THE SPATIAL CHARACTERISTICS OF THE REGIONAL ECONOMIC CONVERGENCE IN THE EUROPEAN UNION

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Abstract. Largely invoked by decision makers and academic staff, the concept of economic convergence is surrounded by strategic stakes related to the cohesion policy in the EU. Despite the fact that during the last 10 years all the NUTS2 regions of the EU present positive relative growth, the differences and the disparities between them accentuate. When mapped, these spatial disparities are far more visible in the recently integrated Eastern Countries. One explanation for these different rhythms of economic growth is derived from two major geographical effects – the spatial and the territorial autocorrelation. Measuring these coefficients is a methodological issue that can be solved using dissimilarity and territorial appurtenance matrixes and calculus. Unfortunately, the time-series of regional gross domestic product per inhabitant are available only for the 1998 – 2008 period, lacking the economic crisis period which systematically disturbed the growth trends and the disparities.

Keywords: *regional economic convergence, disparities, spatial autocorrelation*

1. Introduction

From an economical point of view, the period between 1998 and 2008 was largely characterized by a context of constant growth in almost all the NUTS2 regions of the European Union and the candidate states. Skeptical scholars or politicians would be quite disagreeing with this first phrase, but it is the output of the rough data analysis and mapping of the Eurostat time series concerning the regional GDP by inhabitant in PPA, for these ten years. In the same time, a closer look at the data will show that this context of growth was more affecting the regions situated in the Eastern candidate states, while the Old Europe was more temperate in this regard. For example, the North-East Region of Romania passes from 1200 Euro/inhab. in 1998 to 4000 in 2008, tripling thus the value of this indicator. Luxembourg shows a more relaxed rhythm of economic growth – from 40700 Euro/inhab.(1998) to only 81200 in 2008. The contrast between the poorest and some of the richer NUTS2 region is relevant for the issues and the stakes that surround the concept of economic growth. Also, the debate between the competiveness (Luxembourg) vs. cohesion oriented decisions (North-East Region of Romania), as a possible coherent territorial policy of the EU, seems to extract the substance from these numbers. What kind of "economic convergence" are we facing before the first world wide financial disorder? A relative one, which keeps the major European, fractures in place, an absolute one which shows only that the

"richer get richer"? The numbers itself won't clarify this aspect, if we look at them in the wrong context, while the paradox between relative and absolute growth will remain intact. Understanding the mechanism of economic growth also demands a geographical reference in order to be clarified. The undergoing processes of economic convergence could rely on three simple scales of analysis: the neighborhood effect, the territorial belonging effect and the hierarchical position. An approach that takes into account these three scales of reference will provide the needed spatial, territorial and hierarchical auto-correlation coefficients which will explain the invisible trends behind the economic convergence illusions affecting the decision makers in the nowadays EU.

2. Origin of data

The gross domestic product is a synthetic indicator used to compare the differences in economic performance at national and regional scale in the EU. Although large efforts were implemented by Eurostat in order to harmonize the semantics of this indicator, we still assist to some issues regarding the coherence of the data, due to the variety of national sources. From the researchers' point of view, the regional gross domestic product by inhabitant in purchasing power standards evaluates both the regional economic output of the regional productive systems and the mixed income of the spatial units took into account.

The time series used in this paper starts in 1997 and ends in 2008 (for this indicator, Eurostat delays with two years the publication of the data, which means that the information for the economic crisis period will be available in 2011 – 2012). As different studies show, the process of economic convergence is sensible to the period of crisis and depression so that the established trends for regions and countries might actually change quite dramatically. From these time-series we have maintained in our approach only three years: 1998, 2005 and 2008. The information for 1998 could be considered the t0 moment of a unified database concerning all the NUTS 2 regions in the European Union and the candidate countries. The data for 2005 present interesting aspects concerning the post adhesion period for a large part of the former communist states in the East and already contains the basic trends in the economic convergence process. The choice for 2008 is logic as it represents the end of the time series and a reference for the last post-adhesion period (Romania and Bulgaria in 2007, but with visible effects on the economy visible in 2008). The minimization of gasp in the database was another criterion that explains the choice of these three chronological references.

The spatial coverage of the data is also an important topic. Data is missing for Denmark, Switzerland and Norway (the last two countries not in the EU, but strongly connected with its economy) and is available for Turkey (but not for Croatia, another candidate state). A statistical substitution of data for Denmark

(NUTS0 information, instead of NUTS2) would have been an option but also a supplementary issue in the geographical analysis. Beside this, the spatial substitution is not possible for Switzerland and Norway, too large to act as a NUTS2 region.

3. Theoretical backgrounds in the convergence vs. divergence debate

The topic of the regional economic convergence is definitely a multi-disciplinary task, mobilizing researchers from economy, geography, planning and regional studies. The debates related to the economic convergence process are still largely depending on a conceptual background that has its roots in two major theories: the regional growth theory and the regional development one, inspired from different fields of study in the nowadays economy. Despite the fact that "growth" and "development" could look quite similar, the differences are offered by the methodological choices in the study process. The regional growth theory is deeply inspired by the classical macro-economics while the regional development theory finds its basis on a behaviorist approach and in the use of micro-territorial scales of analysis. It is not just a simple opposition between two separate paths of research (quantitative vs. qualitative approaches), it is more and more a synchronic attempt to liberate the "regional studies" from the unscientific and "art pour art" etiquettes. The stake in this research competition is double: how to integrate different methodological stances (territorial competitiveness analysis, "path dependency" theory, "growth poles and corridors", etc.) in a unique comprehensive frame of analysis and how to provide an accurate predictive model able to serve as a decision-maker platform.

The economic convergence (or divergence in the "loosing regions") cannot be explained only by trends in the income and productivity; it should mobilize different indicators hard to collect in the actual statistical context (R&D increasing returns, the role of the external economies in the location of firms or the "tacit knowledge" in the crafting process). At local scale, the empirical studies could provide this needed information, however aggregated data at regional or national level is almost impossible to be produced. That's why a synthetic (and yet fragile) indicator such as the GDP is preferred by most of the researchers.

The analysis of data obtained from the Eurostat shows two major evolutions for the European NUTS 2 regions, in the 1998-2008 period of time. First, the relative growth of the GDP per inhabitant is in a statistical and spatial relationship with a continental gradient oriented from West to the East. The absolute growth of the GDP per inhabitant is also explained by this gradient, only that the growth direction is reversed, advantaging the occidental NUTS 2 regions (with some exceptions in the UK). Secondly, the disparities between neighbor regions show an interesting pattern – encouraging diminution in some NUTS2

regions of Germany, France and UK, diminution in contrast with problematic emerging disparities in the Eastern Countries (Romania, Poland or Czech Republic). These disparities were calculated by reporting the absolute differences in GDP/ inhab. for every couple of neighbor regions in 1998 and 2008. For example, if the absolute difference between two neighbor regions was 100 Euro in 1998 and 1000 Euro in 2008, the relative evolution of the spatial discontinuities has a value of 10 (the result of division between the two values). Mapping these disparities offers us the possibility to interpret the major trends in the national and regional economic divergence. In Romania, only one couple of regions (SE and South-Muntenia) presents a convergent trend in the evolution of GDP, the rest of the country being quite fragmented by increasing differences of income and productivity. More interesting, the extroverted western border regions are involved in a "catch-up" process with the Hungarian regions, partially due to higher growth rates in the ten years analyzed. The position of Turkey in this equation is also to be noticed.

In the general top of the GDP/inhab. in 2008, the Turkish regions are placed on the final positions. However, some of the Turkish "NUTS2 like" spatial units escape from this rule and overpass in the top the new entry NUTS2 from the Eastern countries. Istanbul, Bursa, Izmir or Adana regions dispose of a GDP per inhab. superior to almost all the Romanian or Bulgarian regions. Concerning the relative evolution of this indicator, Turkey is divided into a proactive but with moderate growth western part and a less dynamic central zone. The repartition of the disparities is highly correlated with this economic opposition. In the case of an eventual accelerated adhesion of Turkey at the EU, the West vs. East Turkish contrast will become an issue of major importance in the cohesion policy of the Union.

In the Old Europe, especially in Germany, the reduction of the regional disparities is much more visible. Should this situation be the result of the EU implication in the reduction of economic differences at regional scale via the regional financial aid mechanisms? Is this the output of older positive evolution trends that in the 1998-2008 period entered in a phase of cumulative inertial growth, explaining thus the diminution of spatial discontinuities? It looks like two simple questions with complicated answers. One method to propose an explanation frame for the repartition of these spatial discontinuities is to check the geographical context in which they evolve.

The role of the geographical context in the economic convergence process

The interpretation of the geographical context relies on three major mechanisms, technically known in the spatial analysis as neighborhood effect

(spatial auto-correlation), belonging effect or the territorial auto-correlation and the position-effect (the hierarchical auto-correlation). In order to provide the coefficients that measure each effect in the distribution of the welfare and economic performance, several steps are compulsory in the analysis process.

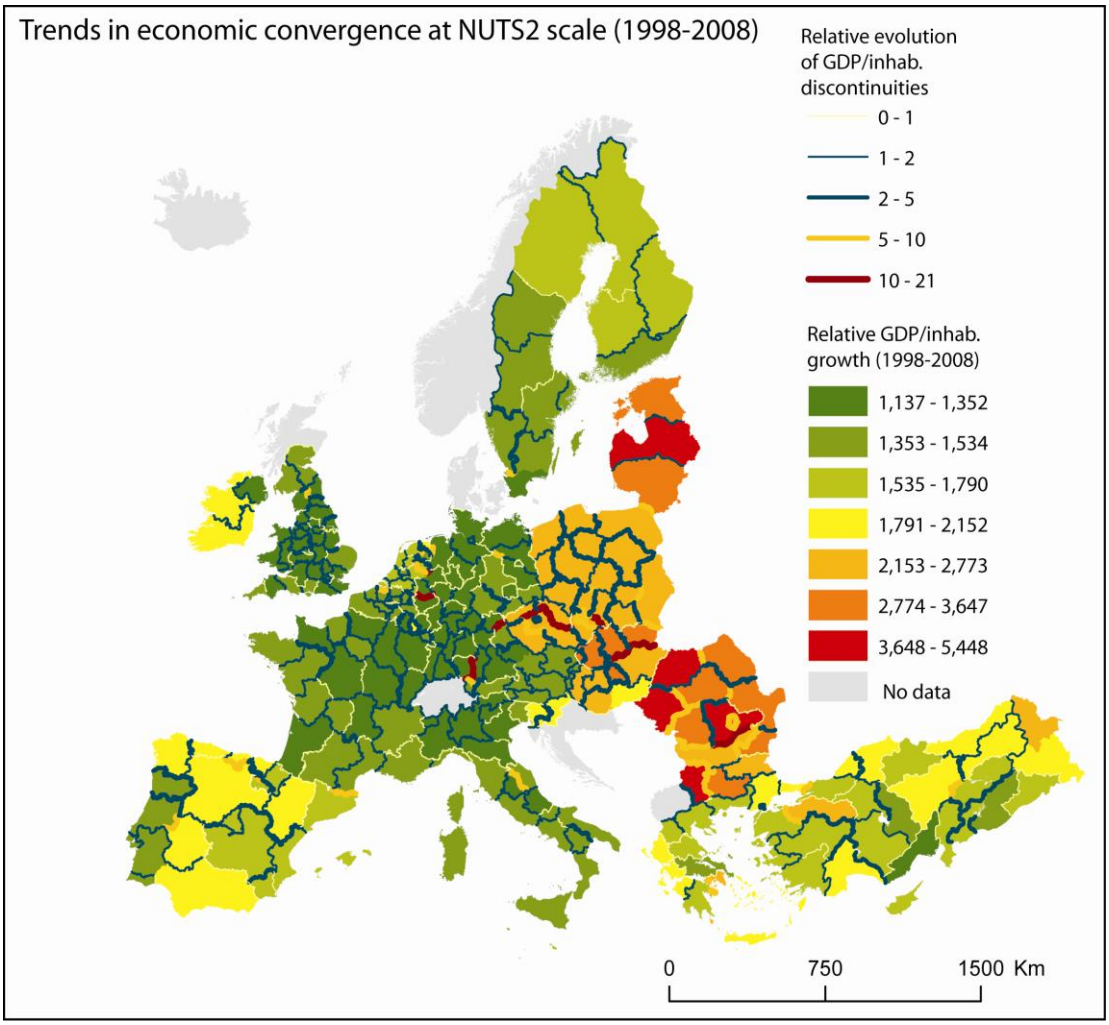

Figure1. Relative economic convergence and regional disparities in EU and Turkey (GDP/inhab. in 1998 =1 in the interpretation of the relative growth legend)

1) The chose and construction of relevant variables. In our case we have retain 9 indicators : GDP/inhab. in PPS – 1998, GDP/inhab. in PPS – 2005, GDP/inhab. in PPS – 2008, relative evolution of GDP/inhab in PPS between 1998-2005, relative evolution of GDP/inhab in PPS between 2005-2008, relative evolution of GDP/inhab in PPS between 1998-2008, absolute evolution of GDP/inhab in PPS between 1998-2005, absolute evolution of GDP/inhab in PPS between 2005-2008 and absolute evolution of GDP/inhab in PPS between 1998-2008.

2) The construction of a dissimilarity index between the regions. In our case, we have made an option for a dissimilarity index based on the absolute difference between all the regions. The results were stored on a matrix covering 290x290 NUTS2 regions.
3) To better seize the three geographical contexts we have elaborated three different weighting matrixes for the dissimilarity index. The first one concerns the belonging effect. Regions belonging to the same country received the value 1, the other regions 0. The same values (1 and 0) were introduced in order to capture the neighborhood effect, this time the value 1 being an indicator of the neighbor relation between regions. The hierarchical context is the most fragile part in the analysis process. Using the Jenks algorithm we have divided the distribution of the indicators in seven classes, according to the GDP/inhab. in PPS in 1998 and 2005. The same binary matrix was elaborated, this time based on the belonging to one of the seven classes. The Jenks algorithm was preferred because it functions using the natural breaks in the distributions, compared with other class division methods, making it more appropriate for our demarche.
4) The dissimilarity index was weighted with the three matrixes and the auto-correlation coefficients were obtained.

The results of the auto-correlation tests strongly suggest that the regional economic convergence is disturbed by geographical factors such us the neighborhood, the national trends and the position in the hierarchy of economic performance in Europe.

Several conclusions can be retained from the analysis of this table. The distribution of the shear indicators (GDP per inhab. in 1998, 2005 and 2008) is explainable both by the belonging effect and by the neighborhood one. The spatial auto-correlation seems to be stronger than the territorial one, meaning that the economic performance might be a matter of close economic relationship between neighborhood regions. It cans also be the result of chance: the probability of high dissimilarities logically grows when we extend the context of study from the neighborhood to the state. A significant aspect is the fact that, in both cases, the coefficients tends to diminish. If the initial indicators (GDP per inhab.) are somehow related to the spatial and territorial context, their relative evolution is even more linked to the neighborhood and the territorial belonging. Almost 80% of the variance of the dissimilarity index (absolute differences between regions) could be explained by the national appurtenance in the 1998-2008 period. That means that regions belonging to the same country will generally present the same level of relative evolution, compared with regions belonging to different countries. In the same time, two regions sharing a common frontier will act similarly in the relative economic growth, compared with two regions not sharing a common spatial limit (the spatial auto-correlation coefficient of 0.73 suggest this conclusion). The absolute growth is far less linked to the spatial and territorial context, even if the values of the coefficients seem relevant and representative.

Table no. 1. Auto-correlation coefficients reflecting the role of the geographical context in the regional economic convergence process

	GDP98	GDP05	GDP08	EVREL 9805	EVREL 0508	EVREL 9808	EVABS 9805	EVABS 0508	EVABS 9808
TAC	0.58	0.55	0.53	0.68	0.79	0.79	0.47	0.58	0.47
SAC	0.68	0.63	0.58	0.7	0.81	0.73	0.32	0.53	0.29
HAC	0.87**	0.85**	***	0.41	0.46	***	0.32	0.12	***

GDP = regional gross domestic product per inhabitant in purchasing power standards
EVREL = relative evolution of the regional gross domestic product per inhabitant in purchasing power standards
EVABS = absolute evolution of the regional gross domestic product per inhabitant in purchasing power standards
98,05,08 = 1998, 2005, 2008
TAC,SAC, HAC = territorial, spatial or hierarchical auto-correlation
** = statistical artifact
*** = not available due to calculation limits

The results obtained for the hierarchical auto-correlation indicate that belonging to a certain class of regions, in a previous period, don't guarantee high or low values of absolute growth for the next one. Simplifying, we will say that being a very rich region in 1998 doesn't make you absolutely richer in 2005 or 2008, the interclass regional mobility being a topic to reflect. The contrary is also valid; some of the poorest regions in 1998 are trespassing classes quite frequently. Actually, in the top of the positive rank evolution we find Prague and Bratislava, but also the capital regions of Athens or Madrid and even Bucharest (11^{th} rank of positive evolution). Maybe the hierarchical effect is also a function of the national economic performance hierarchy, if we look at the fact that the best rank evolutions are associated with the capital-regions. Interpreted at national scale, the evolution of the dissimilarity index between selected contiguous regions shows that the economic convergence and divergence should become a matter of strong academic interest and political implication.

The Romanian example is quite didactic regarding this last conclusion. According to the auto-correlation tables and the map, the context of growth positively affected Romania, especially in relative terms. The evolution could be theoretically explained by the contiguity effect and the territorial belonging of the regions. In the same time, the regional disparities between regions are dramatically increasing becoming a specific issue for the North-East Moldova and South-West Oltenia regions (actually, the most homogeneous NUTS2 in this country). Taking into account the synthetic characteristics and the lack of coherence of the indicator used in this analysis (GDP per inhab. in PPS in Euro), we might consider the aggravation of the regional disparities as a subject of secondary importance compared to other planning priorities. The same planning experience also shows that, neglected or ignored, the regional disparities become specificities difficult to

erase from the regional pedigree, while the effort to reduce them will consume much more resources than the effort to correct them.

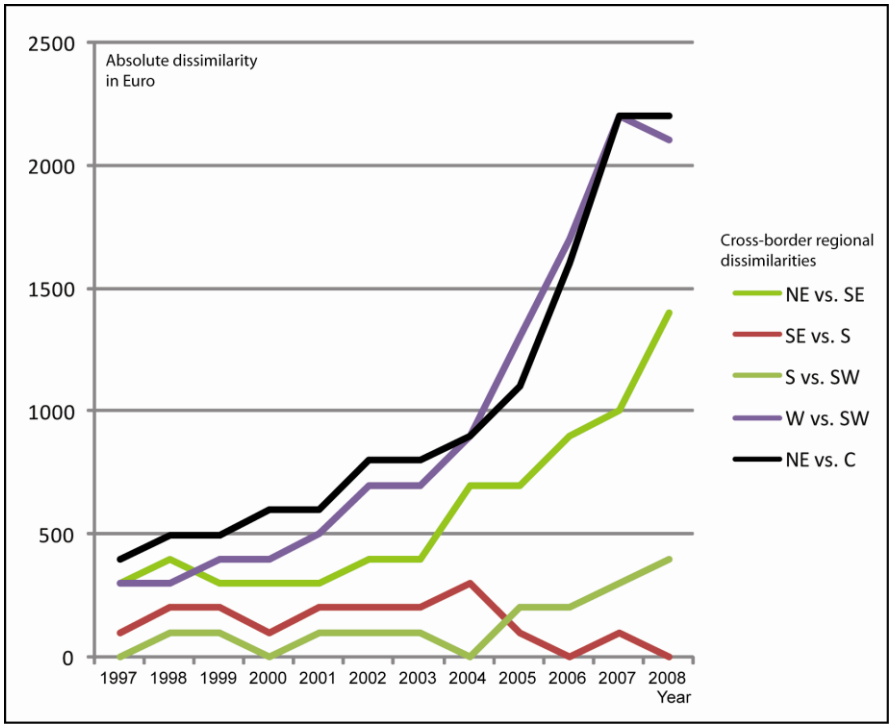

Figure 2. Cross-border disparities in Romania (selected regions)

Conclusions

Despite years of almost continuous economic growth, the main fractures in the EU space still remain intact and, analyzed from the perspective of the GDP per inhab. disparities, they even seem to accentuate. The positive signals from the East are largely reposing on the proactive convergent attitude of the capital-regions or on the extroverted borders, being more visible on the relative terms of growth than on the absolute ones. The spatial and the territorial effects play an important role in the explanation of the geographical distributions of economic performance and on its rhythms of evolution; however, a deeper analysis will also show that only the geo-statistical mechanism is more concerned with the explanation frame and not with the inner processes that affect the mysteries of the economic growth. It seems that the actual landscape of the EU economic performance, helped by the data providers, it's able to satisfy all the para-academic needs. Thus, the political point of view will perceive the positive signals of the regional economic convergence via the relative growth; the critical geographers will find a major topic of interest in the accentuation of absolute disparities and in the reversed gradient of absolute

growth of the GDP, while economic actors and citizens will feel the convergence or divergence debate in their accounts and in their pockets.

References

Auray, J. P., Bailly, A., Derycke, P.H., 1994. *Encyclopedie d´economie spatiale*, Economica, Paris, 1994

Benko G., Lipietz A., 1992. *Les régions qui gagnent. Districts et réseaux : les nouveaux paradigmes de la géographie économique*, L'Aube-DATAR, 1992.

Capello R., 2008. *Regional economics in its 1950s : recent theoretical direction and fuure challenges*, Annals of Regional Science, 2008, vol. 42, p.750.

Decroly J.M., Grasland C., 1993., "Frontières, systèmes politiques et fécondité en Europe", *Espace Population Sociétés, 2*, pp. 135-152

http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/en/nama_r_e2gdp_esms.htm