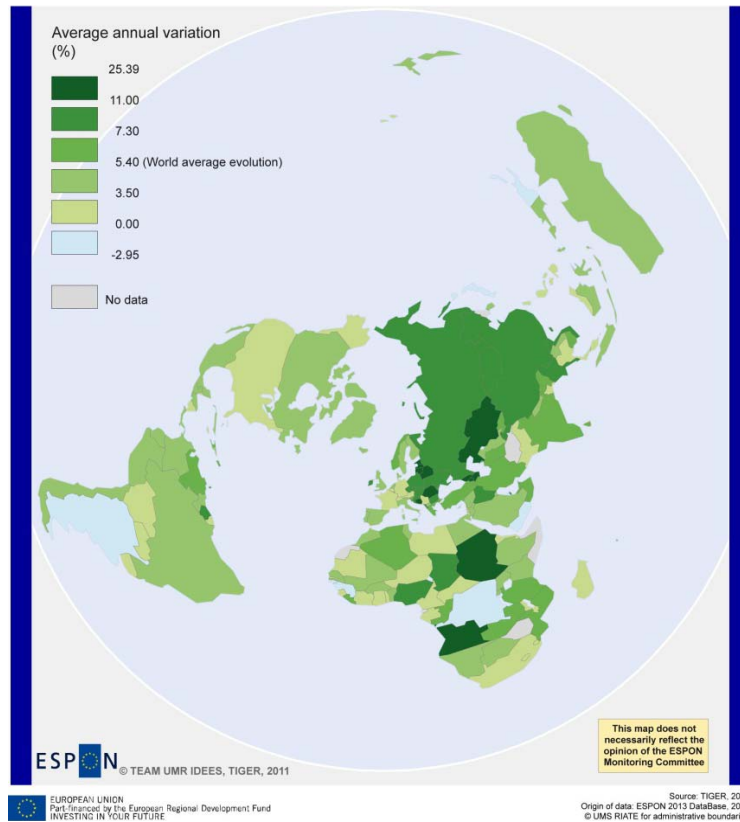


Figure 4 : Share of GDP per inhabitants (1993-2009 evolution)

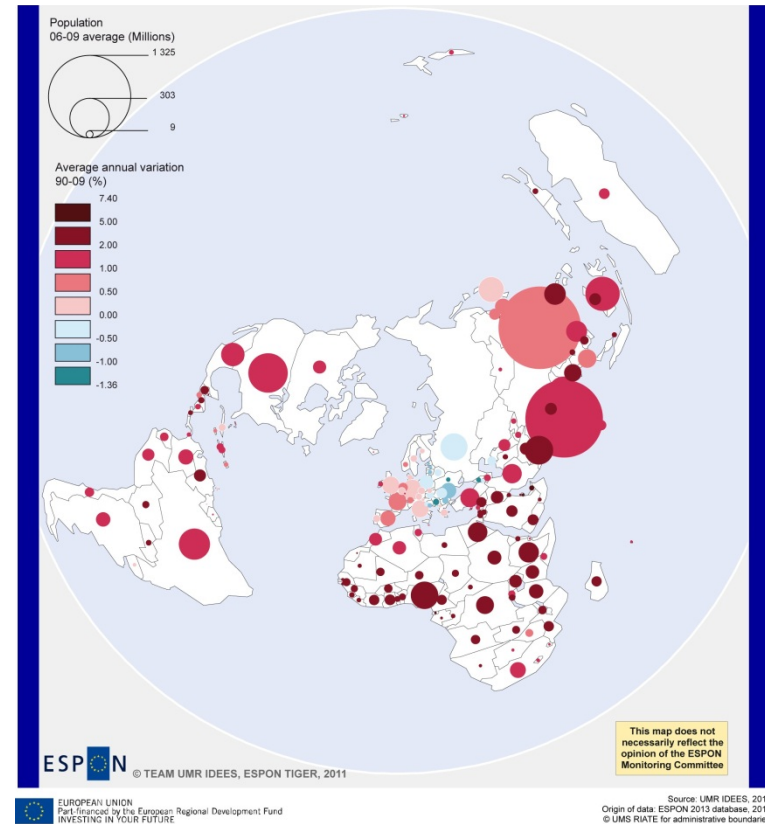


to face strong crisis in the period like in Argentina. The GDP per capita grows very much in China and Russia and in some countries where the situation was previously very bad (Angola, Sudan and Kazakhstan). Anyway, we can also observe that the eastern European countries also undergoes important growth rate during the period.

2.2. Population and demographic structure

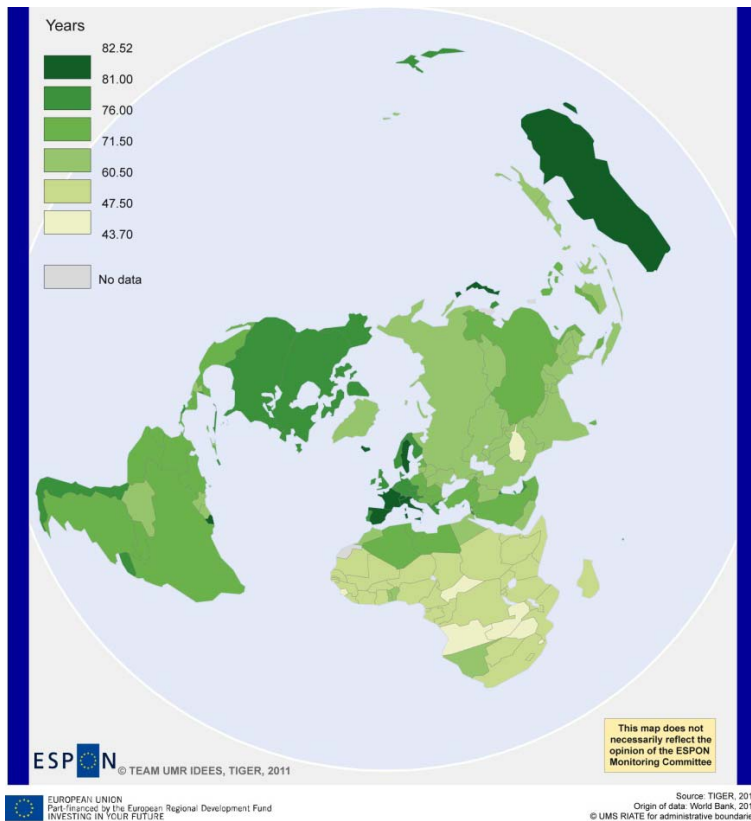
As the wealth, the population is a classical indicator used in the analysis of a potential competitiveness. The reasons to that are numerous, but the main one is that a wide population constitutes a large market. More, the demographic structure is also often analyzed.

Figure 5 : population (2006-2009 average)



The population repartition at the world level shows without any surprise, as those facts are well known that two Asian countries, China and India gather roughly 2/7th of the world population. Other populated countries are in Asia (Indonesia) but also in Africa (Nigeria), and in Americas (Brazil and United States). What it is striking on the previous map (Figure 5) is that many European countries, mostly in the east are affected by population decrease.

Figure 6 : 2006-2009 average life expectancy

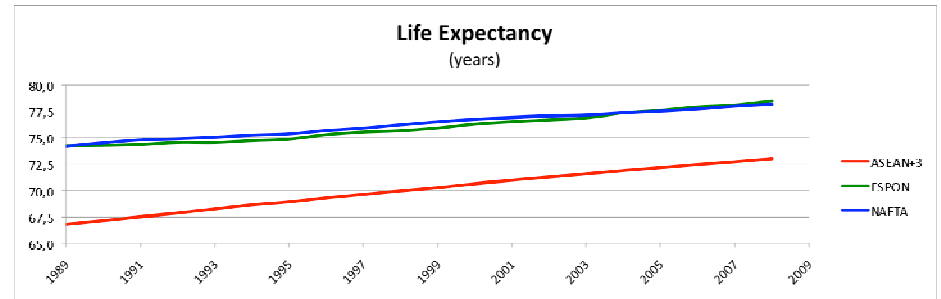


More, other European countries have a small population and a rather small growth rate.

The European countries perform better on another indicator: the life expectancy. In Sweden, France, Spain, Italy they are among the best in the world (Figure 6). However great differences between European countries can be observed and the values observed decreased slowly when going to the East. For example, the values observed in Poland and Romania are equivalent to the ones of Brazil, Morocco or China. The situation of European countries is

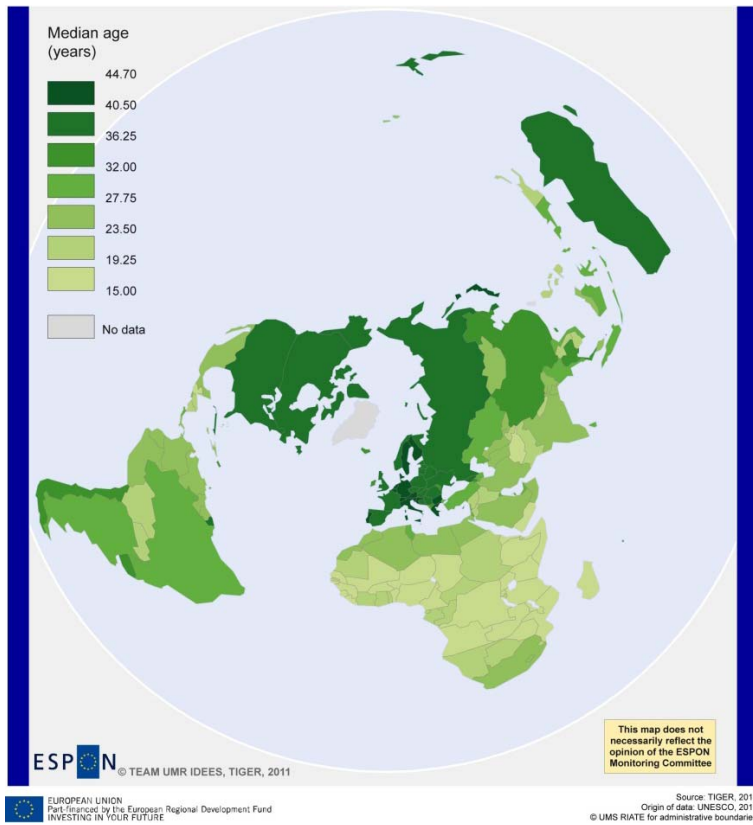
globally good and it is still improving (Figure 7) like in other world regions. The ASEAN3 region is low below ESPON and NAFTA, with about 72.5 years in 2009 but the situation is improving quickly and the difference level decrease

Figure 7 : evolution of life expectancy in NAFTA, ESPON and ASEAN+3



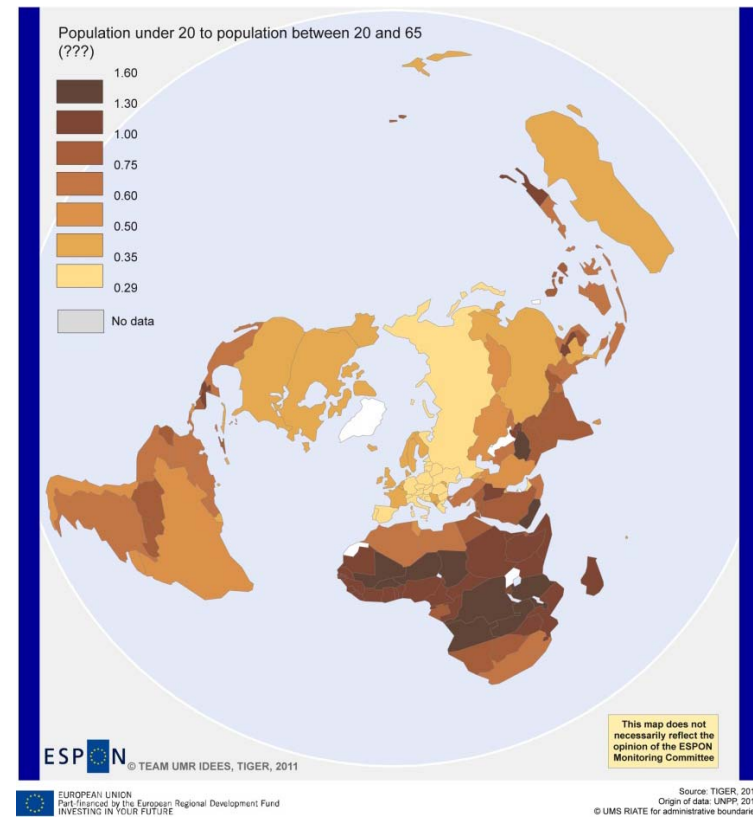
The life expectancy reflects the quality of life and the quality of the health system, but the increase of life expectancy have some consequences in term of competitiveness that are rather considered are negative. The most important one is the ageing of the population that can be observed on the figure 8. The median age, i.e., the age where 50% of the population is younger and 50% is older show the highest values for Europe (Sweden, Finland, Germany, Austria, Greece etc.). The situation is equivalent in Japan with a medium age between 40.5 and 44.7 years. In the rest of Europe, in North American and Australia the median age is lower, and then the population globally younger, but still they are among the oldest of the world.

Figure 8 : 2010 median age



should be accompanied by employment perspective for the young population that is not always the case in African countries.

Figure 9 : active population renewal (2010)

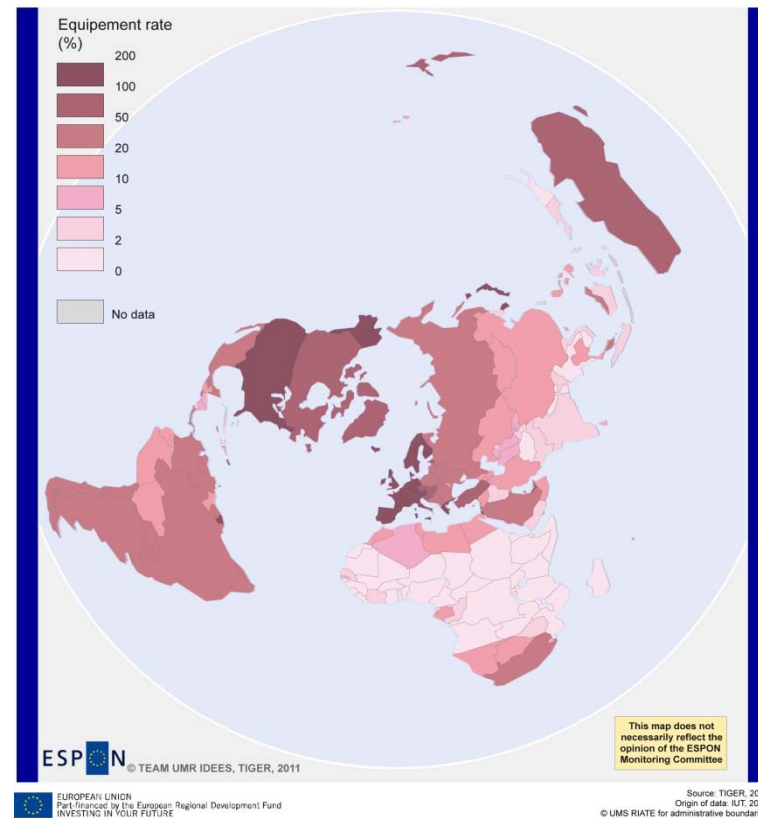


Indeed, what it is at stake with the life expectancy and median age is the perspectives in active population renewal i.e. the perspective of replacement of active population when the present one will become too old to work and when they will retire with the financial burden that suppose for the active population. For this situation the perspectives seems better in Africa, and to a lesser extent, is some Asian countries (Figure 9) even if the things are not so simple; the replacement of active population perspective

2.3. Telecommunication infrastructure

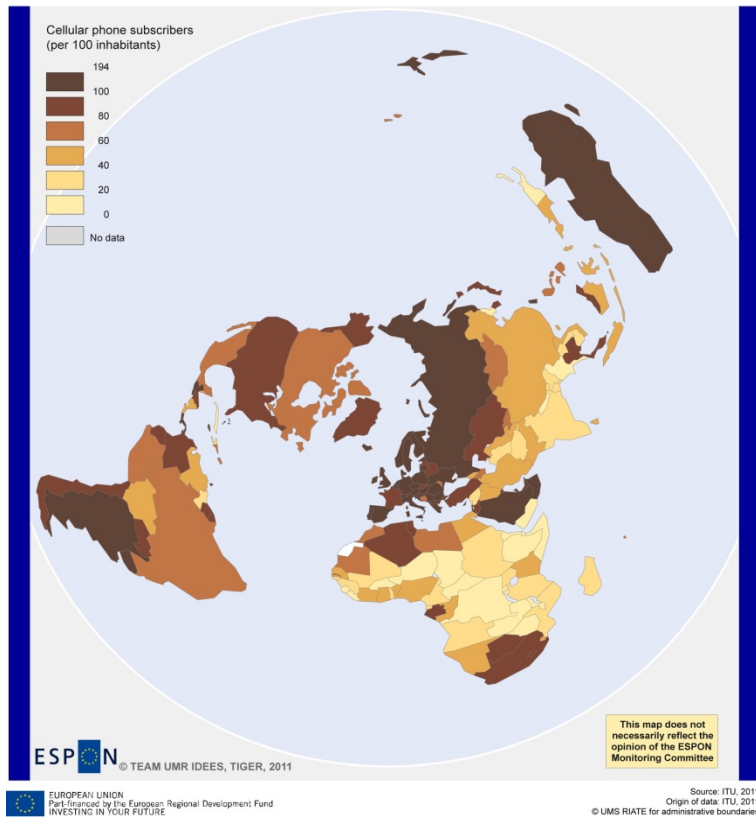
The telecommunication infrastructure is often taken into account in the analysis of competitiveness because it reflects first the innovative capabilities of the countries, but more, telecommunication infrastructures are the support of many economic interactions in trade and finance.

Figure 10 home telephone lines subscribers (2000)



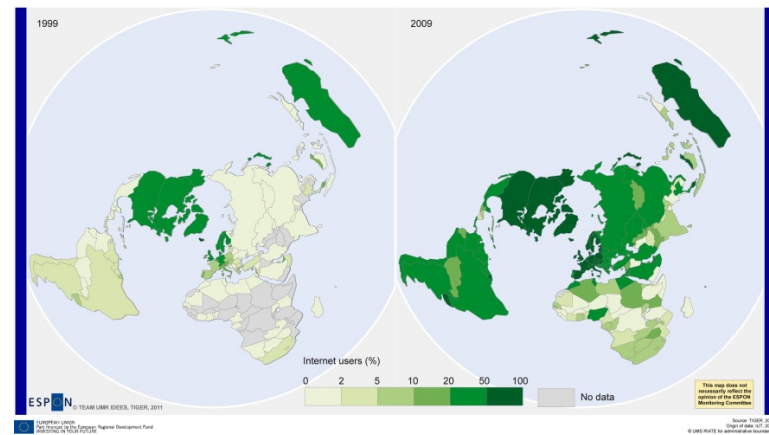
World countries situation regarding the information and telecommunication infrastructure is quite differentiated with some countries seeming to be particularly backward in this domain like African countries. This is the case for the main telephone lines (Figure 10) (that implies a costly infrastructure at the national level), but also for the cellular phone lines (Figure 11) even if the cell phone networks are considered as cheaper to set up.

Figure 11 : cellular phone subscribers (2008)



In most of the European countries like in other industrialized countries like United States and Japan, we observe value showing that both in term of main lines and mobile phones they are more phones than population. That can describe the equipment level of the population but also the dynamism of the economic sector.

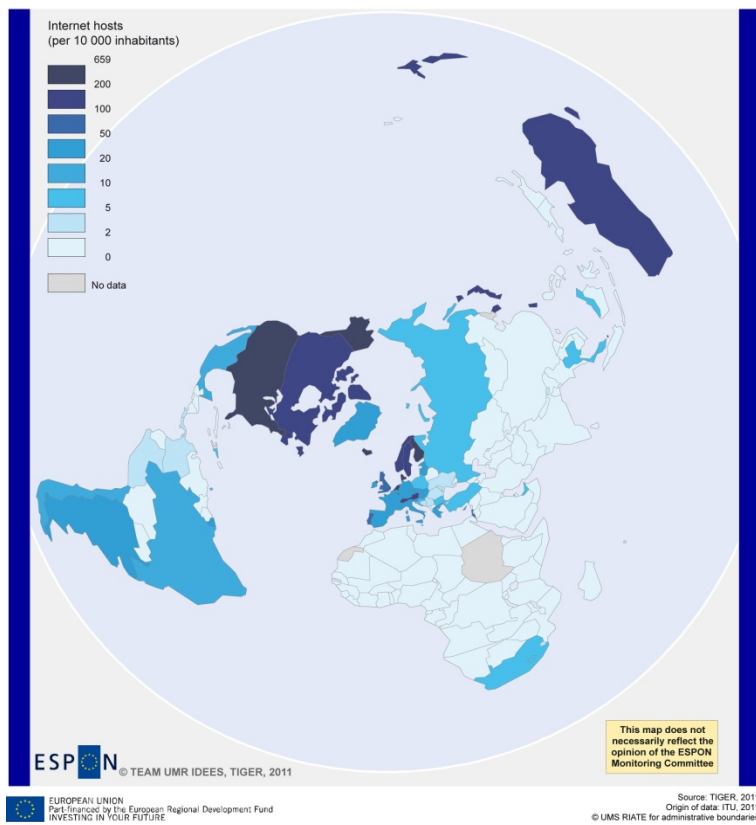
Figure 12 : Internet user's rate evolution



As far as the internet connections are concerned, the Figure 12 illustrated well the innovation capabilities of rich countries, including European countries. They were among the first to have significant rates of internet users. The usage of the Internet is diffusing quickly in the world, but still North American and European countries keep their advance. The ASEAN+3 regions, with the exception of Japan show relatively low figures of internet connections.

Finally one other interesting indicator is the number of internet hosts that can be considered as a revelator of both the technologic domination and the knowledge production predominance. Internet hosts are the most numerous in United States and no other country of the world can compete in this domain for the while. In Europe, the most advanced countries in term of internet host equipment are Norway, Sweden and Finland.

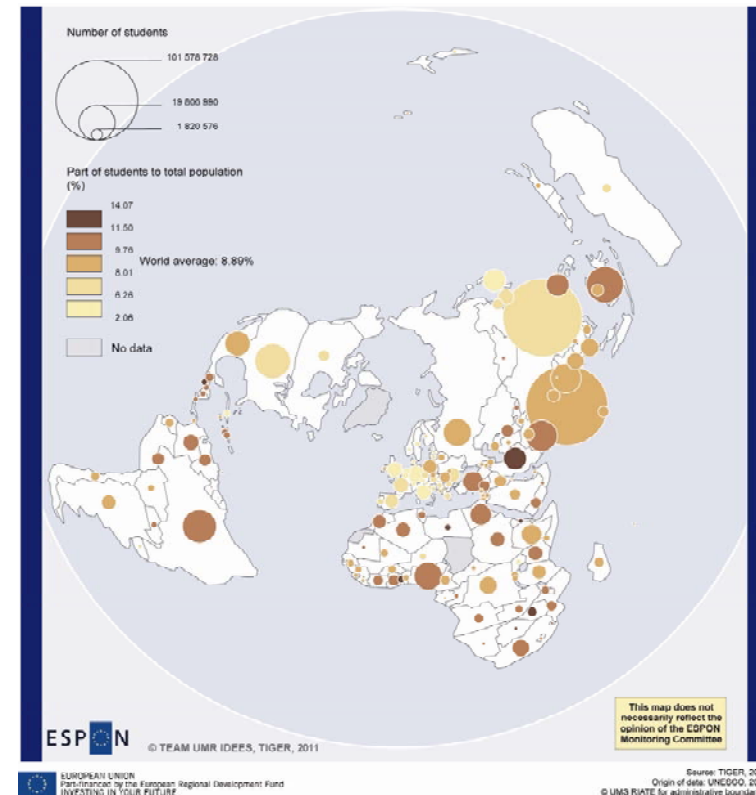
Figure 13 : Internet hosts in 2005



2.4.Higher education and research

The education and research indicators can allow assessing future trends on competitiveness because they are link both to the skill qualification of the employed population but also because they are related to the production of knowledge that is considered as a challenge in the future economy.

Figure 14 : Students in superior (2001-2003 average)



However the situation is more complex especially when it comes to the numbers of students observed in the different countries and the rate they represent in the total population (Figure 14). The highest rate of students cannot be observed in European countries neither in other developed countries like United States, Canada, Japan or Australia, but in African countries or in Iran. In fact in those countries the numbers of student reflect

Figure 15 : public expenditure in research and developments.

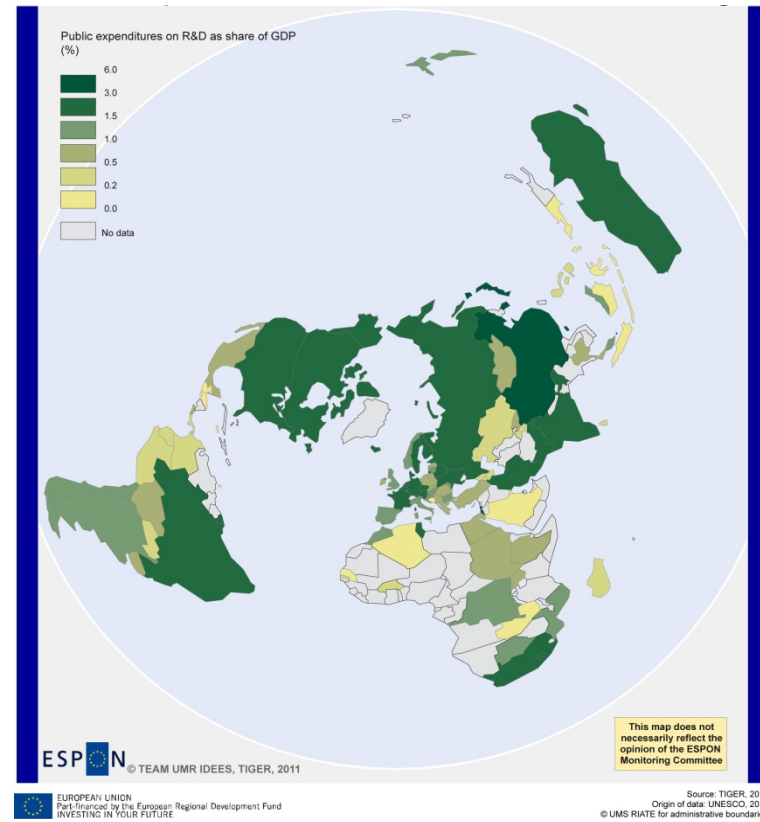
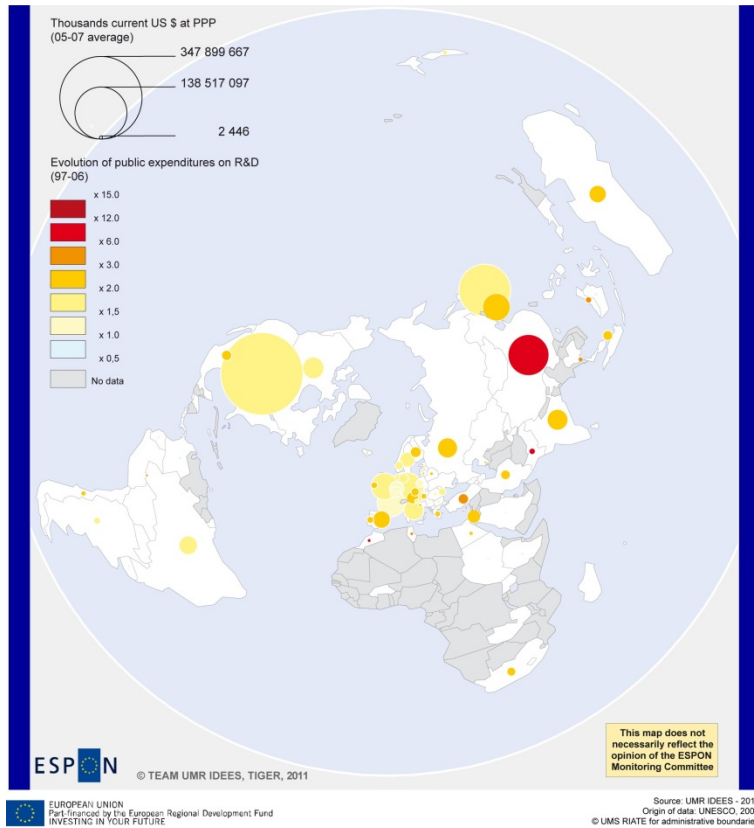
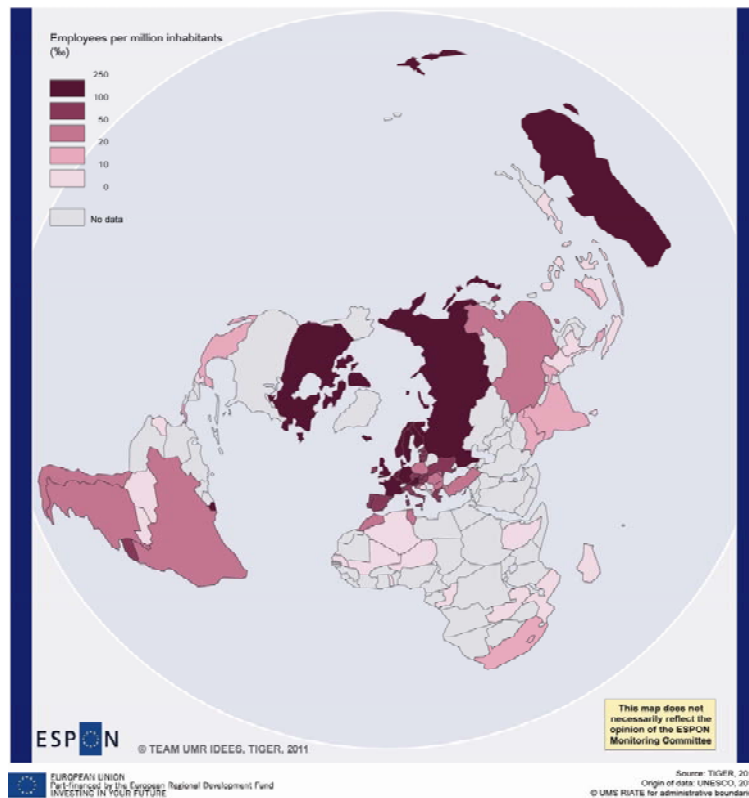


Figure 17 : personal working in R&D (2005-2007 average)

rather the difficulties faces by young people to find a job and the time they spend to study in order to maintain a social status. Even if for the following indicators the comparison at the world level is not really possible because of missing values, it is more important to analyses the investment in research and development and the values of R&D personal. Investment and employment in R&D is relatively high in Europe (figure 15 to 17).

Figure 16 : public expenditures per GDP on R&D (2005-2007 average)



However China seems to perform better as far as investments are concerned: they are higher and more they seem to increase. This trend would maybe lead China to catch up on the employment figure and maybe to rise as a credible challenger in technologic and scientific domain in the future.

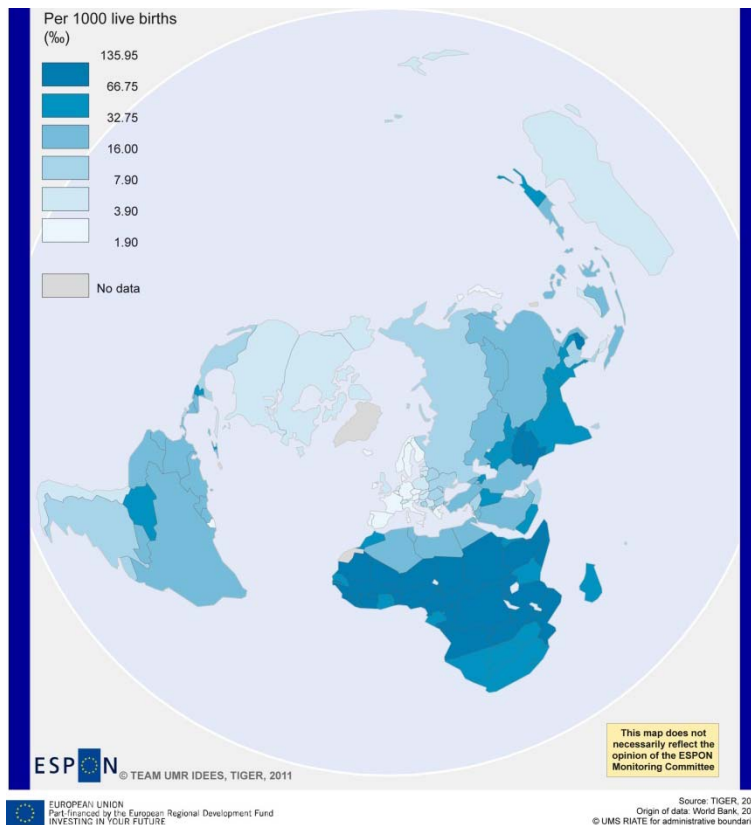
3. Social cohesion indicators

The justification of the choice of indicators will be detailed in the final version of the Atlas

3.1.Health

Health indicators are seldom used as cohesion indicator in the context of ESPON. However they are very useful as they depict the sanitary situation that reflects partly the wealth level, but also the health system that is often the base of the social solidarity in a country.

Figure 18 : Infant mortality (2006-2009 average)



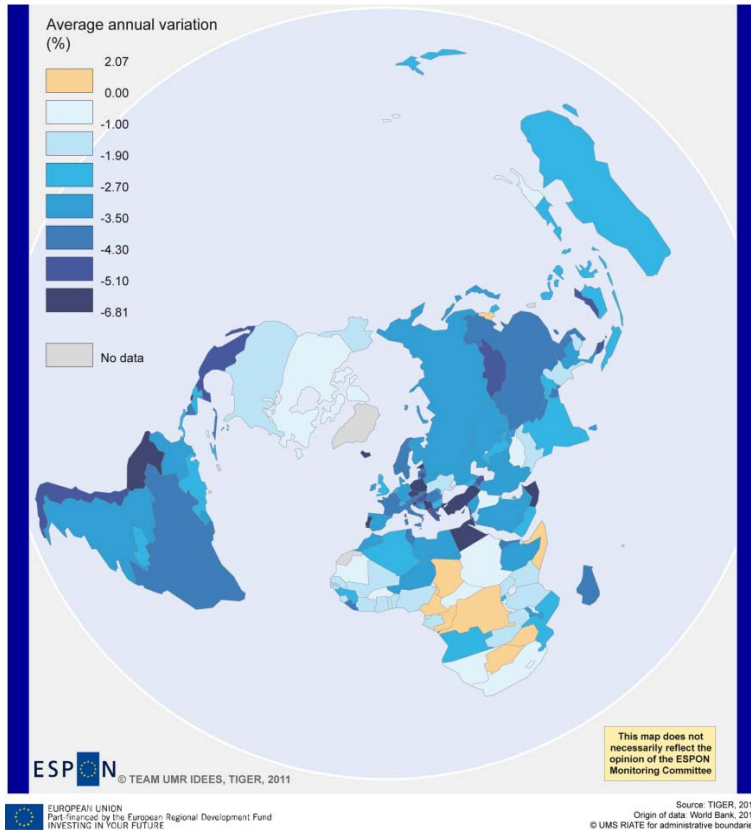
The infant mortality is the number of infants dying before reaching one year of age, per 1,000 live births, in a given year. As such, these precious indications translate rapidly the mutations of social conditions prevailing into a population. As a matter of fact, compared to all other indicators, within two decades, child mortality shows a strong decline. In 2009, (Figure 1) the picture offered by the ratio was a good testimony of the great divide in between the North and South, with low figures attached to the richest countries, especially Western European nations. Twenty years later the gap has been reduced. Now, Africa and South Asia became exceptions where high figures remain with a slow dynamic. Conflicts, political destabilization and low education of the women affect the variations of IM in countries of Africa. It is noteworthy that the main reducing transition (Figure 19) occurred by contiguity among the neighbouring states of the most well off countries (ie North America and Europe). As such, Turkey and the entire Maghreb have joined or are on the way to join the group of low child mortality states. Whatever, Europe is still leading in the matter. On the contrary, Asian fascinating economic growth of some of its countries did not lead to the postulated reduction of the ratio. This indicator could be an argument to prove that economic growth is, at least in a first step, far from a direct betterment in term of living conditions.

Broadly speaking, **Health Expenditures** correlate with GDP: rich nations spend more for their health than the poorer countries (**The Out of Pocket Expenditure** (OOP) indicator helps to understand how much, in a given country, households have to pay directly from their pocket for health supply, including in kind payments and gratuities. After World War II, some governments, especially in Europe, tried to implement a free access to medical care. But everywhere the pattern for health provision is to pay a personal fee for a service.

Figure 20). As an average, the level of spending is increasing everywhere, more notably in Asia, South Africa and South America. During a short period (2003-09), major growths occur in transition countries. When during the

period the variation is weak, it may reveal different significations: a high level of HE is already prevailing since long time (America, Europe and Oceania). Or it may also pint point some cases of nations lagging behind; like sub Saharan Countries and South Asia.

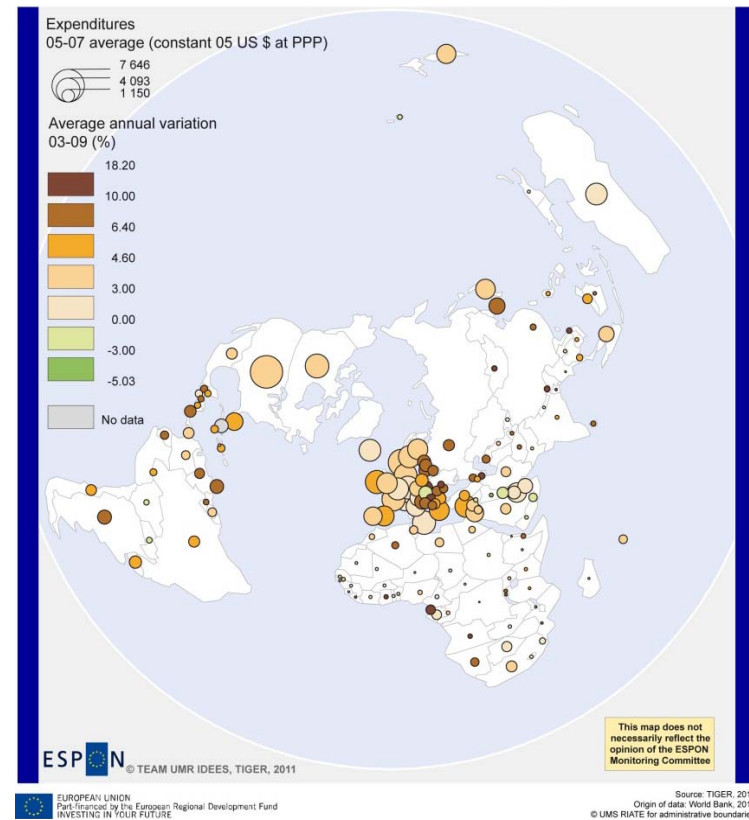
Figure 19 : 1992-2009 infant mortality evolution



The Out of Pocket Expenditure (OOP) indicator helps to understand how much, in a given country, households have to pay directly from their pocket for health supply, including in kind payments and gratuities. After World War

II, some governments, especially in Europe, tried to implement a free access to medical care. But everywhere the pattern for health provision is to pay a personal fee for a service.

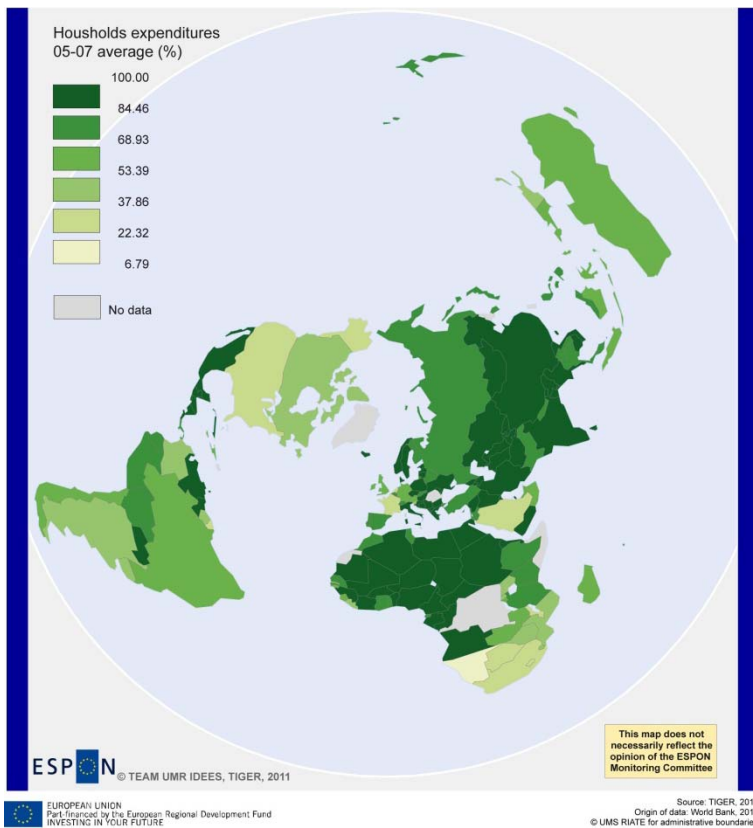
Figure 20 : Health expenditure per capita



A high level of Out Of Pocket Payments is a major burden in access to quality health care and have huge financial implication to deprived households. Despite decades of foreign assistance, a cheap universal coverage remains a dream, especially in low incomes countries where high levels of OOP is a

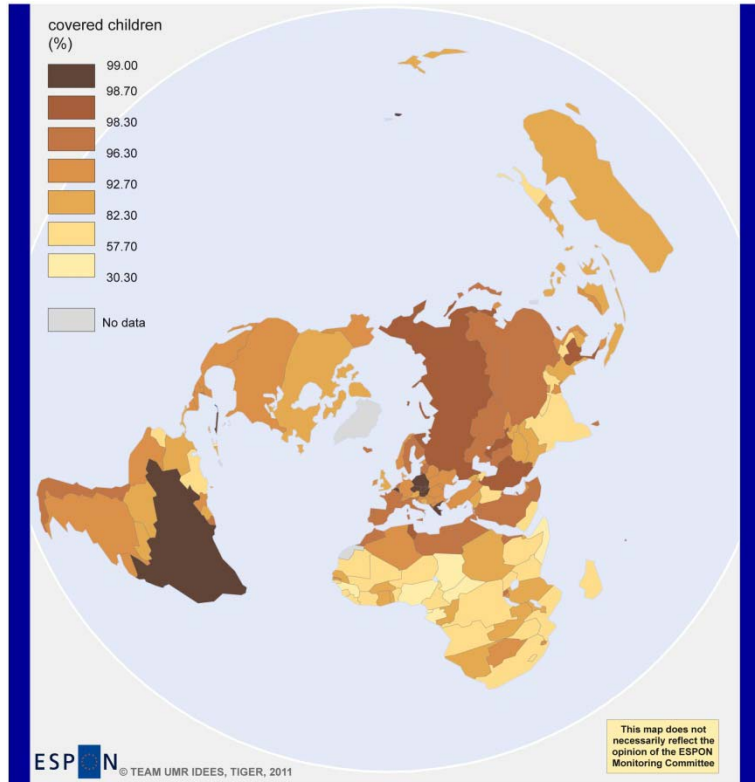
major factor to poverty and poor health. In the world (Figure 21), two continents seem to do better than others, Europe and America (except Central America). At the contrary, Africa (exception of South Africa) and all Asia (especially China), ask more money directly to their citizen for health purpose. In Europe, there is still a divide in between Eastern and Western sides, in comparison, the western part offering a better picture.

Figure 21 : Out of pocket expenditure for health (05-07 average)



Among all the vaccination coverage indicators, polio vaccination (3rd dose) is often considered as a good indicator for understanding poverty and poor development. Looking at the third dose of polio vaccination also offers an indicator giving the stage of efficiency of the health system for basic vaccinations. In the world, the average of vaccination coverage was 77% in 1990 and 87% among the target population (children) in 2009. In 1992, the highest coverage was found for North America, South East Asia, Europe and South America. In 2009 (Figure 22), these regions still have the highest coverage but new regions like North Africa, Middle East, Russia and Central Asia have been included in this group. During the period 1990-2009 (Figure 23), highest increases in coverage are found in Central and West Africa despite coverage still lower than the average for most of these countries in 2009. Decrease of the coverage may result of under regulatory health system (lack of surveillance, difficulties to conduct mass OPV campaigns, to carry out house-to-house OPV “mop-up” campaigns), of different OPV (oral polio) /IPV (inactivated polio) vaccination policies, of polio resistance, but also of a very slight decrease of the immunization practices in older well protected countries. The virus that causes poliomyelitis is still endemic in four countries (Nigeria, India, Pakistan and Afghanistan) and was reintroduced in nine countries in the 2000’s (Angola, Bangladesh, Ethiopia, Indonesia, Nepal, Niger, Somalia, Chad and Yemen). These countries maintain the lowest coverage in the world, despite some growth. Among the period, high economic growth is not always associated with improvement of the coverage. For example, Brazil has increased the coverage. For China, it was already high in 1990. India maintains its position among the lowest coverage countries. Old industrialized countries can have both low coverage (US, Canada) and high coverage (Europe).

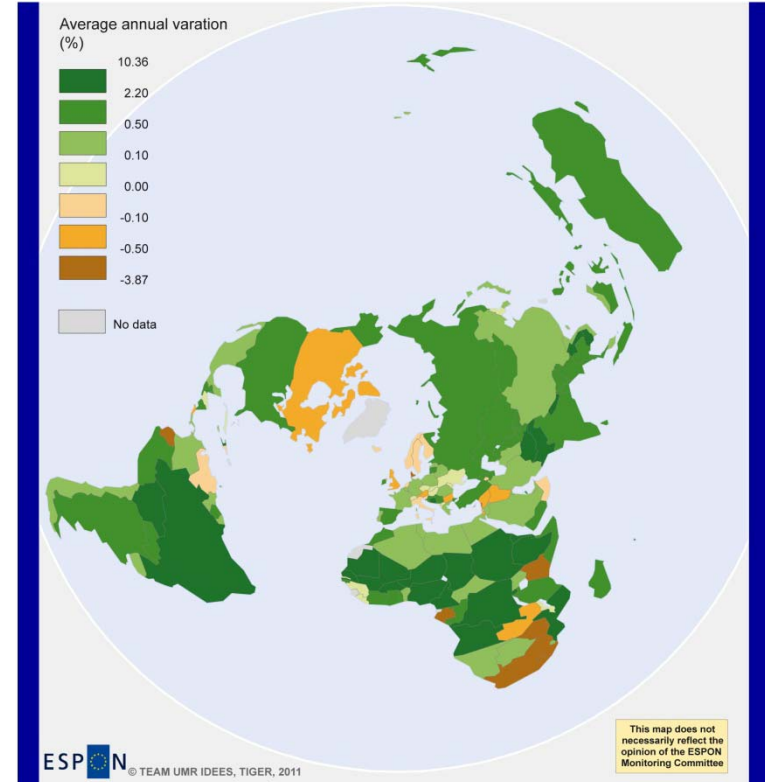
Figure 22 : 3rd dose polio vaccination, (2007-2009 average)



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Source: TIGER, 2011
Origin of data: WHO, 2011
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Figure 23 : 1992-2009 3rd dose polio vaccination evolution



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Origin of data: WHO, 2011
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3.2. Child education and literacy

As far as the education is concerned, the graph on the evolution of the literacy rate (Figure 24) shows that European countries positions are the best compared to the two other world regions and is the highest and the most stable on the all period. The high value of the European space is not a surprise as in Europe; nearly all the population is literate. The same figure can be observed in developed countries and the situation is improving quickly in developing ones like in South American or in Asia. But what it is at stake as far as the literacy rate is concerned? A low literacy rate can be considered first as an indicator of a low level of social cohesion in the countries of the region analyzed because it could reveal some problems in the school system. That means that a certain share of children does not attend school or leave school very early in their life. This is well illustrated by the Figure 26 showing the primary school enrolment. If in developed countries nearly all children attend school it is not the case in large part of the world and especially in African.

Figure 24 : literacy rate evolution in NAFTA, ESPON and ASEAN +

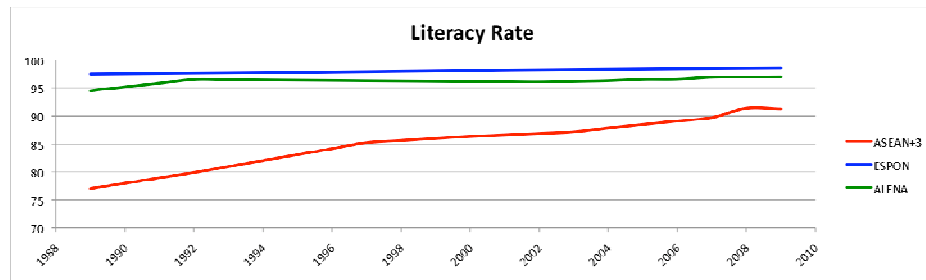


Figure 25 : literacy rate (1990 and 2008)

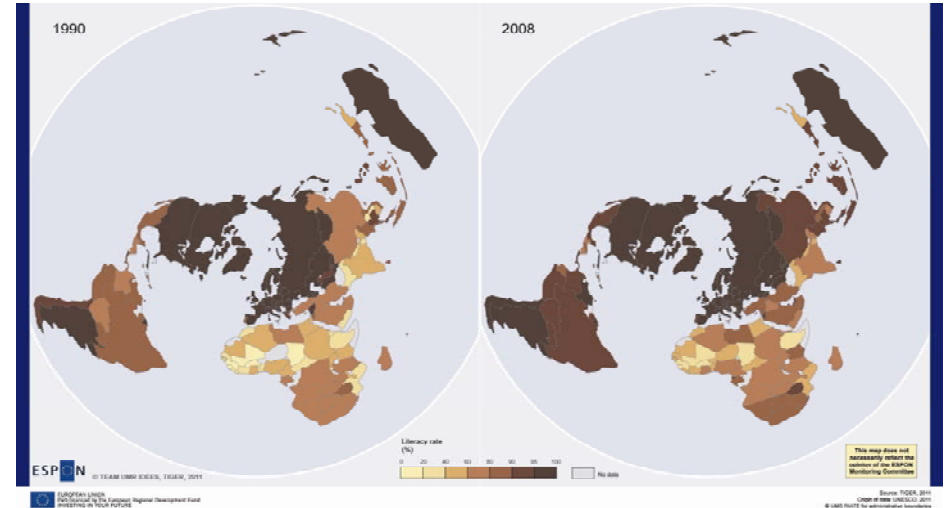
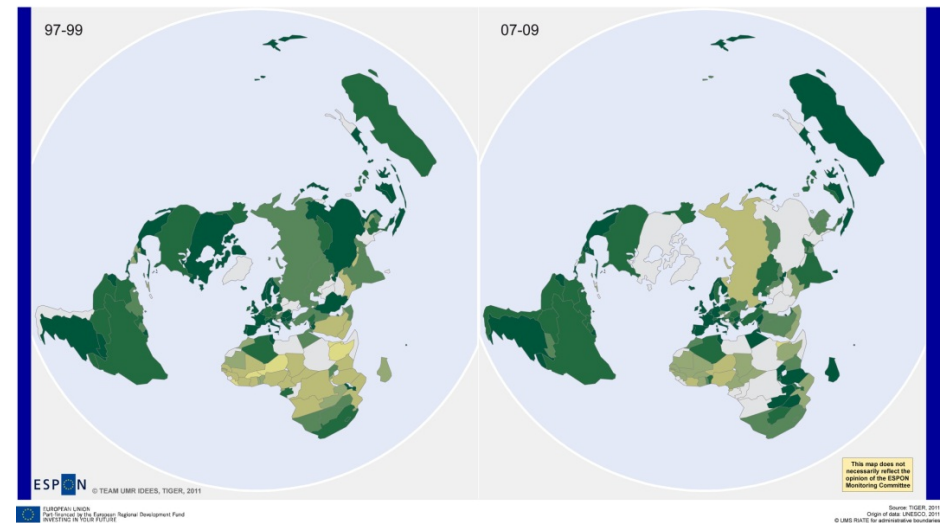


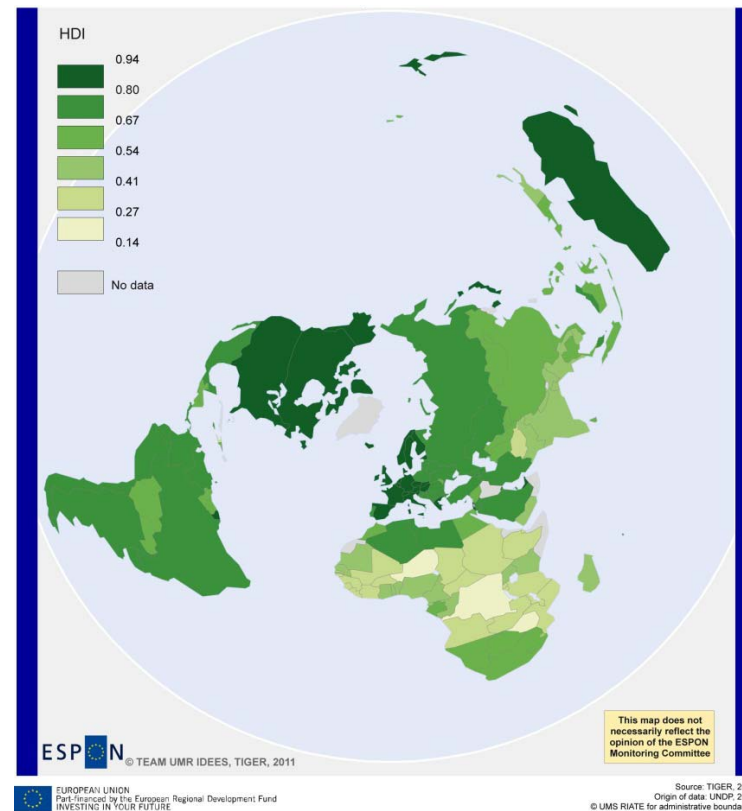
Figure 26 : primary school enrolment (1998 and 2008).



3.3. Poverty and inequalities

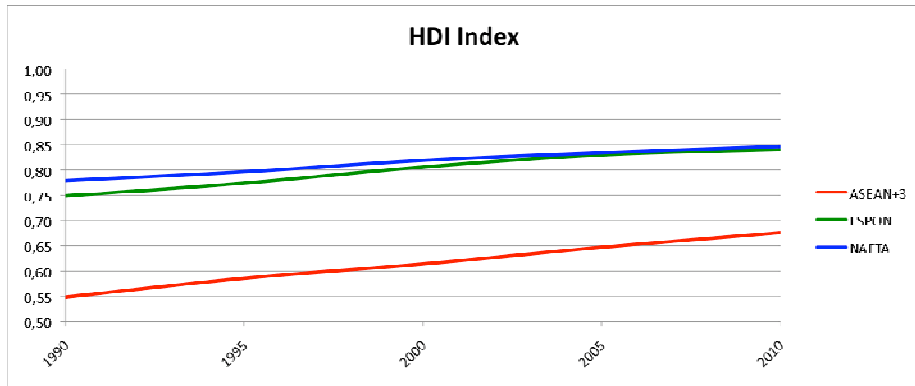
Data on poverty and inequality are very important to measure the social cohesion and the quality of life of population. Unfortunately the data available on a goof quality are very scares and the most useful is the Human development index.

Figure 27 : Human development index, 2010



The human development index show that the European countries position is among the best, with the highest values observed with some other developed countries like Australia, New Zealand, Japan, South Korea, Canada and United States. However some difference still exists in European Union with some eastern countries showing lower rates. Anyway, the HDI is still increasing in Europe and it is now strictly equivalent to the one of the NAFTA region. If the situation is also improving quickly in ASEAN +3 (nearly plus 12 points in 20 years) the HDI value in this region is still very low.

Figure 28 : HDI index evolution between 1990 and 2010 in NAFTA, ESPON and ASEAN+3

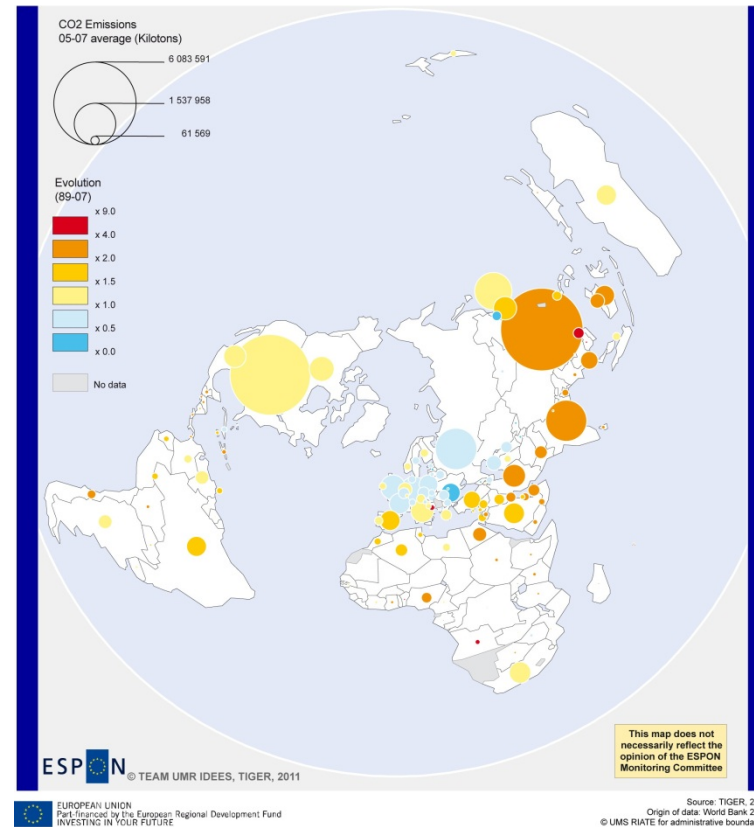


When searching to complete the dataset for the building of the cohesion synthetic index we found data on the rate of population below the poverty line. Those dataset are showing numerous missing values, but they can be used anyway. For the next version at least a map of this indicator will be proposed.

3.4.Green indicators

The environmental issue has been stress in most of the European Union publications and some environmental rules have been set up. The emission level of European countries stay important (Figure 29), even if they can seem low compared to the one of United States and China. More, they decrease.

Figure 29 : CO2 emissions (2005-2007) average and evolution



An indicator allows measuring the impact of efforts of each country in the environmental issue is the ratio between the CO² emissions and the GDP. It could be understand of the measure of “how much each region need to reject CO² to produce 1\$ of GDP. Globally between the two date of observation, the map seems becoming “lighter” that would mean that the pollution level produce to produce wealth is decreasing (Figure 30). In the mostly all world countries the GDP increased during the period but the CO² emission varies differently: they have been multiplied by 2.3 in the ASEAN region, by 1.21 in the NAFTA region but they have decreased in the ESPON region (x 0.9). Asiatic

developing countries are those where the CO2 emission for each dollar of GDP stay the highest.

Figure 30 : CO2 emissions by millions of dollars of GDP

