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The Emergence of New Regional Convergence Clubs in a Nordic and Baltic Perspective

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First draft, please do not quote!

50th Congress of the European Regional Science Association

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The Emergence of New Regional Convergence Clubs in a Nordic and Baltic Perspective

Abstract:

The spatial patterns of change in economic diversion and convergence have become more blurred during the last decades. International disparities between nations have diminished. At the same time, intra-national disparities have increased in most European countries. In the search to identify the drivers behind this seemingly paradox, this paper tries to look behind the traditional way to analyze convergence and disparities based on consolidated national or geographical.

The purpose of the paper is to identify groups or clubs of regions in the Nordic and Baltic countries characterized by similar patterns of development with regard to economic performance measured by GDP per capita. The clubs are identified by a series of variables defined according to the most important determinants for economic growth according to neoclassical and new economic growth theory, i.e. capital formation, labor force, but also innovative capabilities, human resources, entrepreneurship etc.

The first section provides a brief outline of the theoretical foundations and a discussion of the specific research questions analyzed. Section 2, is a survey of regional growth performance with special attention on divergence and convergence based on NUTS II or similar regional division. Statistics are ranging from the mid 1990ties. Section 3 aims to identify different types of nations and regions according to the main drivers of regional growth based on regional innovative potential and entrepreneurial behavior.

The last section summarizes the main findings based on the identification of regional clubs, challenges and tendencies of regional development in a spatial and national context. Here an attempt is provided in order to characterize the spatial and structural characteristics of the identified groups, and some further perspectives and policy implications is given of the obtained results.

Key words: economic convergence and disparities – growth drivers – convergence clubs – typology of regions

JEL classification: R11, R12 and R58.

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1. Introduction

Regional development has become one of the hot issues among policy makers even in countries which seen from the outside look very homogenous. One reason is that problems common to all mature industrial societies like migration and ageing in non-metropolitan regions creates immediate needs for policy action due to the lower population density. In the age of globalization and outsourcing in business and industry, economic analysis often focuses on international transactions and organizational changes. Competition between the regions and metropolis in Europe or in other parts of world has become a major topic in international economics and business as well as on the political scene. These tendencies raise the question of national and regional coherence. The issue of cohesion in regional economic associations like the EU becomes a decisive issue for further integration (European Parliament 2007). Particularly in the more advanced forms of economic integration, the issues of re-distributive instruments are crucial, (Molle 1999, p146ff).

Furthermore changes in the international productions system and division of labor have often strong adverse effects in regions with limited access to participate in the new modes of value creation based on knowledge and innovation.

In many countries the local adverse economic impacts are further increased by changes in regional and local governance and service provision, and budget cuts in the aftermath of the economic crisis' since 2007, leading to a revival of the regional issue even in a homogenous country like Denmark, see Ministry of the Interior and Health (2010). To some extent, the emerging new regional issue serves as a magnifying glass for the societal change caused by alterations in the global economic landscape.

The economic position of the Nordic countries and the Baltic Region has altered in the last two decades, partly due to internal changes and revitalized growth performance, partly by the removal of the iron curtain and the reintegration of the former state economies in the western market-based economic system. One consequence is that the former command economies also are affected by the same economic cycles as the old market economies. In a Baltic Rim perspective, the 'Nordic periphery' has turned into the center or at least has become a part of the overall of economic development in Europe.

The purpose of the paper is to identify groups or clubs of regions in the Europe and particularly in Nordic countries characterized by similar patterns of development with regard to economic

performance measured by GDP per capita. The clubs are identified by a series of variables defined according to the most important determinants for economic growth according to neoclassical and new economic growth theory, i.e. capital formation, labor force, but also innovative capabilities, human resources, entrepreneurship etc.

In a European perspective, Cornett and Sørensen (2009a) used the Regional Innovation Scoreboard (RIS) to identify the underlying structure of the forces behind the process leading to economic growth and convergence. This analysis was further extended by Cornett and Sørensen (2009b). Here the statistics on regional economic GDP per capita were regrouped by decile, in order to identify regional clubs across the borders of the European nations. Further, we related the regrouped data set to the indicators of innovation in order to identify the forces behind the process of economic growth. It turned out that presence of patents served as a main force behind the wealthy regions, whereas skills related to the workforce such as “knowledge workers” and “life long learning” served as main indicators for the poorer regions. This pattern suggested that a regional specialization took place in production and development.

One issue discussed is that large intraregional disparities do not necessarily lead to lower economic growth on a national level than smaller disparities. Furthermore, the study provides an assessment of the consequences of economic integration in the region, here defined as the countries located in the Baltic Rim region, i.e. the old market economies Norway, Sweden, Denmark, Finland and Germany, and Russia, Poland and the Baltic states from the former socialistic economies.

The paper is organized as follows. The next section provides a discussion of the process of convergence in a Baltic perspective. In Section 3, we relate the process of growth to the Regional Innovation Scoreboard variables. The section aims to identify different types of regions according to the main drivers of regional change. The last section summarizes the main findings of the study and provides an attempt to characterize the spatial and structural characteristics of the identified groups. Finally, an attempt is made to sketch some further perspectives and policy implications of the obtained results.

2. Regional Convergence in a Baltic Perspective

Regional convergence is a central objective in the EU economic and regional agenda¹, but also still far away from to be realized in a foreseeable future². This is in particular the case in a North European and Baltic Sea perspective.

Traditional, the literature of convergence, see for example Abbeu, De Groot and Florax (2005) has focused on the concept of β -convergence³. This type of convergence is derived from the neoclassical model of economic growth developed by Solow, for further elaboration see Cornett & Sørensen (2009b). Assuming steady-state growth and a Cobb-Douglas production form, the model can be made dynamic by a Taylor approximation around the growth path. By solving this system, a linear approximation is found on the following form⁴:

$$\Delta \log y_{t,i} = \beta_0 + \beta_1 \ln y_{0,i} \quad i = 1, \dots, n$$

Where $\Delta \log y_{t,i}$ is the growth rate from period 0 to t, β_0 is a constant, and β_1 is an estimate of the speed of convergence. If β_1 is significantly negative then convergence is present. If β_1 is positively significant, divergence is present. This model can be consistently estimated by use of OLS. Further i denotes a region, and n is all regions. The model is then estimated on cross-section data.

The constant term β_0 is among other things an indicator of technology, and is assumed exogenous to the model. Therefore, technology and other effects embodied in the constant term cannot be separated. The exogenous treatment of the relation among technology and the growth pattern is a very strong restriction to the model. Further, it is assumed that the model by itself finds the steady

¹ For a discussion of the principal aspects of this trend, from both empirical and theoretical perspectives, see Cuadrado-Roura & Parellada ed. (2002), and for a recent policy based interpretation Mancha-Navarro & Garrido-Yserte (2008, p. 64): *'Empirical studies confirm that while at the European level a certain improvement in regional economic convergence has been achieved, at the level of the Member States a clear regional divergence has occurred. This situation may have two different readings. One reading is the success of the cohesion policy. Another is the negative regional impact of the national economic policies, which plays a crucial role in the configuration of the general environment and hold considerable influence over regional, economic perspectives.'*

The crucial point is that national policies must reinforce the regional policy. In particular, innovation and R&D oriented policies are often mainly beneficiary for the centre regions.

² For an assessment, see European Commission (2007a), in particular also with regard to regional differences in innovation performance, pp.74ff.

³ Cornett and Sørensen (2008a&b) also consider σ -convergence. This concept is however not appropriate for the analysis undertaken in Section 3, and is therefore not considered in the present paper. The results obtained on convergence, is in general found to be consistent regardless of the approach of convergence being applied.

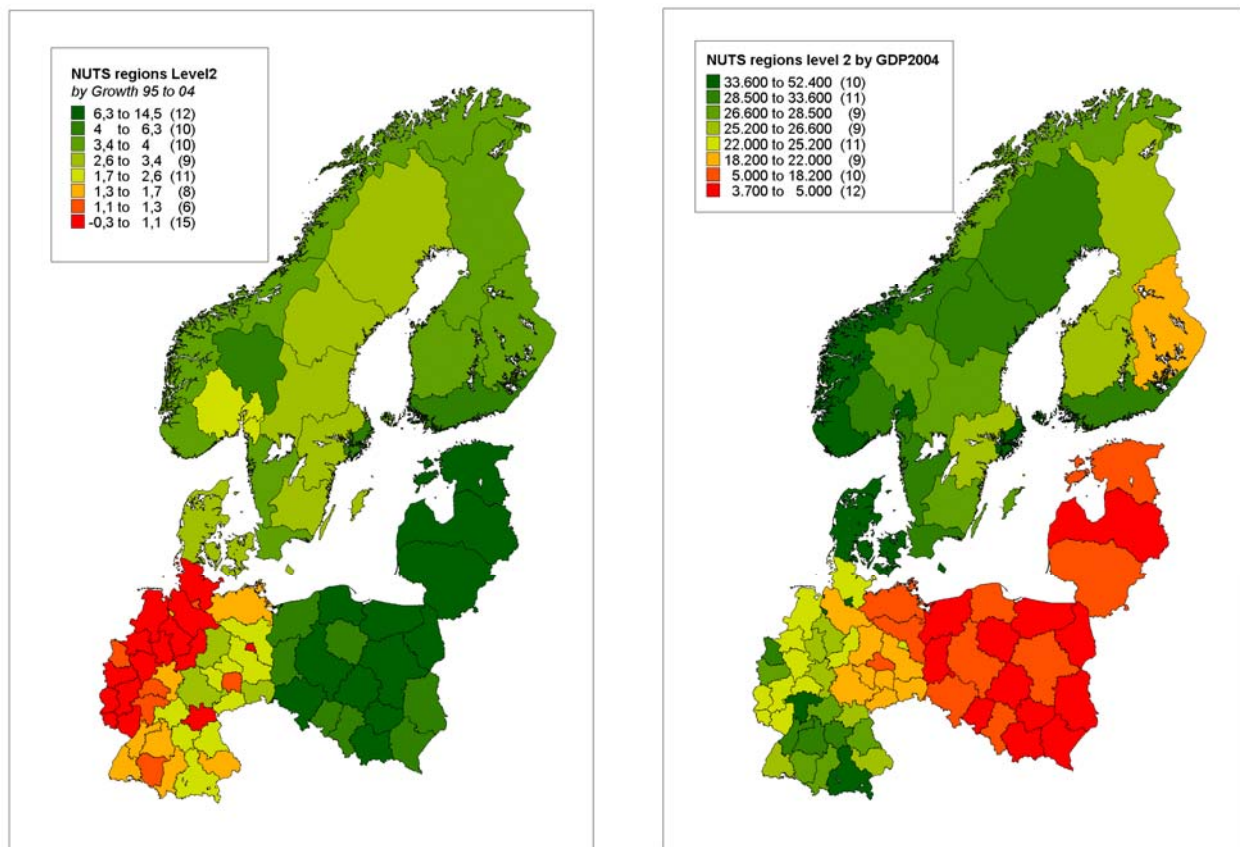
⁴ For a detailed derivation of the expression of β -convergence, see for example Cornett and Sørensen (2008a&b).

state. If a relation exists between technology and growth then the constant term will be biased. Abreu, De Groot and Florax (2005) review the different attempts that have been undertaken in various contributions to cope with these issues for example random effects models and various estimation methods coping with the problem of bias.

2.1 Convergence in the Baltic Rim

Many studies of convergence by regions in Europe reports a rate of convergence around the “legendary” 2 percent as stressed by Abreu, De Groot and Florax (2005), who surveyed around 600 randomly selected estimates of convergence all published in peer-reviewed journals. However, this finding is not expected to be valid for the 9 nations forming the Baltic region. This is evident from Figure 2.1.

Figure 2.1 Economic Evolutions in the Baltic Region 1995 - 2004



Annual growth in GDP per capita 1994 to 2004

GDP per capita in € 2004

Note: Exclusive Russia.

Source: Eurostat, Danmarks Statistik and Norges Statistik.

The left panel shows the annual growth rates in the Baltic region, whereas the right panel shows GDP per capita in € for 2004. A dichotomy is highly visible. A high level of GDP per capita is found in northwestern Germany and in Scandinavia. A low level of GDP per capita is observed in the eastern parts of Germany, Poland and the 3 Baltic states. Moving to the growth rates the reverse pattern is seen. This observation suggests a division of the Baltic Rim in two parts namely:

Baltic East: Estonia, Latvia, Lithuania and Poland

Baltic West: Denmark, Norway, Sweden, Finland and Germany

This division is debatable, for example is the division between the new and the old market economies is very visible, but Germany and Poland as rather large nations with many regions not located at the Baltic coastline can disturb the picture. In order to highlight the Baltic dimension we have provided the reduced data set *Germany Baltic* and *Poland Baltic*. Appendix 1 gives a more detailed view on the aggregations.

However, this division may also reflect different opportunities with regard to technological development. The regions with higher GDP per capita may have a larger accumulation of capital. This may affect the type of technology being developed. For example, capital augmented technological progress such as patents may be more frequent in Scandinavia, whereas labor augmenting technological progress such as learning by doing may be of higher significance in the regions with lower GDP per capita. We shall return to this issue later.

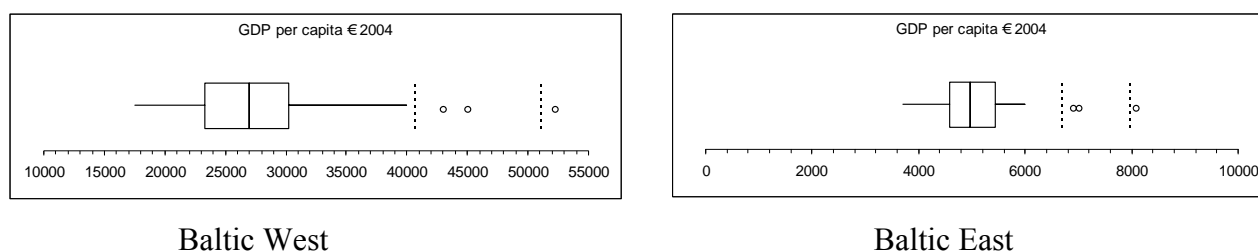
For the analysis of convergence, we use statistics supplied by Eurostat on GDP per capita in Euro at the NUTS 2 level except for Denmark where we use statistics at the NUTS 3 level¹. The small Baltic nations Estonia, Latvia and Lithuania are not regionalized in the present analysis. The Russian part of the BSR is not included in the convergence analysis either². For Norway data are only available for 2004, and the data set constructed is based on Neubauer et. al. (2007), who reports regional GDP growth rates for the period 1998–2002. These values are used for the present analysis along with data from Statistics Norway. For Denmark, we use statistics from Statistics Denmark.

¹ The statistical material is available on request to the authors.

² In some of the policy-oriented frameworks like the VASAB-initiative the Russian part of the BSR usually includes the Murmansk region, Kaliningrad and the Leningrad oblast.

The distribution of income per capita among the countries in the Baltic region is for 2004 examined in Figure 2.2 by use of Box-plots. Initially, note the different scales on the horizontal axis in Figure 2.2, and observe that even the wealthiest region in Baltic East is far below even the most rural area in Baltic West. In Baltic West, the regions with the highest income are Oslo, Hamburg, Stockholm, Copenhagen and Åland. The poorest region included is Dessau in former Eastern Germany. Still, it has an income that is more than double the income per capita in Mazowieckie Poland, the wealthiest region in Baltic East. In Baltic West the mean income equals around 27,400 €, whereas it in Baltic East amounts to about 5,100 €.

Figure 2.2 Box-plots of Regional Disparities in the Baltic region



Note: The Box plot is set up as follows: The median is marked as a vertical line across the box. The hinges of the box are the upper and the lower quartiles (the rightmost and leftmost sides of the box). The interquartile range (IQR) is the distance from the upper quartile to the lower quartile. The vertical dotted lines mark the inner and outer lower and upper fence respectively. The upper inner fence is a point at a distance of 1.5(IQR) above the upper quartile. The upper outer fence is a point at a distance of 3.0(IQR) above the upper quartile and vice versa with regard to the lower inner and outer fence respectively. If an observation is located between the inner and outer fence then it is considered as a suspected outlier. If an observation is located outside the outer fence then it is considered as an outlier.

Source: Own calculations based on statistics from Eurostat (2007), Danmarks Statistik and Norges Statistik.

Table 2.1 reports the results of various regressions run in order to identify β -convergence. The first row shows the convergence relation run for all EU members at the NUTS 2 level reported in Cornett and Sørensen (2008a&b). Observe that we are very close to the rate of 2 percent. For the Baltic region in total, a higher rate of convergence is reported equal to 2.46 percent. Decomposing our data into the two sub-regions of the Baltic very diversified results are obtained confirming the patterns observed from Figures 2.1 and 2.2.

Table 2.1 β -Convergence in the Baltic Region

| | | Constant, β_0 | | | β_1 -coefficient | | | R^2 | Standard Error | Obs. |
|---------------------|---|---------------------|---------|---------|------------------------|---------|---------|-------|----------------|------|
| | | Coef. | Std.dv. | P-value | Coef. | Std.dv. | P-value | | | |
| EU Total | C | 22.97 | 0.97 | 0.00 | -1.97 | 0.10 | 0.00 | 0.49 | 1.73 | 369 |
| Baltic Total | C | 26.54 | 1.39 | 0.00 | -2.46 | 0.15 | 0.00 | 0.73 | 1.44 | 106 |
| Baltic East | C | 28.61 | 7.25 | 0.00 | -6.63 | 1.75 | 0.00 | 0.37 | 1.91 | 26 |
| Baltic West | C | 18.75 | 5.80 | 0.00 | -1.68 | 0.58 | 0.00 | 0.10 | 1.16 | 80 |
| Baltic East: | | | | | | | | | | |
| Poland | D | -13.04 | 8.56 | 0.14 | 2.48 | 1.09 | 0.03 | 0.20 | 0.74 | 23 |
| Poland Baltic | I | 12.88 | 10.59 | 0.26 | -0.83 | 1.34 | 0.56 | 0.05 | 0.44 | 9 |
| Baltic West: | | | | | | | | | | |
| Germany | C | 14.68 | 3.43 | 0.00 | -1.34 | 3.87 | 0.00 | 0.23 | 0.59 | 51 |
| Germany Baltic | I | 10.60 | 8.42 | 0.25 | -0.96 | 0.85 | 0.30 | 0.15 | 0.76 | 9 |
| Denmark | I | -12.65 | 33.17 | 0.72 | 1.38 | 3.25 | 0.69 | 0.04 | 0.97 | 6 |
| Sweden | D | -22.93 | 12.52 | 0.11 | 2.65 | 1.26 | 0.07 | 0.39 | 0.40 | 9 |
| Norway | C | 29.71 | 12.86 | 0.07 | -2.63 | 1.29 | 0.10 | 0.45 | 0.69 | 7 |
| Finland | D | -5.07 | 3.85 | 0.24 | 0.91 | 0.34 | 0.07 | 0.52 | 0.16 | 7 |

Note: C = convergence, D = divergence and I = inclusive. If the P-value is less than 0.10 weak significance is observed (10 % level), if the P-value is less than 0.05 significance is observed (5 % level), and if the P-value is less than 0.01 strong significance is observed (1 % level).

Source: Own calculations based on statistics from Eurostat, Danmarks Statistik and Norges Statistik.

The highest rate of convergence is reached by the regions in Baltic East equaling 6.61 percent more than 2.5 times the rate of convergence of Baltic West. Moving to the country specific results it is seen that convergence is mostly an aggregated phenomenon. For Sweden, Finland and Poland, divergence is found, whereas the groups Germany Baltic and Poland Baltic along with Denmark are inclusive. For Germany total, convergence is observed and for Norway. In many of the cases considered, the results are based on a low number of observations.

As evident from Table 2.1, the constant term β_0 takes a large range of values. For several of the estimates are negative. This is due to heterogeneity among regions within a country. We shall return to this issue below.

2.2 Convergence and Innovation in a European Perspective

In a European context the regional growth strategies have to contribute to fulfillment of the Lisbon targets to create the world's most competitive economic region. Due to the fact that the half time evaluation of the implementation was rather disappointing the Lisbon Strategy was re-launched in 2005 named the 'Renewed Lisbon Strategy', stressing the innovation and conservation of the environment. Central objectives are (Mancha-Navarro & Garrido-Yserte 2008, p.57):

- Improvement policies related to Information Society and Research and Development.
- Acceleration of the structural reform process with regard to innovation and competitiveness.
- Social modernization through investment in human capital and combating social exclusion.
- Facilitating economic and social progress together with environmental protection.

These aims have to be implemented in a situation where the EU faces a complex economic situation with decreasing economic divergence between member states and increasing disparities within many countries¹ and now also a significant decrease of economic growth with fundamental risks for economic wealth and progress in particular in some of the new East European member states.

In this perspective, the Lisbon targets² - also in the revised Renewed Lisbon Strategy - are not necessarily always in harmony with a policy aiming at a country's regional disparity reduction. Economic catch-up, in particular in new member states, has taken place in metropolitan areas with increasing internal disparities as a consequence. In the last 5-10 years, similar tendencies have been seen in Western Europe, also in the Nordic countries and Denmark. Among the consequences is an increasing polarization of the commuting pattern in many areas leading to a process of regional enlargement³.

According to the Lisbon Strategy and the revised from 2010 entitled '*Europe 2020 – Strategy for smart, sustainable and inclusive growth*' (European Commission 2010a), innovation and entrepreneurship are central component in the policy to improve European global competitiveness. As the previous analysis has proved, overall economic growth and regional conversion are not

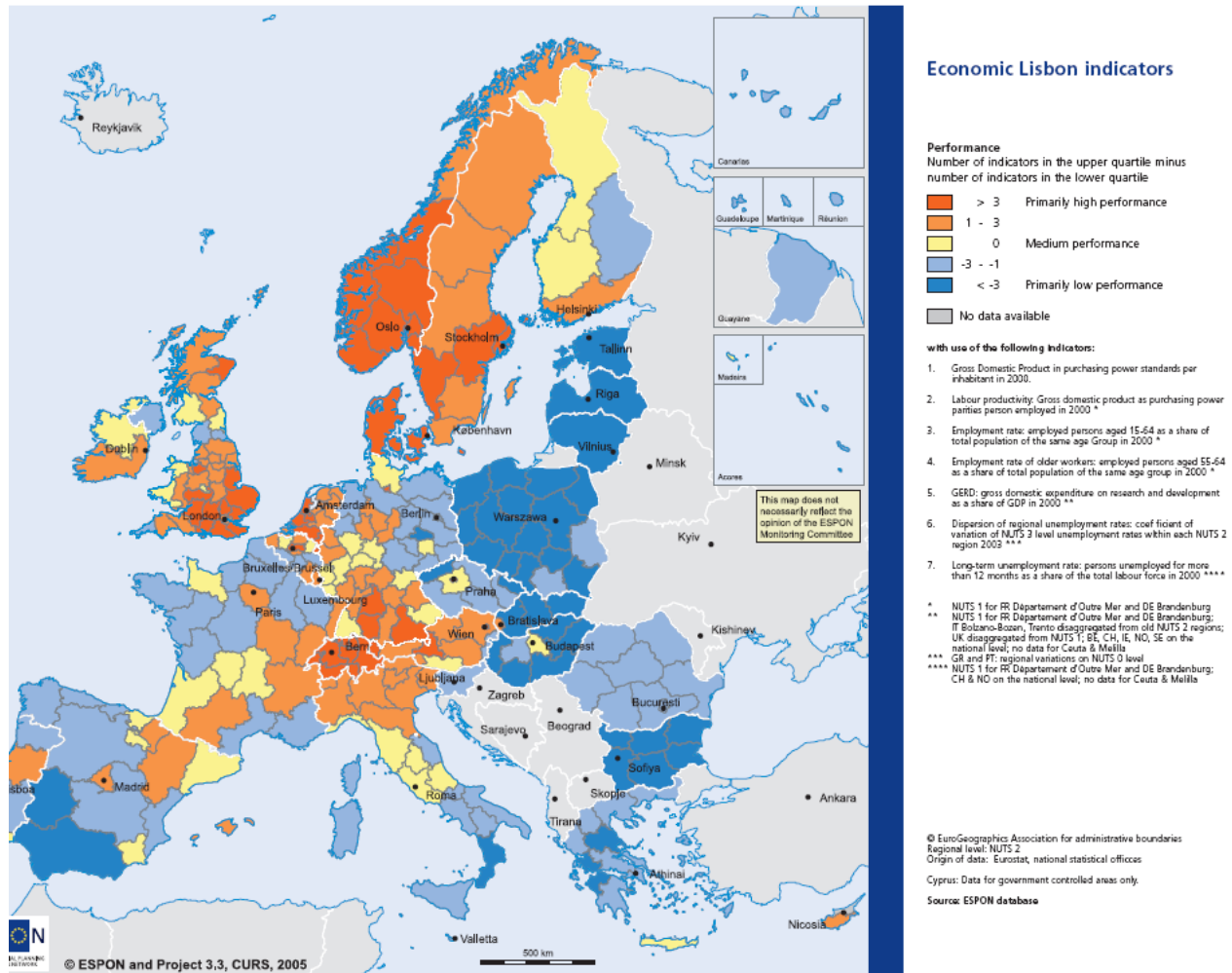
¹ For a discussion of the principal aspects of this trend from both empirical and theoretical perspectives, see Cuadrado-Roura & Parellada ed. (2002).

² Of particular interest is the so-called EU Lisbon Strategy to create the most competitive economy in Europe by 2010 and the Barcelona targets to spend 3 % of GDP on R&D in the EU, see also Cornett & Sørensen (2007).

³ For an assessment of the impacts on the regional labour markets in the Nordic countries, see Neubauer et al. (2007 pp.15ff.) and Johansson (2005) for a discussion of the concept and impacts of regional enlargement, based on a study of cities and regions in the Baltic Sea Region.

always compatible. In particular, economic growth based on innovation, knowledge and often entrepreneurship tend to be biased toward economic core regions or the metropolitan areas. Figure 2.3 below summarizes regional economic performance according to the original Lisbon indicators in an All European context, including the European Economic Area countries and Switzerland.

Figure 2.3 Regional performances according to ‘Lisbon Indicators’



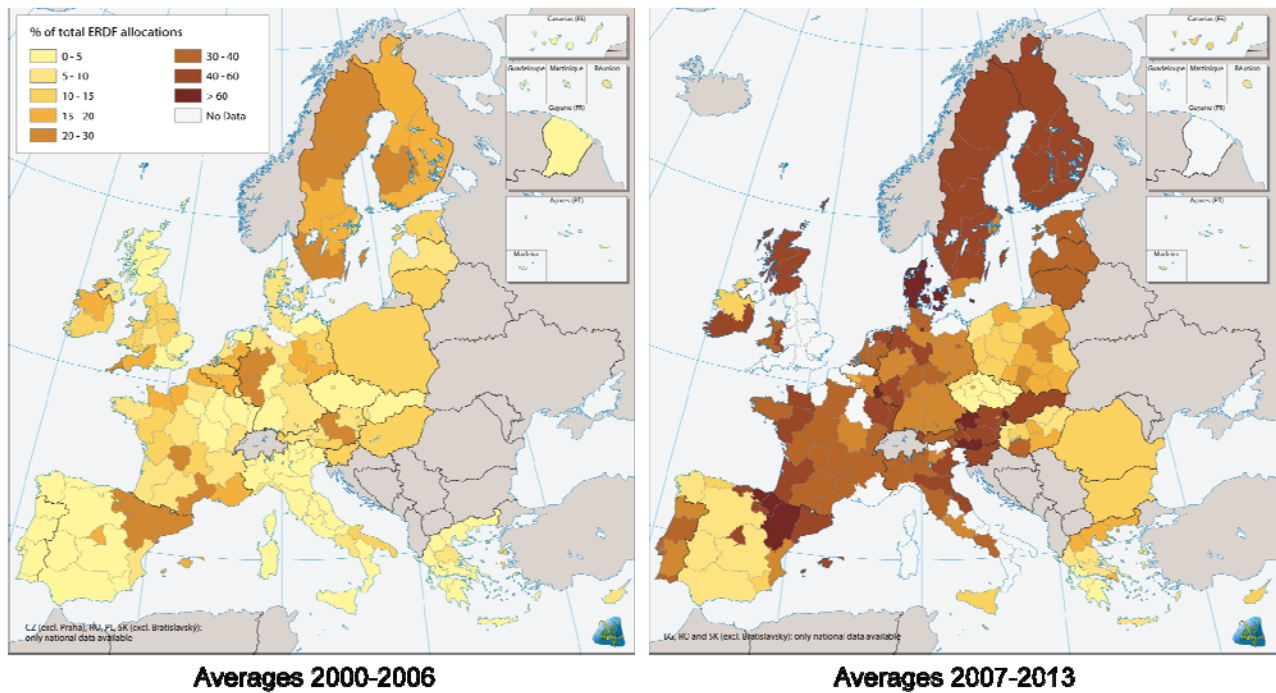
Source: ESPON 2007

On way to solve some of the adverse implications of this development could be to allocate the Structural Fund resources aiming to improve the economic structure of economical disfavored regions toward these areas to facilitate not only an income catch-up but also an overall improvement of the economic base with regard to knowledge, innovation and human resources. Based on the data presented in Figure 2.4 this record seems to be rather mixed, from the 2000–2006

to the 2007-2013 program period expenditures (planned expenditures) have become more concentrated geographically, but not to the advantage of the regions with the weakest factor endowment related to the new economic growth drivers.

Figure 2.4 Growth driver relevant expenditures of Structural Funds

Expenditure for R&D, innovation and information society at regional level



Source: European Commission 2007b

In the spring 2010, the EU-commission formally re-launched the Lisbon Strategy under the heading ‘The Europe 2020 Strategy’ formulating a vision for ‘Europe’s social market economy’ a well-known expression from the economic history of Germany after the second world. In the next 10 years, focus should be on three related and mutually reinforcing areas of priority (European Commission 2010b):

- Smart growth, developing an economy based on knowledge and innovation;
- Sustainable growth, promoting a low-carbon, resource-efficient and competitive economy;

- Inclusive growth, fostering a high-employment economy delivering social and territorial cohesion.

Overall the targets are similar to the Lisbon Strategy (see Figure 2.3), and progress towards these objectives will be measured against five representative EU-level targets. The member States have to translate the indicators into national targets reflecting their respective point of departure (European Commission 2010a&b):

- 75% of the population aged 20-64 should be employed
- 3% of the EU's GDP should be invested in R&D
- The "20/20/20" climate/energy targets should be met
- The share of early school leavers should be under 10% and at least 40% of the younger generation should have a degree or diploma
- 20 million less people should be at risk of poverty

Overall the aim of the Lisbon Strategy seems only to be slightly modified but the goal setting seems to be more realistic compared to the vision of the EU to become the most competitive regions of the world in the original strategy from 2000.

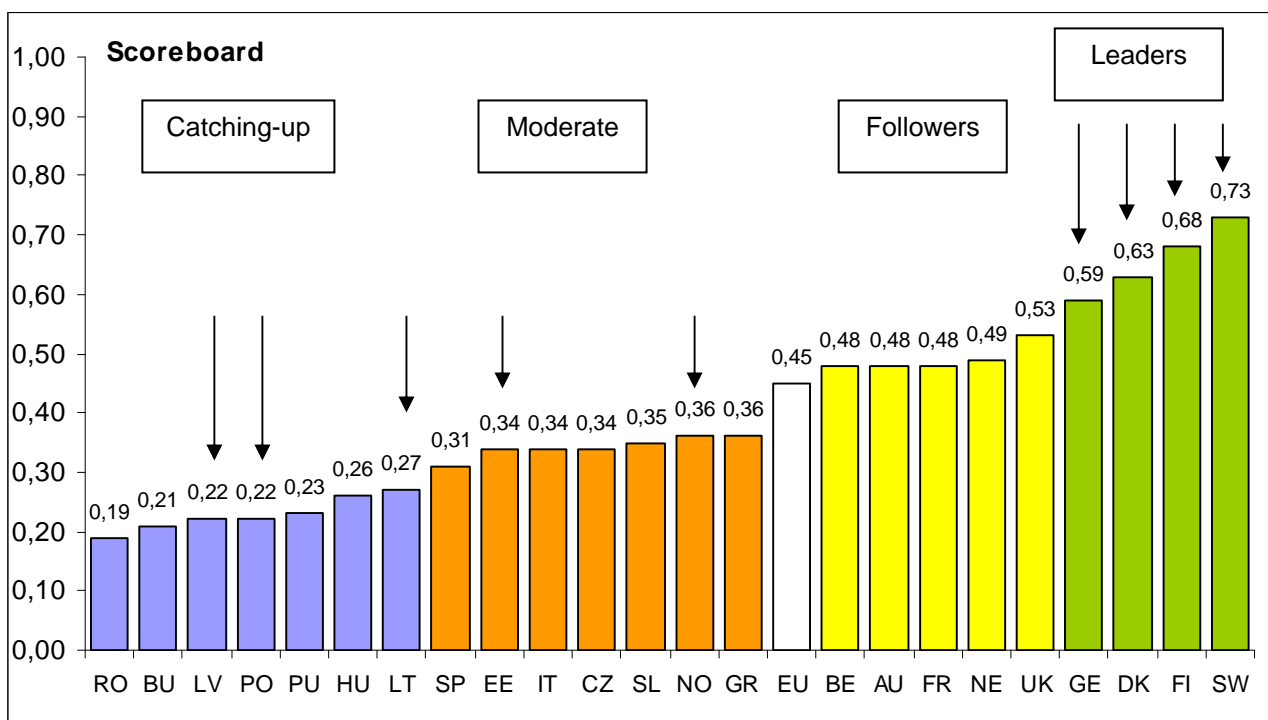
The next section aims to dig deeper into this issue based on an analysis of the Baltic Sea countries with regard to their innovation capabilities and economic development.

3. Main Drivers of Growth and Innovation in the Baltic Rim

The aim of this section is to provide an empirical assessment of whether countries and regions in the Baltic Rim with high performance in innovation and entrepreneurship have higher economic growth than countries and regions with lower levels of innovation and entrepreneurship oriented development policy. Related to our model of convergence we try to identify some of elements embodied in the constant term β_0 .

The policy of regional development was studied extensively in a Nordic perspective by Neubauer et al. (2007). Here special attention was drawn to the emphasis of the development policy. Based on the annual publication of the European Innovation Scoreboard (EIS), Innometrics (2006 & 2009) this issue will be discussed further. The EIS provides a comparative analysis of innovation, and is originally developed as an instrument to access, evaluate and compare the innovation of the European Union, within the so-called Lisbon strategy.

Figure 3.1 Summary Innovation Performance, EU Member States and Norway 2006



Note: Exclusive countries outside the Baltic Rim, where it not is possible to relate to the regional GDP statistics. These are: Catching-up countries: Cyprus. Moderate countries: Malta. Followers: Ireland and Luxembourg. A complete list of countries and abbreviations can be found in the Appendix 2.

Source: Innometrics (2006, 2009), Annex D.

Innometrics (2006 & 2009) are the only reports that provides a comparative analysis at the NUTS 2 level. Data are available for 202 regions. The most recent data are for 2006. From 2000 to 2004, annual data are given for the aggregated scoreboard. Over the period, the scoreboard values have been very constant. Figure 3.1 brings the 2006 summary innovation index by most of the nations in the European Union and Norway. The 9 countries forming the Baltic Rim is marked with an arrow. Innometrics (2006&2009) classify the nations into 4 categories. Latvia, Poland and Lithuania are classified as *catching-up countries* with a scoreboard indicator well below that of the EU–25, but with faster than average innovation performance improvement. Estonia is classified as a *moderate* country and seems to be trailing with a score well below the EU–25 average. Surprisingly this is also the case for Norway. The remaining western part of the Baltic Rim all belongs to the *innovation leaders* all with a score well above that of the EU–25. The lead of the innovation leaders has been declining compared to the average of the EU–25, with exception of Denmark. Figure 3.1 confirms the dichotomy among the countries of the Baltic Rim found in the analysis of the pattern of convergence.

Table 3.2 Ranked Innovation Performances by Indicators for the Baltic Rim

| Indicators: | SW | FI | DK | GE | NO | PO | EE | LT | LV |
|---------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Innovation drivers | 2 | 1 | 3 | 19 | 6 | 25 | 14 | 15 | 22 |
| Knowledge creation | 1 | 2 | 11 | 5 | 18 | 24 | 31 | 25 | 28 |
| Innovation and entrepreneurship | 1 | 3 | 2 | 8 | 21 | 25 | 4 | 15 | 11 |
| Applications | 5 | 3 | 12 | 2 | 25 | 24 | 21 | 29 | 31 |
| Intellectual property | 5 | 4 | 6 | 2 | 18 | 26 | 25 | 30 | 28 |

Note: A complete list of countries and abbreviations can be found in the Appendix 2.

Source: Own ranking based on Innometrics (2006) page 12.

The innovation analysis is undertaken for 34 countries including several overseas countries outside the European Union. Table 3.2 brings a classification of the countries with regard to 5 background indicators¹ for the countries forming the Baltic Rim. *Innovation drivers* measure the structural conditions required for innovation potential, *Knowledge creation* measures the investments in R&D activities, *Innovation and entrepreneurship* measures the efforts towards innovation at the firm

¹ These dimensions were introduced in the European Innovation Scoreboard 2005. More details can be found in the methodology report <http://www.proinno-europe.eu/metrics>

level, *Applications* measures the performance expressed in the terms of labor and business activities and their value added in innovative sectors, and *Intellectual property* measures the achieved results in terms of successful know-how.

Table 3.3 Regional Scoreboard Variables

| <i>Variable:</i> | <i>Measurement:</i> |
|--------------------------------------|---|
| Knowledge workers | Science and technology – core per cent of population |
| Life-long learning | Participation in life-long learning per 100 population aged 25–64 |
| Medicine and high-tech manufacturing | Employment out of total workforce |
| Hightech services | Employment in high-tech sectors in per cent of total workforce |
| Public research and development | Public R&D in per cent of GDP |
| Business research and development | Private R&D in per cent of GDP |
| Patents | EPO patents per million population |

Source: Innometrics (2006) page 28.

The dichotomy found above is confirmed. Sweden and Finland are performing highly efficiently on all indicators. Moving to Denmark and Germany the picture becomes more interesting. Germany falls out with regard to Innovation drivers, whereas Denmark falls out with regard to Knowledge creations and Applications. For the latter country, it seems that some kind of link is missing between development and implementation of new products or processes. Norway is very interesting. Besides, from Innovation drives, the performance is overall insufficient especially when compared to the level of income.

Moving to the eastern part of the Baltic Rim the score for especially Poland is poor. The small Baltic nations each have a comparative position on minimum one of the indicators. Common for all is a good performance on Innovation and Entrepreneurship, as also noticed earlier.

As stressed, the Innovation Scoreboard can be regionalized for 202 regions at the NUTS 2 level¹. The regional scoreboard is based on 7 indicators all summarized in Table 3.3. Now, we substitute these variables for the overall scoreboard and estimate the influence on the level of GDP per capita in 2004 and the growth of GDP during the period from 1995 to 2004. In addition, we add a dummy variable if the region belong to the Baltic East.

¹ Statistics for Norway is not included at the regional level

Table 3.4 Influence of Scoreboard Classification on GDP performance by Regions

| | <i>Model GDP level 2004</i> | | | <i>Model GDP Growth 95–04</i> | | |
|---------------------------|-----------------------------|----------------|----------------|-------------------------------|-----------------|----------------|
| | <i>Coefficient</i> | <i>Std.dv.</i> | <i>P-value</i> | <i>Coefficient</i> | <i>Std.dv..</i> | <i>P-value</i> |
| Variables: | | | | | | |
| Constant | 16,729 | 6,933 | 0.02 | 0.33 | 3.64 | 0.93 |
| Knowledge workers | 265,702 | 121,880 | 0.04 | 7.22 | 69.45 | 0.92 |
| Life-long learning | -110,154 | 82,627 | 0.20 | 27.60 | 47.08 | 0.56 |
| Med/Hi-Tech manufacturing | -113,121 | 77,174 | 0.16 | -15.90 | 43.97 | 0.72 |
| Hi-Tech Services | -53,638 | 82,228 | 0.52 | 6.03 | 46.85 | 0.90 |
| Public R&D | -40,537 | 27,770 | 0.16 | -1.04 | 15.82 | 0.95 |
| Business R&D | 94,277 | 49,452 | 0.07 | 7.08 | 28.18 | 0.80 |
| Patents | 223,932 | 135,133 | 0.09 | -14.63 | 77.0 | 0.85 |
| Baltic East dummy | -12,982 | 3,536 | 0.00 | 6.95 | 2.01 | 0.00 |
| Diagnostics: | | | | | | |
| R ² -adjusted | 0.85 | | | 0.40 | | |
| Standard Error | 4,831 | | | 2.75 | | |
| Observations | 30 | | | 30 | | |

Note: If the P-value is less than 0.10 weak significance is observed (10 % level), if the P-value is less than 0.05 significance is observed (5 % level), and if the P-value is less than 0.01 strong significance is observed (1 % level).

Table 3.4 summarizes the results. The model in levels is found to the left, whereas the model in growth is shown to the right. Turning first to the model in levels, ie. the model in the left panel, the negative coefficients means that performance will *lower* the level of GDP per capita. This is so, because the distribution of income is non-symmetric among the included countries. Interestingly, R&D in the public sector does not have significant impact on GDP in both models. Besides from the dummy for Baltic East, the only significant variables are knowledge workers and patents with the latter having the largest effect. All significant variables take the expected positive signs. The parameters found here is consistent with the findings by Cornett and Sørensen (2009b). It is likely that the significance if knowledge works especially is visible for the countries in Baltic East. The innovative potential in the Baltic East is then underlined by the positive significance of dummy variable. All together, our finding suggests a division or specialization in the Baltic where development in the Baltic West is devoted to patents, and in the Baltic East to knowledge skills of the labor force. Moving the result in right panel, the outcome is very poor. It looks like that the only thing stimulating growth is the dummy variable. This was also the picture from Figure 1.1 where is was observed that the growth rates in Baltic East far exceed the growth rates in the Baltic West.

4. Conclusion and Discussion

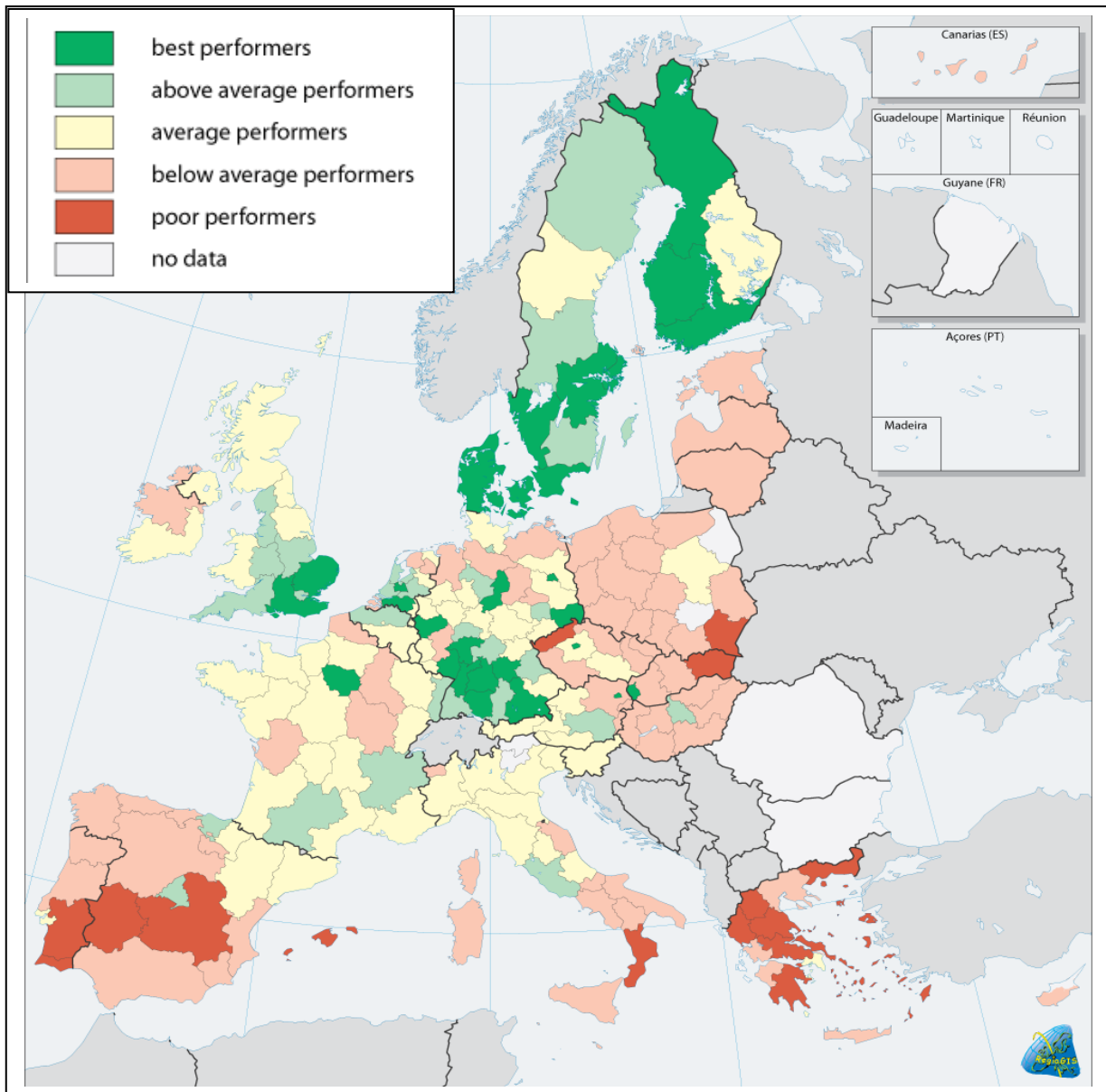
The analysis of convergence and disparities in the Baltic Rim region and the main drivers of economic development show to a large extent the same pattern than in other parts of Europe where new and old market economies are bordering. With regard to regional convergence the highest rate of convergence are found in the Baltic East regions with more than 2.5 times the rate of convergence rate of Baltic West region. With regard to country specific results convergence is mainly a phenomenon on the aggregate level. For Sweden, Finland and Poland, divergence is found, whereas the groups Germany Baltic and Poland Baltic along with Denmark are inclusive. For Germany as a whole and for Norway, convergence is observed. Due to the low number of observations the interpretation of the result has to be carefully.

With regard to the economic drivers, the picture is on the surface relatively simple. Four of the five Western Baltic Rim states are in the group of innovation leaders, and three of the four former command economies are in the catch up category. Only Estonia and Norway are in the intermediate group of moderate innovators (see Figure 3.1). More interesting in a convergence perspective is that the four innovation leaders actually have very height with regard to the most important new economic growth drivers, innovation, knowledge entrepreneurship and application, a measure for the ability to transform new invention into the market¹.

In a policy perspective one of the most interesting results is that R&D in the public is that only the private sector do have significant impact on GDP. For the western parts of the Baltic, GDP is based on the presence patents, whereas it seems like income in the East is based primary on knowledge workers. Growth is mainly devoted to the East. This is due to the catch-up effect. The tendency to concentrate the Structural Funds expenditures in the field of R&D, see Figure 2.4 looks to be in accordance with our observations. The Baltic States seems to receive a relative high share compared to other peripheral regions in Europe, but overall the performance is still rather weak in the eastern part of Baltic Rim, but higher than in some of the South European regions, see Figure 4.1 below. Overall it still an open question, to what extent a growth policy based on more advanced economic activities actually will be able to reach. This is true for both the old disfavored regions and the 'new periphery' in the old market economies. These are suffering from economic change, and the move away from traditional manufacturing and physical production toward a service and knowledge based economy.

¹ For a discussion of this issue see Ejermo & Kander (2006).

Figure 4.1 Innovation Indicators by Regions



Source: European Commission (2007c)

The aim of this study, to identify clubs or groups of regions characterized by similar trends and patterns of development, cannot give a specific answer. However, our data indicate that the issue is general and not specific linked to the Northern part of Europe or the division between old and new market economies, but rather to an urban rural or metropolitan periphery dichotomy.

In a regional development in a Northern European perspective, the crucial issue is twofold; to maintain the leading position of the Nordic countries with regard to the drivers of new economic activities, and to avoid further development of the internal bias within the counties.

Appendix 1: Baltic Regions in Poland and Germany

Germany Baltic:

Schleswig-Holstein, Hamburg, Lüneburg, Mecklenburg-Vorpommern, Brandenburg and Berlin.

Poland Baltic:

Zachodniopomorskie, Pomorskie, Warminsko-Mazurskie, Kujawsko-Pomorskie and Podlaskie.

Notice that the number of regions is larger than indicated due to a more detailed division of our statistics than indicated by the map below.



Appendix 2: Country Codes in Alphabetic Order

| Country | Country |
|----------------|----------------|
| Austria | AU |
| Belgium | BE |
| Bulgaria | BU |
| Czech Republic | CZ |
| Cyprus | CY |
| Denmark | DK |
| Estonia | ES |
| EU-25 | EU |
| Finland | FI |
| France | FR |
| Germany | GE |
| Greece | GR |
| Hungary | HU |
| Italy | IT |
| Ireland | IE |
| Latvia | LV |
| Lithuania | LI |
| Luxembourg | LU |
| Malta | MA |
| Netherlands | NE |
| Poland | PO |
| Portugal | PU |
| Romania | RO |
| Slovenia | SL |
| Spain | SP |
| Sweden | SW |
| UK | UK |

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