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**Conference Paper**

## Determinants of Convergence and Disparities in Europe: Innovation, Entrepreneurship and the Processes of Clustering

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## **52<sup>th</sup> Congress of the European Regional Science Association**

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### **Determinants of Convergence and Disparities in Europe: Innovation, Entrepreneurship and the Processes of Clustering**

#### **Abstract:**

Innovation and entrepreneurship are key factors in current regional development initiatives, derived from the concepts of new economic growth theory. The aim of this paper is to combine an assessment of innovative and entrepreneurial performance with the spatial distribution and functional linkages of certain types of economic clusters. The hypothesis is that clustered regions with high entrepreneurial and innovative performance have higher growth than non-innovative/entrepreneurial regions or regions with a more scattered economic structure.

The clustering and in some cases even the polarization of economic activities in metropolitan regions can lead to excess growth, and contribute to a process of convergence between nations, but will also turn regional economic divergence back on the national economic development agenda.

The purpose of this paper is to provide in deep information on these processes in an international and perspective based on European empirical evidence. The first part of the paper addresses the development and growth issue in a theoretical development policy perspective.

The impact of innovation (measured by innovation scoreboard data) and entrepreneurship (GEM data etc.) on regional growth is estimated individual and combined as well as dummies for various levels of industrial clustering and agglomeration etc. are introduced.

Within these groups we study the process of convergence by use of the traditional measures of convergence. The findings are compared with traditional geographical convergence results, enabling an analysis based both on traditional geographical adjacent regions, often characterized by a common institutional framework, and regions characterized by common features in economic performance terms.

Based on the empirical results and the findings of the literature survey in the first part of the paper the final section provides an assessment of the overall trends in economic convergence and disparities and the drivers behind this process.

*Key words:* convergence & disparities – high vs. low growth regions – entrepreneurship & innovation – clustering – location quotients & concentration – regional economic policy

*JEL classification:* R11, R12, R58

**Paper for Theme ZS. SS- Knowledge, Innovation and regional Growth**

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## **1. Introduction**

Convergence and divergence have been crucial issues in economic development of the European area since the very beginning of the process of economic integration in the aftermath of the second world war. Structural change in business and industry has been the most important driver of regional alterations. Nowadays innovation and entrepreneurship are key factors in current regional development. Current strategies of policy are often derived from the concepts of new economic growth theory.

The aim of this paper is to combine an assessment of innovative and entrepreneurial performance with the spatial distribution and functional linkages of certain types of economic clusters. The central hypothesis is that clustered regions with high entrepreneurial and innovative performance have higher growth and rate of convergence than non- innovative/entrepreneurial regions or regions with a more scattered economic structure.

## **2. Theoretical and empirical framework**

The explorative nature of this paper calls for a combined theoretical and empirical foundation of the analysis. Theoretical and conceptual the point of departure is new economic growth theory and spatial aspects of economic growth and competitiveness, i.e. regional innovation systems and processes of clustering and co-location. The second anchor of the paper is the empirical distribution of economic activity and the patterns of economic performance in the European Union.

### **2.1 New economic growth, clustering and regional innovation systems<sup>1</sup>**

The transformation of mature economies from traditional industrial societies toward modern service and knowledge societies has caused huge changes also in the regional balance within and between the countries of the European Union. Less than five years ago conventional wisdom often stated that in particular countries dominated by manufacturing industries would be the losers of structural change and economic transformation. Recent figures have shown that this not always is the case, in particular the export based German economy has performed astonishing well after the financial crisis and in the first years of the state debt crisis of the Euro area. One reason is that Germany not only has implemented significant reforms of the traditional very sticky labor market around the turn

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<sup>1</sup> This section is based on Cornett (2012) forthcoming in Brown et al. (2012), Resources and Competitive Advantage in Clusters.

of the century by the social-democratic green government, the so-called Harz-reforms, but more important that the traditional manufacturing industry has adapted to the new modes of economic growth. New economic growth does not only apply to the knowledge and service industry but also to manufacturing and more traditional sectors of the economy.

The reason d'être of regional development efforts is closely linked to the fact that some regions perform worse compared to others, and that this leads to a (comparative) derogation of the quality of living and will create unequal conditions within a country.

Traditional economic growth models have their focus on capital and labor as growth drivers. More refined concepts of growth and new growth models are operating with a wider range of growth drivers including factors like human capital, knowledge and innovation and even intangible factors like entrepreneurial spirit (Audresch 2006). It has been recognised that some of the mechanisms behind economic growth are endogenous in a certain economic system rather than independent of previous performance (see Romer 1994). Innovation and the capacity to innovate are central factors for economic growth and regional development in this new context. The set-up of the regional and national system of innovation becomes crucial for the functioning of a modern business environment. Innovation has to be seen as both independent variable (i.e. a growth driver) and as a dependent variable with regard to policies aiming at stimulating innovative behaviour in the firm or educational sector. In this perspective, the role of knowledge and innovation is at least twofold. In the short run, innovation and knowledge creation becomes necessary instruments in the process of regional adaptation to industrial change as a response to changes in the competitive environment. One example of the new focus on competences is the on-going discussion of knowledge as a central factor in the spatial organisation of industries (Malmberg & Maskell 2002: 438f). In a longer perspective, innovation and knowledge are preconditions for a successful restructuring of the economic base, nationally as well as regionally and locally. As a consequence, attention has been on the role of innovation policy in economic policy in general (i.e. OECD 2001) and on regional development in particular (see Acs & Varga 2002).

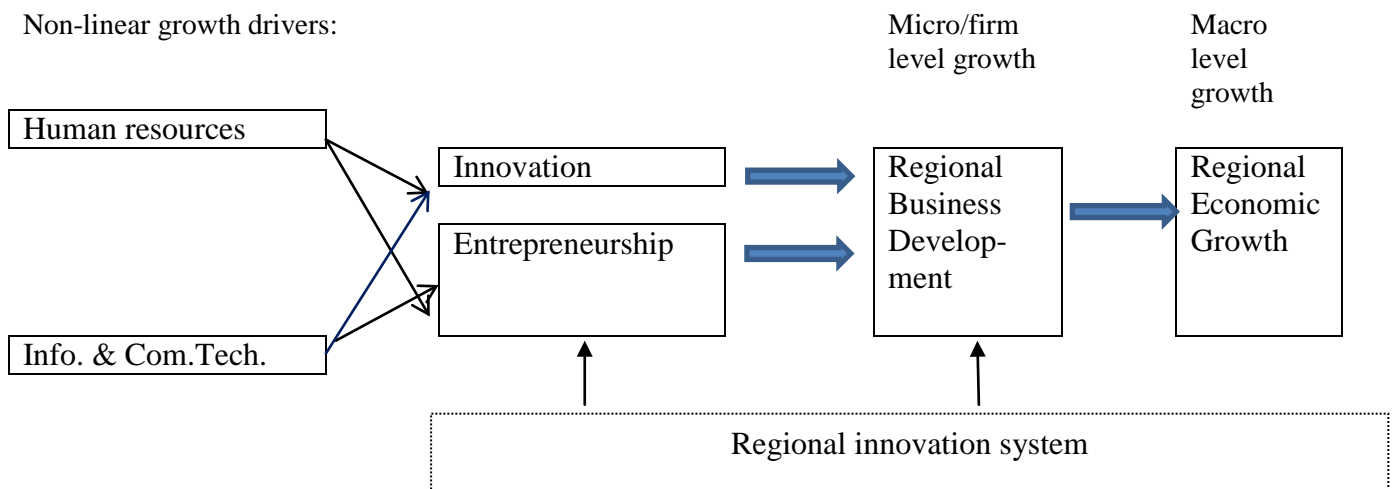
Contrary to traditional growth theory in this non-linear approach to economic growth<sup>1</sup>, the knowledge sector, innovation and entrepreneurship has become one of the crucial growth-drivers, and has attracted much attention a public policy perspective. Figure 1 below modifies the more

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<sup>1</sup> For an assessment of traditional vs. new growth theory with special attention on to what extent growth factors are endogenous, see Solow 1994.

common framework (see Cornett & Ingstrup 2010) with special attention on the nature of the mechanisms and the micro and macro aspects of growth and the regional setting (i.e. the regional innovation system into account. In the current context the main focus is on the linkage between growth drivers and how they influent economic growth and development, direct as well as indirect, see figure 1 below.

**Figure 1:** From growth driver to regional economic growth



**Source:** adapted from Cornett (2012)

Attention has been on the nature of innovation, on the conceptual frameworks of the systems of innovation, and on the most appropriate policy set up, but also policy initiatives to stimulate entrepreneurship has been taken<sup>1</sup>. In particular in situations with limits in the availability of traditional factors of production, alterations in the use and organisation of these factors become important, in particular with regard to innovation. In an assessment of the role endogenous innovation in growth theory G. M. Grossman and E. Helpman summarized:

“...Improvements in technology are the best chance we have to overcome the apparent “limits to growth.” If greater output requires greater tangible inputs, then it seems more than likely that the

<sup>1</sup> For an elaboration of the concept and significance of the national innovation system see Lundvall (1992). In an assessment of the institutional and organizational aspects of the regional system of innovation Cooke et al (1997: 489-90) concludes: “the best configuration of a Regional Innovation System can be evaluated from a dual perspective: (a) From a regionalisation approach, relating the region to its competence (jurisdiction) capacity, valuing its degree of autonomy to develop policies and manage the different elements that make up the regional system. As well as financing capacity for strategic investments in infrastructure absolutely necessary for the development of innovation processes. (b) From a regionalism approach, related to the region’s cultural base which is a certain level of systemic potential”. In many regards the RIS becomes a special case of the NIS which is defined by certain characteristic usually defined or specific to a country. This makes the model sketched in figure 1 unique in every region.

fixity in the supplies of various of earth's resources eventually will mean an end to rising per capita incomes. But if mankind continues to discover ways to produce more output (or better output) while conserving on those inputs that cannot be accumulated or regenerated, then there seems no reason why living standards cannot continue to rise for many centuries to com. (Grossmann & Helpman 1994: 42)

The core aspect is the transformation from the growth factors into the real economy, into economic growth and increased competitiveness. The main aspects addressed in the model deal with entities and relations of the business environment and the constitutive actors<sup>1</sup>. The focal point is the interaction between business entities and the external environment as a part of a broader network of innovative relations covering intra-firm as well as extra-firm relations and processes, generating positive externalities, usually ascribed to clusters and industrial districts<sup>2</sup>.

## **2.2 Regional convergence and disparities**

Structural change of the economy usually leads to an alteration of the regional balance within and between countries (Cornett & Sørensen 2008). The European Union and many other mature developed countries as well as the new fast growing economies have faced the challenge of increasing regional disparities, se Figure 2 below for the development within the EU area.

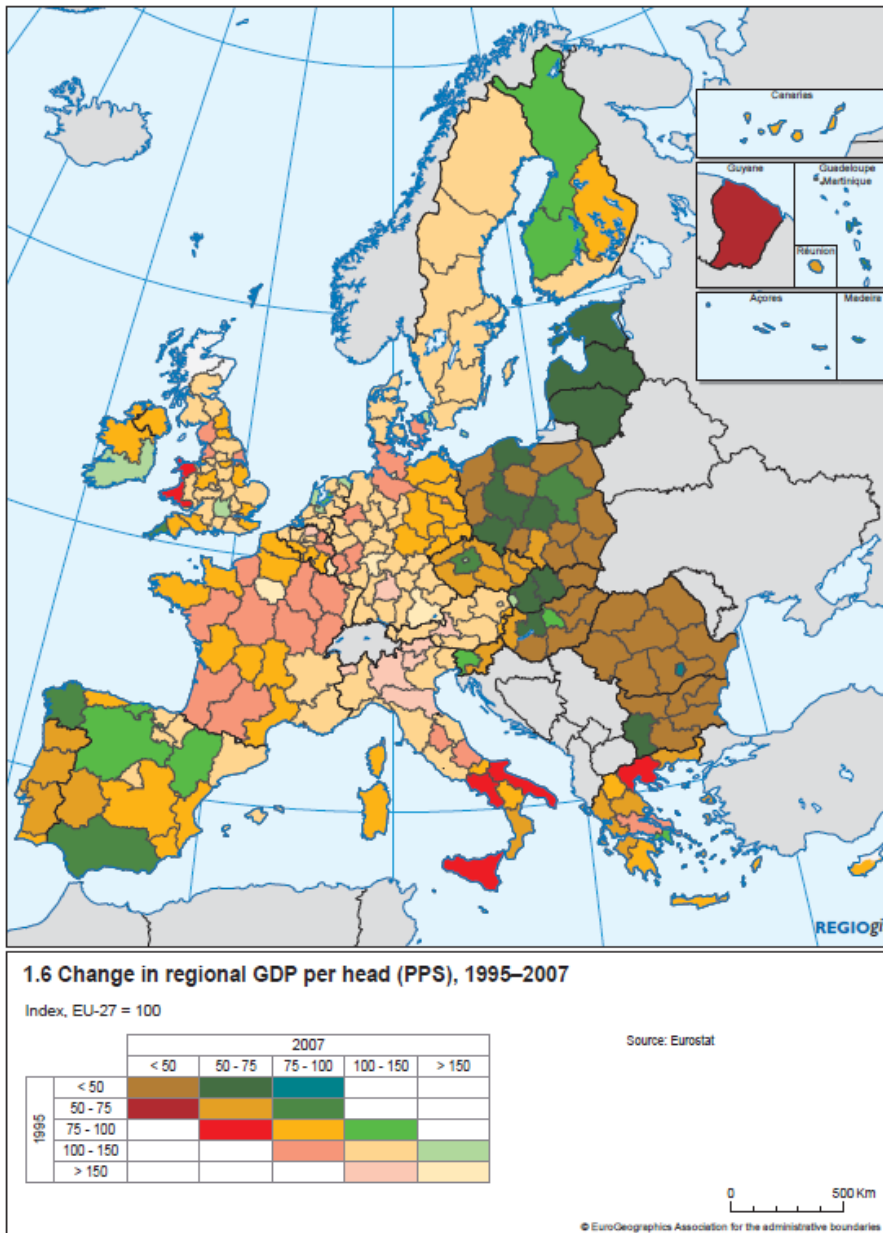
During the last decade growth in the metropolitan and center regions has in most countries been significant higher than in other regions, even in former industrial strongholds. One explanation is the previous mentioned change in the industrial structure toward knowledge and innovation intensive industries. In a European context the growth strategies since 2000 have to contribute to fulfillment of the Lisbon targets to create the world's most competitive economic region. The process to reach this goal turned out to some extent to be in contradiction to the intra-regional EU objective to promote regional conversion, not only between countries as a whole, but also within countries and between EU-regions.

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<sup>1</sup> A popular set up is the so-called Triple Helix framework (see Etzkowitz & Leydesdorff 2000).

<sup>2</sup> Clusters in a narrow sense are usually only a small part of the regional economy, but are often central as transmitters of knowledge and innovation to the individual firm or entrepreneur. Therefore, clusters and cluster policy are often considered to be an efficient tool in transferring policy into economic growth and competitiveness, and play an increasingly prominent role in business development and industrial policy:  
 "Second, this task has obvious policy relevance today. Throughout the OECD world (and beyond, as a matter of fact) cluster-based policies have in recent years increasingly been seen as the main option in the field of industrial and regional policy. As an important element of these policies we find a doctrine saying that regions should specialize industrially and promote the dynamics of spatial clustering in order to gain or sustain competitiveness and prosperity."  
 (Malmberg & Maskell 2002: 431)

**Figure 2** Change in regional GDP per capita (PPS) 1995-2007



Source: European Union 2010, p.15.

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 countries<sup>1</sup> 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 targets<sup>2</sup> - 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. Among the consequences is an increasing polarization of the commuting pattern in many areas leading to a process of regional enlargement<sup>3</sup>.

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 convergence are not 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 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.

One 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 economically 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 4 the 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.

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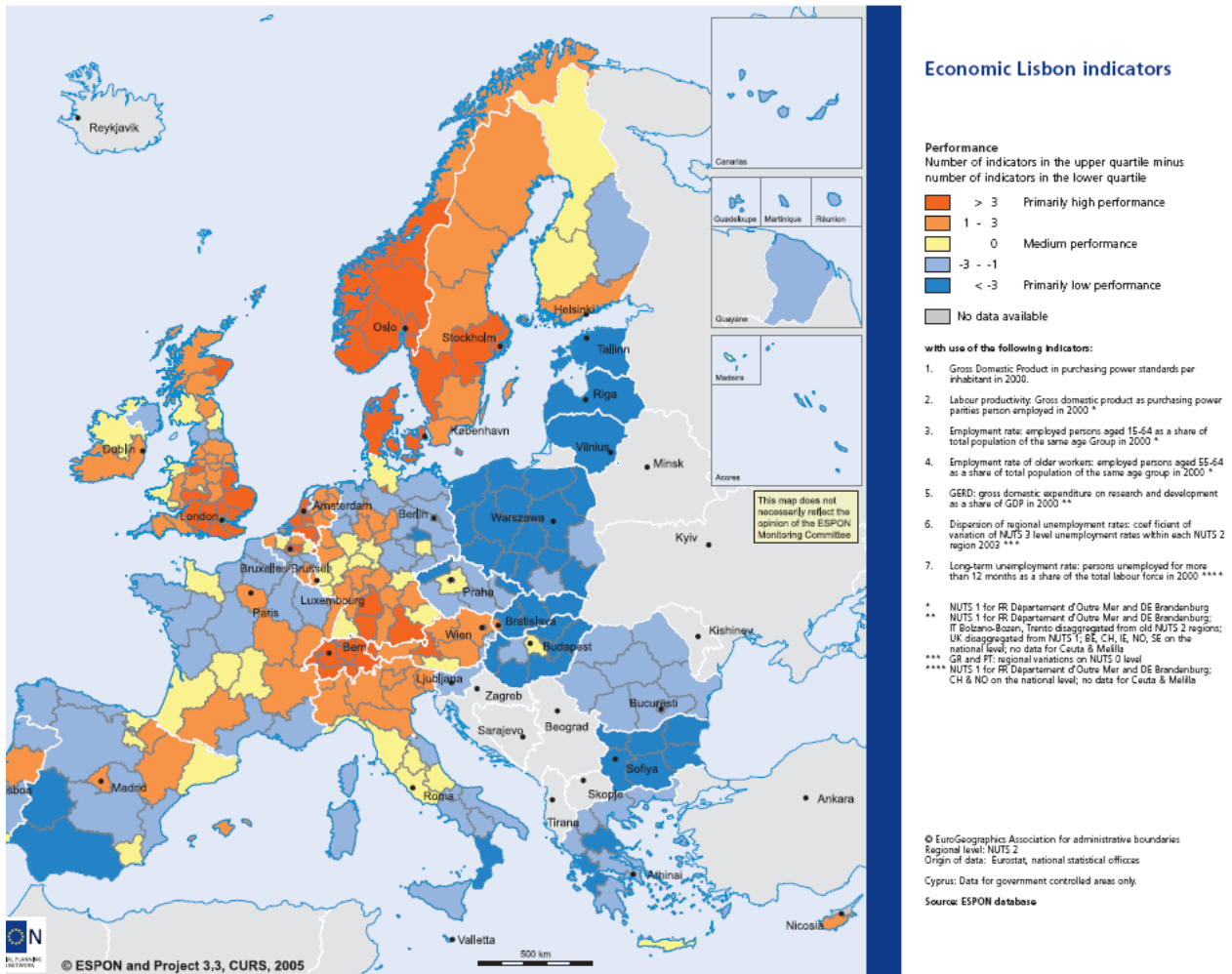
<sup>1</sup> For a discussion of the principal aspects of this trend from both empirical and theoretical perspectives, see Cuadrado-Roura & Parellada ed. (2002).

<sup>2</sup> 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.

<sup>3</sup> See 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.



**Figure 3** Regional performances according to ‘Lisbon Indicators’



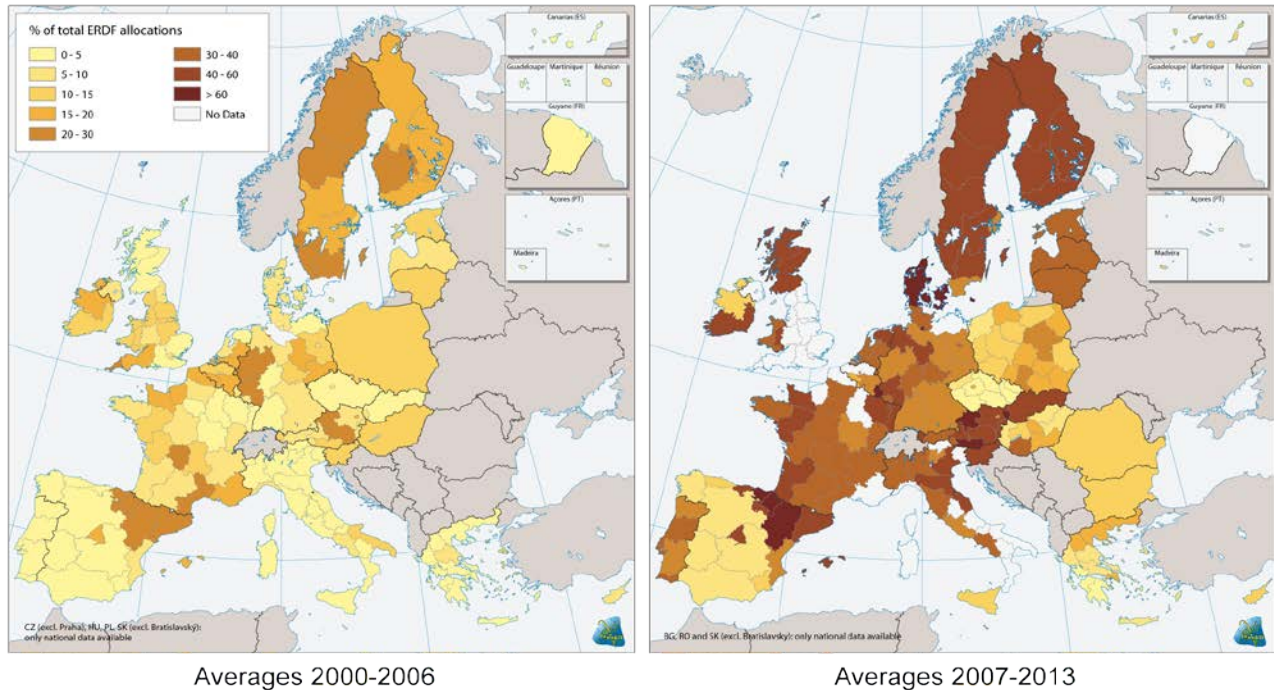
Source: ESPON 2007

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.

**Figure 4** Growth driver relevant expenditures of Structural Funds

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



**Source:** European Commission 2007

Overall the targets are to a large degree 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

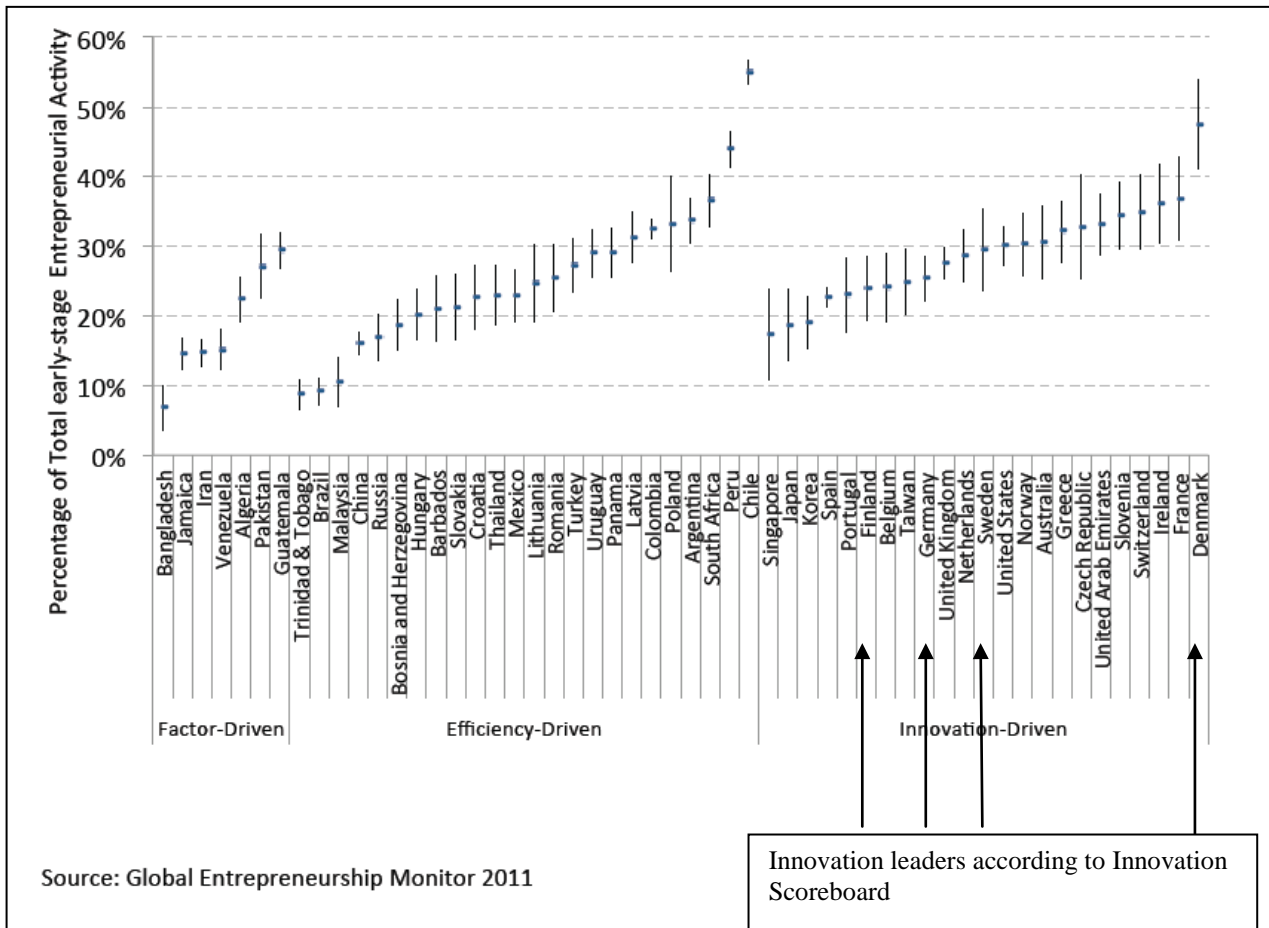
Overall the aim of the Lisbon Strategy seems only to be slightly modified but the goal setting seems to be more realistic compared to the vision of the EU to become the most competitive regions of the world in the original strategy from 2000.

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. Innovation and entrepreneurship: Growth performance and the process of clustering

Nowadays innovation and entrepreneurship are closely related, and innovative entrepreneurs are often among the most important drivers of economic growth<sup>1</sup>. Furthermore research institutes and other knowledge institutions are important actors in the entrepreneurial network which in itself becomes a type of triple helix system. In a recent survey based on The Danish Global Entrepreneurship Monitor data 22 % of the firms involved in product or service innovation have relations to the knowledge sector (Schøtt 2011 : 56). In general the innovative orientation is relative high among early stage entrepreneurs in Northern Europe, which is in accordance with the overall pattern found in the European Innovation scoreboard data, see figure 5 below.

**Figure 5** Innovative orientations of early-stage entrepreneurs, by phase of economic development and country



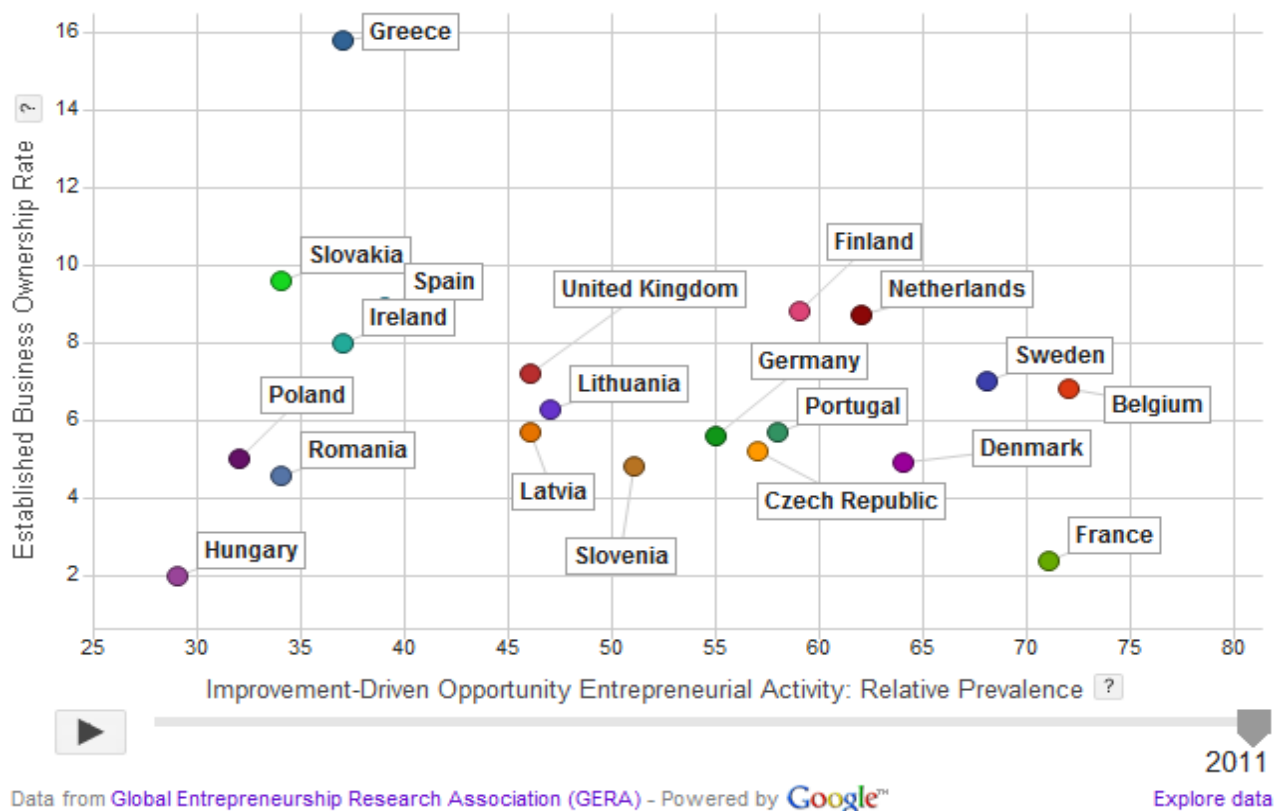
Source: Bosma et al. 2012: 38

<sup>1</sup> The geographical aspect of innovative entrepreneurship was already stressed in Schøtt 2007 based on regional Danish GEM data. The share of innovative entrepreneurs in DK (average 2002 – 2006) was between 24 % in Metropolitan Copenhagen and 17 % in Northern Jutland.

Innovative oriented entrepreneurs are at the center for economic growth and competitiveness both theoretical and in a policy perspective. One way to generate a fertile economic environment could be artificial to create a business environment similar to classical industrial districts or clusters.

Central to these concepts is that they aim for to exploit positive externalities, mainly external to the firm. This does not mean that positive externalities with a firm not are of importance. Large firm often become an anchor or even the nucleus for new firms (spin offs) in a cluster<sup>1</sup>. Entrepreneurial activity can even take place within an existing firm; see Schøtt 2011, for a survey based in GEM-data.

**Figure 6** Improvement-Driven Opportunity Entrepreneurial Activity: Relative Prevalence and Established Business Ownership Rate for selected EU countries 2011.



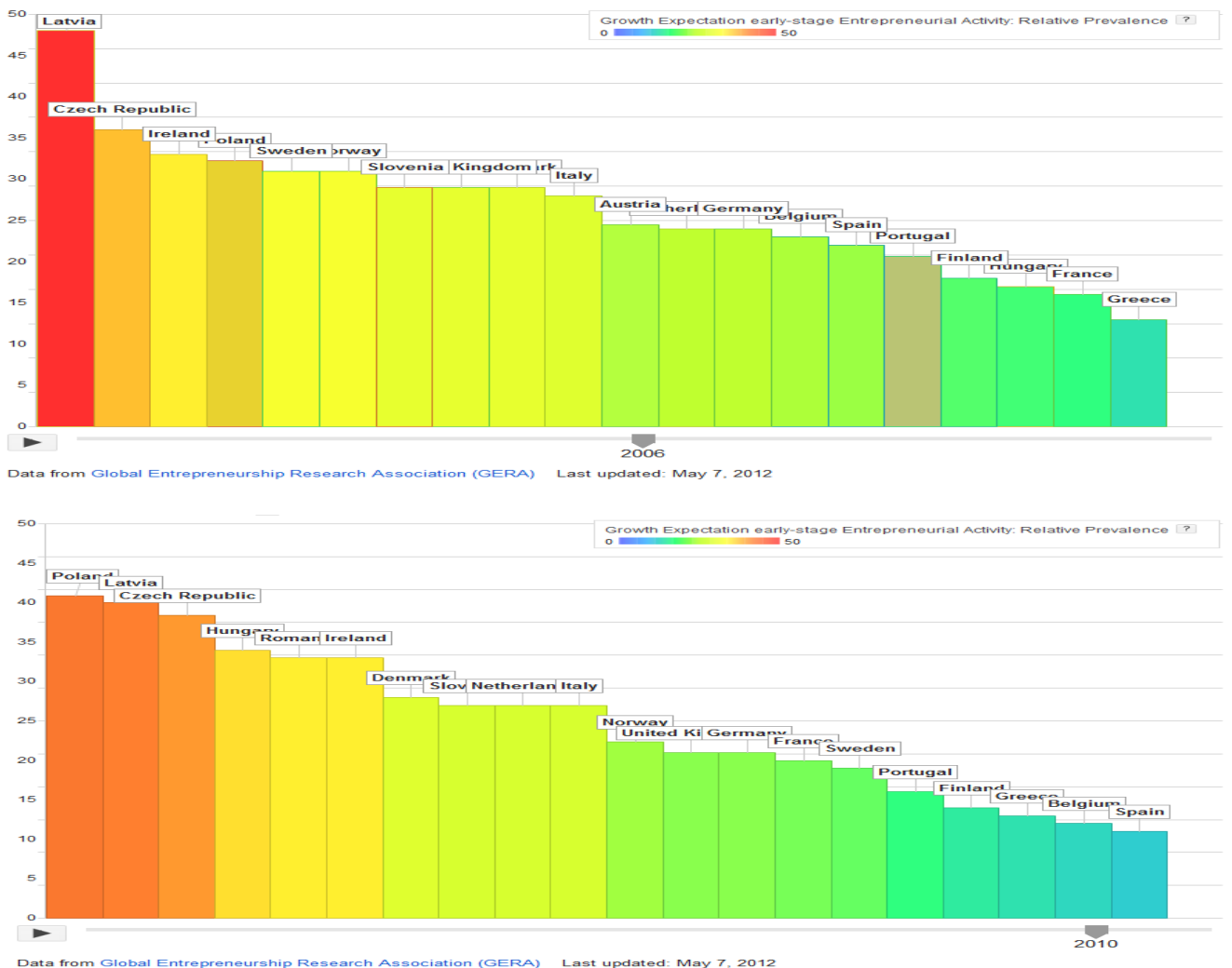
**Note:** *Improvement-Driven Opportunity Entrepreneurial Activity:* Percentage of those involved in TEA who (i) claim to be driven by opportunity as opposed to finding no other option for work; and (ii) who indicate the main driver for being involved in this opportunity is being independent or increasing their income, rather than just maintaining their income. *Established Business Ownership Rate:* Percentage of 18-64 population who are currently owner-manager of an established business, i.e., owning and managing a running business that has paid salaries, wages, or any other payments to the owners for more than 42 months.

**Source:** GEM (2012) <http://www.gemconsortium.org/Data> (accessed 26-6-2012)

<sup>1</sup> For an elaboration of the concept see Cornett (2012 forthcoming), and for an empirical assessment and discussion of the role of agglomerations (city-size) for innovation performance Cornett & Sørensen (2012).

In a long run regional development perspective the most important aspect of entrepreneurship is that the activity supports the overall performance of a region, also in a more qualitative sense, i.e. improving living conditions and knowledge level etc. Figure 6 provides a first overview based on data for the motivation of entrepreneurs to embark on an entrepreneurial endeavor. Overall the picture is very much in accordance with conventional wisdom, pull factors like opportunity driven entrepreneurship are predominantly found in the traditional well performing Northern part of Europe (with lower overall ownership rates) and pull-factor or necessity driven entrepreneurship seem to be more dominant in South and East.

**Figure 7** Growth Expectation early-stage Entrepreneurial Activity: Relative Prevalence (2006 & 2010).



**Note:** Percentage of TEA who expect to employ at least five employees five years from now

**Source:** GEM (2012) <http://www.gemconsortium.org/Data> (accessed 26-6-2012)

Figure 7 sketches some light on the overall growth expectations of new entrepreneurs before and after the financial crisis. In the group with high expectations are typical East European countries (end in 2006 Ireland), whereas the advanced Northwest European economies are in the middle and lower middle group with regard to growth expectations, also for the new entrepreneurs. Portugal, Greece and Spain are also in the lower end of the classification. Interestingly the position has not changed that much after the financial crisis, but unfortunately the data does not cover the impact of the European debt crisis.

#### 4. Implications for convergences and disparities in regional development

The previous part of the paper considered the process of innovation and entrepreneurship at a rather aggregated level. In the present section we attempt to dig deeper into the effects of clusters at a more regional level. As stated in the Introduction, the hypothesis is that clustered regions with high entrepreneurial and innovative performance have higher growth and standards of living than regions with a more scattered economic structure.

In order to fulfill this task an investigation of convergence by regions in Europe is undertaken. This approach takes in consideration the level of wealth as well as the rate of growth. Traditional, the literature of convergence, see for example Abreu, De Groot and Florax (2005) for a detailed discussion has focused on the concept of  $\beta$ -convergence. This type of convergence is derived from the neoclassical model of economic growth developed by Solow, for further elaboration see for example Cornett & Sørensen (2008, 2009 & 2012). 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 form 1:

$$\Delta \log y_{t,i} = \beta_0 + \beta_1 \ln y_{0,i} + \beta_2 D_i \quad i = 1, \dots, n$$

Where  $\Delta \log y_t$  is the growth rate from period 0 to  $t$ ,  $\beta_0$  is a constant,  $\beta_1$  is an estimate of the speed of convergence, and  $\beta_2$  is measuring the effect of a dummy variable. Finally,  $n$  is the number of regions.

If  $\beta_1$  is significantly negative then convergence is present. If  $\beta_1$  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  $\beta_0$  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.

Finally, the term  $\beta_2$  is a dummy variable measuring effects having influence in the constant term i.e. the variable measuring among other things the level of technology. Cornett & Sørensen (2009) uses the Regional Innovation Scoreboard (RIS), see especially Innometrics (2006, 2009) to provide an operationalization of the concept into a perspective of convergence. Innometrics has developed a

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<sup>1</sup> For a detailed deviation of the expression of  $\beta$ -convergence, see for example Cornett and Sørensen (2012), appendix.



framework to analyze the emergence of new regional clusters in a trans-national perspective. The RIS statistics originates from the European Innovation Scoreboard (EIS) and has only been published for the years 2004 and 2006. Here we use the latter dataset. The RIS is composed of seven indicators summarized in Table 1<sup>1</sup>.

The statistics on RIS covers 202 regions in Europe at the NUTS 2 level. In order to make the model operational a list of regions with clusters is needed. Here we use the list provided by the Center for Strategy and Competitiveness (CSC 2011). They use the RIS to point out the 100 strongest cluster agglomerations by regions in Europe. Using this list we end up with a total of 64 strong innovative cluster regions. The reason for lower number of regions in our dataset is that one region can embody several strong clusters within different sectors. For example inner London has four strong clusters: business services, education and knowledge creation, financial services and finally media and publishing.

**Table 1** 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: 28).

From the CSC (2011) it is visible that many larger cities have strong clusters. In order to examine the impact of cities and clusters we adopt an approach undertaken in Cornett & Sørensen (2012). Here a variable by regions is developed using the population size in order to measure the impact of urbanization. Relative to the RIS we find that 57 regions can be characterized by a high degree of urbanization. We labeled this variable *Cities*.

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<sup>1</sup> Notice that we do not claim that the RIS is covering every element of the regional level of innovation. The RIS does however give the best operational indicator.

Finally, we can combine or two dummy variables. It turns out that 25 regions are strong clusters as well as regions with a high degree of urbanization.

**Table 2**  $\beta$ -Convergence in the European Union. Effects of Innovation, Strong Clusters and Cities

	<i>Constant, <math>\beta_0</math></i>			<i><math>\beta_2</math>-coefficient</i>			<i><math>\beta_2</math>-coefficient (dummy)</i>			<i>R<sup>2</sup></i>	<i>Stand Error</i>	<i>Obs.</i>
	<i>Coef.</i>	<i>Std.</i>	<i>P-v</i>	<i>Coef.</i>	<i>Std.</i>	<i>P-v</i>	<i>Coef.</i>	<i>Std.</i>	<i>P-v</i>			
EU Total	22.97	0.97	.00	-1.97	0.10	.00				0.49	1.73	369
EU Innometrics <sup>1</sup>	29.63	1.45	.00	-2.69	0.15	.00				0.60	1.61	202
EU Strong clusters D	30.29	1.45	.00	-2.78	0.16	.00	0.65	0.02	.01	0.62	1.59	202
EU Strong clusters	34.77	3.21	.00	-3.17	0.33	.00				0.60	1.83	64
EU Cities D	28.87	1.43	.00	-2.63	0.15	.00	0.90	0.25	.00	0.63	1.63	202
EU Cities	28.70	2.67	.00	-2.52	0.29	.00				0.59	1.96	57
EU Clusters & cities	32.38	4.82	.00	-2.87	0.50	.00				0.59	2.02	25

**Note:** P-v is the P-value. 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). D is equal to the presence of a dummy variable.

1) Bulgaria Slovakia and Romania are not included, and compared to GDP figures the regional division is less thorough in some countries explaining the lower number of regions in the regression.

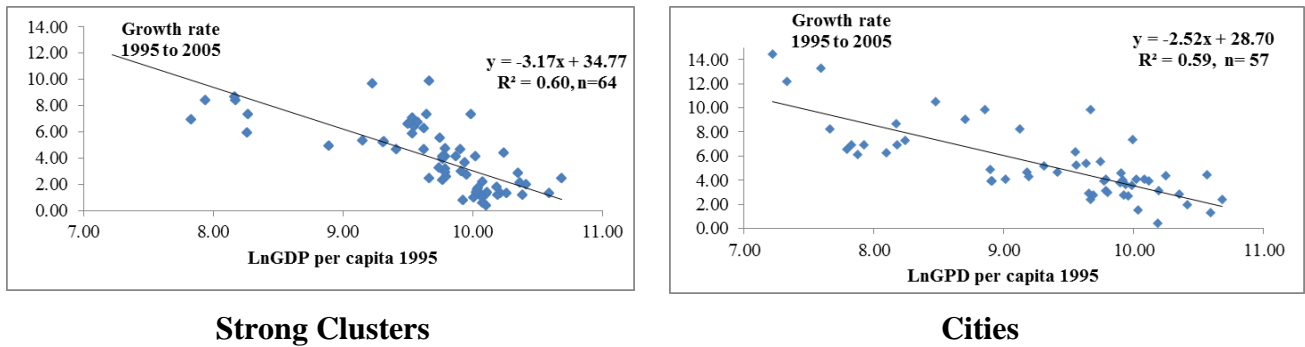
**Source:** Cornett & Sørensen (2012) and own calculations based on statistics from Eurostat.

Table 2 investigate patterns of convergence in Europe. As reported in Cornett & Sørensen (2008, 2012) the overall rate of convergence is a little below 2 percent. The rate of convergence for the regions covered by the RIS statistics is somewhat higher and equals 2.69 percent. The third row gives the result including the dummy variable for the strong clusters. A significantly positive estimate is observed. This implies that the presence of a strong innovative cluster has an impact on the level of technology in the region. In addition, the rate of convergence speeds up a little as observed from the coefficient of  $\beta_2$ . In order to isolate this effect a regression has been performed only for the 64 regions with strong clusters. It is shown that the process of convergence among these regions speeds up from 2.67 percent to 2.17 percent.

A similar investigation has been undertaken with regard to the presence of large cities in a region. Here the effect different. The presence of large urban areas does not increase the rate of convergence relative to the rate of convergence observed for all the regions in the RIS data. Compared to the overall estimate for all regions in Europe the observed rate of convergence equal to 2.52 percent is higher than 1.97 percent. In addition, the presence of large urbanized areas does have a positive impact on the constant term. Isolated this effect is larger than for the strong cluster regions, but the overall effect is the same due to an initial higher value of the constant term for the strong clusters.

Finally, combining the strong clusters and the regions with large urbanized areas does not increase the rate of convergence. In sum, a strong cluster is more important than urbanized areas. Figure 8 summarize the finding on convergence for strong clusters in the left panel and cities in the right panel.

**Figure 8** Convergence for Strong Clusters and Cities



To investigate the impact of the components of the process of innovation and development we perform a regression of the seven variables forming the regional scoreboard indicator, RIS and the logarithm of the GDP per capita by regions in 2005. A positive sign implies a positive impact on GDP and vice versa. This task is undertaken in Table 3 with a division of regions similar to Table 2. Our finding for the total is consistent with Sørensen and Cornett (2009) where the analysis was done with statistics on GDP per capita for 1995.

In general, we observe that all significant coefficients take the correct signs. For all regions taken together, only the presence of knowledge workers and patents has a positive influence on GDP. In general, it is also observed that neither public nor private research nor development is significant.

**Table 3** Influence of Scoreboard Classification on the logarithm of GDP per capita 2004

	<i>CON</i>	<i>KW</i>	<i>LLL</i>	<i>MHTM</i>	<i>HTS</i>	<i>PR&amp;D</i>	<i>BR&amp;D</i>	<i>PAT</i>	$R^2$	<i>Standard Error</i>	<i>Obs.</i>
	$\beta_0$	$\beta_1$	$\beta_2$	$\beta_3$	$\beta_4$	$\beta_5$	$\beta_6$	$\beta_7$			
Total	9.05***	3.60*	2.73	-2.12	-0.12	0.33	-1.35	8.95***	0.44	0.43	202
Clusters	8.78***	0.89	3.50	5.48**	7.69***	-0.07	3.73**	2.40	0.45	0.41	64
Cities	8.45***	6.12*	0.43	1.95	2.16	1.87	2.45	4.30**	0.51	0.55	57
Clusters & Cities	8.95***	0.22	5.85	3.05*	7.87**	-1.58	2.69**	3.39*	0.51	0.58	25

**Note:** \* Indicates weak significance (10 % level); \*\* Indicates significance (5 % level); \*\*\* Indicates strong significance (1 % level). The variables are described in Table 3. CON = constant term; KW = knowledge workers; LLL = Life-long learning; MHTM = Medicine and High-Tech Manufacturing; HTS = High-Tech Services; PR&D = Public Research and development; BR&D = Business Research and Development; PAT = Patents.

**Source:** Own calculations based on statistics from Eurostat and Innometrics.

Moving to the strong clusters we observe an interesting picture. Significant contributors are: Medicine and high-tech manufacturing, high-tech services and business research and development. Surprisingly the presence of patents is not significant. For cities we find that the presence of knowledge workers and patents contributes positively to GDP. Finally, for the regions with clusters as well as a high degree of urbanization a picture is obtained very similar to that of clusters only, but now with patents entering as a significant variable. The message from this is that very large cities with strong clusters have a quite diversified economic structure like for example London that is as stressed above hosting four strong clusters. Further, the region of Inner London has the highest GDP per capita in Europe and for that reason a lower rate of convergence. This is also true for cities like Hamburg, Munich and Milan, and explains the lower rate of convergence.

## 5. Concluding remarks

Built on the a combination of theoretical concepts grounded in new economic growth theory and spatial based approaches like regional innovation systems and processes of clustering the drivers of regional convergence and divergences are investigated in a European context.

Among the findings are that innovation and innovative entrepreneurship seems to be present in particular in the countries which also are classified as leaders or strong generators in the European Innovation scoreboard. Furthermore more traditional (non-innovative or less growth intensive entrepreneurship) seems to be predominant in the economic weaker southern and eastern countries. Impact of the financial crisis on employment growth expectations of entrepreneurs seems to be ambivalent; changes in ranking and level are modest. More interesting is that the above mentioned innovation leaders persistently scores relative low on this dimension. Since some of these regions also have the highest score with regard to clusters according to the European Cluster Observatory (but not all, i.e. Denmark has no cluster according to the European classification!) there seems to be no direct connection. One reason could be that we find a kind of ceiling effect with regard to growth in these countries. Furthermore the nature of innovative entrepreneurship as predominantly knowledge base may affect the judgments.

Using the regional innovation scoreboard (RIS) we analyze the influence of the presence of strong clusters and cities on the process of convergence among regions in Europe. We find that the presence of strong clusters has two effects. First, strong clusters have a higher content of technology than the typical regions in Europe. Second, the speed of convergence among the strong clusters is equal to 3.17 percent – more than 1 percentage point higher than the overall speed of convergence. Many strong clusters are located in regions with high degree urbanization. Furthermore urbanization increases the content of technology as well as the speed of convergence among the urbanized regions. However, the effects are smaller than the effects observed for the strong clusters.

We also examine the determinants of the scoreboard relative to the level of GDP by region. For the strong clusters positive contributions are observed for the variables: Medicine and High-Tech Manufacturing, High-Tech Services and Business Research and Development. Surprisingly we do not find any effects from the presence of patents. For the urbanized regions positive contributions are found for knowledge workers and patents. For regions with strong clusters as well as a high

degree of urbanization we observed positive influence of GDP from the variables: Medicine and High-Tech Manufacturing, High-Tech Services, Business Research and Patents.

The message from this is that very large cities with strong clusters have a quite diversified economic structure like for example London that is hosting four strong clusters within the sectors: business services, education and knowledge creation, financial services and finally media and publishing. Further, the region of Inner London has the highest GDP per capita in Europe and for that reason a lower rate of convergence, but in reality the relevant economic region is rather Greater London or the whole of Southeast England.

Overall the conclusion is that our central hypothesis that clustered regions with high entrepreneurial and innovative performance have higher growth than non- innovative/entrepreneurial regions or regions with a more scattered economic structure only to a limited extend is confirmed. Further investigation of the nature of the clusters is necessary, but some of the European regions with large agglomeration and strong innovative clusters are among the best performing regions. This holds both for capital regions and other large metropolitan regions, i.e. Hamburg or Catalonia.

## References

- Abreu, Maria, Henri L. F. de Groot and Raymond J.G.M. Florax (2005): “A Meta-analysis of  $\beta$ -Convergence: The Legendary”, pp. 389–420 in *Journal of Economic Surveys* 19.
- Acs, Z. J. & Varga, A. (2002): Geography, Endogenous Growth, and Innovation in *International Regional Science Review* 25, 1, 2002: 132-148.
- Audresch, D.B. (2006): “The Knowledge Spillover Theory of Entrepreneurship and Spatial Cluster” pp. 177-188 in Iréne Johansson (ed.), *Innovations and Entrepreneurship in Functional Regions*. Papers presented the 8th Uddevalla Symposium & the 8th McGill International Entrepreneurship Conference Uddelvall, Sweden 15-17 September, 2005. Research reports 2006:01 University West, Trollhättan; Sweden.
- Bosma, N, Wennekers, S. & Amorós J.E (2012), *Global Entrepreneurship Monitor 2011 Extended Report: Entrepreneurs and Entrepreneurial Employees Across the Globe*. Global Entrepreneurship Research Association (GERA) 2012. (<http://www.gemconsortium.org/docs/download/2200> (accessed 27-6-12))
- Center for Strategy and Competitiveness, CSC (2011):* “Strong Clusters in Innovative Regions”. Appeared from <http://www.clusterobservatory.eu/index.html> (accessed 27-6-12).
- Cooke, P. , M.G. Uranga & G. Etxebarria (1997): “Regional innovation systems: Institutional and organisational dimensions” pp. 475-492 in *Research Policy* 26 (1997). N.H. Elsevier, The Netherlands.
- Cornett, A. P. (2012 forthcoming): “Conceptualization of clusters as a tool in local and regional business development” in Brown, K., J. Burgess, M. Festing, & S.Royer (2012 forthcoming), *Resources and Competitive Advantage in Clusters*, Rainer Hampp Verlag, München/Germany.
- Cornett, A.P. & M. B. Ingstrup (2010): Cluster Development as an Instrument of Regional Business development Policy: Concepts and Danish Reality, 43-61 in Brown, Kerry, John Burgess, Marion Festing & Susanne Royer (Eds.), *Value Adding Webs and Clusters - Concepts and Cases*, Rainer Hampp Verlag München, Mering, Germany, 2010.
- Cornett, A.P. & N. K. Sørensen (2012): “Innovation and regional disparities – a survey of regional growth drivers and economic performance” pp. 81-108 in Charlie Karlsson et al. (2012), *Innovation, Technology and Knowledge*, Routledge , Abingdon (UK) & New York (NY).
- Cornett, A.P., & Sørensen, N.K. (2009): “Reconsidering Convergence in European Economic Growth – the Emergence of New Clusters across Nations”. Paper presented at the 49th Congress of the European Regional Science Association, Lotz, Poland.
- Cornett, A.P., & Sørensen, N.K. (2008): “International vs. Intra-national Convergence in Europe – an Assessment of Causes and Evidence”, pp. 35-56 in *Investigaciones Regionales* No. 13, Otoño 2008, Asociación Española de Ciencia Regional, Madrid.
- Cuadrado-Roura, J.R. & Parellada, M.(eds) (2002), *The European Monetary Union and Regional Convergence, Facts Prospects and Politics*, Advances in Spatial Science, Springer-Verlag Heidelberg New York, 2002.
- ESPON (2007):* ‘ESPON Maps’, [www.espon.eu](http://www.espon.eu).
- Etzkowitz, H. & Leydesdorff , L. (2000): The dynamics of innovation: from National Systems and ”Mode 2” to a Triple Helix of university-industry-government relations, pp. 109-123 in *Research Policy* 29(2000) , Elsevier, The Netherlands.
- European Commission (2010a):* “Communication from the Commission Europe 2020 – Strategy for smart, sustainable and inclusive growth” Brussels 3.3.3010 COM(2010) 2020. (<http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf>, accessed June 11, 2010)
- European Commission (2010b):*”Europe 2020: Commission proposes new economic strategy in Europe”. **IP/10/225** Brussels, 3rd March 2010. (<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/225&format=HTML&aged=0&language=EN&guiLanguage=en>,)
- European Commission (2007b) :*”Growing Regions, growing Europe, Fourth report on economic and social cohesion” PowerPoint Presentation. ([http://ec.europa.eu/regional\\_policy/sources/docoffic/official/reports/cohesion4/index\\_en.htm](http://ec.europa.eu/regional_policy/sources/docoffic/official/reports/cohesion4/index_en.htm), accessed June 2010).

European Union (2010): “Investing in Europe’s Future, Fifths report on economic, social and territorial cohesion” Luxembourg 2010.

Eurostat: ”Regio Data” Luxembourg. ([www.europa.eu](http://www.europa.eu)).

GEM (2012) Global Entrepreneurship Monitor (<http://www.gemconsortium.org/Data> ,accessed 26-6-2012)

Grossman G.M. & E. Helpman: “Endogenous Innovation in the Theory of Growth”, pp. 23-44 in *Journal of Economic Perspectives* 8 (1), 1994. *Innometrics (2005ff)*: “European Innovation Scoreboard 2006, 2009”, Maastricht Economic Research Institute on Innovation and Technology (MERIT) and the Joint Research Centre (Institute for the Protection and Security of the Citizen) of the European Commission (<http://www.proinno-europe.eu/metrics>)

Johansson, M. (2005): “Changing labour market conditions”, pp. 63-74 in Groth, Niels Boje, Thilo Lang, Mats Johansson, Vesa Kanninen, Stefan Anderberg and Andreas P. Cornett (eds) (2005), *Restructuring of Medium Sized Cities. Lessons from the Baltic Sea Region*, Final report of the Interreg IIIB project Medium Sized Cities in Dialogue around the Baltic Sea. Danish Centre for Forest, Landscape and Planning, No. 26, Frederiksberg, 2005.

Lundvall, Bengt-Åke (ed.) (1992), *National systems of Innovation Toward a Theory of Innovation and Interactive Learning*, Pinter publisher, London.

Malmberg A. & P. Maskell (2002): “The elusive concept of localization economies: towards a knowledge-based theory of spatial clustering” pp. 429-449 in *Environment and Planning A* vol. 34, 2002.

Mancha-Navarro, T and R. Rubén Garrido-Yserte (2008): “Regional policy in the European Union: The cohesion-competitiveness dilemma”, pp.47-66 in *Regional Science Policy & Practice* Volume1, Number 1, 2008.

OECD (2001): ‘The New Economy: Beyond the Hype the OECD growth report’, Paris 2001.

Romer, P.M. (1994): “The Origins of Endogenous Growth”, pp. 3-22 in *Journal of Economic Perspectives* 8 (1), 1994.

Schøtt. T (2011), *Entrepreneurial Work by Employees in Enterprises – studied via Global Entrepreneurship Monitor in Denmark 2011*. University of Southern Denmark, Department of Entrepreneurship and Relationship Management. Kolding, Denmark.

Schøtt. T (2007), *Entrepreneurship in the Regions in Denmark – studied via Global Entrepreneurship Monitor in Denmark*. University of Southern Denmark, CESFO, Kolding, Denmark.

Solow, R.M. (1994): ”Perspectives on Growth Theory”, pp. 45-54, in *Journal of Economic Perspectives* 8 (1), 1994.