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## The Determinants of Growth in EU Border Regions

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50<sup>th</sup> ERSA Congress, 19<sup>th</sup> – 23<sup>rd</sup> August 2010

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### The Determinants of Growth in EU Border Regions

#### Abstract

The ongoing and parallel processes of integration and EU enlargement have produced a new socioeconomic map across the border space. Internal EU borders have become more permeable while external EU borders have been turned to be much more rigid. The abolition of the artificial impediments of cross border interaction within EU, has not only reduced barriers to trade but also brought to the fore a new mix of threats and opportunities that has put EU border regions in a state of flux. Since the role of boundaries as obstacles to interaction institutionally, at least fades out, the potential of border regions has to be analyzed not only in relation to their national centers but also in relation to their neighbors and the enlarged EU space as well.

The paper aims to detect the determinants of growth in EU border regions (NUTS III spatial level). For this purpose, the paper develops an empirical model for growth performance in the EU border regions, taking into consideration the pertinent theoretical discussion and compiling a cross-section econometric model. The estimation techniques used accounts for growth performance the 349 EU NUTS III border regions during the period 2000-2006, incorporating quantitative and qualitative parameters of growth. The findings of the paper are going to provide valuable insight for the understanding of the determinants of growth in EU border regions, having important implications for both theory and policy-making.

Key-Words: determinants of growth, EU border regions, integration, cross border interaction

JEL: R11, R12

## 1. Introduction

The ongoing and parallel processes of integration and EU enlargement have produced a new regional socioeconomic map releasing dynamics that have strongly influenced the EU border space putting EU border regions in a state of flux. The abolition of the artificial impediments of cross border interaction within the EU, has brought to the fore, a new mix of opportunities and threats while external EU borders have turned out to be much more rigid. Since the role of boundaries as obstacles to interaction institutionally, at least fades out, dynamism and the development levels of border regions have to be re-assessed not only in relation to their national centers but also in relation to their neighbors and the enlarged EU space. On the other hand, despite the fact that EU borders do not function as instruments of national protection policies, they still divide different structures of different national economic systems.

The meaning and the role of borders in the context of global transformations and the new spatiality of politics is diverse as a series of new definitions and concepts has been introduced in the recent literature, and particularly of the emergence of a 'borderless world' and the 'end of the nation state' (Ohmae 1993 and 2005); the multi-centric definitions (Blatter 2001); the weakening of national boundaries by globalization (Anderson 2002); the 'borders under stress' (Newman 2000); the 'spaces of flows' (Castells 2000); or the 'frontiers' of 'fragmegration' (Rosenau 1997). In any case, the role of border areas has fundamentally changed in the process of European integration, whereas their implications in the economic and spatial organization are various.

Within the context of the aforementioned emerged milieu, the paper aims to detect the determinants of growth in EU border regions (NUTS III spatial level). More specifically, goal of this paper is the study and the evaluation of the economic, spatial and social dynamics and perspectives of EU border regions. For this purpose, the paper develops an empirical model for growth performance in the EU border regions, taking into consideration the pertinent theoretical discussion and compiling a cross-section econometric model.

In more details, the paper compiles a cross-section empirical econometric model that accounts for growth performance in the 349 EU NUTS III border regions during the period 2000-2006 and studies a series of inherent and acquired factors (initial conditions) that determine the growth performance in the EU border regions. These factors are both ("traditional") quantitative and qualitative ("soft"), indicating the complexity of border issues.

The paper is organized as follows. The next section briefly presents the pertinent theoretical discussion on the literature. The third section provides the empirical part of the analysis. The last section provides the conclusions and some policy implications.

## 2. Literature Review

Border areas have posed a significant issue in the academic discussion mainly after the collapse of the East-West “Iron Curtain” era (Paasi 2005). Furthermore, it seems that there has been a methodological shift in research practices towards theorising borders. In particular, traditional studies aimed mainly at empirical analyses of specific case studies, often enclaved in a “*unitary case syndrome*” without providing substantial added value on border theory (Paasi 2005, Topaloglou et.al. 2005).

Border areas were traditionally being studied by geography. A fundamental study was that of Prescott (1965) whose central aim was to scrutinize the importance of factors that determine the role of ‘geographical features’ in establishing boundaries. Nowadays, border studies seem to form an interdisciplinary field which lends itself for discussion by economic, cultural and regional geographers. (Paasi 2005). From the economic literature point of view, three broad groups of studies have been distinguished and investigated (Niebuhr and Stiller 2002): i) the effects and their evolution in the course of integration, ii) the spatial effects of integration by the changes in regional accessibility, and iii) the effects of economic adjustment in specific border areas. The paper further displays the most salient factors associated with the economic growth of border areas.

In a theoretical level, *traditional locational theory* implies that border regions are weakly developed within a closed economy. However, some central border regions might be affected positively by the reduction of border impediments (Niebuhr and Stiller 2002). Furthermore, it is worth noting that even from the early seminal location theorists such as Weber (1909), Christaller (1933) and Lösch (1954)<sup>1</sup>, was pointed out that location decisions are strongly influenced by two parameters: trade costs and increasing return of scale. The first drives firms to supply their products closer to large markets whilst the second parameter makes the single location of firms more profitable. It is evident that both parameters enforce agglomeration dynamics and with those characteristics some border areas might be favoured.

Closer to real world Alonso Villar (1999), in her model suggests that some places offer cheaper access to foreign markets than others. Within this frame, border regions have a

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<sup>1</sup> The actual studies were developed within a partial equilibrium framework.

locational advantage in open economies attracting mobile activities. What's more, if the foreign markets are large enough and the international trade cost low, then the spatial effects in the interior region cannot be balanced. This argument underlines the market size effect on border space due to trade liberalization. Brülhart et al. (2004), claim that foreign demand drives domestic firms to relocate closer to the borders in order to exploit better access to foreign market. Foreign supply however, drives domestic firms to relocate to the interior, away from the foreign competitors, in order to find a shelter from foreign competition.

The *new economic geography* deals with the distribution of economic activities across space and explains regional disparities by entirely endogenous location decisions. According to the theoretical approach known as NEG, the existing of increasing returns to scale, trade costs and the mobility of labor force creates agglomeration dynamics (Krugman 1991, Fujita 1993). Within this context<sup>2</sup>, firms, tend to move towards the large markets due to reduction in trade cost and nominal wages. In turn, workers are attracted by higher real wages and the wider product variety found in agglomerations, making the location of firms in the actual place more profitable. Krugman (1991), in an attempt to explain the geographical concentration driving forces (which is undoubtedly a considerable growth determinant) has shown that historical initial conditions may trigger permanent differences between two regions or two countries. The larger number of firms located in one region generates through forward and backward linkages a circular causation process. These centripetal forces (market size effects, thick labor markets, informational spillovers) increase the variety of goods, decrease prices and raise profits if trade cost fall below a critical level. On the other hand however, centrifugal forces (immobile factors, land rents, pure external diseconomies) come to the fore mainly due to congestions costs and intensive competition (Krugman 1998).

The domination of centripetal forces would lead to the uneven distribution of people and firms in the space. The backward and forward linkages might induce a self-reinforcing process of agglomeration that in turn would bring large disparities in the density of economic activities among the industrial centre and the less developed hinterland<sup>3</sup>.

Tabuchi and Thisse (2002), in their respective NEG model referring to two adjacent regions, come to the conclusion that beyond a threshold level of trade openness, congestion forces dominate the agglomeration forces, and eventually trigger disperses among the two

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<sup>2</sup> NEG paradigm, uses general equilibrium models with monopolistic competition à la Dixit and Stiglitz (1977).

<sup>3</sup> The less developed hinterland is coincided in many examples with agricultural regions. Given the enormous productivity gains from technology and investments in the secondary and tertiary sectors against the agricultural sector, high dependence on agriculture regions are closely related with low development and competitiveness levels.

neighboring regions. However, instead of the urban congestion costs they assumed two other dispersion factors. Firstly, dispersion forces arise from immobility of farmers across regions and secondly, from the “competition effect” in regions with high concentrations which favor the dispersion of firms. It is worth noting however, that a number of similar studies<sup>4</sup>, suggest exactly the opposite results, claiming that trade openness foster concentration trends within a country (Monfort and van Ypersele 2003, Paluzie 2001, Brülhart et al. 2004). In the same line, Fujita et al. (1999), claim that trade openness favors spatial concentration of specific sectors due to input-output linkages.

Hanson (1997, 1998) studying the Mexican borders come to the conclusion that trade openness offer an incentive for Mexican firms to relocate towards the border with the United States. It is worth noting however, that these border regions were already more developed compared to the Mexican average prior to the liberalization. As a result, trade opening associated with spatial divergence. Conversely, if previously less developed regions have better access to the foreign markets, then the available empirical evidence suggests that trade liberalization favours spatial convergence. Eastern border regions of West Germany and Austria for instance, enjoyed higher rates of growth after the fall of Iron Curtain (Redding and Sturm 2008, Brülhart et. al. 2008).

Another component of NEG and a subject of a group of studies is the market potential. Using the Harris (1954) concept<sup>5</sup> of market potential, it has often been assumed that proximity to markets is an advantage for growth. Market potential is a combination of income and accessibility and indicates that most densely populated areas and central locations should realize higher economic gains.

Melchior (2008), in his very interesting contribution, examines the development patterns of EU regions according to their longitudes and latitudes in the European space. The empirical analysis suggests that growth is significantly related to geographical coordinates. Hence the location of each border region in the broader European space matters. More specifically, regions close to the borders benefit more than regions to the interior. However, it should be noted that such analysis neglects any country’s specific conditions.

Also accessibility is related with physical geography. According to Overman et al (2003), the spatial pattern of economic activities across space can be interpreted by two spatial concepts of physical geography: The first is one (coasts, mountains, rivers, natural

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<sup>4</sup> Mainly based on the Dixit-Stiglitz approach with regard to preferences, without taking into consideration urban congestion costs.

<sup>5</sup> Harris (1954) introduced a model in which firms choose locations with good access to markets and suppliers, inducing a circular process labeled as ‘market potential’.

resources, distance etc) which is based upon factor-endowment trade theory. The second involves the impacts of the actual physical geography on efficiency and agents' behavior, based mainly on New Economic Geography (NEG) considerations. Rauch (1991) claims that cities located close to coasts or border gain from trade openness due to their better access to foreign markets. Similarly, Gallup et. al. (1998) support that coastal economies generally have higher income than the landlocked economies.

The sense of accessibility, as it has been presented so far, is not coincided with one only definition but is related with a series of factors. Exploring border regions in terms of geography, an interesting question is whether or not; access to foreign market is defined only by natural distance and geographical features. There is no doubt that ports and navigable rivers facilitate access to distant markets. Nowadays however, market access is associated to a large extent by transport infrastructures, telecommunication networks, institutional factors, and a series of political and cultural parameters. Within this line of thought the notion of "access" to foreign markets is placed in a broader framework (Topaloglou et. al. 2005).

The literature indicates that gains in accessibility due to interregional transport infrastructures will always be relatively higher in the central location than in the peripheral one (Vickerman et. al. 1999). The precise role of cross border transport infrastructure in the process of economic integration and regional development, even the direction of causality, is still open to much debate. In its simplest form it is implied that better infrastructure will lead to lower transport costs or to a wider range of choice and more competition. Improved access to input materials and to markets will cause firms in a region, *ceteris paribus*, to be more productive, more competitive and hence more successful than those in regions with inferior accessibility.

The intensity of border impediments is also an essential parameter to the economic growth of border areas. Alonso Villar (1999), in her model suggests that some places offer cheaper access to foreign markets than others. Within this frame, border regions have a locational advantage in open economies attracting mobile activities. What's more, if the foreign markets are large enough and the international trade cost low, then the spatial effects in the interior region cannot be balanced. This argument underlines the market size effect on border space due to trade liberalization. Brühlhart et al. (2004), claim that foreign demand drives domestic firms to relocate closer to the borders in order to exploit better access to foreign market. Foreign supply however, drives domestic firms to relocate to the interior, away from the foreign competitors, in order to find a shelter from foreign competition.

Over the last decades, the basic core of the bibliography tackles the border phenomenon as a social outcome and one which requires an interdisciplinary approach in order to be interpreted and understood (Wilson and Donnan 1998). Recently, a major set of studies attempted to analyze the economic cross border interaction on the basis of a human-centered approach in which the way of thinking and the way people feel and perceive things close to the borders occupy a fundamental position (van Houtum 1999, van der Velde 1999, Berg 1999, Barjak 1999).

Collier and Hoeffler (2001) examining the role of ethnic diversity in economic performance, present a model on the causes of ethnic war. Using a dummy variable that takes value one if the largest ethnic group accounts for between 45 and 90% of the population positively predicts conflict. As the authors point out, this is consistent with the view that an ethnic group will try to assert its dominance when it is large. What they also show is that the probability of conflict is inverted-U shaped in the fraction of primary commodities in total exports. Miguel et al. (2004) disclose that economic conditions strongly influence the probability of conflict (Casselli and Coleman 2006).

Huntington (1997), in his seminal work of “clash of civilizations”, underlines the significant role of cultural parameters in border space. He claims in particular, that the “iron curtain” ideology in Europe has been replaced by the “Velvet curtain”, where religion differences play a vital role. Along the same line, recent empirical works on the interior of the European Union have shown that countries with Catholic or Orthodox roots are ranked as more “European” in relation to Protestants, showing that religious beliefs affect perceptions in respect to the “others” at the borders (OPTEM S.A.R.L., 2001).

One last category that concerns the empirical part of studies and should be mentioned is the selected case studies of border areas. The most known study is that of Hanson (1996) which concerns the US-Mexico border region. Furthermore, in these research works focused on border-specific zones are analyzed a broad range of indicators relative to economic development. Particularly, except the business environment, physical environment has received an increasing role due to the augmenting sensibility to environmental protection issues. Grossman and Krueger (1991) study the physical environment as a means for regional cooperation and economic development in the border area of US and Mexico. Additionally, recent incidents have highlighted the vulnerability of urban areas to climate hazards which their cumulative effect, undoubtedly, is a constraint for territorial competitiveness (ESPON 2006).



Concisely, despite the resurgence of the research study in a range of scientific fields on borders, there are not yet any satisfactory theoretical models to bridge the interpretation gaps among different scientific approaches (van Houtoum, 2003, Newman 2003). Newman and Paasi (1998), note that the recent scientific discussion on borders, which is largely influenced by economic interpretations ignoring that borders are often associated with dividing lines among different geophysical sections, nations, political and economic systems, institutions, histories, cultures and practices. Taking all the above into consideration, one comes to conclusion that the economic analysis and potential of border regions is determined among others, by culture, language, nationality and other socioeconomic and geopolitical characteristics of border regions (Reitel et al. 2002, Arbaret-Schulz et al. 2004).

### 3. Empirical model for growth performance in the EU border regions

Taking into consideration the pertinent theoretical discussion, as it is concisely presented in the previous section, this section compiles a cross-section empirical econometric model that accounts for growth performance in the 349 EU NUTS III border regions during the period 2000-2006. The study of growth performance (in the EU border regions) requires the detection and the assessment of both economic and non-economic or “soft” (however, with an economic dimension) determinants, and, consequently the analysis of both quantitative and qualitative variables (Maier 1995).

The model takes the form:  $Y_{r,T} = a_0 + \sum_{\lambda=1}^v (a_{\lambda} X_{\lambda,r,t}) + \varepsilon_{r,t}$ , where  $Y_{r,T}$  is the dependent growth variable for border regions  $r$  during the period  $T$  (the period 2000-2006),  $X_{\lambda,r,t}$  is a set of  $\lambda$  independent growth determinants (initial conditions) for border regions  $r$  in the base year  $t$  (the year 2000),  $a_0$  is the constant term,  $a_{\lambda}$  is the set of the estimators of the  $\lambda$  independent growth determinants, and  $\varepsilon_{r,t}$  is the disturbance term, which follows the normal probability distribution with zero mean and constant variance (i.e.  $\varepsilon_{r,t} \sim N(0, \sigma_t^2)$ ).

The dependent variable of the model is the per capita GDP real (i.e. constant prices of the year 2000) growth performance in the EU borders regions (PCGDPGR0006).

The level of per capita GDP (PCGDP00) is used as a control variable in order to capture the effect of initial conditions on consequent growth performance. A negative effect of initial conditions on growth may signify the advantages of the backwardness as far as less developed regions can gain from the more development ones through (mainly) technological spillovers (Gerschenkron 1962). In such a process, less developed regions outperform the

most developed ones in growth terms. In contrast, a respective positive effect may indicate a diverging process that further builds on itself. Of course, the effects of initial conditions on growth may be counteractive (Petraikos et al. 2007). Since regional economies change in their course of development (i.e. they become larger and deeper, more diversified, with different levels of intra-regional and inter-regional integration), it is reasonable to assume that the balance of forces determining their growth performance also changes. Thus, a possible non-linear relation between initial level of development and consequent level of growth is, also, going to be examined.

The number of employees in the primary sector of production (i.e. agriculture, fishing, forestry, mining and quarrying) (PRIMEMP00) is included in the model. Since the primary sector is considered to be a low-productivity sector<sup>6</sup> (Gylfason 1999), the paper tests empirically the hypothesis that employment in the primary sector of production generates lower rates of growth performance.

The type of spatial structure (SPATSTRU00)<sup>7</sup> is included in the model. In particular, spatial structure is proxied by a dummy variable that takes on the values 1 and 0; 1 indicates that the border region is city core region, very densely populated, and 0 indicates that the border region is rural region, less densely populated. The EU experience indicates that, in a context of economic integration, core regions generate advantages, leading to differential growth performance, through the entrenchment of internal and external economies of scale<sup>8</sup>, and operate as hubs for economic activities associated with IRS<sup>9</sup> (Petraikos 2008). Hence, the paper tests empirically the hypothesis that core and more densely populated border regions generate higher rates of growth performance.

(Economic) Geography is, also, included in the model by the variable of accessibility (ACCESS00).<sup>10</sup> Particularly, the variable expresses the combined effect of geographical position and location advantage provided by the transport system (i.e. multimodal

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<sup>6</sup> This phenomenon is commonly attributed to the slower rise in the demand for food as compared with other goods and services, and to the rapid development of new farm technologies, which lead to expanding food supplies per hectare and worker (Anderson 1987).

<sup>7</sup> The original variable refers to the year 2003. The paper assumes that the same observations for the aforementioned variable stand for the year 2000, also.

<sup>8</sup> Internal economies of scales are cost benefits (i.e. decrease of the average total cost) arising from the internal environment of firms due to the increase of their size. External economies of scale are cost-related benefits (such as spillovers of know-how and tacit knowledge, forward and backward linkages, efficient labor market pooling) arising from the external environment of firms due to the expansion of their economic sector (localization economies) and / or due to the expansion of the city services (urbanization economies).

<sup>9</sup> Returns to scale refer to changes in output subsequent to a proportional change in all inputs (i.e. all inputs increase by a constant factor) used in the production process.

<sup>10</sup> While, in the past, geography has been much neglected in formal econometric studies, economists have long noted the crucial role of geographic factors in the growth process (Gallup et al. 1998).

accessibility potential calculated through aggregation of road, rail and air travel time-distance between regions). Accessibility is proxied by a categorical variable and takes on the values 0, 1, 2, 3, 4, 5; 0 indicates that the border region is very peripheral, and 1 indicates that the border region is peripheral, 2 indicates that the border region is neither (very) peripheral nor (very) central, 3 indicates that the border region is central, and 4 indicates that the border region is very central. Accessibility is recognized to be an important determinant of growth. The literature indicates that there seems to be a clear positive correlation between accessibility and the level of economic performance (Keeble et al. 1982; Biehl 1986; Keeble et al. 1988).<sup>11</sup> Thus, the paper tests empirically the hypothesis that accessibility has a positive impact on growth.

(Physical) Geography is, also, included in the model (COAST00)<sup>12</sup>. Geography is proxied by a dummy variable that takes on the values 1 and 0; 1 indicates that the border region is coastal, and 0 indicates that the border region is no coastal. Since coastal economies are considered to generate higher growth rates as compared to landlocked economies (Gallup et al. 1998, Limao and Venables 2001), the paper tests empirically this hypothesis.

Environment, a factor that increasingly obtains a significant role in the process of economic growth, is, also, included in the model (ENVHAZ00). Environment is proxied by a composite variable that incorporates the natural and technological hazards (i.e. unexpected or uncontrollable events of unusual magnitude that threaten human activity or people themselves) that may affect EU regions. Recent incidents indicate that the EU regions are, more or less, exposed to environmental hazards (Hassol 2004). Hence, the paper tests empirically the hypothesis that environmental hazards have a negative impact on growth performance.

Since borders are understood not only as static lines but also as sets of practices, discourses and perceptions (that affect cross-border interaction) (Paasi 1999, Topaloglou et al. 2005), the variables of minorities (MINOR00)<sup>13</sup> and religion (RELIG00)<sup>14</sup> are, also, included in the model. Minorities are proxied by a dummy variable that takes on the values 1 and 0; 1 indicates that there is a strong presence of minorities in the neighbouring border region, and 0 indicates that there is a weak (or no) presence of minorities in the neighbouring border region.

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<sup>11</sup> However, reservations have been expressed concerning the impact of TENSs, in particular, on intra-regional distribution effects (Vickerman 1995).

<sup>12</sup> The original variable refers to the year 2003. The paper assumes that the same observations for the aforementioned variable stand for the year 2000, also.

<sup>13</sup> The original variable refers to the year 2003. The paper assumes that the same observations for the aforementioned variable stand for the year 2000, also.

<sup>14</sup> The original variable refers to the year 2003. The paper assumes that the same observations for the aforementioned variable stand for the year 2000, also.

Religion is proxied by a dummy variable that takes on the values 1 and 0; 1 indicates that the border region has a common (or similar) religion with its neighbours, 0 indicates that the border region has a different religion with its neighbours.

Table 1 provides a brief presentation of the variables included in the model for the examination of the growth determinants of the EU border regions.

Table 1: The variables included in the model for the examination of the growth determinants of the EU border regions

Variable (Abbreviation)	Unit of Measurement	Source
Per capita GDP growth, 2000-2006 (PCGDPGR0006)	%; constant prices of the year 2000	European Regional Database (Cambridge Econometrics)
Per capita GDP, 2000 (PCGDP00)	€/inhabitant	European Regional Database (Cambridge Econometrics)
Employment in primary sector, 2000 (PRIMEMP00)	number of employees	European Regional Database (Cambridge Econometrics)
Type of spatial structure, 2000 (SPATSTRU00)	dummy variable; 0 = rural region, less densely populated 1 = city core region, very densely populated	ESPON Project Indicators 2006 (ESPON)
Accessibility, 2000 (ACCESS00)	categorical variable; 0 = very peripheral 1 = peripheral 2 = neither (very) peripheral nor (very) central 3 = central 4 = very central	ESPON Project Indicators 2006 (ESPON)
(Physical) Geography, 2000 (COAST00)	dummy variable; 0 = no coastal region 1 = coastal region	ESPON Project Indicators 2006 (ESPON)
Environment, 2000 (ENVHAZ00)	weighted environmental hazard score (composite index)	ESPON Project Indicators 2006 (ESPON)
Minorities, 2000 (MINOR00)	dummy variable; 0 = weak (or no) presence of minorities in the neighboring region 1 = strong presence of minorities in the neighboring region	Topaloglou et al. (2005)
Religion, 2000 (RELIG00)	dummy variable; 0 = different religion with the neighboring regions 1 = common (or similar) religion with the neighboring regions	Topaloglou et al. (2005)

Source: Authors' Elaboration

The econometric model has been estimated with the WLS (and not the OLS) method. The OLS method tends to overlook the relative importance (size) of each region in the (inter)national setting, treating all regional observations as equal. Yet, regions (economies) vary widely in terms of (relative) population and this can produce unrealistic or misleading results. Even though comparisons are rarely referred to similar-sized economies, this issue has, paradoxically, been almost completely ignored in the literature, especially at the regional level. The WLS method, in contrast, is able to overcome this major drawback allowing regions to have an influence, which is analogous to their relative size, on the regression results (Petrakos and Artelaris 2009). Hence, the variable of the relative population in the base year (POP00) is used as weighting variable in the present study.

Table 2 presents the results of the econometric model. The problem of heteroscedasticity, which concerns the distribution of residuals, has been corrected. The overall explanatory power of the model is quite satisfactory for cross-section data, and all independent variables have a statistically significant impact on growth performance.

Table 2: An empirical model for growth performance in the EU border regions (WLS cross section method)

Independents	Dependant variable: PCGDPGR0006	
	b-estimator	t-statistic
PCGDP00	$-3.78 \cdot 10^{-3}$	-10.21***
PCGDP00 <sup>2</sup>	$6.35 \cdot 10^{-10}$	6.93***
PRIMEMP00	-0.001	-1.85*
SPASTRU00	0.049	1.73*
ACCESS00	0.074	3.69***
COAST00	0.067	2.05**
ENVHAZ00	-0.001	-3.14***
MINOR00	0.199	2.40**
RELIG00	0.185	2.31**
R <sup>2</sup> adj	0.733	
F	101.37	
N	329	

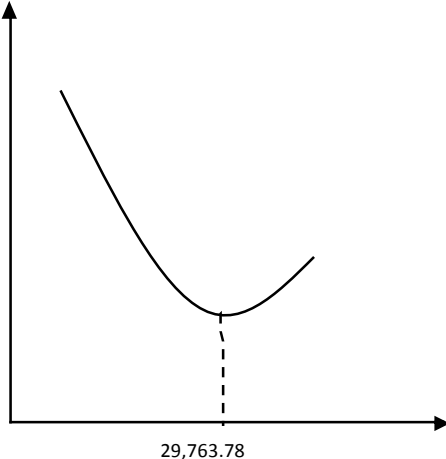
\* statistically significant at 10%, \*\* statistically significant at 5%, \*\*\* statistically significant at 1%

Source: Authors' Elaboration

The evidence indicates that the per capita GDP of the EU border regions exhibits a non-linear pattern of growth. The signs of the coefficients indicate that after a threshold, the most dynamic EU border regions grow faster and, as a result, divergence forces eventually dominate. It seems that the regional growth drivers proposed by the competing neoclassical (convergence school) and cumulative causation (divergence school) theories co-exist in each

stage of development, although in different proportions and in different strength (Petrakos et al 2007). Regions in earlier stages of development are more likely to be characterized by a productive system where resource-intensive activities dominate, markets are relatively shallow or fragmented, while quality, diversity and factor augmenting technology are limited. These characteristics possibly describe CRS environments, where capital productivity is declining. As a result, in early stages of development convergence forces dominate and less advanced regions may grow faster. In contrast, the productive system in advanced regions is more likely to be characterized by economies of scale, positive externalities and agglomeration, higher levels of R&D, higher quality of human resources, more advanced market structure, better mix of activities and larger size. The combination of these characteristics may generate a favorable environment where IRS and home market effects yield over time higher growth rates. As a result, in more advanced stages of development divergence forces dominate, as the leading regions grow faster. In particular, convergence forces dominate among EU border regions having a level of per capita GDP smaller than 29,763.78 €/inhabitant. After this threshold level of development, divergence forces dominate. This stands for the regions of Luxemburg (Grand-Duche), Passau, Altötting, Aachen, Salzburg und Umgebung, Sydjylland, Antwerpen, and Wiener Umland/Südteil. This evidence indicates that the non-linear pattern of per capita GDP growth at the EU border regions is a mirror-image J-shaped one (i.e. a U-shaped pattern with the declining segment being the most prominent), similar to the one depicted in Figure 1.

Figure 1: Growth patterns and level of development at the EU border regions



Source: Authors' Elaboration

The relation of the variable of spatial structure to the economic growth is positive verifying the hypothesis that core and more densely populated border regions generate, through the entrenchment of scale economies, higher rates of growth performance. Therefore, the rural-urban dichotomy that has long characterised approaches to territorial division, with rural areas perceived as disadvantaged and economically weak, seems to stand also for border areas.

The relation of the accessibility to per GDP growth is also positive indicating a clear positive correlation between transport infrastructure endowments or the location in interregional networks and the levels of economic growth. Given the increasing importance of the role of border regions, their connections to the main communication networks are an important influence on global accessibility within as well as between countries contributing to the integration and coherence of the broader area. Furthermore, this evidence indicates the advantage of (very) central EU border regions, which, even though they have a peripheral position in the national market, they have a (very) central position in the EU setting.

The coefficient for the variable of geography has the expected positive sign. This evidence indicates the advantage of the coastal EU border regions, over the landlocked EU border regions, for the generation of higher rates of growth performance. Therefore, it has been attested that specific geographic characteristics can become for some regions an asset rather a liability.

The relation of the variable of environment to the per capita GDP growth is negative indicating the negative impact of environmental hazards on growth performance. This result is in line with the expected risk and the eventually damage that could be put in economic prosperity by any environmental hazards.

The coefficient for the variable of minorities has a positive sign. This evidence indicates the positive impact of the strong presence of minorities in the neighboring regions on generating higher rates of growth performance. Thus, the model underlines another regional 'characteristic' that in essence do not constitute an impediment of the economic growth but a lever on which are based cooperation schemes and economic robustness.

The coefficient for the variable of religion has, also, a positive sign, a fact that indicates the positive impact of having common (or similar) religion with the neighboring regions on generating higher rates of growth performance. This evidence has been displayed in the literature in the past by Weber (1930), who argues that religious practices and beliefs have important consequences for economic development, as well as more recently by Barro and McCleary (2003) who attest that economic growth responds positively to religious

beliefs. In this paper has been proved that the religious factor could be a significant parameter of economic growth also for European border regions (as far as it is not related of course with other social or political issues).

Totally, the findings of the econometric investigation suggest that there is a series of inherent and acquired factors (initial conditions) that determine the growth performance in the 349 EU NUTS III border regions during the period 2000-2006. These factors are both (traditional) quantitative and qualitative (“soft”), indicating the complexity of border issues. The findings of the econometric investigation have important implications for both theory and policy.

#### 4. Conclusions

In the present paper is attempted the detection of the salient determinants influencing the growth performance of border areas. The contribution of the paper is based, initially, on the part of *methodology*. More analytically, most of the discussion that concerns the economic development of border regions has concentrated so far to the use of quantitative variables and “economically measurable” approaches. However, in the sphere of reality it is quite obvious that the development perspectives of an area constitute an especially complex issue for being assessed and adequately interpreted. Thus, any intention of studying the border areas by a single-dimension approach would steer to vague or general conclusions. Within this context, it is also apparent that the growth of border regions is influenced by a series of other parameters, beyond the economic ones. Particularly, the degree of national, social, linguistic or religious heterogeneity of border areas in relation to the neighboring country could play a decisive role for their development path.

In *theory*, the paper contributes to the confirmation of the aspect of a peculiar coexistence of neoclassical and “cumulative” approaches as far as the regional disparities are concerned at the border space. More analytically, the results indicate that border regions characterized by a low development level present convergence trends compared to the more developed regions, keeping up thus with the neoclassical theory. On the contrary, border regions beyond a threshold level of development display divergence trends forming a new club that includes metropolitan regions characterized by favored initial conditions. Therefore, this result confirms the advocates of the cumulative approach. Concisely, the economic growth of the border regions is a complex process that cannot be attributed by only a single driver more by a single theoretical approach.



Furthermore, given the new genre of research and the entrenchment of the New Economic Geography, this paper has embodied a considerable part of the detection of growth determinants in that theoretical approach. More analytically, modern agglomeration theories allege the existence of a core-periphery model that is based on second-nature factors. The outcomes of the paper reveal the significance of these factors in the economic growth of border regions underling three essential points: first, accessibility to markets varies across regions and thus the spatial frictions between two regions are likely to be different. It has been attested that the relative position of the region within the whole network of interactions matters as border regions display a higher economic growth when are characterized by a favour accessibility (very 'central' against very 'peripheral' frontier regions). Second, the spatial structure of the regions functions as a dependant-path dependency: in the city core regions agglomeration economies tend to attract further economic activities by developing forces of cumulative causation through a self-reinforced process. In that way any extension of the economic activity is 'caged' in their internal achieving higher growth rates against the rural regions. Third, an endogenous asymmetry is intensified as is formed a spatial imbalance that is emanated not only on the previous urban-rural pattern but also on a core-periphery model. Particularly, peripheral regions are characterized as heavily specialized and dependant in agricultural-type activities by a high employment share in agriculture.

The paper also introduces for further discussion the proposal of an interdisciplinary approach to the explanation of economic development of border areas that could be further reinforces the credibility of economic analysis. In the context of this approach, the expositive tools of sociology, anthropology and political science could be most useful.

Finally, the findings of the paper indicate a significant heterogeneity of the development characteristics and perspectives of the border areas in EU-27. In the level of cross-border *policies*, this heterogeneity brings to the surface two essential questions: First, are the policies (in term of planning and implementation level) able to contribute to the decline of the economic heterogeneity and account for the increase of spatial coherence? Second, and in case of a positive answer to the previous question, which should be the mix and the intensity of these policies so that they assure to be effective? Obviously, the answer to these questions goes beyond the context of the present paper. Nevertheless, it is almost certain that dreadful policies of the king "one size fits all" which are often adopted by the EU, do not longer seem appropriate.

## Abbreviations

CRS = Constant Returns to Scale

EU = European Union

GDP = Gross Domestic Product

IRS = Increasing Returns to Scale

NUTS = Nomenclature of Territorial Units for Statistics

OLS = Ordinary Least Squares

R & D = Research and Development

TEN = Transnational European Networks

WLS = Weighted Least Squares

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