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Master Thesis:

Income Inequalities among EU regions: Investigation for the Existence of Convergence Clubs

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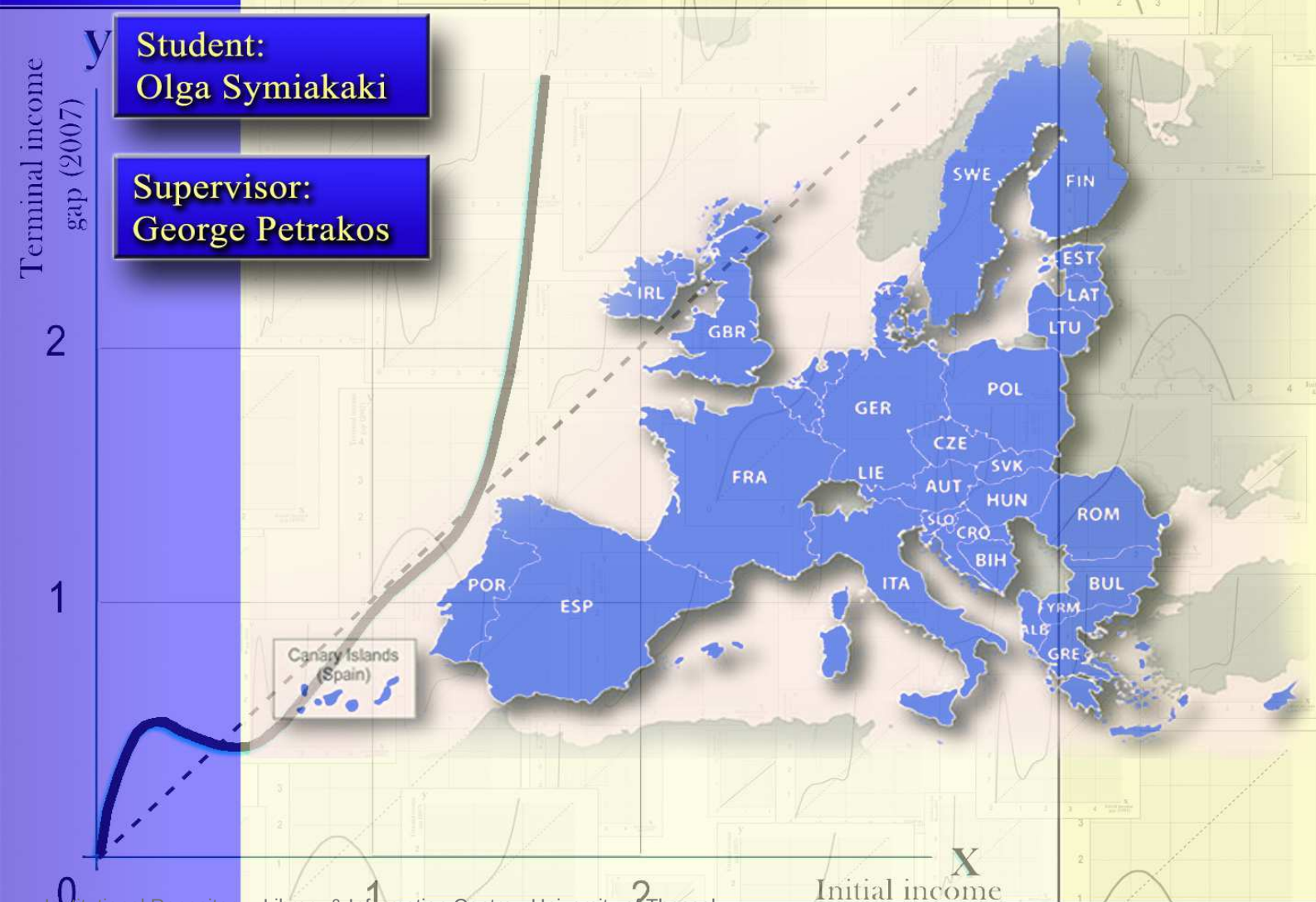

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Abstract

The evaluation and evolution of income inequalities among spatial units- economies is a very important issue. Although there are numerous studies investigating the existing trends of convergence or divergence, the concept of convergence club has received far less attention. The present master thesis aims to investigate econometrically the existence of income convergence clubs both in the European Union as a whole and, more specifically, in each European Member State. However, this was not feasible in some countries due to their insufficient (small) number of observations (regions). Furthermore, some other countries were excluded because a satisfying econometric model wasn't found and, as a result, an equation for convergence clubs. The investigation refers to NUTS III spatial level, employs GDP per capita and covers the period 1991-2007. This analysis comprehends non linear econometric models which showed the existence of regional convergence clubs in many European countries.

Key Words: EU regions, Income Convergence- Divergence, Convergence Clubs, Econometrics

THANKSGIVING

Regional Development and, more specifically, regional disparities are subjects of intense interest. The study of regional inequalities in Greece constituted the title of the master thesis in my undergraduate studies. Nevertheless, the issue of the emergence of convergence clubs was unknown to me. The choice of this theme for the title of this thesis was an idea of the Lecturer Mr. Dimitris Kallioras and I would like to thank him first of all. Not only did he mention and explain the unknown to me, until then, issue of investigation, but also guided me by giving precious pieces of advice and significant help in order to complete my project. Mr. Kallioras was the one who had the essential supervision.

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TABLE OF CONTENTS

LIST OF TABLES

Tables in Appendix:

LIST OF MAPS

LIST OF FIGURES

LIST OF ABBREVIATIONS

EU: European Union

GDP: Gross Domestic Product

NMS: New Member-States

NUTS: Nomenclature of Territorial Units for Statistics

OECD: Organisation for Economic Co-operation and Development

OLS: Ordinary Least Squares

WLS: Weighted Least Squares

1. INTRODUCTION

Regional inequalities constitute a major problem of contemporary economies. During the last decades, the problem of regional inequalities has constituted an intense subject of discussion and investigation. There are a lot of studies aiming to explain them, to observe their evolution and to find the determinant factors of their emergence. The results of these studies provide useful conclusions at both political and theoretical level. At political level, the investigation of the existing trends of convergence or divergence is related to the configuration of the intensity and form of European and national regional policies. This investigation can also be used to estimate the effectiveness of these policies. At the theoretical level, it can be used in order to control the validity of different growth models (Artelaris et al., 2010: 114).

However, the majority of the previous studies are based on econometric models with linear relations between the growth rate of GDP at a specific time period and its initial rate. These models are characterized by doubts and disputes. The present master thesis is based on more recent models of economic growth which support that there are multiple steady states indicating trends of convergence clubs. This presupposes the existence of convergence among spatial units- economies inside convergence clubs without the precondition of convergence among those clubs. Convergence clubs are observed when economies with identical structural characteristics and relatively similar initial conditions converge at respectively GDP per capita levels. As a consequence, convergence can be observed between different (identical) economies which constitute a club within a spatial area, without converging with the rest of the clubs (Artelaris et al., 2008: 412).

The objective of the present master thesis is to investigate econometrically the possibility for the emergence of convergence clubs both in the European Union as a whole and, more specifically, in each European Member State. However, this was not feasible in some countries due to their insufficient (small) number of observations (regions). Furthermore, some other countries were excluded because a satisfying econometric model wasn’t found and, as a result, an equation for convergence clubs. The investigation refers to NUTS III spatial level, employs GDP per capita and covers the period 1991-2007. This analysis of convergence is different

from the usual ones which have failed to reach clear and final conclusions because the relations examined are, in fact, non linear. The results will be different from the previous studies and can provide more analytical and realistic conclusions with regard to the evolution of regional inequalities.

This master thesis is organised as following: the next section refers to the convergence issue and presents its three main concepts (β-convergence, σ-convergence and convergence clubs) by giving their definitions, their equations and other relative information. The third section cites the results of some previous empirical studies made by Baumol and Wolff (1988), Chatterji (1992), Quah (1992), Quah (1995), Chatterji and Dewhurst (1996), Kangasharju (1999), Canova (2004), Alexiadis (2004), Artelaris et al. (2008) and Artelaris et al. (2010). The fourth section examines econometrically the emergence of convergence clubs between the EU regions in the period 1991-2007. These regions refer not only to the European Union as a whole, but also to each of 15 Member States (Austria, Belgium, Bulgaria, Finland, France, Germany, Greece, Hungary, Italy, Netherlands, Poland, Portugal, Spain, Sweden, United Kingdom). The application of non- linear econometric models has shown the existence of regional convergence clubs in many European countries. Convergence clubs were not formed only in the case of Bulgaria, Greece and Poland. Finally, the last section summarises the findings and provides the conclusions.

2. THE CONVERGENCE ISSUE

In recent years there has been considerable interest in the growth patterns of different countries. The immense variability in growth rates of gross domestic product (GDP) per capita has naturally led to an investigation of whether this is a cyclical phenomena or part of a longer term trend. This key economic issue, known as the convergence issue, is trying to answer to the question of whether or not nations tend to approach each other or move away from each other in the long run (Chatterji and Dewhurst, 1996: 31). In the case that poor countries tend to grow faster than rich ones, there is also the question if there are automatic forces that lead to convergence over time in the levels of per capital income and product (Barro and Sala-i-Martin, 1992: 223).

Convergence can be defined in different ways. Afterwards, its three main concepts will be presented: β-convergence, σ-convergence and convergence clubs.

2.1 β-CONVERGENCE

There are two forms of β-convergence, which is related to the neoclassical growth model: the absolute or unconditional and the conditional one. In the first case, homogeneous economies converge in an absolute sense as they will converge towards the same steady-state (Artelaris et al., 2010: 119). Thus, convergence occurs when there is a negative relationship between growth and the initial level of the variable under consideration. In most studies the relevant variable has been real per capita income rather than labour productivity (Chatterji, 1992: 58; Tsionas, 2002: 603). The absolute β-convergence indicates that economies with low initial levels of GDP per capita tend to grow faster than those with higher levels, and in the long-run will conclude in a common steady state.

According to the neoclassical growth model, the above type of convergence occurs only if economies are similar in structural, demographic and other parameters. If significant differences are observed, economies will converge in a conditional sense as they will grow toward different, multiple steady states positions (Artelaris et

al., 2010: 120). This type of convergence is called conditional β-convergence. In this case, the negative relationship between initial levels of GDP per capita and growth rates occurs only if the differences are taken into consideration, and consequently, conditional β-convergence does not necessarily mean that poorer economies will converge with richer ones (Artelaris et al., 2008: 415). Some of the variables that have been used in order to eliminate these differences are: sectoral structure, dummies related to geographical differences, policy tools, differences at the level of education as an approach to the differences at the quality and the potential of human capital. However, the success of the use of the above variables has become a subject of reservation and contesting and, as a result, there is a need for more effort in order to find the factors affecting the differences (Fotopoulos et al., 2002: 65).

Much of the applied literature on convergence are based on the empirical analysis of Barro and Sala-i-Martin (1992) and has focused on the estimation of cross-section regression equations, such as:

$$\ln\left(Y_i^T / Y_i^B\right) = \alpha + \beta \times \ln\left(Y_i^B\right) + \varepsilon, i = 1,...\mathrm{N} \qquad (1)$$

where: Y is per capita GDP, α is a constant term, β is the rate of convergence, i is the indicator for the regions that are examined, B is the indicator for the initial year of analysis, T is the indicator for the last year of analysis, and ε is an error term. Convergence requires that β is negative in equation (1), which implies that growth over the period is negative correlated with the initial level of GDP, and as a result, poor regions tend to grow unconditionally faster than rich ones (Barro and Sala-i-Martin, 1992: 227; Chatterji and Dewhurst, 1996: 32; Tsionas, 2002: 604; Artelaris et al., 2008: 417**;** Fotopoulos et al., 2002: 63-64). Therefore, in order to investigate the convergence or divergence trends, the annual speed of convergence must be estimated, which is the rate at which the gap separating a region's current position and its steady state position is closed. This can be calculated according to the relation $b = -\ln(1+\mathrm{T}\beta)/\mathrm{T}$ (Artelaris et al., 2008: 417; Rey and Vanikas, 2005: 159).

However, Chatterji (1992) pointed out that a value of β less than zero does not guarantee that the variance of Y is lower at the end of the period than at the

beginning, nor does $\beta < 0$ guarantee that the set of regions will converge to a steady state where Y is equalized. He points out that the condition required for those two (i.e. diminishing variance and convergence to a steady state with equal Y) is stronger, viz. $-2 < \beta < 0$, and consequently, he distinguishes convergence between weak when $\beta<0$ and strong convergence when $-2 < \beta < 0$ (Chatterji and Dewhurst, 1996: 32).

Chatterji (1992) and Fotopoulos et al. (2002) answer to the question: convergence to what? They support that the hypothesis of a common steady state reflects a common potential long-term situation for all the economies included into the cross-section data. The speed of growth of these economies depends inversely on the distance of each economy from the common potential long-term situation. As a result, economies with a greater distance from this common long-term steady state grow faster than those having to cover smaller distance. This happens due to the basic convergence mechanism of the neoclassical model, which is the diminishing returns to capital (Fotopoulos et al., 2002: 64).

Nevertheless, the cross-section data approach, according to the equation (1), is characterized by doubts and disputes. There is evidence of statistical problems related to the linearity of the used variables, the impacts of endogeneity between variables and the measurement errors. Consequently, false conclusions may be considered. Alternative methodological approaches include panel data, time-series data and stochastic procedures, which also have some weaknesses. In addition, the approach of cross-section data has two more disadvantages. Firstly, it does not take the population size of each spatial unit into account and all the observations of the same significance and importance are considered, and secondly, it is unable to investigate the hypothesis of convergence clubs (Artelaris et al., 2008: 418).

2.2 σ-CONVERGENCE

An alternative unit of analysis is the distribution of regional incomes. The concept of σ-convergence refers to the dispersion of per capita income at a given moment. It relates to the fact that if there is convergence of incomes, then the dispersion of income distribution must be decreasing over time. Dispertion is measured by the evolution of standard deviation or the coefficient of variation (Artelaris et al., 2008: 416; Artelaris et al., 2010: 120 Quah, 1995: 12; Rey and Vanikas, 2005: 160; Tsionas, 2002: 604). The cross-sectional standard deviation at time *t* is defined as:

$$v_t = \sqrt{(N-1)^{-1}\sum_{r=1}^{N}(\gamma_{rt} - \bar{\gamma}_t)^2}, t = 1,...,T \qquad (2)$$

where: *N* is he number of regions, *T* is the number of time periods, and the cross-sectional average is:

$$\bar{\gamma}_t = N^{-1}\sum_{r=1}^{N}\gamma_{rt} \qquad (3)$$

A plot of v_t over time, which shows a tendency for the cross-sectional variance to decrease over time, would provide evidence in favour of σ-convergence (Tsionas, 2002: 604).

However, Rey and Vanikas (2005) pointed a number of limitations in the measures of σ-convergence. They support that, firstly there has been evidence that the focus on dispersion can conceal important geographical patterns that may be changing over time. Secondly, the income distribution is viewed at an aggregate level which masks any mixing and mobility of individual economies. Thirdly, other aspects of the distribution such as skewness and modality are ignored (Rey and Vanikas, 2005: 160).

With regard to the relation between β-convergence and σ-convergence, the first does not necessarily imply the second. β-convergence type is a necessary but not a sufficient condition for σ-convergence (Artelaris et al., 2010: 120). While the coefficient β may lead to convergence, factors that affect the variability of the estimate can lead to the opposite direction (Quah, 1995: 12; Fotopoulos et al., 2002: 69-70). A shock can temporarily increase the dispersion of income among the analysed spatial units even when they converge on a common long-term equilibrium point. The coexistence of absolute β-convergence and σ-convergence is possible. The difference between these two types of convergence is that σ-convergence examines the evolution of income distribution over time and β-convergence examines mobility within the distribution of income. Thus, these two concepts of convergence are complementary and often used in common (Artelaris et al., 2008: 416).

However, the temporal observation of the evolution of the dispersion is unable to show whether a single spatial unit (country/ region) converges (in mean square) to steady state or to anything else, because what matters is how the entire cross-section behaves. A diminishing standard deviation of incomes does not indicate whether some poorer economies catch up with the richest economies faster than some others, i.e. it does not reveal possible non-linear convergence behaviour (Kangasharju, 1999: 208). Even when the standard deviation is unchanging through time, the economies underlying the cross section could still be moving within the invariant distribution. Furthermore, an invariant distribution could be due to the stable inequalities, meaning that rich economies remain rich and poor ones, poor. The empirics of σ-convergence cannot recognize the dynamics of evolving distributions and cannot inform how one part of the distribution behaves relatively to one another: if it catches-up (Quah, 1995: 13-14; Fotopoulos et al., 2002: 71).

2.3 CONVERGENCE CLUBS

Convergence club, which is related to endogenous growth models with multiple steady states, refers to a tendency for the steady-states distribution to cluster around a small number of poles of attraction (Canova, 2004: 49). More precisely, convergence club implies the existence of a set of economies identical in structural characteristics and similar in their initial conditions, which, in the long run, are driven to a steady state with equalized real per capita incomes. In the case that the conditions for convergence are satisfied only when a subset of countries is included in the sample, convergence club is an exclusive club from which some countries are excluded (Chatterji, 1992: 59-60; Alexiadis and Tomkins, 2004: 387). The catching up of economies with one another occurs only within particular subgroups. This means that there are groups of economies which are converging (either weakly or strongly), but these groups are themselves diverging from each other. In other words, there is convergence within each club but there is not convergence across clubs (Artelaris et al., 2010: 120; Chatterji and Dewhurst, 1996: 32; Quah, 1997: 2**)**.

The difference between conditional β-convergence and convergence clubs is often a difficult task. In essence, in the conditional β-convergence, each region converges to a different level of long-term equilibrium (a long-term steady state corresponds to each region) while in the convergence clubs, each *group of regions* converge to different long-term equilibrium level (a long-term steady state corresponds to each group of region). However, both conditional β-convergence and convergence clubs are consistent, among other things, with phenomena and situations such as the polarization and the maintenance of inequalities between regions or countries (Artelaris et al., 2008: 416).

In order to investigate convergence clubs, Chatterji and Dewhurst (1996) use an econometric approach with no-linear hypothesis, which is based on the economic gaps of per capita GDP between the richest economy (leader) and the rest ones through the estimation of the correlation between the gap at the final year with the relative gap at an earlier year (Chatterji and Dewhurst, 1996: 32; Kangasharju, 1999: 208-209; Artelaris et al., 2008: 419).

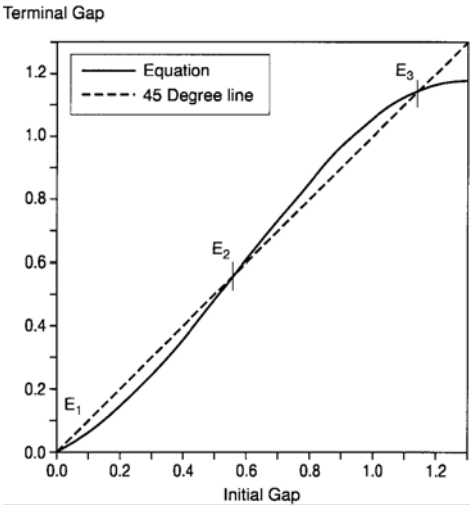
The income-gap equation constitutes a recast of the equation (1):

$$\ln\left(Y_L^T / Y_i^T\right) = \left(1+\beta\right)_\kappa \ln\left(Y_L^B / Y_i^B\right)^\kappa + \varepsilon \qquad (4)$$

where: Y is per capita GDP, β is the rate of convergence, L is the indicator for the richest –in GDP terms- region, i is the indicator for the regions that are examined, B is the indicator for the initial year of analysis, T is the indicator for the last year of analysis, ε is an error term and κ is the indicator for further powers of the difference of the logarithms of GDP per capita in the leader and any economy at the initial year, in order to allow the possible existence of two, or more groups of economies (Chatterji and Dewhurst, 1996: 32; Artelaris et al., 2008: 423).

Two examples of outcome of the above equation are shown at Figure 1 and 2, in which the function of the relation between the initial and terminal gap is collated with the function y=x (the function of the diagonal of the 90^o angle).

Figure 1: an indicative relation between the initial and the terminal gap

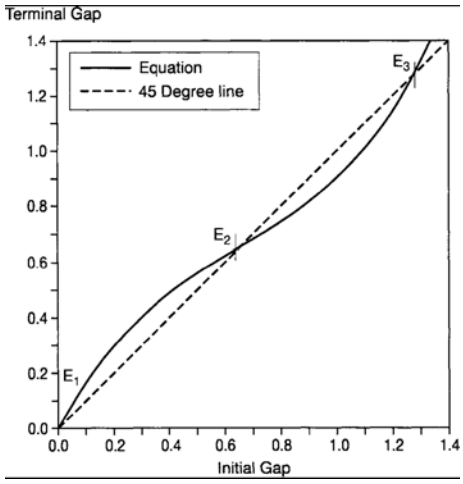


Source: Kangasharju (1999: 210)

Figure 1 shows that the economies with an initial gap less than the second equilibrium E_2, converge to the leader, as their terminal gap tend to be smaller than the initial one, and together with the leader constitute a leading convergence club. The economies with the gap between E_2 and E_3 diverge from the leader and converge together towards the stable equilibrium E_3. Economies with a gap greater than E_3

converge again to the leader and together towards the stable equilibrium E_3. The two last groups converge together to the equilibrium E_3 constituting a wider convergence club (Chatterji and Dewhurst, 1996: 32; Kangasharju, 1999: 209).

Figure 2: an indicative relation between the initial and the terminal gap



Source: Kangasharju (1999: 210)

Figure 2 shows that the economies with an initial gap less than E_3, converge towards an inferior equilibrium E_2, although the economies to the right of E_2 grow faster than the leader. Economies to the left of E_2 diverge from the leader in the same way as the economies with a gap greater than E_3, but converge together toward the equilibrium E_2 (Kangasharju, 1999: 209).

The equation (4) reveals more detail about the convergence behaviour of economies than the analysis of standard deviation. First, it reveals the possible diminishing dispersion of income within a subgroup of economies, although the dispersion would not apply to the whole group of economies under investigation (like in Figure 2). Second, it reveals possible non-linear convergence behaviour, which means that economies may catch up with or even fall behind the richest economy at different speeds (Kangasharju, 1999: 210).

Convergence clubs are possible for some reasons. The formation of convergence clubs may be induced by several factors: the existence of some threshold level in the endowment of strategic factors of production, nonconvexities or increasing returns, similarities in preferences and technologies, and government

policies, which become more similar over time within certain groups (Canova, 2004: 49).

The two first reasons refer to human capital and growth population and reflect to the differences in the parameters of production which may lead to multiple growth paths. Lower endowment of human capital and lower levels of saving rates and demographic factors might lead some economies to a lower level of development trapping them to a backward convergence club (Canova, 2004: 59; Mora, 2008: 913-914). Furthermore, a number of factors, such as diversification and internal scale of economies because of specialization seem to play a decisive role (Kallioras and Petrakos, 2010: 12; Kangasharju, 1999: 208).

Some other key factors influencing the formation of a growth trap are geography and trade (Mora, 2008: 914; Canova, 2004: 59-60; Quah, 1997: 21-23). Countries are not isolated islands and do not act in isolation. Units that are either members of the same nation, share some borders, or belong to geographically homogenous areas tend to cluster together because information flows more easily across units with these characteristics (Canova, 2004: 59). Geography plays an important role as, in many cases, it is observed that rich economies are typically close to other rich ones and interact more with them. Similarly, poor economies are typically close to other poor ones (Quah, 1997: 21). A region's economic wellbeing can be predicted by that in both surrounding regions and the host state. But, there is evidence that physical location and geographical spillovers matter more than do national factors (Quah, 1996: 953-954). In addition, international trade and the level of trade costs play an important role. Quah (1997) underlines that as rich countries trade mostly with other rich ones and, interestingly, the very poorest countries, mostly with rich ones again, improvement in convergence possibilities is most obvious only for middle-income countries (Quah, 1997: 23-24).

Another key factor influencing the formation of clubs refers to technological differences. The absence of adequate conditions for R&D endowment and monopolies in technology can generate lower development levels (Mora, 2008: 914). Kangasharju (1999) uses the model of technological diffusion in order to explain the occurrence of convergence clubs. According to this model, economies with smaller

economic gaps relatively to the richest economy grow faster than the leader one because they can imitate technological innovations, which is cheaper than producing innovations of their own. Respectively, economies with largest gaps might be so underdeveloped that they are unable to imitate innovations, and hence they grow at a slower rate than the leader. Instead of converging towards the leader, the poorest economies may converge towards an inferior equilibrium (Chatterji, 1992: 62; Kangasharju, 1999: 208).

There are three convergence club characterizations. The first is polarization, when the rich is becoming richer, the poor poorer, and the middle class is vanishing. The second is stratification, when there are multiple modes in the income distribution across countries. The third is divergence, when two economies with initial equal footing are separating over time so that one eventually becomes wealthier than the other. When the convergence clubs are two, then clustering occurs at high and low parts of the income distribution as the middle-income group of economies vanishes, and the rich continues to become richer, and the poor, poorer. When more than two convergence clubs form, stratification is an apposite term in place of polarization to describe the outcome. The number of convergence clubs and their composition depends on the initial distribution of income across the entire cross section. If the world began with all incomes already close together, then only a single convergence club forms with all countries converging to equality. If, on the other hand, initial incomes are disparate, then, multiple clubs form (Quah, 1995: 17-18; Quah, 1997: 2).

Chatterji (1992) argues that both models of technological diffusion (diffusion hypotheses) and multiple equilibria models (endogenous growth) apply if, in the empirical analysis, there are two convergence clubs found: a superior club, where all countries have the same per capita income as the leader and grow at the same rate thereafter, and a weaker club, where all countries will converge to the same level of per capita income but this will be lower than that of those countries in the superior club. If only a single club can be detected, then the endogenous growth view is rejected and only the diffusion view applies. If no clubs are discovered, then both views are rejected and the income levels of all economies diverge from that of the leader (Chatterji, 1992: 64).

Some countries may be ‘stuck’ in a low-level equilibrium trap which corresponds to low convergence club. Chatterji (1992) underlines that these countries will need a ‘big push’ to get out of the trap and that the governments of the richer countries will not necessarily help these nations. He suggests that systematic programme aid should be directed towards certain target nations, those which are marginal members of the low club. Furthermore, he suggests the possibility of government intervention (Chatterji, 1992: 68). Mora (2008) underlines that the implementation of national policies remains the key factor to ensure a region escapes from low levels of development, because an economy which is trapped in a backward club can escape from it mainly through the state’s fiscal policies to reduce inequalities within the country. (Mora, 2008: 911-912). However, Chatterji and Dewhurst (1996) support that regional policy is likely to be more important in boom than in slump. This is because they observed a stronger tendency of convergence in periods of slow national growth (Chatterji and Dewhurst, 1996: 39).

3. EXISTING EMPIRICAL STUDIES

There aren't many studies in which convergence clubs are explored in international and regional contexts. Only a small number have asserted the presence of nonlinearities in the growth process implying multiple steady-states and convergence clubs. Then, some of these studies are presented briefly.

Baumol and Wolff (1988) studied the behaviour of 72 countries in the period 1950-1980, using data on real GDP per capita. Their model, composed by non-linear relations, showed that there is an upper-income convergence club, constituted by 17 countries, and a lower-income divergence one.

Chatterji (1992) used data of GDP values for 109 countries in 1960 and 1985. USA had the highest real per capita income both in 1960 and 1985 and, as a result, was identified as the leader. Using the gap variable, which was defined as the difference between the GDP per capita level of the leader and the corresponding levels of the other economies considered, he found two mutually exclusive convergence clubs: one including the rich nations and another including the poor nations where the division between rich and poor is endogenously determined. The superior convergence club was consisted of 45 countries, while the inferior club of 64 countries.

Quah (1992) used Markov chains, a stochastic procedure which is an alternative for the income-gap equations in the study of σ convergence, for 118 countries from 1962 to 1985. The results showed a tendency towards a two-camp world, implying polarization of countries into two different income classes. Economies across the world seem to be converging to a distribution where many remain wealthy, and many remain poor. Escaping from the poverty trap is a low-probability proposition, either over the short or long run. The mobility that occurred implied two convergence clubs: cross-country incomes tended towards extremes at both high and low endpoints.

Quah (1995) estimated Markov chains for the US states from 1948 to 1989. Comparing the results with those of his previous study, he found greater mobility for

the US states than for the 118 countries suggesting greater convergence within the states of US. Furthermore, the evidence showed one convergence club and bimodality was not evident as in world income distribution dynamics.

Chatterji and Dewhurst (1996) used gap equations of GDP per capita examining the British regional convergence for the period 1977 to 1991 and for six sub-periods. London was identified as the leader of Great Britain during the periods under investigation. The results indicated that, the experience of the counties and regions of Great Britain compared to the leader fluctuates from period to period, although over the period as a whole, there was no tendency of convergence to London. In general over the period, the counties and regions of Great Britain tended to diverge in terms of their GDP per capita rather than converge. With regard to the six sub-periods, during which (some of them) London alone formed the superior club, whereas during other periods all the regions formed a single club. Furthermore, it was observed that, although there was no evidence of convergence over the whole period, there was some evidence of convergence in periods of slow national growth.

Kangasharju (1999) investigated the convergence behaviour of the 88 Finnish sub-regions by examining the development of relative income levels for the period 1934 to 1993 and for two 30-year and three 10-year sub-periods. The results showed that the Finnish sub-regions have formed a single convergence club without excluding any of the sub-regions. In addition, the convergence towards Helsinki, the leading sub-region in Finland, has been non-linear, in the sense that the initially poorer sub-regions have caught up with the leader and, more specifically, the smaller their initial income level is the faster the growth rate is.

Canova (2004) searched for clubs using income per capita from 144 European regions (NUTS II) for the period 1980-1992 and OECD countries for the period 1951-1985. He found heterogeneities in European regional per capita income and a tendency of the steady-state distribution to cluster around four poles of attractions characterized by different dynamics, different posterior mean steady states, and different mobility features. Similarly, the results showed that OECD national per capita income data presented two convergence clubs. In both cases, a rich-poor, north-south dimension emerged in the clubs.

Alexiadis (2004) tested the existence of convergence clubs in the regions (NUTS II) of Greece over the period 1970-2000, using time series techniques. The results showed that, although there was no uniform pattern across all regions, four central regions follow a common convergence path and the existence of a convergence club seems a plausible explanation. He underlined that, in the case of Greece, the leading region economic performance is not suitable proxy for the steady-state when the leading region is an outlier in the sense that no other region is catching up. He proposed the measure of the average economic performance as a proxy for the steady-state.

Artelaris et al. (2008) investigated the existence of convergence clubs, in per capita GDP terms, among the prefectures (NUTS III) of Greece during the period 1995-2005. The population was used as a weighting variable so that each region has the relative importance. The results did not verify trends of convergence club among Greek prefectures. In contrast, all prefectures tended to diverge not only from the leading prefecture, but also from one another.

Artelaris et al. (2010) examined the possibility for the emergence of convergence clubs for the regions (NUTS III) of the European Union (EU) New Member-States (NMS) over the period 1990-2005. The regressions were estimated using the Weighted Least Squares (WLS) method in order to take into consideration the relative importance or size of each region in the national setting. The results showed the existence of regional convergence clubs in many EU NMS. The main observation was that the identification of convergence clubs in these countries highlighted the heterogeneous spatial impact of the EU economic integration process.

To sum up, convergence clubs can be found both in the international and in a regional context. The results are rather clear in the case of heterogeneous groups of countries or regions.

4. TESTING FOR CONVERGENCE CLUBS IN THE EU REGIONS

4.1 DATA DESCRIPTION

This chapter investigates the existence of convergence clubs between regions of the European Union as a whole, but also between regions of each Member State of the EU[1].

The investigation for convergence clubs in the EU regions refers to NUTS III spatial level. This study employs GDP per capita, deflated to 2000 prices, and covers the period 1991-2007.

4.2 METHODOLOGY

The concept of convergence clubs, which comprehends non linear relations, can provide more analytical and realistic conclusions with regard to the evolution and evaluation of regional inequalities.

This study is based on the econometric approach proposed by Chatterji (1992). The investigation for the emergence of regional convergence clubs is based on the econometric estimation of the equation:

$$G_{F,l\_i} = \sum_{\kappa=1}^{\kappa} \gamma_{\kappa} \left(G_{B,l\_r}\right)^{\kappa} \qquad (5)$$

where *B* denotes the base (initial) year of estimation, *F* denotes the final year of estimation, *r* denotes the regions under consideration, *l* denotes the richest of the regions under consideration (lead region), *G* is the difference (gap) of the logarithms of the variable under consideration (i.e. per capita GDP) between the lead and each of the regions under consideration, γ (1, 2, …,) is the coefficient of *G*, and κ (1, 2, …,) are the powers of *G*. Thus, it is possible for a non-linear relation between the

[1] However, the results do not refer to all European countries. Some Member States were finally excluded. The sub-chapter 4.3 gives more information.

income gap (among the richest and the regions under consideration) in an initial year and the respective gap in a final year to be found.

As the period of analysis is from 1991 to 2007, the equation can be rewritten to:

$$G_{2007,l\_i} = \sum_{\kappa=1}^{\kappa} \gamma_{\kappa} \left(G_{1991,l\_r}\right)^{\kappa} \qquad (6)$$

The dependent variable of the regional convergence clubs equation is the GDP per capita gap (between the richest and each of the regions under consideration in the year 2007 (G_{2007,l_i}) and the independent variable is the respective gap in the year 1991 (G_{1991,l_r}). In all cases, the lead region (leader) is considered to be the richest region in the year 2007. The final specification of the equations was made under the rule of dropping the statistically insignificant terms.

The regressions are estimated using the Weighted Least Squares (WLS), instead of the Ordinary Least Squares (OLS) method. The conventional OLS method tends to overlook the relative importance or size of each region in the 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. WLS provides an alternative estimation, overcoming this major drawback, allowing regions to have an influence, which is analogous to their relative size, on the regression results (Artelaris et al., 2010). In this study, the observations are weighted to the variable of population at the initial year (POP_{1991}). The equations of each country were found through the econometric program *EVIEWS*.

After finding the equation of each country, their relative graphs were made by using the program *live math maker*. Except from the estimated functions for each of the 17 European countries and for the European Union as a whole, the function $y = x$ is used as a benchmark in order to identify the formation of convergence clubs. Each EU region may converge to the leader when the line of the estimated function is below the line of the benchmark function in the upper right quadrant and, as a result, the GDP per capita gap in the final year is lower as compared to the respective gap in the initial year. In addition, each EU region may diverge from the leader when the

line of the estimated function is above the line of the benchmark function in the upper right quadrant and, as a result, the GDP per capita gap in the final year is higher as compared to the respective gap in the initial year. The regional convergence clubs that are formed can be found after solving the system of the equation $y = x$ and the regional convergence clubs equation that emerges from the econometric investigation.

4.3 ECONOMETRIC RESULTS

This sub-chapter presents the econometric results for the European Union as a whole, but also for each of the 15 European countries (Austria, Belgium, Bulgaria, Finland, France, Germany, Greece, Hungary, Italy, Netherlands, Poland, Portugal, Spain, Sweden, United Kingdom). After the econometric estimations, the formation, the composition and the number of convergence clubs through the equations and the graphs of each country are being investigated. Finally, in order to give a more comprehensive image of the results, the relative maps, which were made by using the program *ArcGIS* are presented.

In this study, 10 European countries are not included (Czech Republic, Denmark, Estonia, Ireland, Latvia, Lithuania, Malta, Romania, Slovakia, Slovenia). The investigation refers to countries that have a considerable number of NUTS III regions. The number of regions of NUTS III spatial level in Czech Republic, Denmark, Estonia, Ireland Latvia, Lithuania, Malta, Slovakia and Slovenia is smaller than twenty. Thus, the above countries were excluded due to insufficient number of observations (Petrakos and Artelaris, 2009: 321). However, Romania was excluded because a satisfying econometric model wasn’t found.

4.3.1 EUROPEAN UNION

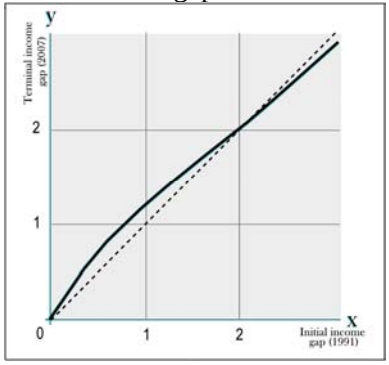
The European Union consists of 1278 regions of NUTS III spatial level. The observations are weighted according to the variable of population at the initial year (POP_{1991}). With regard to the European Union as a whole, the econometric results indicate a non-linear relation between the independent (GAP_{1991}) and the dependent (GAP_{2007}) variable. The independent variable explains 98% of the dependent variable's variability. This arises from the rate of the adjusted coefficient of determination ($R^2_{adj.}$) having coefficients which are statistically significant at the level of 1%.

Table 1: European Union – Econometric Estimation, Period 1991-2007
GAP2007 = - 0.027 GAP1991^4 + 0.237 GAP1991^3 - 0.721 GAP1991^2 (0.0002)*** (0.0007)*** (0.0004)*** + 1.728 GAP1991 (0.0000)***
$R^2_{adj.}$ = 0.979
Weighting variable: $POP_{1991,r}$
N = 1278 observations (NUTS III regions)
*** statistically significant at the level of 1%
White-heteroskedasticity corrected

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

The equation of this model has the form: $y = - 0.027x^4 + 0.237x^3 – 0.721x^2 + 1.728x$ and is depicted in Figure 3 compared to the equation of the function $y = x$, which is used as a benchmark in order to identify the formation of convergence clubs. The horizontal axis represents the initial income gap (GAP_{1991}) and the vertical axis represents the terminal income gap (GAP_{2007}). The equations are intersected at the two points: (0,0) and (2.226,2.226).

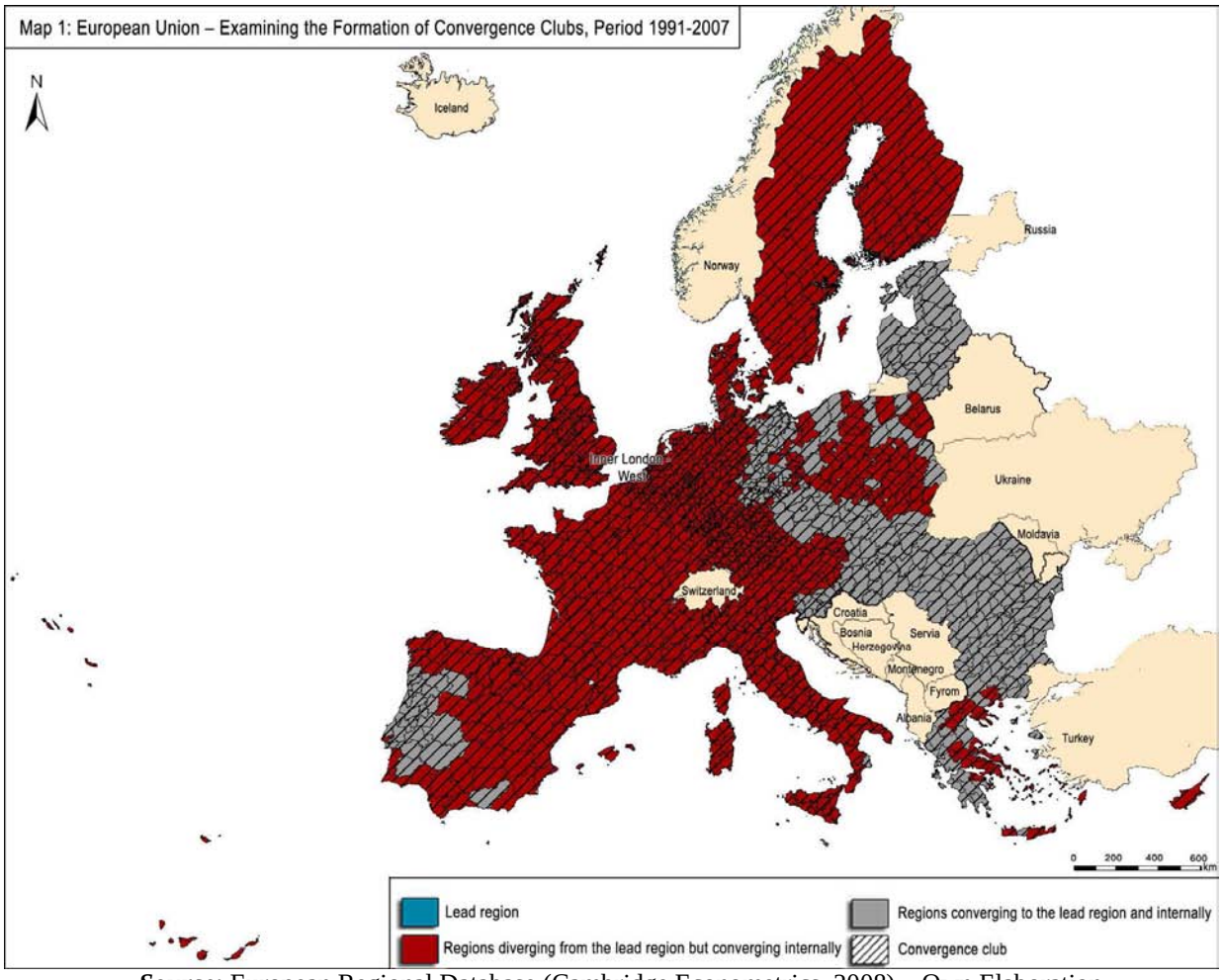
Figure 3: European Union - Relation between the initial (1991) and terminal (2007) income gap



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

In the European Union as a whole, one convergence club is formed which consists of two groups of regions. There are 962 regions, out of 1278, having initial income gaps smaller than 2.226. These regions diverge from the lead region, as their terminal gaps tend to be larger than the initial ones, but converge internally to a gap of 2.226. There are 315 regions with initial income gaps larger than 0.536 which converge not only to the leader, as their terminal gaps tend to be smaller than the initial ones, but also internally to a gap of 2.226. Thus, the two previous groups constitute a wider convergence club at a gap of 2.226. In the Appendix, Table A.1 presents the regions described above.

In the following map (Map 1), it can be observed that the regions that converge to the lead region and internally refer mostly to the regions of the countries of the two last enlargements. This can be explained by the fact that these countries, although they remain poorer than the older member states, they had faster growth rates since they joined the European Union.



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

4.3.2 AUSTRIA

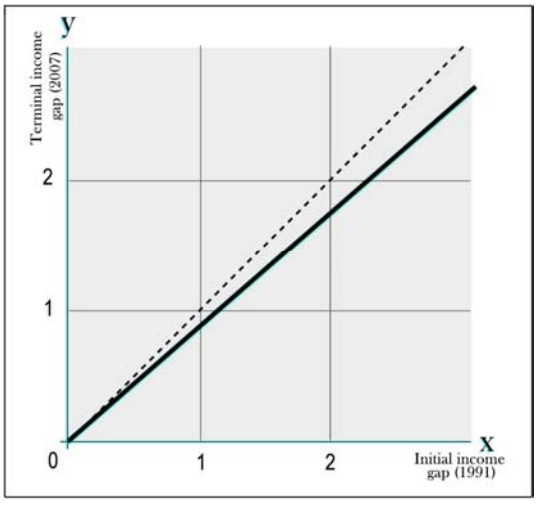
Austria consists of 35 regions of NUTS III spatial level. The observations are weighted to the variable of population at the initial year (POP_{1991}). In the case of Austria, the econometric results indicate a linear relation between the independent (GAP_{1991}) and the dependent (GAP_{2007}) variable. According to the adjusted coefficient of determination ($R^2_{adj.}$) having a coefficient which is statistically significant at the level of 1%, the independent variable explains 95% of the dependent variable's variability.

Table 2: Austria – Econometric Estimation, Period 1991-2007
$GAP_{2007} = 0.884\ GAP_{1991}$ (0.0000)***
$R^2_{adj.} = 0.950$
Weighting variable: $POP_{1991,r}$
N = 35 observations (NUTS III regions)
*** statistically significant at the level of 1%
White-heteroskedasticity corrected

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

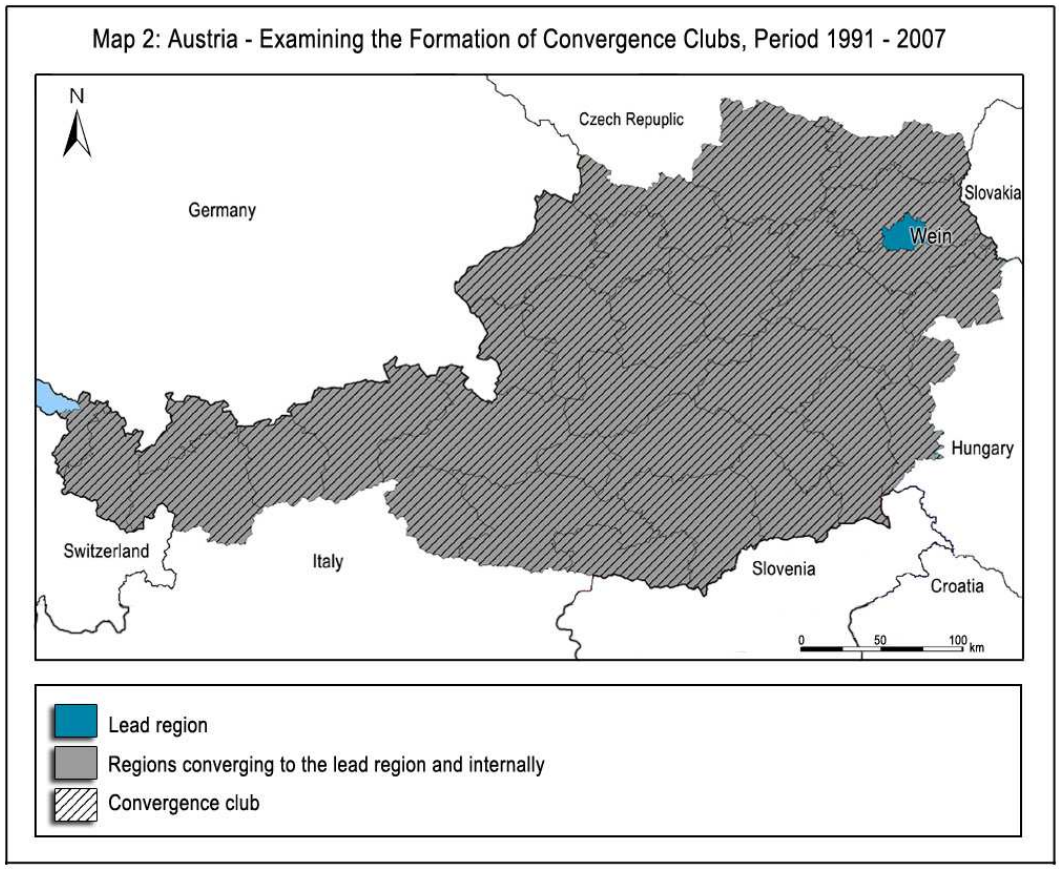
The equation of this model has the form: $y = 0.884x$ and is depicted in Figure 4 compared to the equation of the function $y = x$, which is used as a benchmark in order to identify the formation of convergence clubs. The horizontal axis represents the initial income gap (GAP_{1991}) and the vertical axis represents the terminal income gap (GAP_{2007}). There is only one intersection point at the beginning of the two axes (0,0).

Figure 4: Austria- Relation between the initial (1991) and the terminal (2007) income gap



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

During the period 1991-2007, the estimated function of Austria is below the line of the benchmark function in the upper right quadrant. Thus, one convergence club can be identified. The 34 rest regions of Austria converge to the leader, as their terminal gaps tend to be smaller than the initial ones, and, furthermore, converge together with the leader toward the stable equilibrium (0,0). In the Appendix, Table A.2 presents the regions described above.



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

4.3.3 BELGIUM

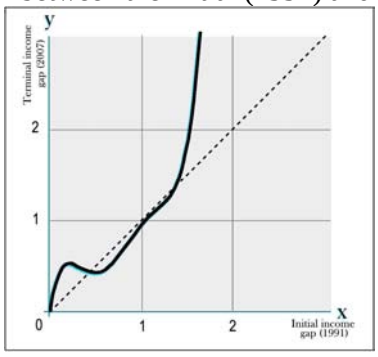
Belgium consists of 43 regions of NUTS III spatial level. The observations are weighted to the variable of population at the initial year (POP_{1991}). In the case of Belgium, the econometric results indicate a non-linear relation between the independent (GAP_{1991}) and the dependent (GAP_{2007}) variable. The independent variable explains 96% of the dependent variable's variability. This arises from the rate of the adjusted coefficient of determination ($R^2_{adj.}$) having one coefficient which is statistically significant at the level of 1%, two coefficients at the level of 5% and two coefficients at the level of 10%.

Table 3: Belgium – Econometric Estimation, Period 1991-2007
GAP2007 = 7.524 GAP1991^5 - 29.700 GAP1991^4 + 42.447 GAP1991^3 (0.0716)* (0.0607)* (0.0479)** - 25.639 GAP1991^2 + 6.325 GAP1991 (0.0353)** (0.0093)***
$R^2_{adj.}$ = 0.962
Weighting variable: $POP_{1991,r}$
N = 43 observations (NUTS III regions)
*** statistically significant at the level of 1% ** statistically significant at the level of 5% * statistically significant at the level of 10%
White-heteroskedasticity corrected

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

The equation of this model has the form: $y = 7.524x^5 - 29.700x^4 + 42.447x^3 - 25.639x^2 + 6.325x$ and is depicted in Figure 5 compared to the equation of the function $y = x$, which is used as a benchmark in order to identify the formation of convergence clubs. The horizontal axis represents the initial income gap (GAP_{1991}) and the vertical axis represents the terminal income gap (GAP_{2007}). The equations are intersected at three points: (0,0), (0.445,0445), and (1.365,1.365).

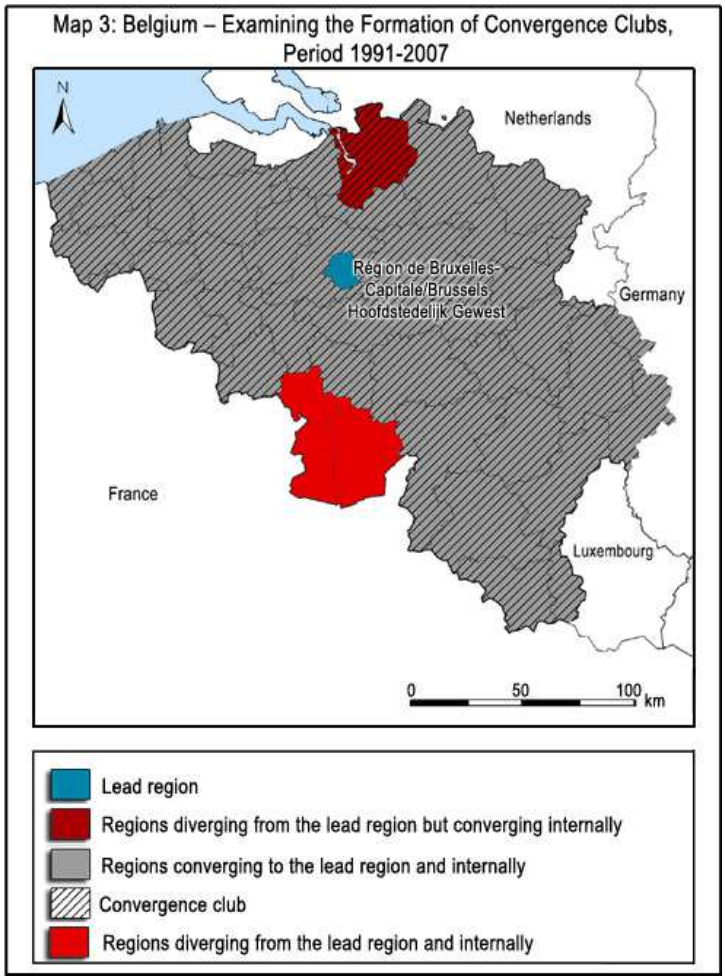
Figure 5: Belgium- Relation between the initial (1991) and terminal (2007) income gap



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

One convergence club is formed in Belgium which consists of two groups of regions. The first group includes one region with initial gap less than 0.445. This region diverges from the lead region, as its terminal gap tends to be larger than the initial one, but converges internally to a gap of 0.445. The second group includes 39 regions with initial gaps between 0.445 and 1.365. These regions converge not only to the leader, as their terminal gaps tend to be smaller than the initial ones, but also internally to a gap of 0.445. Thus, the two previous groups constitute a wider convergence club at a gap of 0.445. Finally, there are 2 regions with initial gaps larger than 1.365 which diverge from the leader, diverge from the above convergence club, but also diverge internally. In the Appendix, Table A.3 presents the regions described above.

In the following map (Map 3), we can see that the regions which diverge from the lead region and internally, are sited at the border with France. Furthermore, the region diverging from the lead region but converging internally is peripheral and shares the borders with Netherlands.



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

4.3.4 BULGARIA

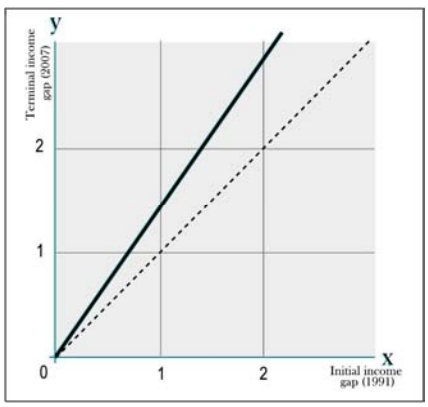
Bulgaria consists of 28 regions of NUTS III spatial level. The observations are weighted to the variable of population at the initial year (POP_{1991}). In the case of Bulgaria, the econometric results indicate a linear relation between the independent (GAP_{1991}) and the dependent (GAP_{2007}) variable. According to the adjusted coefficient of determination ($R^2_{adj.}$) having a coefficient which is statistically significant at the level of 1%, the independent variable explains almost 88% of the dependent variable's variability.

Table 4: Bulgaria- Econometric Estimation, Period 1991-2007
GAP2007 = 1.429 GAP1991 (0.0000)***
$R^2_{adj.}$ = 0.875
Weighting variable: $POP_{1991,r}$
N = 28 observations (NUTS III regions)
*** statistically significant at the level of 1%
White-heteroskedasticity corrected

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

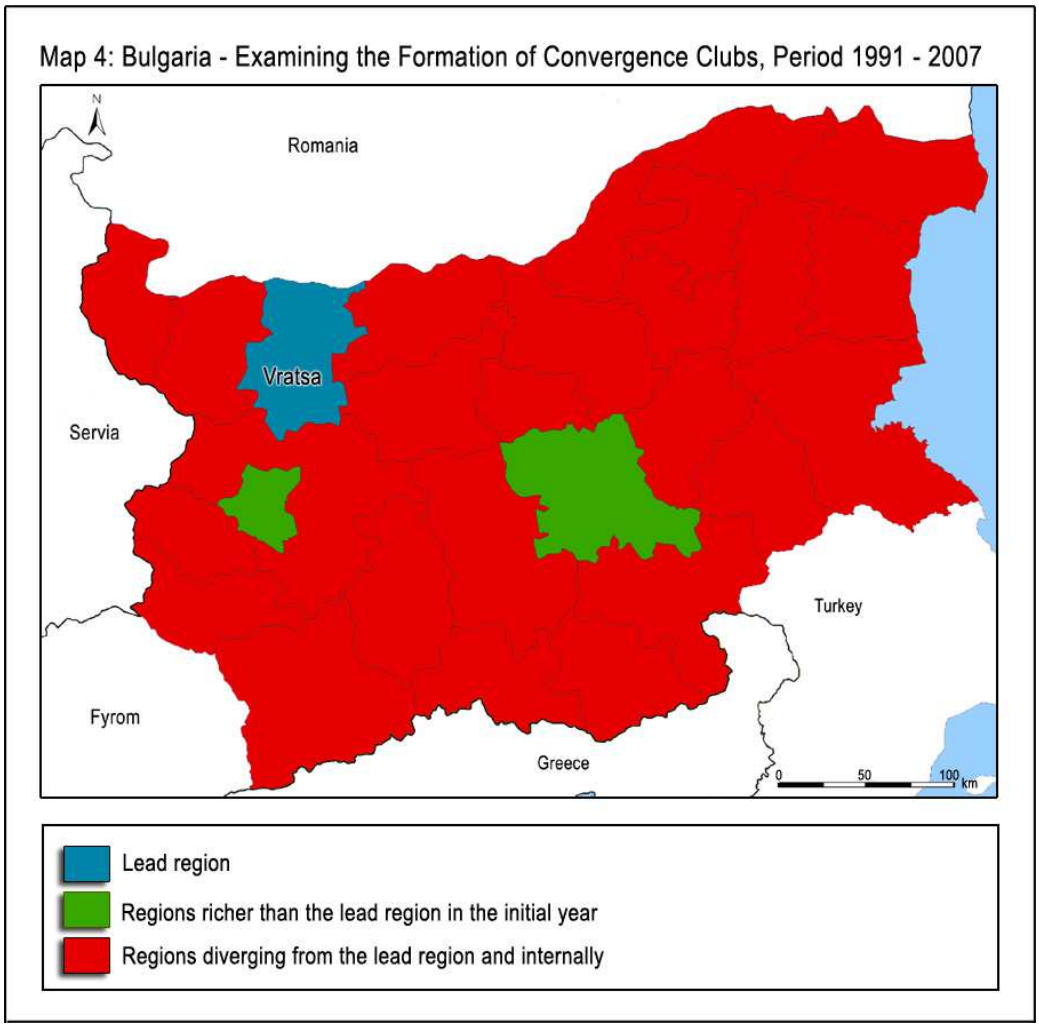
The equation of this model has the form: $y = 1.429x$ and is depicted in Figure 6 compared to the equation of the function $y = x$, which is used as a benchmark in order to identify the formation of convergence clubs. The horizontal axis represents the initial income gap (GAP_{1991}) and the vertical axis represents the terminal income gap (GAP_{2007}). There is only one intersection point at the beginning of the two axes (0,0).

Figure 6: Bulgaria- Relation between the initial (1991) and terminal (2007) income gap



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

During the period 1991-2007, the estimated function of Bulgaria is above the line of the benchmark function in the upper right quadrant. Thus, no convergence club can be identified. In 1991, two regions were richer than the lead region. The rest regions of Bulgaria diverge from the leader, as their terminal gaps tend to be larger than the initial ones, and, furthermore, diverge internally. In the Appendix, Table A.4 presents the regions described above.



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

4.3.5 FINLAND

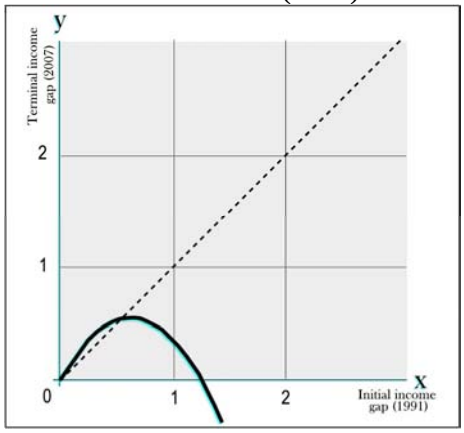
Finland consists of 20 regions of NUTS III spatial level. The observations are weighted to the variable of population at the initial year (POP_{1991}). In the case of Finland, the econometric results indicate a non-linear relation between the independent (GAP_{1991}) and the dependent (GAP_{2007}) variable. The independent variable explains 69% of the dependent variable's variability. This arises from the rate of the adjusted coefficient of determination ($R^2_{adj.}$) having two coefficient which are statistically significant at the level of 1% and 5% respectively.

Table 5: Finland – Econometric Estimation, Period 1991-2007
GAP2007 = - 1.423 GAP1991^2 + 1.818 GAP1991 (0.0266)** (0.0000)***
$R^2_{adj.}$ = 0.689
Weighting variable: $POP_{1991,r}$
N = 20 observations (NUTS III regions)
*** statistically significant at the level of 1% ** statistically significant at the level of 5%
White-heteroskedasticity corrected

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

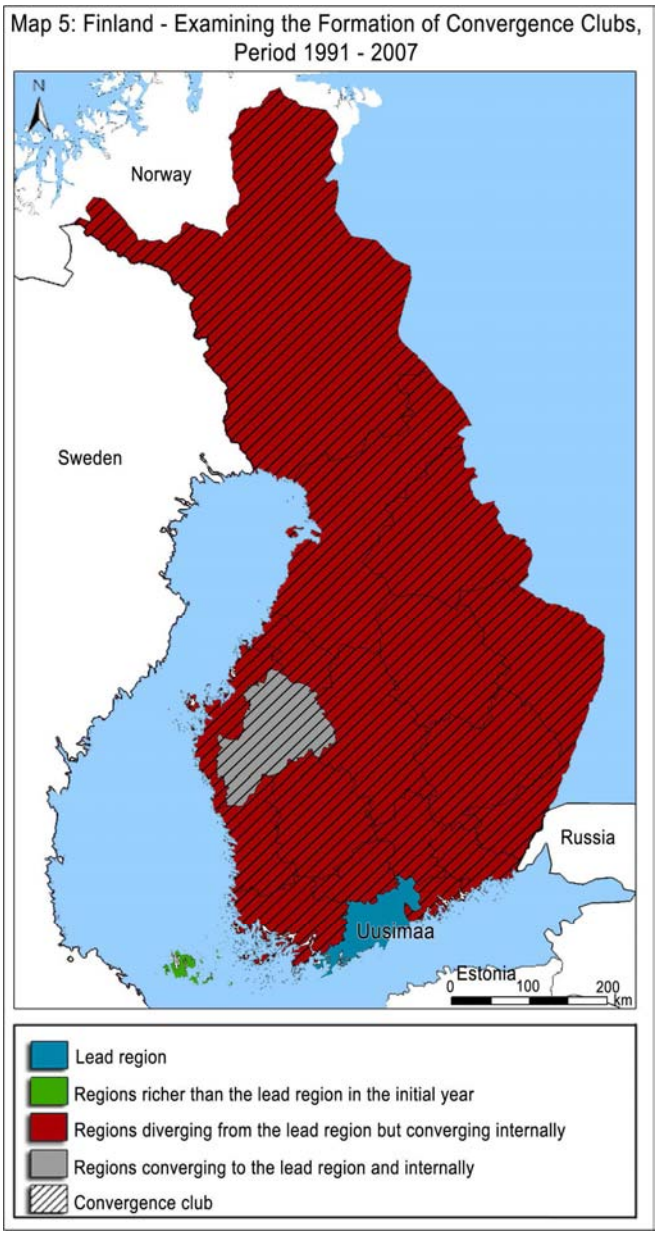
The equation of this model has the form: $y = -1.423x^2 + 1.818x$ and is depicted in Figure 7 compared to the equation of the function $y = x$, which is used as a benchmark in order to identify the formation of convergence clubs. The horizontal axis represents the initial income gap (GAP_{1991}) and the vertical axis represents the terminal income gap (GAP_{2007}). The equations are intersected at two points: (0,0) and (0.575,0.575).

Figure 7: Finland- Relation between the initial (1991) and terminal (2007) income gap



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

One convergence club is formed in Finland which consists of two groups of regions. The first group is constituted by 17 regions with initial gaps less than 0.575. These regions diverge from the lead region, as their terminal gaps tend to be larger than the initial one, but converge internally to a gap of 0.575. The second group is composed by one region with initial gap larger than 0.575. This region converges not only to the leader, as its terminal gap tends to be smaller than the initial one, but also internally to a gap of 0.575. Thus, the two previous groups constitute a wider convergence club at a gap of 0.575. However, there is one region which was richer than the lead region in 1991. In the Appendix, Table A.5 presents the regions described above.



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

4.3.6 FRANCE

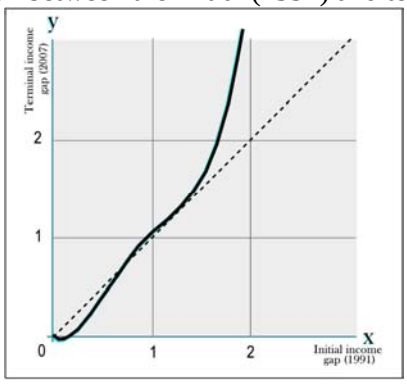
France consists of 96 regions of NUTS III spatial level. The observations are weighted to the variable of population at the initial year (POP_{1991}). In the case of France, the econometric results indicate a non-linear relation between the independent (GAP_{1991}) and the dependent (GAP_{2007}) variable. The independent variable explains almost 100% of the dependent variable's variability. This arises from the rate of the adjusted coefficient of determination ($R^2_{adj.}$) having coefficients which are statistically significant at the level of 1%.

Table 6: France –Econometric Estimation, Period 1991-2007
GAP2007 = 1.333 GAP1991^4 - 4.415 GAP1991^3 + 4.749 GAP1991^2 (0.0000)*** (0.0000)*** (0.0000)*** - 0.622 GAP1991 (0.0000)***
$R^2_{adj.}$ = 0.995
Weighting variable: $POP_{1991,r}$
N = 96 observations (NUTS III regions)
*** statistically significant at the level of 1%
White-heteroskedasticity corrected

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

The equation of this model has the form: $y = 1.333x^4 – 4.415x^3 + 4.749x^2 – 0.622x$ and is depicted in Figure 8 compared to the equation of the function $y = x$, which is used as a benchmark in order to identify the formation of convergence clubs. The horizontal axis represents the initial income gap (GAP_{1991}) and the vertical axis represents the terminal income gap (GAP_{2007}). The equations are intersected at two points: (0,0) and (0.707,0.707).

Figure 8: France - Relation between the initial (1991) and terminal (2007) income gap



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

In France, one convergence club is formed. It is constituted by one region with initial gap less than 0.707. This region converges to the lead region, as its terminal gap tend to be smaller than the initial one, and also converges internally to a gap of 0.000. The rest 94 regions of France diverge from the leader, as their terminal gaps tend to be larger than the initial ones, and diverge internally. In the Appendix, Table A.6 presents the regions described above.

In the following map (Map 6), we can see that the one region which converges to the lead region and internally, forming a convergence club, is around the lead region enjoying the development diffusion.

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

4.3.7 GERMANY

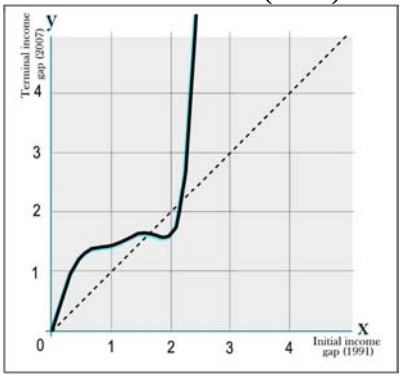
Germany consists of 439 regions of NUTS III spatial level. The observations are weighted to the variable of population at the initial year (POP_{1991}). In the case of Germany, the econometric results indicate a non-linear relation between the independent (GAP_{1991}) and the dependent (GAP_{2007}) variable. The independent variable explains 95% of the dependent variable's variability. This arises from the rate of the adjusted coefficient of determination ($R^2_{adj.}$) having coefficients most of which are statistically significant at the level of 1%.

Table 7: Germany- Econometric Estimation, Period 1991-2007
GAP2007 = 1.391 GAP1991^6 - 8.293 GAP1991^5 + 17.961 GAP1991^4 (0.0209)** (0.0076)*** (0.0008)*** -16.229 GAP1991^3 + 3.589 GAP1991^2 + 3.037 GAP1991 (0.0000)*** (0.0000)*** (0.0000)***
$R^2_{adj.}$ = 0.948
Weighting variable: $POP_{1991,r}$
N = 439 observations (NUTS III regions)
*** statistically significant at the level of 1% ** statistically significant at the level of 5%
White-heteroskedasticity corrected

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

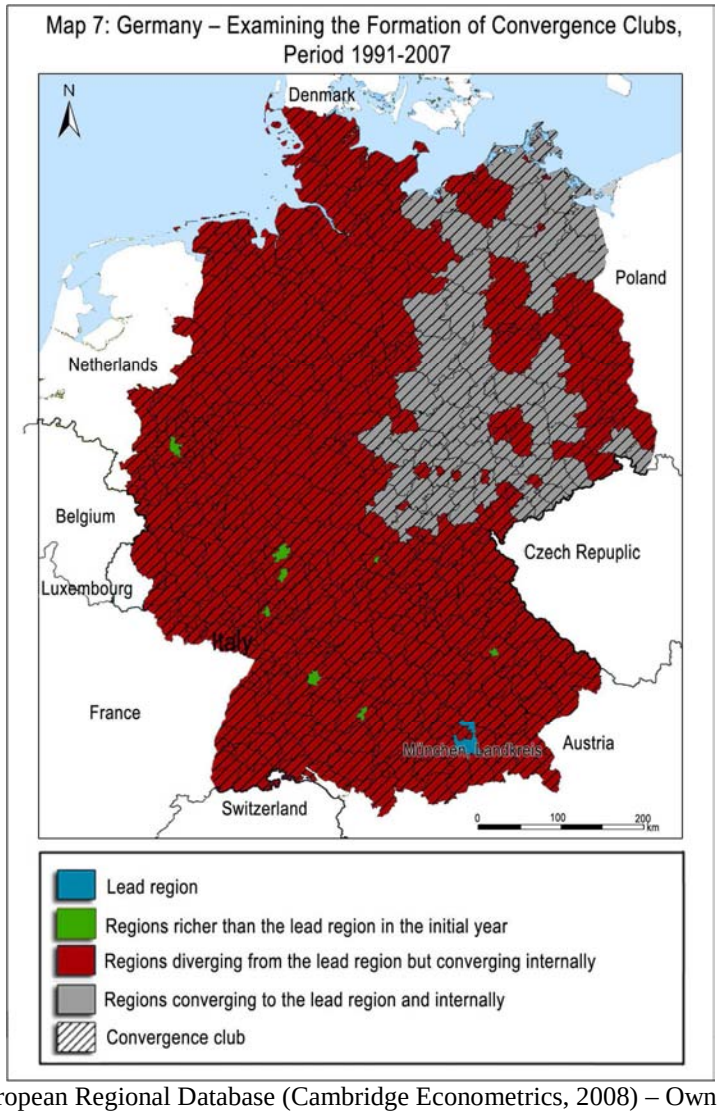
The equation of this model has the form: $y = 1.391x^6 – 8.293x^5 + 17.961x^4 – 16.229x^3 + 3.589x^2 + 3.037x$ and is depicted in Figure 9 compared to the equation of the function $y = x$, which is used as a benchmark in order to identify the formation of convergence clubs. The horizontal axis represents the initial income gap (GAP_{1991}) and the vertical axis represents the terminal income gap (GAP_{2007}). The equations are intersected at three points: (0,0), (1.653, 1.653) and (2.180, 2.180).

Figure 9: Germany - Relation between the initial (1991) and terminal (2007) income gap



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

One convergence club is formed in Germany which consists of two groups of regions. More precisely, the first group is constituted by 370 regions with initial income gaps between 0.000 - 1.653. These regions diverge from the lead region, as their terminal gaps tend to be larger than the initial ones, but converge internally to a gap of 1.653. The second group is composed by 59 regions with initial income gaps between 1.653 and 2.180. These regions converge not only to the leader, as their terminal gaps tend to be smaller than the initial ones, but also internally to a gap of 1.653. Thus, the two previous groups of regions constitute a wider convergence club at a gap of 1.653. Finally, regions with initial income gaps larger than 2.180 diverge from the leader, but also from the previous convergence club and furthermore diverge internally. In the period of analysis, none region has initial income gaps larger than 2.180. However, there are 9 regions, out of 439 German regions, which were richer than the lead region in 1991. In the Appendix, Table A.7 presents the regions described above.



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

4.3.8 GREECE

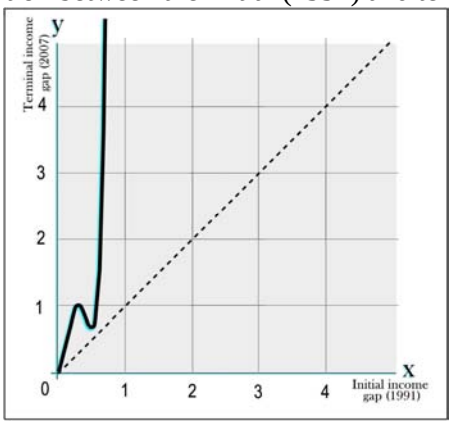
Greece consists of 51 regions of NUTS III spatial level. The observations are weighted to the variable of population at the initial year (POP_{1991}). In the case of Greece, the econometric results indicate a non-linear relation between the independent (GAP_{1991}) and the dependent (GAP_{2007}) variable. The independent variable explains 67% of the dependent variable's variability. This arises from the rate of the adjusted coefficient of determination ($R^2_{adj.}$) having coefficients which are statistically significant at the level of 1%.

Table 8: Greece- Econometric Estimation, Period 1991-2007
GAP2007 = 136.346 GAP1991^5 - 33.782 GAP1991^4 - 63.596 GAP1991^3 (0.0000)*** (0.0000)*** (0.0000)*** + 20.536 GAP1991^2 + 2.672 GAP1991 (0.0000)*** (0.0002)***
$R^2_{adj.}$ = 0.673
Weighting variable: $POP_{1991,r}$
N = 51 observations (NUTS III regions)
*** statistically significant at the level of 1%
White-heteroskedasticity corrected

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

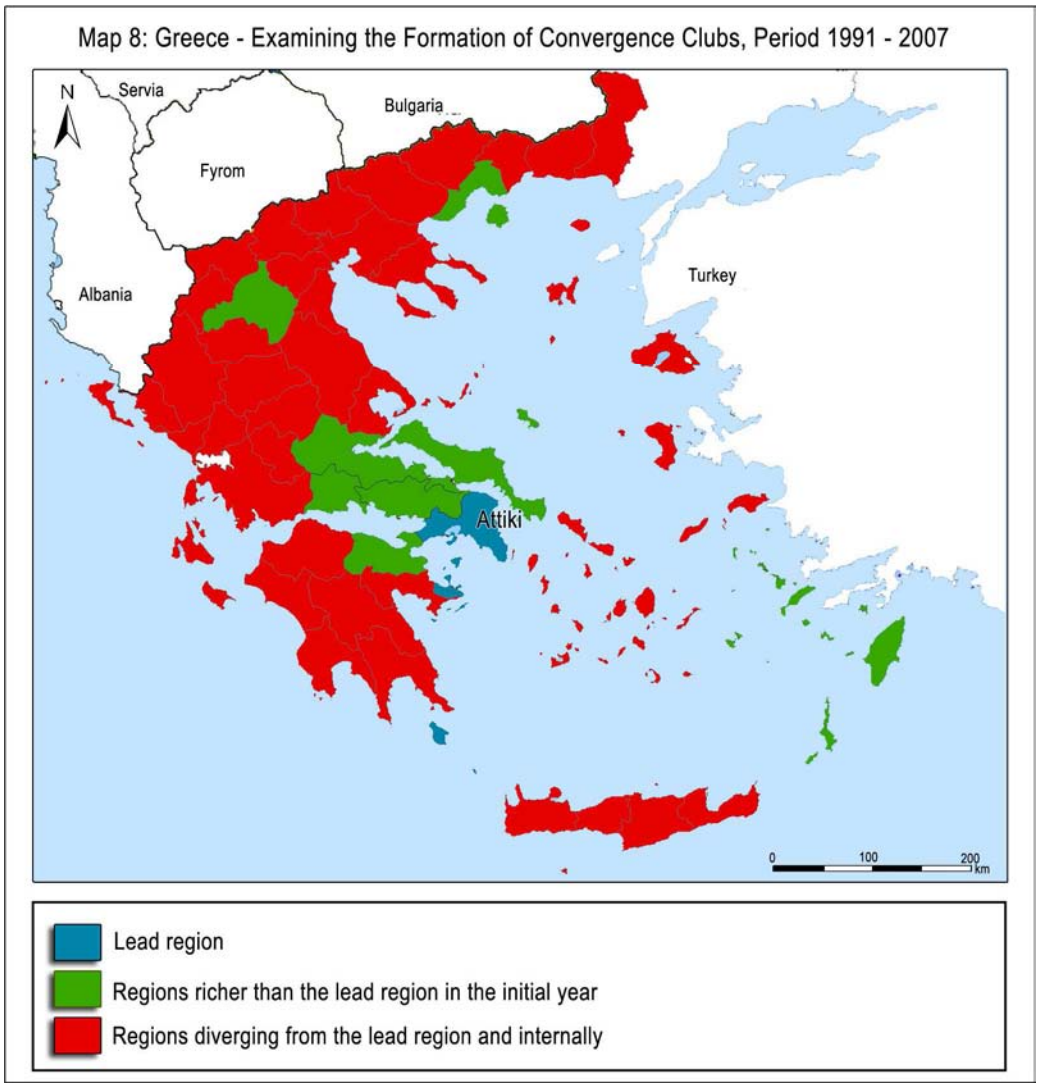
The equation of this model has the form: $y = 136.346x^5 – 33.782x^4 – 63.596x^3 + 20.536x^2 + 2.672x$ and is depicted in Figure 10 compared to the equation of the function $y = x$, which is used as a benchmark in order to identify the formation of convergence clubs. The horizontal axis represents the initial income gap (GAP_{1991}) and the vertical axis represents the terminal income gap (GAP_{2007}). The equations are intersected only at one point: (0,0).

Figure 10: Greece - Relation between the initial (1991) and terminal (2007) income gap



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

During the period 1991-2007, the estimated function of Greece is above the line of the benchmark function in the upper right quadrant. Thus, no convergence club can be identified. In 1991, 8 regions, out of 51 Greek regions, were richer than the lead region. The rest regions of Greece diverge from the leader, as their terminal gaps tend to be larger than the initial ones, and, furthermore, diverge internally. In the Appendix, Table A.10 presents the regions described above.



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

4.3.9 HUNGARY

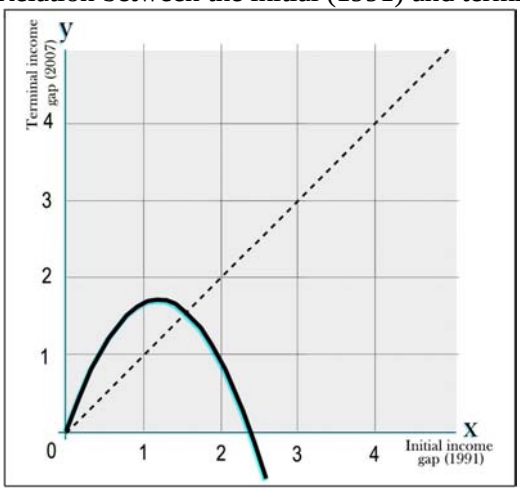
Hungary consists of 20 regions of NUTS III spatial level. The observations are weighted to the variable of population at the initial year (POP_{1991}). In the case of Hungary, the econometric results indicate a non-linear relation between the independent (GAP_{1991}) and the dependent (GAP_{2007}) variable. The independent variable explains 79% of the dependent variable's variability. This arises from the rate of the adjusted coefficient of determination ($R^2_{adj.}$) having coefficients which are statistically significant at the level of 1%.

Table 9: Hungary- Econometric Estimation, Period 1991-2007
GAP2007 = - 1.986 GAP1991^2 + 2.886 GAP1991 (0.0007)*** (0.0000)***
$R^2_{adj.}$ = 0.794
Weighting variable: $POP_{1991,r}$
N = 20 observations (NUTS III regions)
*** statistically significant at the level of 1%
White-heteroskedasticity corrected

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

The equation of this model has the form: $y = -1.986x^2 + 2.886x$ and is depicted in Figure 11 compared to the equation of the function $y = x$, which is used as a benchmark in order to identify the formation of convergence clubs. The horizontal axis represents the initial income gap (GAP_{1991}) and the vertical axis represents the terminal income gap (GAP_{2007}). The equations are intersected at two points: (0,0) and (0.950,0.950).

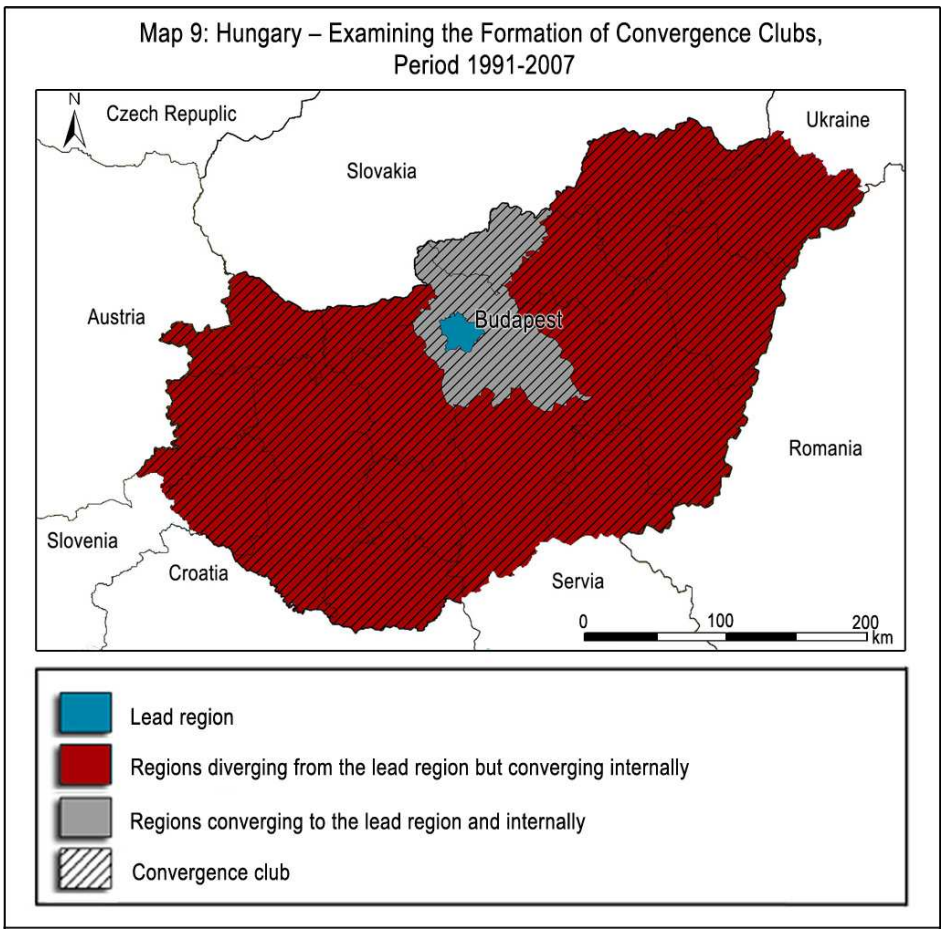
Figure 11: Hungary - Relation between the initial (1991) and terminal (2007) income gap



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

One convergence club is formed in Hungary which consists of two groups of regions. More precisely, there are 17 regions, out of 20, having initial income gaps less than 0.950. These regions diverge from the lead region, as their terminal gaps tend to be larger than the initial one, but converge internally to a gap of 0.950 composing a convergence club. The second group is composed by two regions with initial income gaps larger than 0.950. These regions converge not only to the leader, as their terminal gaps tend to be smaller than the initial ones, but also internally to a gap of 0.950. Thus, the two previous groups constitute a wider convergence club at a gap of 0.950. In the Appendix, Table A.9 presents the regions described above.

In the following map (Map 9), we can see that the two regions which converge to the lead region are placed around the lead region enjoying the development diffusion.



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

4.3.10 ITALY

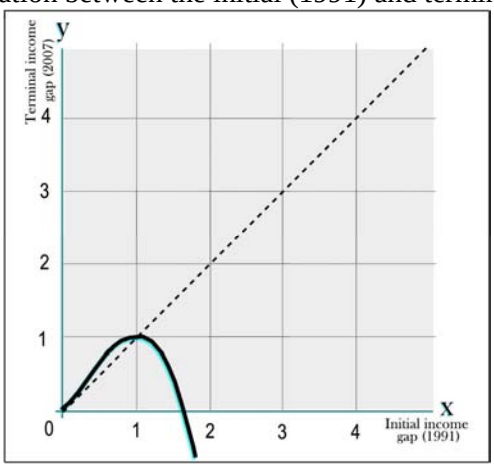
Italy consists of 103 regions of NUTS III spatial level. The observations are weighted to the variable of population at the initial year (POP_{1991}). In the case of Italy, the econometric results indicate a non-linear relation between the independent (GAP_{1991}) and the dependent (GAP_{2007}) variable. The independent variable explains 79% of the dependent variable's variability. This arises from the rate of the adjusted coefficient of determination ($R^2_{adj.}$) having coefficients which are statistically significant at the level of 1%.

Table 10: Italy- Econometric Estimation, Period 1991-2007
GAP2007 = - 0.986 GAP1991^3 + 1.275 GAP1991^2 + 0.717 GAP1991 (0.0007)*** (0.0003)*** (0.0000)***
$R^2_{adj.}$ = 0.984
Weighting variable: $POP_{1991,r}$
N = 103 observations (NUTS III regions)
*** statistically significant at the level of 1%

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

The equation of this model has the form: $y = - 0.986x^3 + 1.275x^2 + 0.717x$ and is depicted in Figure 12 compared to the equation of the function $y = x$, which is used as a benchmark in order to identify the formation of convergence clubs. The horizontal axis represents the initial income gap (GAP_{1991}) and the vertical axis represents the terminal income gap (GAP_{2007}). The equations are intersected at three points: (0,0), (0.285,0.285) and (1.009,1.009).

Figure 12: Italy - Relation between the initial (1991) and terminal (2007) income gap



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

In Italy, two convergence clubs are formed. The first one is constituted by 24 regions, out of 103 Italian regions, having initial income gaps smaller than 0.285. These regions converge to the leader, as their terminal gaps tend to be smaller than the initial ones and also converge internally to a gap of 0.000. The second convergence club consists of two groups of regions. The 76 regions with initial income gaps between 0.285 and 1.009 diverge from the lead region, as their terminal gaps tend to be larger than the initial ones, but converge internally to a gap of 1.009. The rest two regions having initial income gaps larger than 1.009, diverge from the leader, but converge internally to a gap of 1.009. Thus, the two previous groups constitute a wider convergence club at a gap of 1.009. In the Appendix, Table A.10 presents the regions described above.

In the following map (Map 10), the picture is more complex. In general, we can observe that most of the regions converging to the lead region are north and are placed around the lead region.

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

4.3.11 NETHERLANDS

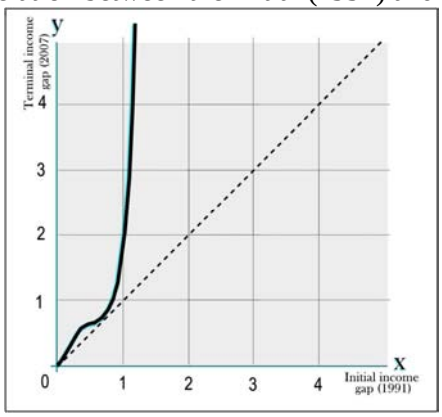
Netherlands consists of 40 regions of NUTS III spatial level. The observations are weighted to the variable of population at the initial year (POP_{1991}). In the case of Netherlands, the econometric results indicate a non-linear relation between the independent (GAP_{1991}) and the dependent (GAP_{2007}) variable. The independent variable explains 75% of the dependent variable's variability. This arises from the rate of the adjusted coefficient of determination ($R^2_{adj.}$) having coefficients which are statistically significant at the level of 1%.

Table 11: Netherlands- Econometric Estimation, Period 1991-2007
GAP2007 = 12.011 GAP1991^4 - 18.605 GAP1991^3 + 7.971 GAP1991^2 (0.0000)*** (0.0000)*** (0.0000)*** + 0.452 GAP1991 (0.0013)***
$R^2_{adj.}$ = 0.749
Weighting variable: $POP_{1991,r}$
N = 40 observations (NUTS III regions)
*** statistically significant at the level of 1%
White-heteroskedasticity corrected

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

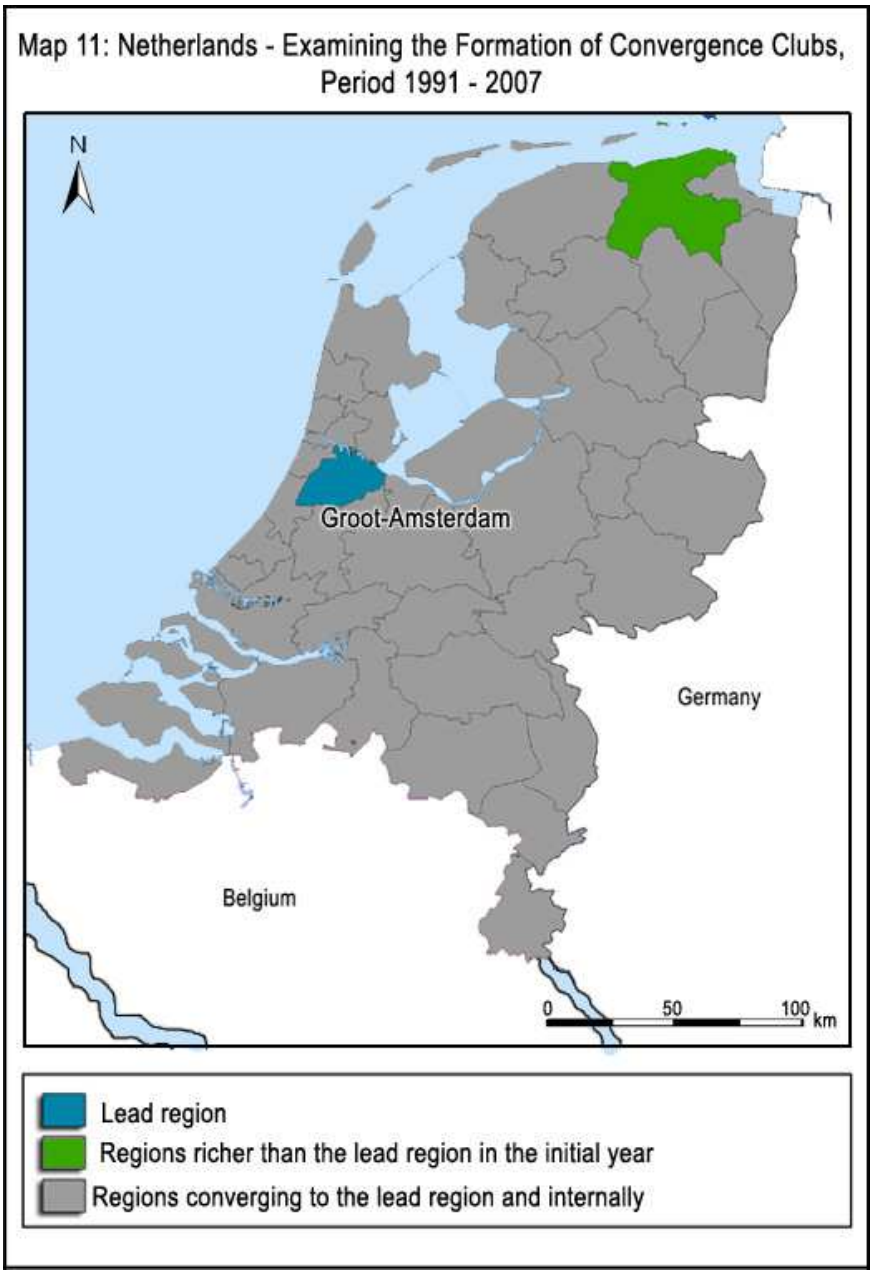
The equation of this model has the form: $y = 12.011x^4 - 18.605x^3 + 7.971x^2 + 0.452x$ and is depicted in Figure 13 compared to the equation of the function $y = x$, which is used as a benchmark in order to identify the formation of convergence clubs. The horizontal axis represents the initial income gap (GAP_{1991}) and the vertical axis represents the terminal income gap (GAP_{2007}). The equations are intersected at two points: (0,0) and (0.085,0.085).

Figure 13: Netherlands - Relation between the initial (1991) and terminal (2007) income gap



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

One convergence club is formed in Netherlands. The regions having initial income gaps smaller than 0.085 converge to the leader, as their terminal gaps tend to be smaller than the initial ones and also converge internally to a gap of 0.085 composing a convergence club. During the period of analysis, 1991-2007, there are no regions belonging to this category. The 38 regions, out of 40 in total, having initial income gaps larger than 0.085, diverge from the lead region, as their terminal gaps tend to be larger than the initial ones, diverge from the first convergence club, and also diverge internally. There is also one region which was richer than the lead region in the initial year of analysis (1991). In the Appendix, Table A.11 presents the regions described above.



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

4.3.12 POLAND

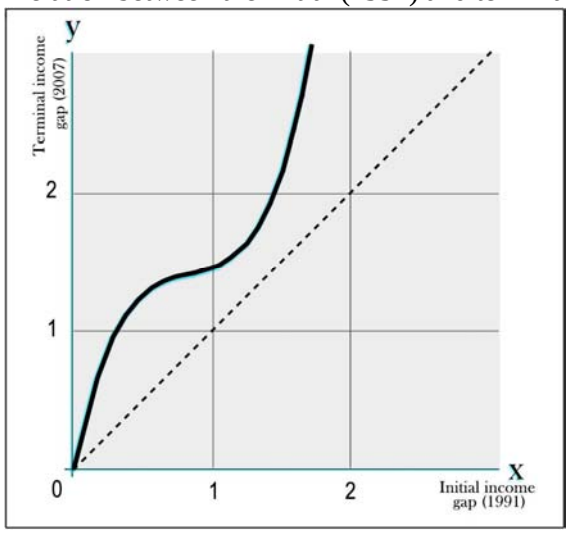
Poland consists of 45 regions of NUTS III spatial level. The observations are weighted to the variable of population at the initial year (POP_{1991}). In the case of Poland, the econometric results indicate a non-linear relation between the independent (GAP_{1991}) and the dependent (GAP_{2007}) variable. The independent variable explains 93% of the dependent variable's variability. This arises from the rate of the adjusted coefficient of determination ($R^2_{adj.}$) having coefficients which are statistically significant at the level of 1%.

Table 12: Poland- Econometric Estimation, Period 1991-2007
GAP2007 = 2.152 GAP1991^3 - 5.426 GAP1991^2 + 4.764 GAP1991 (0.0104)*** (0.0000)*** (0.0000)***
$R^2_{adj.}$ = 0.934
Weighting variable: $POP_{1991,r}$
N = 45 observations (NUTS III regions)
*** statistically significant at the level of 1%

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

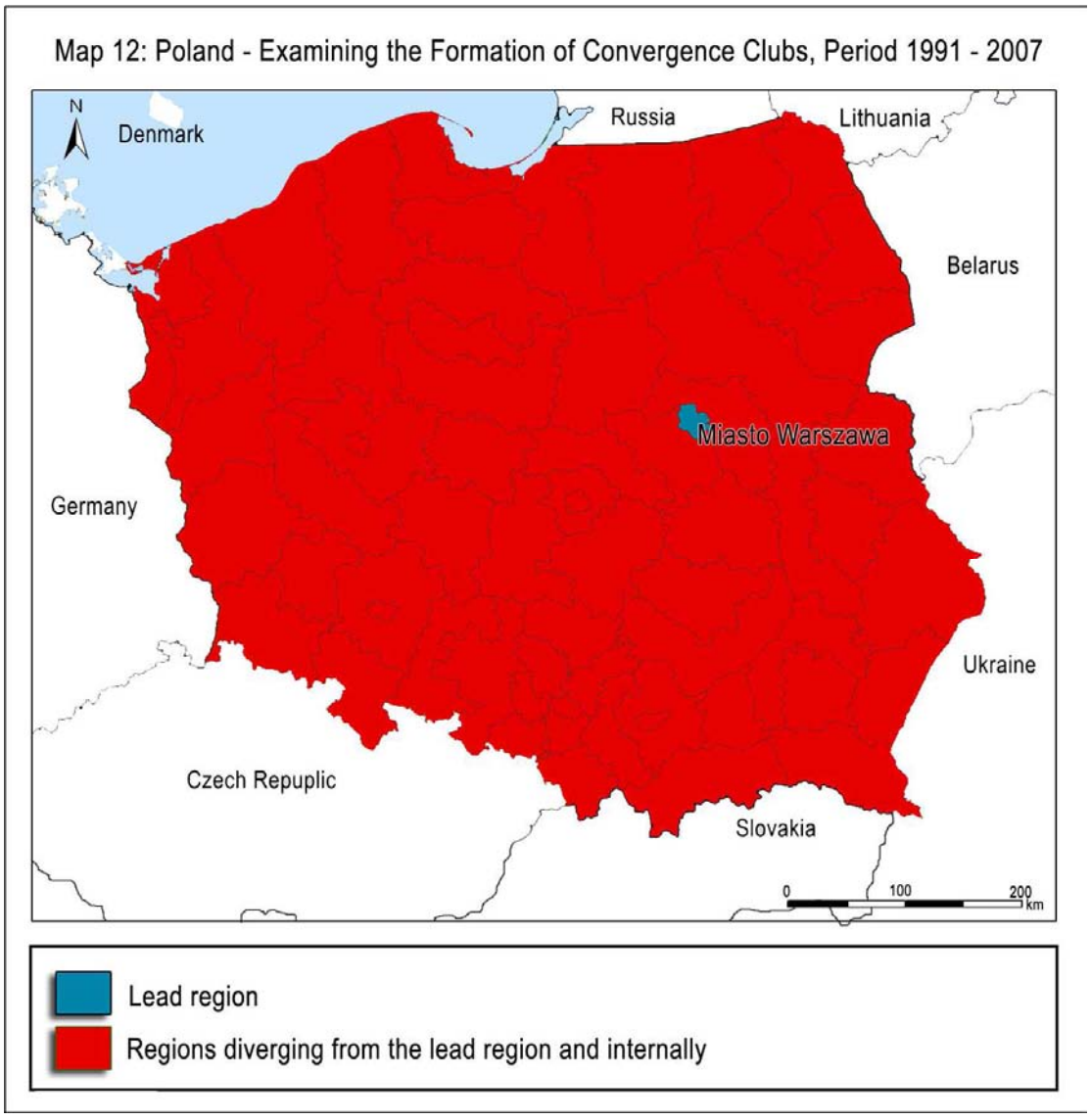
The equation of this model has the form: $y = 2.152x^3 - 5.426x^2 + 4.764x$ and is depicted in Figure 14 compared to the equation of the function $y = x$, which is used as a benchmark in order to identify the formation of convergence clubs. The horizontal axis represents the initial income gap (GAP_{1991}) and the vertical axis represents the terminal income gap (GAP_{2007}). The equations are intersected only at the begging of the axes: (0,0).

Figure 14: Poland - Relation between the initial (1991) and terminal (2007) income gap



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

Convergence clubs are not formed in Poland. During the period 1991-2007, the estimated function of Poland is above the line of the benchmark function in the upper right quadrant. Thus, no convergence club can be identified. All regions of Poland diverge from the lead region, as their terminal gaps tend to be larger than the initial ones, and, furthermore, diverge internally. In the Appendix, Table A.12 presents the regions described above.



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

4.3.13 PORTUGAL

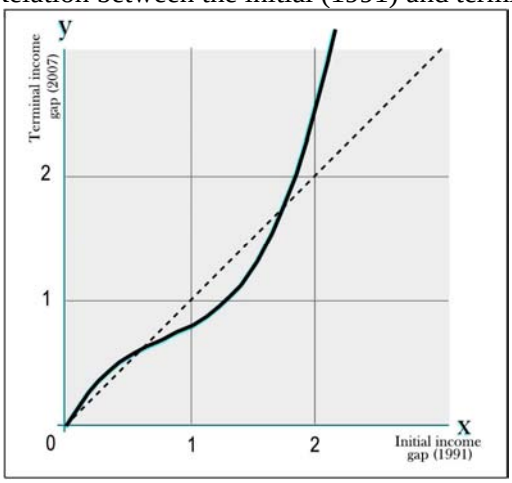
Portugal consists of 28 regions of NUTS III spatial level. The observations are weighted to the variable of population at the initial year (POP_{1991}). In the case of Portugal, the econometric results indicate a non-linear relation between the independent (GAP_{1991}) and the dependent (GAP_{2007}) variable. The independent variable explains 97% of the dependent variable's variability. This arises from the rate of the adjusted coefficient of determination ($R^2_{adj.}$) having coefficients which are statistically significant at the level of 1%.

Table 13: Portugal - Econometric Estimation, Period 1991-2007
GAP2007 = 0.762 GAP1991^3 - 1.794 GAP1991^2 + 1.845 GAP1991 (0.0072)*** (0.0010)*** (0.0000)***
$R^2_{adj.}$ = 0.966
Weighting variable: $POP_{1991,r}$
N = 28 observations (NUTS III regions)
*** statistically significant at the level of 1%

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

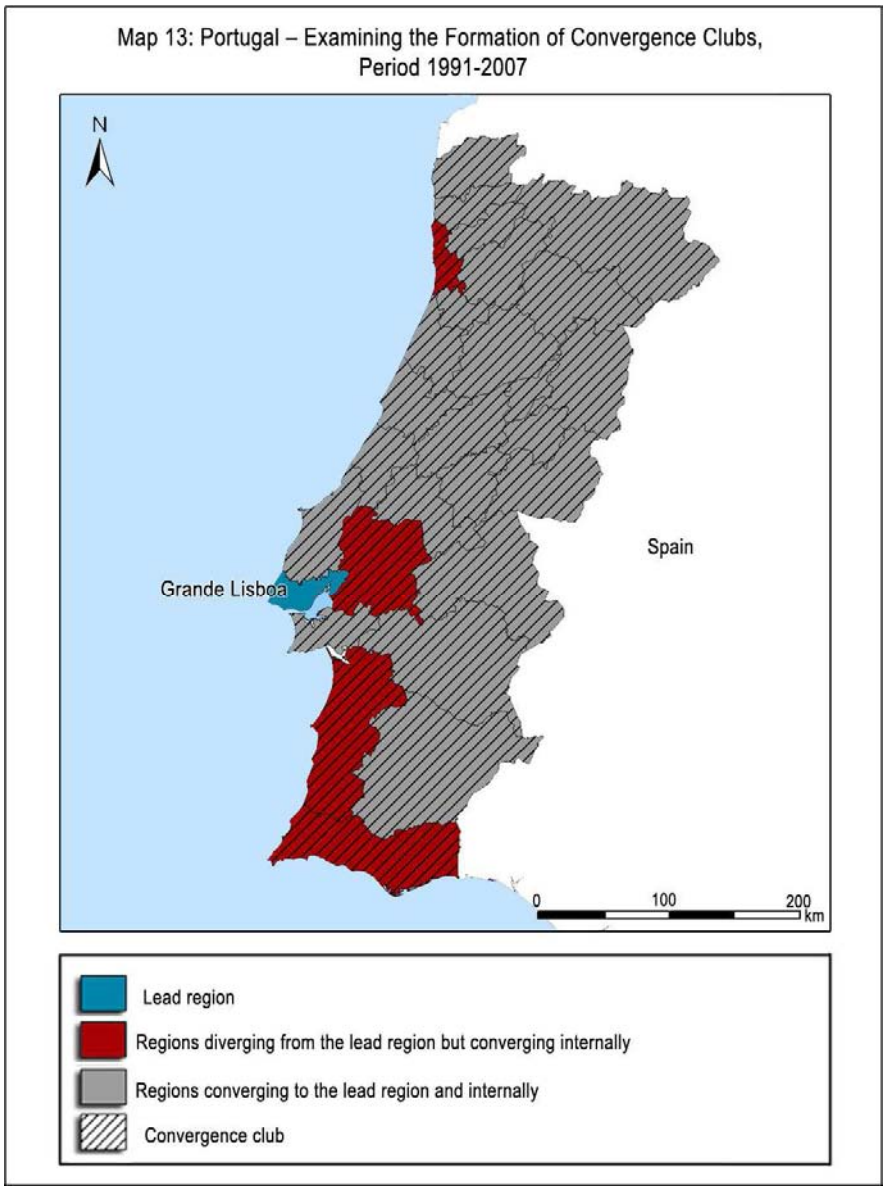
The equation of this model has the form: $y = 0.762x^3 – 1.794x^2 + 1.845x$ and is depicted in Figure 15 compared to the equation of the function $y = x$, which is used as a benchmark in order to identify the formation of convergence clubs. The horizontal axis represents the initial income gap (GAP_{1991}) and the vertical axis represents the terminal income gap (GAP_{2007}). The equations are intersected at the three points: (0,0), (0.651,0.651) and (1.703,1.703).

Figure 15: Portugal - Relation between the initial (1991) and terminal (2007) income gap



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

In Portugal, one convergence club is formed which consists of two groups of regions. There are 4 regions, out of 28 in total, which have initial income gaps smaller than 0.651. These regions diverge from the lead region, as their terminal gaps tend to be larger than the initial ones, but converge internally to a gap of 0.651. The 23 rest regions, with initial income gaps between 0.651-1.703, converge to the leader, as their terminal gaps tend to be smaller than the initial ones and also converge internally to a gap of 0.651. Thus, the two previous groups of regions constitute a wider convergence club at a gap of 0.651. Finally, regions with initial income gaps larger than 1.703 diverge from the lead region, diverge from the 1st convergence club and also diverge internally. During the period of analysis, 1991-2007, no regions are found at this category. In the Appendix, Table A.13 presents the regions described above.



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

4.3.14 SPAIN

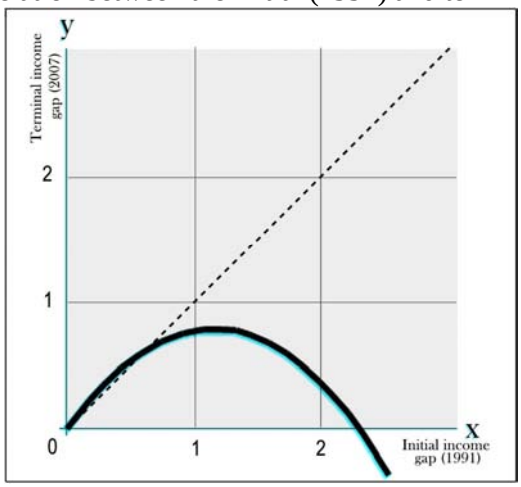
Spain consists of 52 regions of NUTS III spatial level. The observations are weighted to the variable of population at the initial year (POP_{1991}). In the case of Spain, the econometric results indicate a non-linear relation between the independent (GAP_{1991}) and the dependent (GAP_{2007}) variable. The independent variable explains 97% of the dependent variable's variability. This arises from the rate of the adjusted coefficient of determination ($R^2_{adj.}$) having coefficients which are statistically significant at the level of 1%.

Table 14: Spain- Econometric Estimation, Period 1991-2007
GAP2007 = - 0.595 GAP1991^2 + 1.377 GAP1991 (0.0000)*** (0.0000)***
$R^2_{adj.}$ = 0.971
Weighting variable: $POP_{1991,r}$
N = 52 observations (NUTS III regions)
*** statistically significant at the level of 1%

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

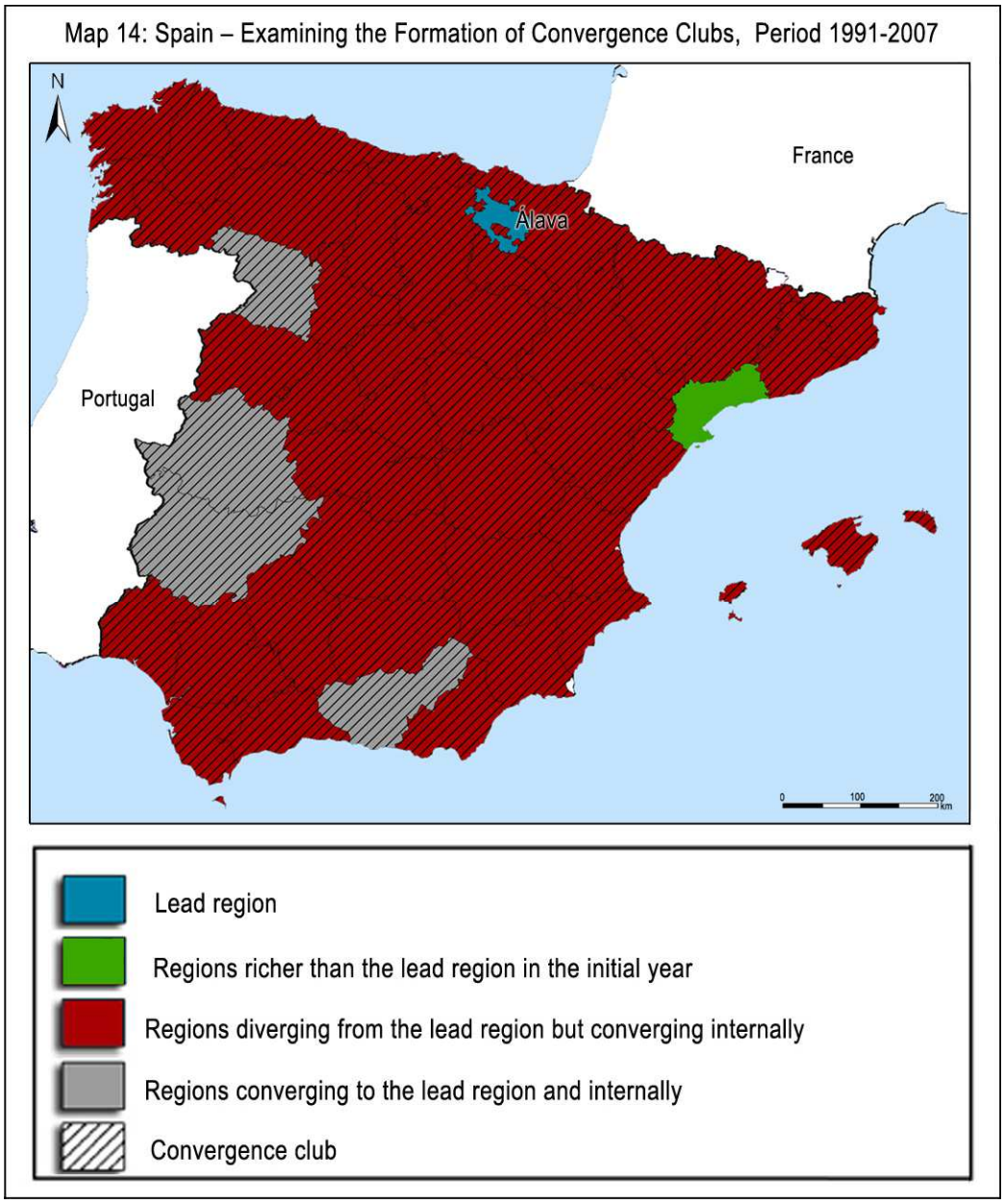
The equation of this model has the form: $y = -0.595x^2 + 1.377x$ and is depicted in Figure 16 compared to the equation of the function $y = x$, which is used as a benchmark in order to identify the formation of convergence clubs. The horizontal axis represents the initial income gap (GAP_{1991}) and the vertical axis represents the terminal income gap (GAP_{2007}). The equations are intersected at the two points: (0,0) and (0.634,0.634).

Figure 16: Spain - Relation between the initial (1991) and terminal (2007) income gap



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

One convergence club is formed in Spain and consists of two groups of regions. There are 46 regions, out of 52, having initial income gaps smaller than 0.634. These regions diverge from the lead region, as their terminal gaps tend to be larger than the initial ones, but converge internally to a gap of 0.634. Four regions with initial income gaps larger than 0.550 converge not only to the leader, as their terminal gaps tend to be smaller than the initial ones, but also internally to a gap of 0.634. Thus, the two previous groups constitute a wider convergence club at a gap of 0.634. In addition, there is one region which was richer than the lead region in 1991. In the Appendix, Table A.14 presents the regions described above.



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

4.3.15 SWEDEN

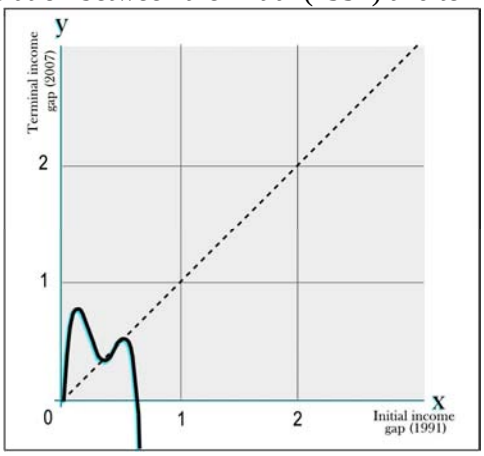
Sweden consists of 21 regions of NUTS III spatial level. The observations are weighted to the variable of population at the initial year (POP_{1991}). In the case of Sweden, the econometric results indicate a non-linear relation between the independent (GAP_{1991}) and the dependent (GAP_{2007}) variable. The independent variable explains 96% of the dependent variable's variability. This arises from the rate of the adjusted coefficient of determination ($R^2_{adj.}$) having coefficients which are statistically significant at the level of 1%.

Table 15: Sweden – Econometric Estimation, Period 1991-2007
GAP2007 = - 202.389 GAP1991^4 + 261.693 GAP1991^3 - 111.171 GAP1991^2 (0.0033)*** (0.0022)*** (0.0013)*** + 16.569 GAP1991 (0.0004)***
$R^2_{adj.}$ = 0.958
Weighting variable: $POP_{1991,r}$
N = 21 observations (NUTS III regions)
*** statistically significant at the level of 1%

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

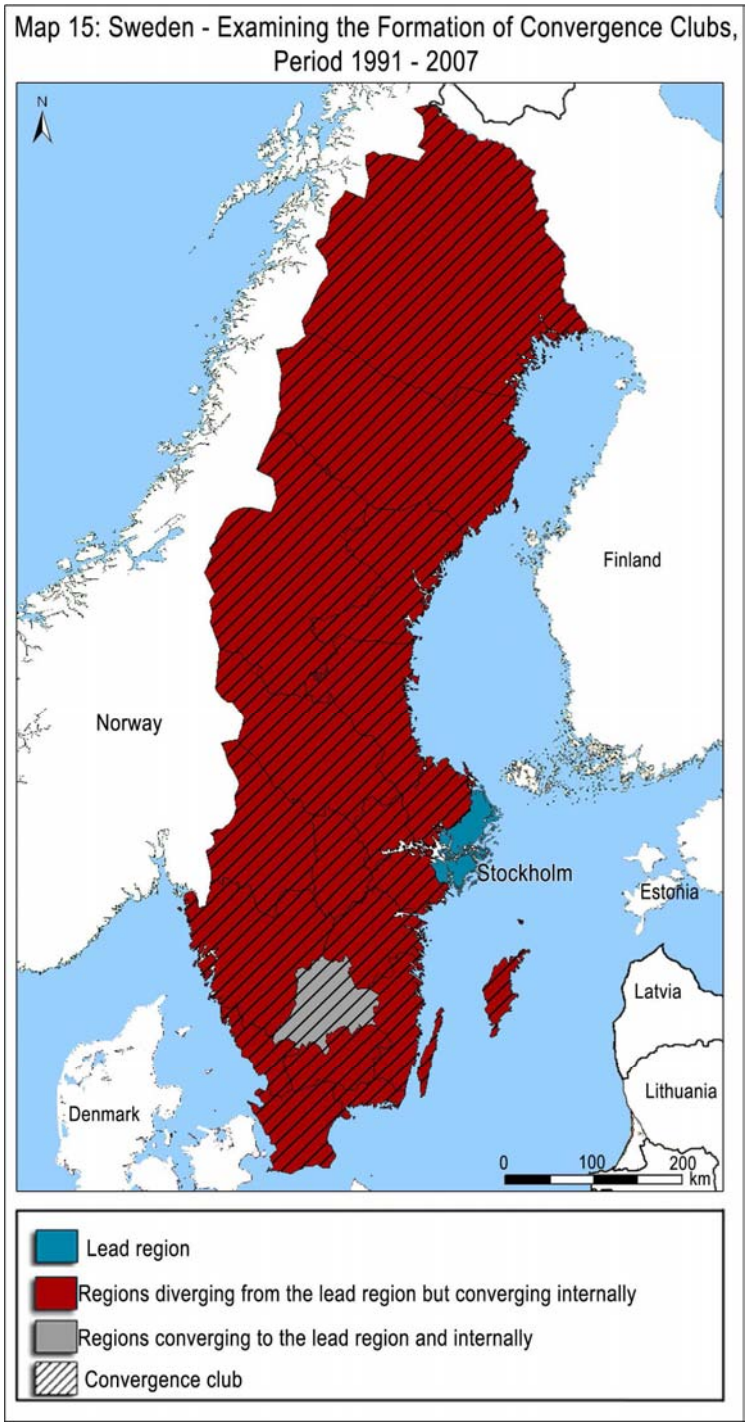
The equation of this model has the form: $y = -202.389x^4 + 261.693x^3 - 111.171x^2 + 16.569x$ and is depicted in Figure 17 compared to the equation of the function $y = x$, which is used as a benchmark in order to identify the formation of convergence clubs. The horizontal axis represents the initial income gap (GAP_{1991}) and the vertical axis represents the terminal income gap (GAP_{2007}). The equations are intersected at the two points: (0,0) and (0.536,0.536).

Figure 17: Sweden - Relation between the initial (1991) and terminal (2007) income gap



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

In Sweden, One convergence club is formed which consists of two groups of regions. There are 19 regions, out of 21, having initial income gaps smaller than 0.536. These regions diverge from the lead region, as their terminal gaps tend to be larger than the initial ones, but converge internally to a gap of 0.536. There is one region with initial income gap larger than 0.536 which converges not only to the leader, as its terminal gap tends to be smaller than the initial one, but also internally to a gap of 0.536. Thus, the two previous groups constitute a wider convergence club at a gap of 0.536. In the Appendix, Table A.15 presents the regions described above.



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

4.3.16 UNITED KINGDOM

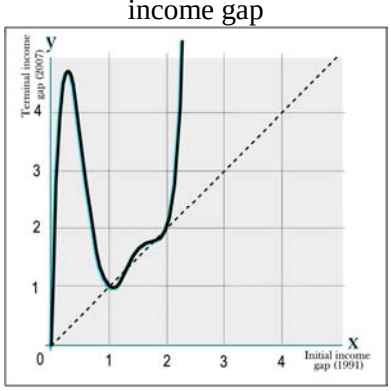
The United Kingdom consists of 133 regions of NUTS III spatial level. The observations are weighted to the variable of population at the initial year (POP_{1991}). In the case of the United Kingdom, the econometric results indicate a non-linear relation between the independent (GAP_{1991}) and the dependent (GAP_{2007}) variable. The independent variable explains 98% of the dependent variable's variability. This arises from the rate of the adjusted coefficient of determination ($R^2_{adj.}$) having coefficients which are statistically significant at the level of 1%.

Table 16: United Kingdom – Econometric Estimation, Period 1991-2007
GAP2007 = 8.022 GAP1991^5 - 48.913 GAP1991^4 + 109.751 GAP1991^3 (0.0105)*** (0.0079)*** (0.0062)*** - 107.148 GAP1991^2 + 39.335 GAP1991 (0.0053)*** (0.0040)***
$R^2_{adj.}$ = 0.980
Weighting variable: $POP_{1991,r}$
N = 133 observations (NUTS III regions)
*** statistically significant at the level of 1%

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

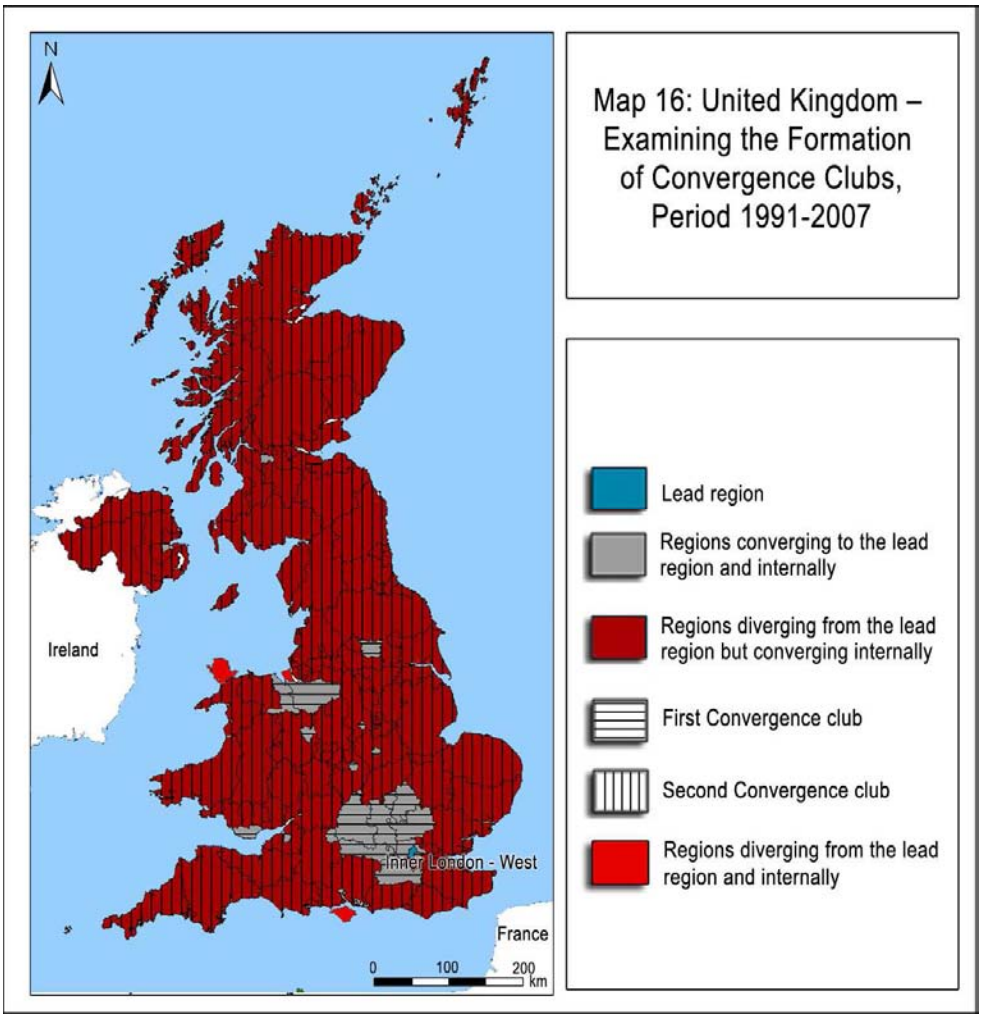
The equation of this model has the form: $y = 8.022x^5 – 48.913x^4 + 109.751x^3 – 107.148x^2 + 39.335x$ and is depicted in Figure 18 compared to the equation of the function $y = x$, which is used as a benchmark in order to identify the formation of convergence clubs. The horizontal axis represents the initial income gap (GAP_{1991}) and the vertical axis represents the terminal income gap (GAP_{2007}). The equations are intersected at the five points: (0,0), (1.023,1.023), (1.340,1.340), (1.864,1.864) and (1.871,1.871).

Figure 18: United Kingdom - Relation between the initial (1991) and terminal (2007) income gap



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

Two convergence clubs are formed in United Kingdom. More precisely, the first one consists of two groups. The first group includes 3 regions, out of 133, with initial income gaps less than 1.023. These regions diverge from the lead region, as their terminal gaps tend to be larger than the initial ones, but converge internally to a gap of 1.023. The other group includes 24 regions which have initial income gaps between 1.023 and 1.340. These regions converge to the lead region and also internally to a gap of 1.023. The second convergence club consists of two groups, too. The first group of this club includes 102 regions with initial income gaps between 1.340 and 1.864. These regions diverge from the lead region and from the first convergence club, but converge internally to a gap of 1.864. The second group of the last club can include regions with initial income gaps between 1.864 and 1.871. In the period of analysis, 1991-2007, none region was identified in this group. Finally, the rest 3 regions with initial income gaps larger than 1.871 diverge from the lead region, diverge from the two convergence clubs and, furthermore, diverge internally. In the Appendix, Table A.16 presents the regions described above.



Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

5. CONCLUDING REMARKS

The convergence issue has preoccupied the scientists very much. That's why there is a plethora of studies examining the convergence or divergence trends between countries or regions. Convergence has three main concepts: (absolute or conditional) β-convergence, σ-convergence and convergence clubs. Despite the numerous studies, there has been relative neglect of the concept of convergence club. The majority of the studies have used β-convergence and σ-convergence methods. However, β-convergence and σ-convergence analysis are based on econometric models with linear relations. These models are characterized by doubts and disputes because they might give a misleading picture of convergence or divergence trends and have failed to reach clear and final conclusions.

Convergence clubs analysis is based on more recent models of economic growth with non- linear relations. These models can provide more analytical and realistic conclusions with regard to the evolution of regional inequalities. The purpose of the present master thesis was to investigate econometrically the existence of income convergence clubs both in the European Union as a whole and, more specifically, in each European Member State. However, this was not feasible in some countries due to their insufficient (small) number of observations (regions). Furthermore, some other countries were excluded because a satisfying econometric model wasn't found there and, as a result, an equation for convergence clubs. So, the countries included are 15: Austria, Belgium, Bulgaria, Finland, France, Germany, Greece, Hungary, Italy, Netherlands, Poland, Portugal, Spain, Sweden, and United Kingdom. The investigation referred to NUTS III spatial level, employed GDP per capita and covered the period 1991-2007.

The econometric results are different from country to country. With regard to the European Union as a whole, the results show the formation of a single convergence club which consists of two groups of regions. The first group includes regions that diverge from the lead region but converge internally, and the second one includes regions that converge to the lead region and internally. Regions belonging to the second group of the convergence club refer mostly to the regions of the countries of the two last enlargements. This can be explained by the fact that these countries,

although they remain poorer than the older member states, had faster growth rates since they joined the European Union.

Convergence clubs are not formed only in Bulgaria, Greece and Poland since, in these countries, all regions diverge from the lead region. This can be explained by the fact that the above three countries are characterized by metropolitan structure meaning that the per capita GDP of the lead region is at a significant distance from those of the rest ones.

One convergence club is formed in most of the countries: Austria, France, Belgium, Finland, Germany, Hungary, Portugal, Spain, and Sweden. The convergence club that is formed in Austria and France consists of regions that converge to the lead region and internally. The convergence club that is formed in Belgium, Finland, Germany, Hungary, Portugal, Spain, and Sweden consists of two groups of regions: the first group consists of regions that diverge from the lead region but converge internally and the second group consists of regions that converge to the lead region, with the regions of the first group and internally. In addition, one convergence club can be formed in Netherlands with regions that converge to the lead region and internally, but during the period of analysis, none of the regions belong to the relative category.

Two convergence clubs are formed in Italy and the United Kingdom. In Italy, the first club consists of regions that converge to the lead region and internally. The second one consists of two groups of regions: the first group consists of regions that diverge from the lead region but converge internally and the second group consists of regions that converge to the lead region, with the regions of the first group and internally. In the United Kingdom, the first club consists of two groups of regions: the first group consists of regions that diverge from the lead region but converge internally and the second group consists of regions that converge to the lead region, with the regions of the first group and internally. The second club also consists of two groups of regions: the first group consists of regions that diverge from the lead region and from the first convergence club but converge internally and the second group consists of regions that converge to the lead region, with the regions of the first group and internally.

In Bulgaria, Finland, Germany, Greece, Netherlands and Spain there are some regions that were richer than the lead region (the richest region in the final year: 2007) in the initial year of consideration (i.e. 1991).

In an effort to compare the results of the European countries with regard to their internal trends of convergence or divergence, no similarities can be found concerning the spatial parameter. There are not similar results between southern, eastern, northern or central countries. Furthermore, there are not any other similarities at the formation of convergence clubs considering the time that each country joined the EU.

It is believed that the results of this project contribute to the best understanding of the regional problem and raise the question about how proper the Regional Policy which is based on linear perceptions for non- linear issues is. In general, the results of this master thesis suggest that while there is no uniform pattern of convergence across all regions of each country and of the EU as a whole, some regions do appear to be following a convergence path and the existence of convergence clubs seem a plausible explanation. However, a policy and systematic programmes must be adopted in order to help the regions which diverge from the lead region.

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APPENDIX

Table A.1: European Union – Examining the Formation of Convergence Clubs, Period 1991-2007		
Lead region	1st convergence club	
(richest region in 2007)	(divergence from the lead region; internal convergence to a gap of 2.226)	(convergence to the lead region; internal convergence to a gap of 2.226)
Inner London - West	Mittelburgenland; Nordburgenland; Südburgenland; Mostviertel-Eisenwurzen; Niederösterreich-Süd; Sankt Pölten; Waldviertel; Weinviertel; Wiener Umland/Nordteil; Wiener Umland/Südteil; Wien; Klagenfurt-Villach; Oberkärnten; Unterkärnten; Graz; Liezen; Östliche Obersteiermark; Oststeiermark; West- und Südsteiermark; Westliche Obersteiermark; Innviertel; Linz-Wels; Mühlviertel; Steyr-Kirchdorf; Traunviertel; Lungau; Pinzgau-Pongau; Salzburg und Umgebung; Außerfern; Innsbruck; Osttirol; Tiroler Oberland; Tiroler Unterland; Bludenz-Bregenzer Wald; Rheintal-Bodenseegebiet; Région de Bruxelles-Capitale/Brussels Hoofdstedelijk Gewest; Arr. Antwerpen; Arr. Mechelen; Arr. Turnhout; Arr. Hasselt; Arr. Maaseik; Arr. Tongeren; Arr. Aalst; Arr. Dendermonde; Arr. Eeklo; Arr. Gent; Arr. Oudenaarde; Arr. Sint-Niklaas; Arr. Halle-Vilvoorde; Arr. Leuven; Arr. Brugge; Arr. Diksmuide; Arr. Ieper; Arr. Kortrijk; Arr. Oostende; Arr. Roeselare; Arr. Tielt; Arr. Veurne; Prov. Brabant Wallon; Arr. Ath; Arr. Charleroi; Arr. Mons; Arr. Mouscron; Arr. Soignies; Arr. Thuin; Arr. Tournai; Arr. Huy; Arr. Liège; Arr. Verviers; Arr. Waremme; Arr. Arlon; Arr. Bastogne; Arr. Marche-en-Famenne; Arr. Neufchâteau; Arr. Virton; Arr. Dinant; Arr. Namur; Arr. Philippeville; Cyprus; Stuttgart, Stadtkreis; Böblingen; Esslingen; Göppingen; Ludwigsburg; Rems-Murr-Kreis; Heilbronn, Stadtkreis; Heilbronn, Landkreis; Hohenlohekreis; Schwäbisch Hall; Main-Tauber-Kreis; Heidenheim; Ostalbkreis; Baden-Baden, Stadtkreis; Karlsruhe, Stadtkreis; Karlsruhe, Landkreis; Rastatt; Heidelberg, Stadtkreis; Mannheim, Stadtkreis; Neckar-Odenwald-Kreis; Rhein-Neckar-Kreis; Pforzheim, Stadtkreis; Calw; Enzkreis; Freudenstadt; Freiburg im Breisgau, Stadtkreis; Breisgau-Hochschwarzwald; Emmendingen; Ortenaukreis; Rottweil; Schwarzwald-Baar-Kreis; Tuttlingen; Konstanz; Lörrach; Waldshut; Reutlingen; Tübingen, Landkreis; Zollernalbkreis; Ulm, Stadtkreis; Alb-Donau-Kreis; Biberach; Bodenseekreis; Ravensburg; Sigmaringen; Ingolstadt, Kreisfreie Stadt; München, Kreisfreie Stadt; Rosenheim, Kreisfreie Stadt; Altötting; Berchtesgadener Land; Bad Tölz-Wolfratshausen; Dachau; Ebersberg; Eichstätt; Erding; Freising; Fürstenfeldbruck; Garmisch-Partenkirchen; Landsberg am Lech; Miesbach; Mühldorf am Inn; München, Landkreis; Neuburg-Schrobenhausen;	Vidin; Montana; Vratsa; Pleven; Lovech; Veliko Tarnovo; Gabrovo; Ruse; Razgrad; Silistra; Varna; Dobrich; Shumen; Targovishte; Burgas; Sliven; Yambol; Stara Zagora; Sofia (stolitsa); Sofia; Blagoevgrad; Pernik; Kyustendil; Plovdiv; Haskovo; Pazardzhik; Smolyan; Kardzhali; Praha; Střední Cechy; Jihocecký; Plzenský; Karlovarský; Ústecký; Liberecký; Královehradecký; Pardubický; Vysocina; Jihomoravský; Olomoucký; Zlínský; Moravskoslezko; Märkisch-Oderland; Oberhavel; Ostprignitz-Ruppin; Prignitz; Uckermark; Elbe-Elster; Havelland; Teltow-Fläming; Demmin; Güstrow; Mecklenburg-Strelitz; Müritz; Nordvorpommern; Nordwestmecklenburg; Ostvorpommern; Parchim; Rügen; Uecker-Randow; Annaberg; Chemnitzer Land; Freiberg; Mittlerer Erzgebirgskreis; Mittweida; Stollberg; Aue-Schwarzenberg; Zwickauer Land; Bautzen; Riesa-

	Pfaffenhofen an der Ilm; Rosenheim, Landkreis; Starnberg; Traunstein; Weilheim-Schongau; Landshut, Kreisfreie Stadt; Passau, Kreisfreie Stadt; Straubing, Kreisfreie Stadt; Deggendorf; Freyung-Grafenau; Kelheim; Landshut, Landkreis; Passau, Landkreis; Regen; Rottal-Inn; Straubing-Bogen; Dingolfing-Landau; Amberg, Kreisfreie Stadt; Regensburg, Kreisfreie Stadt; Weiden in der Oberpfalz, Kreisfreie Stadt; Amberg-Sulzbach; Cham; Neumarkt in der Oberpfalz; Neustadt an der Waldnaab; Regensburg, Landkreis; Schwandorf; Tirschenreuth; Bamberg, Kreisfreie Stadt; Bayreuth, Kreisfreie Stadt; Coburg, Kreisfreie Stadt; Hof, Kreisfreie Stadt; Bamberg, Landkreis; Bayreuth, Landkreis; Coburg, Landkreis; Forchheim; Hof, Landkreis; Kronach; Kulmbach; Lichtenfels; Wunsiedel im Fichtelgebirge; Ansbach, Kreisfreie Stadt; Erlangen, Kreisfreie Stadt; Fürth, Kreisfreie Stadt; Nürnberg, Kreisfreie Stadt; Schwabach, Kreisfreie Stadt; Ansbach, Landkreis; Erlangen-Höchstadt; Fürth, Landkreis; Nuernberger Land; Neustadt an der Aisch-Bad Windsheim; Roth; Weißenburg-Gunzenhausen; Aschaffenburg, Kreisfreie Stadt; Schweinfurt, Kreisfreie Stadt; Würzburg, Kreisfreie Stadt; Aschaffenburg, Landkreis; Bad Kissingen; Rhön-Grabfeld; Haßberge; Kitzingen; Miltenberg; Main-Spessart; Schweinfurt, Landkreis; Würzburg, Landkreis; Augsburg, Kreisfreie Stadt; Kaufbeuren, Kreisfreie Stadt Kempten (Allgäu), Kreisfreie Stadt; Memmingen, Kreisfreie Stadt; Aichach-Friedberg; Augsburg, Landkreis; Dillingen an der Donau; Günzburg; Neu-Ulm; Lindau (Bodensee); Ostallgäu; Unterallgäu; Donau-Ries; Oberallgäu; Berlin; Frankfurt (Oder), Kreisfreie Stadt; Barnim; Oder-Spree; Brandenburg an der Havel, Kreisfreie Stadt; Cottbus, Kreisfreie Stadt; Potsdam, Kreisfreie Stadt; Dahme-Spreewald; Oberspreewald-Lausitz; Potsdam-Mittelmark; Spree-Neiße; Bremen, Kreisfreie Stadt; Bremerhaven, Kreisfreie Stadt; Hamburg; Darmstadt, Kreisfreie Stadt; Frankfurt am Main, Kreisfreie Stadt; Offenbach am Main, Kreisfreie Stadt; Wiesbaden, Kreisfreie Stadt; Bergstraße; Darmstadt-Dieburg; Groß-Gerau; Hochtaunuskreis; Main-Kinzig-Kreis; Main-Taunus-Kreis; Odenwaldkreis; Offenbach, Landkreis; Rheingau-Taunus-Kreis; Wetteraukreis; Gießen, Landkreis; Lahn-Dill-Kreis; Limburg-Weilburg; Marburg-Biedenkopf; Vogelsbergkreis; Kassel, Kreisfreie Stadt; Fulda; Hersfeld-Rotenburg; Kassel, Landkreis; Schwalm-Eder-Kreis; Waldeck-Frankenberg; Werra-Meißner-Kreis; Greifswald, Kreisfreie Stadt; Neubrandenburg, Kreisfreie Stadt; Rostock, Kreisfreie Stadt; Schwerin, Kreisfreie Stadt; Stralsund, Kreisfreie Stadt; Wismar, Kreisfreie Stadt; Bad Doberan; Ludwigslust;	Großenhain; Löbau-Zittau; Weißeritzkreis; Döbeln; Leipziger Land; Muldentalkreis; Torgau-Oschatz; Anhalt-Zerbst; Bernburg; Bitterfeld; Köthen; Wittenberg; Burgenlandkreis; Mansfelder Land; Saalkreis; Sangerhausen; Weißenfels; Aschersleben-Staßfurt; Bördekreis; Halberstadt; Ohrekreis; Quedlinburg; Schönebeck; Altmarkkreis Salzwedel; Gera, Kreisfreie Stadt; Eichsfeld; Unstrut-Hainich-Kreis; Kyffhäuserkreis; Schmalkalden-Meiningen; Gotha; Sömmerda; Hildburghausen; Ilm-Kreis; Weimarer Land; Sonneberg; Saalfeld-Rudolstadt; Saale-Holzland-Kreis; Saale-Orla-Kreis; Greiz; Altenburger Land; Põhja-Eesti; Lääne-Eesti; Kesk-Eesti; Kirde-Eesti; Lõuna-Eesti; Zamora; Badajoz; Cáceres; Granada; Evros; Xanthi; Rodopi; Pieria; Serres; Grevena; Kastoria; Florina; Larisa; Trikala; Arta; Thesprotia; Ioannina; Preveza; Zakynthos; Kerkyra; Kefallinia; Lefkada; Aitoloakarnania; Achaia; Ileia; Argolida; Arkadia; Lakonia; Messinia; Lesvos; Chios; Rethymni; Budapest; Pest; Fejér; Komárom-Esztergom; Veszprém; Gyor-Moson-

	Braunschweig, Kreisfreie Stadt Salzgitter, Kreisfreie Stadt; Wolfsburg, Kreisfreie Stadt; Gifhorn; Göttingen; Goslar; Helmstedt; Northeim; Osterode am Harz; Peine; Wolfenbüttel; Diepholz; Hameln-Pyrmont; Hildesheim; Holzminden; Nienburg (Weser); Schaumburg; Region Hannover; Celle; Cuxhaven; Harburg; Lüchow-Dannenberg; Lüneburg, Landkreis; Osterholz; Rotenburg (Wümme); Soltau-Fallingbostel; Stade; Uelzen; Verden; Delmenhorst, Kreisfreie Stadt; Emden, Kreisfreie Stadt; Oldenburg (Oldenburg), Kreisfreie Stadt; Osnabrück, Kreisfreie Stadt; Wilhelmshaven, Kreisfreie Stadt; Ammerland; Aurich; Cloppenburg; Emsland; Friesland; Grafschaft Bentheim; Leer; Oldenburg, Landkreis; Osnabrück, Landkreis; Vechta; Wesermarsch; Wittmund; Düsseldorf, Kreisfreie Stadt; Duisburg, Kreisfreie Stadt; Essen, Kreisfreie Stadt; Krefeld, Kreisfreie Stadt; Mönchengladbach, Kreisfreie Stadt; Mülheim an der Ruhr, Kreisfreie Stadt; Oberhausen, Kreisfreie Stadt; Remscheid, Kreisfreie Stadt; Solingen, Kreisfreie Stadt; Wuppertal, Kreisfreie Stadt; Kleve; Mettmann; Neuss; Viersen; Wesel; Aachen, Kreisfreie Stadt; Bonn, Kreisfreie Stadt; Köln, Kreisfreie Stadt; Leverkusen, Kreisfreie Stadt; Aachen, Landkreis; Düren; Erftkreis; Euskirchen; Heinsberg; Oberbergischer Kreis; Rheinisch-Bergischer-Kreis; Rhein-Sieg-Kreis; Bottrop, Kreisfreie Stadt; Gelsenkirchen, Kreisfreie Stadt; Münster, Kreisfreie Stadt; Borken; Coesfeld; Recklinghausen; Steinfurt; Warendorf; Bielefeld, Kreisfreie Stadt; Gütersloh; Herford; Höxter; Lippe; Minden-Lübbecke; Paderborn; Bochum, Kreisfreie Stadt; Dortmund, Kreisfreie Stadt; Hagen, Kreisfreie Stadt; Hamm, Kreisfreie Stadt; Herne, Kreisfreie Stadt; Ennepe-Ruhr-Kreis; Hochsauerlandkreis; Märkischer Kreis; Olpe; Siegen-Wittgenstein; Soest; Unna; Koblenz, Kreisfreie Stadt; Ahrweiler; Altenkirchen (Westerwald); Bad Kreuznach; Birkenfeld; Cochem-Zell; Mayen-Koblenz; Neuwied; Rhein-Hunsrück-Kreis; Rhein-Lahn-Kreis; Westerwaldkreis; Trier, Kreisfreie Stadt; Bernkastel-Wittlich; Bitburg-Prüm; Daun; Trier-Saarburg; Frankenthal (Pfalz), Kreisfreie Stadt; Kaiserslautern, Kreisfreie Stadt; Landau in der Pfalz, Kreisfreie Stadt; Ludwigshafen am Rhein, Kreisfreie Stadt; Mainz, Kreisfreie Stadt; Neustadt an der Weinstraße, Kreisfreie Stadt; Pirmasens, Kreisfreie Stadt; Speyer, Kreisfreie Stadt; Worms, Kreisfreie Stadt; Zweibrücken, Kreisfreie Stadt; Alzey-Worms; Bad Dürkheim; Donnersbergkreis; Germersheim; Kaiserslautern, Landkreis; Kusel; Südliche Weinstraße; Ludwigshafen, Landkreis; Mainz-Bingen; Südwestpfalz; Saarbrücken, Stadtverband; Merzig-Wadern; Neunkirchen; Saarlouis; Saarpfalz-Kreis; Sankt Wendel;	Sopron; Vas; Zala; Baranya; Somogy; Tolna; Borsod-Abaúj-Zemplén; Heves; Nógrád; Hajdú-Bihar; Jász-Nagykun-Szolnok; Szabolcs-Szatmár-Bereg; Bács-Kiskun; Békés; Csongrád; Crotone; Alytaus (Apskritis); Kauno (Apskritis); Klaipedos (Apskritis); Marijampoles (Apskritis); Panevezio (Apskritis); Siauliu (Apskritis); Taurages (Apskritis); Telsiu (Apskritis); Utenos (Apskritis); Vilniaus (Apskritis); Kurzeme; Latgale; Riga; Pieriga; Vidzeme; Zemgale; Malta; Gozo and Comino / Ghawdex u Kemmuna; Lódzki; Piotrkowsko-skierniewicki; Miasto Lódz; Ciechanowsko-plocki; Ostrolecko-siedlecki; Radomski; Warszawski; Miasto Warszawa; Krakowsko-tarnowski; Nowosadecki; Miasto Kraków; Czestochowski; Bielsko-bialski; Centralny slaski; Rybnicko-jastrzebski; Bialskopodlaski; Chelmsko-zamojski; Lubelski; Rzeszowsko-tarnobrzeski; Krosniensko-przemyski; Swietokrzyskie; Bialostocko-suwalski; Lomzynski; Pilski; Poznanski; Kaliski; Koninski; Miasto Poznan; Szczecinski; Koszalinski; Gorzowski; Zielonogórski; Jeleniogórsko-

	Chemnitz, Kreisfreie Stadt; Plauen, Kreisfreie Stadt; Zwickau, Kreisfreie Stadt; Vogtlandkreis; Dresden, Kreisfreie Stadt; Görlitz, Kreisfreie Stadt; Hoyerswerda, Kreisfreie Stadt; Meissen; Niederschlesischer Oberlausitzkreis; Sächsische Schweiz; Kamenz; Leipzig, Kreisfreie Stadt; Delitzsch; Dessau, Kreisfreie Stadt; Halle/Saale, Stadtkreis; Merseburg-Querfurt; Magdeburg, Kreisfreie Stadt; Jerichower Land; Stendal; Wernigerode; Flensburg, Kreisfreie Stadt; Kiel, Kreisfreie Stadt; Lübeck, Kreisfreie Stadt; Neumünster, Kreisfreie Stadt; Dithmarschen; Herzogtum Lauenburg; Nordfriesland; Ostholstein; Pinneberg; Plön; Rendsburg-Eckernförde; Schleswig-Flensburg; Segeberg; Steinburg; Stormarn; Erfurt, Kreisfreie Stadt; Jena, Kreisfreie Stadt; Suhl, Kreisfreie Stadt; Weimar, Kreisfreie Stadt; Nordhausen; Eisenach, Kreisfreie Stadt; Wartburgkreis; Byen København; Københavns omegn; Nordsjælland; Roskilde amt; Vestsjællands amt; Storstrøms amt; Bornholm; Fyns amt; Sønderjyllands amt; Ribe amt; Vejle amt; Ringkøbing amt; Århus amt; Viborg amt; Nordjyllands amt; La Coruña; Lugo; Orense; Pontevedra; Principado de Asturias; Cantabria; Álava; Guipúzcoa; Vizcaya; Comunidad Foral de Navarra; La Rioja; Huesca; Teruel; Zaragoza; Comunidad de Madrid; Avila; Burgos; León; Palencia; Salamanca; Segovia; Soria; Valladolid; Albacete; Ciudad Real; Cuenca; Guadalajara; Toledo; Barcelona; Gerona; Lérida; Tarragona; Alicante; Castellón de la Plana; Valencia; Illes Balears; Almería; Cadiz; Córdoba; Huelva; Jaén; Málaga; Sevilla; Región de Murcia; Ciudad Autónoma de Ceuta (ES); Ciudad Autónoma de Melilla (ES); Las Palmas; Santa Cruz De Tenerife; Etelä-Savo; Pohjois-Savo; Pohjois-Karjala; Kainuu; Uusimaa; Itä-Uusimaa; Varsinais-Suomi; Kanta-Häme; Päijät-Häme; Kymenlaakso; Etelä-Karjala; Satakunta; Pirkanmaa; Keski-Suomi; Etelä-Pohjanmaa; Pohjanmaa; Keski-Pohjanmaa; Pohjois-Pohjanmaa; Lappi; Åland; Paris; Seine-et-Marne; Yvelines; Essonne; Hauts-de-Seine; Seine-Saint-Denis; Val-de-Marne; Val-d'Oise; Ardennes; Aube; Marne; Haute-Marne; Aisne; Oise; Somme; Eure; Seine-Maritime; Cher; Eure-et-Loir; Indre; Indre-et-Loire; Loir-et-Cher; Loiret; Calvados; Manche; Orne; Côte-d'Or; Nièvre; Saône-et-Loire; Yonne; Nord; Pas-de-Calais; Meurthe-et-Moselle; Meuse; Moselle; Vosges; Bas-Rhin; Haut-Rhin; Doubs; Jura; Haute-Saône; Territoire de Belfort; Loire-Atlantique; Maine-et-Loire; Mayenne; Sarthe; Vendée; Côte-du-Nord; Finistère; Ille-et-Vilaine; Morbihan; Charente; Charente-Maritime; Deux-Sèvres; Vienne; Dordogne; Gironde; Landes; Lot-et-Garonne; Pyrénées-Atlantiques; Ariège; Aveyron; Haute-Garonne; Gers; Lot; Hautes-Pyrénées; Tarn; Tarn-et-Garonne; Corrèze; Creuse; Haute-Vienne; Ain; Ardèche; Drôme; Isère;	walbrzyski; Legnicki; Wroclawski; Miasto Wroclaw; Opolskie; Bydgoski; Torunsko-wloclawski; Elblaski; Olsztynski; Elcki; Slupski; Gdanski; Gdansk-Gdynia-Sopot; Minho-Lima; Cávado; Ave; Tâmega; Entre Douro e Vouga; Douro; Alto Trás-os-Montes; Baixo Vouga; Baixo Mondego; Pinhal Litoral; Pinhal Interior Norte; Dão-Lafões; Pinhal Interior Sul; Serra da Estrela; Beira Interior Norte; Beira Interior Sul; Cova da Beira; Oeste; Médio Tejo; Península de Setúbal; Alto Alentejo; Alentejo Central; Baixo Alentejo; Lezíria do Tejo; Bihor; Bistrita-Nasaud; Cluj; Maramures; Satu Mare; Salaj; Alba; Brasov; Covasna; Harghita; Mures; Sibiu; Bacau; Botosani; Iasi; Neamt; Suceava; Vaslui; Braila; Buzau; Constanta; Galati; Tulcea; Vrancea; Arges; Calarasi; Dâmbovita; Giurgiu; Ialomita; Prahova; Teleorman; Bucuresti; Ilfov; Dolj; Gorj; Mehedinti; Olt; Vâlcea; Arad; Caras-Severin; Hunedoara; Timis; Pomurska; Podravska; Koroska; Savinjska; Zasavska; Spodnjeposavska; Gorenjska; Notranjsko-kraska; Goriska; Obalno-kraska; Jugovzhodna Slovenija; Bratislavský kraj; Trnavský kraj; Trencianský

	Loire; Rhône; Savoie; Haute-Savoie; Allier; Cantal; Haute-Loire; Puy-de-Dôme; Aude; Gard; Hérault; Lozère; Pyrénées-Orientales; Alpes-de-Haute-Provence; Hautes-Alpes; Alpes-Maritimes; Bouches-du-Rhône; Var; Vaucluse; Corse-du-Sud; Haute-Corse; Drama; Kavala; Imathia; Thessaloniki; Kilkis; Pella; Chalkidiki; Kozani; Karditsa; Magnisia; Voiotia; Evvoia; Evrytania; Fthiotida; Fokida; Korinthia; Attiki; Samos; Dodekanisos; Kyklades; Irakleio; Lasithi; Chania; Border; Midlands; West; Dublin; Mid-East; Midwest; South-East (IE); South-West (IE); Torino; Vercelli; Biella; Verbano-Cusio-Ossola; Novara; Cuneo; Asti; Alessandria; Valle d'Aosta/Vallée d'Aoste; Imperia; Savona; Genova; La Spezia; Varese; Como; Lecco; Sondrio; Milano; Bergamo; Brescia; Pavia; Lodi; Cremona; Mantova; Provincia Autonoma Bolzano-Bozen; Provincia Autonoma Trento; Verona; Vicenza; Belluno; Treviso; Venezia; Padova; Rovigo; Pordenone; Udine; Gorizia; Trieste; Piacenza; Parma; Reggio nell'Emilia; Modena; Bologna; Ferrara; Ravenna; Forlì-Cesena; Rimini; Massa-Carrara; Lucca; Pistoia; Firenze; Prato; Livorno; Pisa; Arezzo; Siena; Grosseto; Perugia; Terni; Pesaro e Urbino; Ancona; Macerata; Ascoli Piceno; Viterbo; Rieti; Roma; Latina; Frosinone; L'Aquila; Teramo; Pescara; Chieti; Isernia; Campobasso; Caserta; Benevento; Napoli; Avellino; Salerno; Foggia; Bari; Taranto; Brindisi; Lecce; Potenza; Matera; Cosenza; Catanzaro; Vibo Valentia; Reggio di Calabria; Trapani; Palermo; Messina; Agrigento; Caltanissetta; Enna; Catania; Ragusa; Siracusa; Sassari; Nuoro; Oristano; Cagliari; Luxembourg; Oost-Groningen; Delfzijl en omgeving; Overig Groningen; Noord-Friesland; Zuidwest-Friesland; Zuidoost-Friesland; Noord-Drenthe; Zuidoost-Drenthe; Zuidwest-Drenthe; Noord-Overijssel; Zuidwest-Overijssel; Twente; Veluwe; Achterhoek; Arnhem/Nijmegen; Zuidwest-Gelderland; Flevoland; Utrecht; Kop van Noord-Holland; Alkmaar en omgeving; IJmond; Agglomeratie Haarlem; Zaanstreek; Groot-Amsterdam; Het Gooi en Vechtstreek; Agglomeratie Leiden en Bollenstreek; Agglomeratie 's –Gravenhage; Delft en Westland; Oost-Zuid-Holland; Groot-Rijnmond; Zuidoost Zuid-Holland; Zeeuwsch-Vlaanderen; Overig Zeeland; West-Noord-Brabant; Midden-Noord-Brabant; Noordoost-Noord-Brabant; Zuidoost-Noord-Brabant; Noord-Limburg; Midden-Limburg; Zuid-Limburg; Grande Porto; Algarve; Grande Lisboa; Alentejo Litoral; Stockholm; Uppsala län; Södermanlands län; Östergötlands län; Örebro län; Västmanlands län; Blekinge län; Skåne län; Värmlands län; Dalarnas län; Gävleborgs län; Västernorrlands län; Jämtlands län; Västerbottens län; Norrbottens län; Jönköpings län; Kronobergs län; Kalmar län; Gotlands län; Hallands län; Västra Götalands län; Osrednjeslovenska; Hartlepool and	kraj; Nitrianský kraj; Zilinský kraj; Banskobystrický kraj; Presovský kraj; Kosický kraj

	Stockton; South Teeside; Darlington; Durham CC; Northumberland; Tyneside; Sunderland; West Cumbria; East Cumbria; Halton and Warrington; Cheshire CC; Greater Manchester South; Greater Manchester North; Blackburn with Darwen; Blackpool; Lancashire CC; East Merseyside; Liverpool; Sefton; Wirral; City of Kingston upon Hull; East Riding of Yorkshire; North and North East Lincolnshire; York; North Yorkshire CC; Barnsley, Doncaster and Rotherham; Sheffield; Bradford; Leeds; Calderdale, Kirklees and Wakefield; Derby; East Derbyshire; South and West Derbyshire; Nottingham; North Nottinghamshire; South Nottinghamshire; Leicester City; Leicester CC and Rutland; Northamptonshire; Lincolnshire; Herefordshire; Worcestershire; Warwickshire; The Wrekin; Shropshire CC; Stoke-on-Trent; Staffordshire CC; Birmingham; Solihull; Coventry; Dudley and Sandwell; Walsall and Wolverhampton; Peterborough; Cambridgeshire CC; Norfolk; Suffolk; Luton; Bedfordshire CC; Hertfordshire; Southend-on-Sea; Thurrock; Essex CC; Inner London – East; Outer London - East and North East; Outer London – South; Outer London - West and North West; Berkshire; Milton Keynes; Buckinghamshire CC; Oxfordshire; Brighton and Hove; East Sussex CC; Surrey; West Sussex; Portsmouth; Southampton; Hampshire CC; Isle of Wight; Medway Towns; Kent CC; City of Bristol; North and North East Somerset, South Gloucestershire; Gloucestershire; Swindon; Wiltshire CC; Bournemouth and Poole; Dorset CC; Somerset; Cornwall and Isles of Scilly; Plymouth; Torbay; Devon CC; Isle of Anglesey; Gwynedd; Conwy and Denbighshire; South West Wales; Central Valleys; Gwent Valleys; Bridgend and Neath Port Talbot; Swansea; Monmouthshire and Newport; Cardiff and Vale of Glamorgan; Flintshire and Wrexham; Powys; North Eastern Scotland; Angus and Dundee City; Clackmannanshire and Fife; East Lothian and Midlothian; The Scottish Borders; Edinburgh, City of; Falkirk; Perth and Kinross, Stirling; West Lothian; East and West Dunbartonshire, Helensburgh and Lomond; Dumfries and Galloway; East Ayrshire and North Ayrshire Mainland; Glasgow City; Inverclyde, East Renfrewshire and Renfrewshire; North Lanarkshire; South Ayrshire; South Lanarkshire; Caithness and Sutherland, Ross and Cromarty; Inverness and Nairn, Moray, Badenoch and Strathspey; Lochaber, Skye and Lochalsh, Argyll and The Islands; Comhairle Nan Eilan (Western Isles); Orkney Islands; Shetland Islands; Belfast; Outer Belfast; East of Northern Ireland; North of Northern Ireland; West and South of Northern Ireland	

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

Table A.2: Austria – Examining the Formation of Convergence Clubs, Period 1991-2007	
Lead region	1st convergence club
(richest region in 2007)	(convergence to the lead region; internal convergence to a gap of 0.000)
Wien	Mittelburgenland; Nordburgenland; Südburgenland; Mostviertel-Eisenwurzen; Niederösterreich-Süd; Sankt Pölten; Waldviertel; Weinviertel; Wiener Umland/Nordteil; Wiener Umland/Südteil; Klagenfurt-Villach; Oberkärnten; Unterkärnten; Graz; Liezen; Östliche Obersteiermark; Oststeiermark; West- und Südsteiermark; Westliche Obersteiermark; Innviertel; Linz-Wels; Mühlviertel; Steyr-Kirchdorf; Traunviertel; Lungau; Pinzgau-Pongau; Salzburg und Umgebung; Außerfern; Innsbruck; Osttirol; Tiroler Oberland; Tiroler Unterland; Bludenz-Bregenzer Wald; Rheintal-Bodenseegebiet.

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

Table A.3: Belgium – Examining the Formation of Convergence Clubs, Period 1991-2007			
Lead region	1st convergence club		Divergence
(richest region in 2007)	(divergence from the lead region; internal convergence to a gap of 0.445)	(convergence to the lead region; convergence to the first convergence club; internal convergence to a gap of 0.445)	(divergence from the lead region; divergence from the previous convergence club; internal divergence)
Région de Bruxelles-Capitale/Brussels Hoofdstedelijk Gewest	Arr. Antwerpen	Arr. Mechelen; Arr. Turnhout; Arr. Hasselt; Arr. Maaseik; Arr. Tongeren; Arr. Aalst; Arr. Dendermonde ;Arr. Eeklo; Arr. Gent; Arr. Oudenaarde; Arr. Sint-Niklaas; Arr. Halle-Vilvoorde; Arr. Leuven; Arr. Brugge; Arr. Diksmuide; Arr. Ieper; Arr. Kortrijk; Arr. Oostende; Arr. Roeselare; Arr. Tielt; Arr. Veurne; Prov. Brabant Wallon; Arr. Ath; Arr. Charleroi; Arr. Mons; Arr. Mouscron; Arr. Soignies; Arr. Tournai; Arr. Huy; Arr. Liège; Arr. Verviers; Arr. Waremme; Arr. Arlon; Arr. Bastogne; Arr. Marche-en-Famenne; Arr. Neufchâteau; Arr. Virton; Arr. Dinant; Arr. Namur.	Arr. Thuin; Arr. Philippeville

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

Table A.4: Bulgaria – Examining the Formation of Convergence Clubs, Period 1991-2007		
Lead region		Divergence
(richest region in 2007)	(richer than the lead region in 1991)	(divergence from the lead region; internal divergence)
Vratsa	Stara Zagora; Sofia (stolitsa)	Vidin; Montana; Pleven; Lovech; VelikoTarnovo; Gabrovo; Ruse; Razgrad; Silistra; Varna; Dobrich; Shumen; Targovishte; Burgas; Sliven; Yambol; Sofia; Blagoevgrad; Pernik; Kyustendil; Plovdiv; Haskovo; Pazardzhik; Smolyan; Kardzhali

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

Table A.5: Finland – Examining the Formation of Convergence Clubs, Period 1991-2007			
Lead region		1st convergence club	
(richest region in 2007)	(richer than the lead region in 1991)	(divergence from the lead region; internal convergence to a gap of 0.575)	(convergence to the lead region; convergence to the first convergence club; internal convergence to a gap of 0.575)
Uusimaa	Åland	Etelä-Savo; Pohjois-Savo; Pohjois-Karjala; Kainuu; Itä-Uusimaa; Varsinais-Suomi; Kanta-Häme; Päijät-Häme; Kymenlaakso; Etelä-Karjala; Satakunta; Pirkanmaa; Keski-Suomi; Pohjanmaa; Keski-Pohjanmaa; Pohjois-Pohjanmaa; Lappi	Etelä-Pohjanmaa

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

Table A.6: France – Examining the Formation of Convergence Clubs, Period 1991-2007		
Lead region	1st convergence club	Divergence
(richest region in 2007)	(convergence to the lead region; internal convergence to a gap of 0.707)	(divergence from the lead region; internal divergence)
Paris	Hauts-de-Seine	Seine-et-Marne; Yvelines; Essonne; Seine-Saint-Denis; Val-de-Marne; Val-d'Oise; Ardennes; Aube; Marne; Haute-Marne; Aisne; Oise; Somme; Eure; Seine-Maritime; Cher; Eure-et Loir; Indre; Indre-et-Loire; Loir-et-Cher; Loiret; Calvados; Manche; Orne; Côte-d'Or; Nièvre; Saône-et-Loire; Yonne; Nord; Pas-de-Calais; Meurthe-et-Moselle; Meuse; Moselle; Vosges; Bas-Rhin; Haut-Rhin; Doubs; Jura; Haute-Saône; Territoire de Belfort; Loire-Atlantique; Maine-et Loire; Mayenne; Sarthe; Vendée; Côte-du-Nord; Finistère; Ille-et-Vilaine; Morbihan; Charente; Charente-Maritime; Deux-Sèvres; Vienne; Dordogne; Gironde; Landes; Lot-et-Garonne; Pyrénées-Atlantiques; Ariège; Aveyron; Haute Garonne; Gers; Lot; Hautes-Pyrénées; Tarn; Tarn-et-Garonne; Corrèze; Creuse; Haute-Vienne; Ain; Ardèche; Drôme; Isère; Loire; Rhône; Savoie; Haute-Savoie; Allier; Cantal; Haute-Loire; Puy-de-Dôme; Aude; Gard; Hérault; Lozère; Pyrénées-Orientales; Alpes-de-Haute-Provence; Hautes-Alpes; Alpes-Maritimes; Bouches-du-Rhône; Var; Vaucluse; Corse-du-Sud; Haute-Corse

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

Table A.7: Germany – Examining the Formation of Convergence Clubs, Period 1991-2007				
Lead region		1st convergence club		Divergence
(richest region in 2007)	(richer than the lead region in 1991)	(divergence from the lead region; internal convergence to a gap of 1.653)	(convergence to the lead region; convergence to the first convergence club; internal convergence to a gap of 1.653)	(divergence from the lead region; internal divergence)
München, Landkreis	Stuttgart, Stadtkreis; Ulm, Stadtkreis; Regensburg, Kreisfreie Stadt; Schweinfurt, Kreisfreie Stadt; Darmstadt, Kreisfreie Stadt; Frankfurt am Main, Kreisfreie Stadt; Düsseldorf, Kreisfreie Stadt; Koblenz, Kreisfreie Stadt; Ludwigshafen am Rhein, Kreisfreie Stadt	Böblingen; Esslingen; Göppingen; Ludwigsburg; Rems-Murr-Kreis; Heilbronn, Stadtkreis; Heilbronn, Landkreis; Hohenlohekreis; Schwäbisch Hall; Main-Tauber-Kreis; Heidenheim; Ostalbkreis; Baden-Baden, Stadtkreis; Karlsruhe, Stadtkreis; Karlsruhe, Landkreis; Rastatt; Heidelberg, Stadtkreis; Mannheim, Stadtkreis; Neckar-Odenwald-Kreis; Rhein-Neckar-Kreis; Pforzheim, Stadtkreis; Calw; Enzkreis; Freudenstadt; Freiburg im Breisgau, Stadtkreis; Breisgau Hochschwarzwald; Emmendingen; Ortenaukreis; Rottweil; Schwarzwald Baar-Kreis; Tuttlingen; Konstanz; Lörrach; Waldshut; Reutlingen; Tübingen, Landkreis; Zollernalbkreis; Alb-Donau-Kreis; Biberach; Bodenseekreis; Ravensburg; Sigmaringen; Ingolstadt, Kreisfreie Stadt; München, Kreisfreie Stadt; Rosenheim, Kreisfreie Stadt; Altötting; Berchtesgadener Land; Bad Tölz-Wolfratshausen; Dachau; Ebersberg; Eichstätt; Erding; Freising; Fürstenfeldbruck; Garmisch-Partenkirchen; Landsberg am Lech; Miesbach; Mühldorf am Inn; Neuburg-Schrobenhausen; Pfaffenhofen an der Ilm; Rosenheim, Landkreis; Starnberg; Traunstein; Weilheim-Schongau; Landshut, Kreisfreie Stadt; Passau, Kreisfreie Stadt; Straubing, Kreisfreie Stadt; Deggendorf; Freyung-Grafenau; Kelheim; Landshut, Landkreis;	Oberhavel; Prignitz; Uckermark; Elbe-Elster; Havelland; Teltow-Fläming; Demmin; Mecklenburg-Strelitz; Müritz; Nordvorpommern; Nordwestmecklenburg; Ostvorpommern; Parchim; Rügen; Uecker-Randow; Annaberg; Chemnitzer Land; Freiberg; Mittlerer Erzgebirgskreis; Mittweida; Stollberg; Aue-Schwarzenberg; Bautzen; Riesa-Großenhain; Löbau-Zittau; Weißeritzkreis; Döbeln; Leipziger Land; Torgau-Oschatz; Bernburg; Bitterfeld; Köthen; Wittenberg; Burgenlandkreis; Mansfelder Land; Saalkreis; Sangerhausen;	(none)

		Passau, Landkreis; Regen; Rottal-Inn; Straubing-Bogen; Dingolfing-Landau; Amberg, Kreisfreie Stadt; Weiden in der Oberpfalz, Kreisfreie Stadt; Amberg-Sulzbach; Cham; Neumarkt in der Oberpfalz; Neustadt an der Waldnaab; Regensburg, Landkreis; Schwandorf; Tirschenreuth; Bamberg, Kreisfreie Stadt; Bayreuth, Kreisfreie Stadt; Coburg, Kreisfreie Stadt; Hof, Kreisfreie Stadt; Bamberg, Landkreis; Bayreuth, Landkreis; Coburg, Landkreis; Forchheim; Hof, Landkreis; Kronach; Kulmbach; Lichtenfels; Wunsiedel im Fichtelgebirge; Ansbach, Kreisfreie Stadt; Erlangen, Kreisfreie Stadt; Fürth, Kreisfreie Stadt; Nürnberg, Kreisfreie Stadt; Schwabach, Kreisfreie Stadt; Ansbach, Landkreis; Erlangen-Höchstadt; Fürth, Landkreis; Nuernberger Land; Neustadt an der Aisch-Bad Windsheim; Roth; Weißenburg-Gunzenhausen; Aschaffenburg, Kreisfreie Stadt; Würzburg, Kreisfreie Stadt; Aschaffenburg, Landkreis; Bad Kissingen; Rhön-Grabfeld; Haßberge; Kitzingen; Miltenberg; Main-Spessart; Schweinfurt, Landkreis; Würzburg, Landkreis; Augsburg, Kreisfreie Stadt; Kaufbeuren, Kreisfreie Stadt; Kempten (Allgäu), Kreisfreie Stadt; Memmingen, Kreisfreie Stadt; Aichach-Friedberg; Augsburg, Landkreis; Dillingen an der Donau; Günzburg; Neu-Ulm; Lindau (Bodensee); Ostallgäu; Unterallgäu; Donau-Ries; Oberallgäu; Berlin; Frankfurt (Oder), Kreisfreie Stadt; Barnim; Märkisch-Oderland; Oder Spree; Ostprignitz-Ruppin; Brandenburg an der Havel, Kreisfreie Stadt; Cottbus, Kreisfreie Stadt; Potsdam, Kreisfreie Stadt; Dahme-Spreewald; Oberspreewald-Lausitz; Potsdam-Mittelmark; Spree-Neiße; Bremen, Kreisfreie Stadt; Bremerhaven, Kreisfreie	Weißenfels; Aschersleben-Staßfurt; Bördekreis; Halberstadt; Quedlinburg; Schönebeck; Altmarkkreis Salzwedel; Eichsfeld; Unstrut-Hainich-Kreis; Kyffhäuserkreis; Schmalkalden-Meiningen; Gotha; Sömmerda; Hildburghausen; Ilm-Kreis; Weimarer Land; Sonneberg; Saalfeld-Rudolstadt; Saale-Holzland-Kreis; Saale-Orla-Kreis; Greiz; Altenburger Land	

		Stadt; Hamburg; Offenbach am Main, Kreisfreie Stadt; Wiesbaden, Kreisfreie Stadt; Bergstraße; Darmstadt-Dieburg; Groß-Gerau; Hochtaunuskreis; Main-Kinzig-Kreis; Main-Taunus-Kreis; Odenwaldkreis; Offenbach, Landkreis; Rheingau-Taunus-Kreis; Wetteraukreis; Gießen, Landkreis; Lahn-Dill-Kreis; Limburg-Weilburg; Marburg-Biedenkopf; Vogelsbergkreis; Kassel, Kreisfreie Stadt; Fulda; Hersfeld-Rotenburg; Kassel, Landkreis; Schwalm-Eder-Kreis; Waldeck-Frankenberg; Werra-Meißner-Kreis; Greifswald, Kreisfreie Stadt; Neubrandenburg, Kreisfreie Stadt; Rostock, Kreisfreie Stadt; Schwerin, Kreisfreie Stadt; Stralsund, Kreisfreie Stadt; Wismar, Kreisfreie Stadt; Bad Doberan; Güstrow; Ludwigslust; Braunschweig, Kreisfreie Stadt; Salzgitter, Kreisfreie Stadt; Wolfsburg, Kreisfreie Stadt; Gifhorn; Göttingen; Goslar; Helmstedt; Northeim; Osterode am Harz; Peine; Wolfenbüttel; Diepholz; Hameln-Pyrmont; Hildesheim; Holzminden; Nienburg (Weser); Schaumburg; Region Hannover; Celle; Cuxhaven; Harburg; Lüchow-Dannenberg; Lüneburg, Landkreis; Osterholz; Rotenburg (Wümme); Soltau-Fallingbostel; Stade; Uelzen; Verden; Delmenhorst, Kreisfreie Stadt; Emden, Kreisfreie Stadt; Oldenburg (Oldenburg), Kreisfreie Stadt; Osnabrück, Kreisfreie Stadt; Wilhelmshaven, Kreisfreie Stadt; Ammerland; Aurich; Cloppenburg; Emsland; Friesland; Grafschaft Bentheim; Leer; Oldenburg, Landkreis; Osnabrück, Landkreis; Vechta; Wesermarsch; Wittmund; Duisburg, Kreisfreie Stadt; Essen, Kreisfreie Stadt; Krefeld, Kreisfreie Stadt; Mönchengladbach, Kreisfreie Stadt; Mülheim an der Ruhr,		

		Kreisfreie Stadt; Oberhausen, Kreisfreie Stadt; Remscheid, Kreisfreie Stadt; Solingen, Kreisfreie Stadt; Wuppertal, Kreisfreie Stadt; Kleve; Mettmann; Neuss; Viersen; Wesel; Aachen, Kreisfreie Stadt; Bonn, Kreisfreie Stadt; Köln, Kreisfreie Stadt; Leverkusen, Kreisfreie Stadt; Aachen, Landkreis; Düren; Erftkreis; Euskirchen; Heinsberg; Oberbergischer Kreis; Rheinisch-Bergischer-Kreis; Rhein-Sieg-Kreis; Bottrop, Kreisfreie Stadt; Gelsenkirchen, Kreisfreie Stadt; Münster, Kreisfreie Stadt; Borken; Coesfeld; Recklinghausen; Steinfurt; Warendorf; Bielefeld, Kreisfreie Stadt; Gütersloh; Herford; Höxter; Lippe; Minden-Lübbecke; Paderborn; Bochum, Kreisfreie Stadt; Dortmund, Kreisfreie Stadt; Hagen, Kreisfreie Stadt; Hamm, Kreisfreie Stadt; Herne, Kreisfreie Stadt; Ennepe-Ruhr-Kreis; Hochsauerlandkreis; Märkischer Kreis; Olpe; Siegen-Wittgenstein; Soest; Unna; Ahrweiler; Altenkirchen (Westerwald); Bad Kreuznach; Birkenfeld; Cochem-Zell; Mayen-Koblenz; Neuwied; Rhein-Hunsrück-Kreis; Rhein-Lahn-Kreis; Westerwaldkreis; Trier, Kreisfreie Stadt; Bernkastel-Wittlich; Bitburg-Prüm; Daun; Trier-Saarburg; Frankenthal (Pfalz), Kreisfreie Stadt; Kaiserslautern, Kreisfreie Stadt; Landau in der Pfalz, Kreisfreie Stadt; Mainz, Kreisfreie Stadt; Neustadt an der Weinstraße, Kreisfreie Stadt; Pirmasens, Kreisfreie Stadt; Speyer, Kreisfreie Stadt; Worms, Kreisfreie Stadt; Zweibrücken, Kreisfreie Stadt; Alzey-Worms; Bad Dürkheim; Donnersbergkreis; Germersheim; Kaiserslautern, Landkreis; Kusel; Südliche Weinstraße; Ludwigshafen, Landkreis; Mainz-Bingen; Südwestpfalz; Saarbrücken, Stadtverband; Merzig-Wadern; Neunkirchen; Saarlouis; Saarpfalz Kreis; Sankt Wendel;		

		Chemnitz, Kreisfreie Stadt; Plauen, Kreisfreie Stadt; Zwickau, Kreisfreie Stadt; Vogtlandkreis; Zwickauer Land; Dresden, Kreisfreie Stadt; Görlitz, Kreisfreie Stadt; Hoyerswerda, Kreisfreie Stadt; Meissen; Niederschlesischer Oberlausitzkreis; Sächsische Schweiz; Kamenz; Leipzig, Kreisfreie Stadt; Delitzsch; Muldentalkreis; Dessau, Kreisfreie Stadt; Anhalt-Zerbst; Halle/Saale, Stadtkreis; Merseburg-Querfurt; Magdeburg, Kreisfreie Stadt; Jerichower Land; Ohrekreis; Stendal; Wernigerode; Flensburg, Kreisfreie Stadt; Kiel, Kreisfreie Stadt; Lübeck, Kreisfreie Stadt; Neumünster, Kreisfreie Stadt; Dithmarschen; Herzogtum Lauenburg; Nordfriesland; Ostholstein; Pinneberg; Plön; Rendsburg-Eckernförde; Schleswig-Flensburg; Segeberg; Steinburg; Stormarn; Erfurt, Kreisfreie Stadt; Gera, Kreisfreie Stadt; Jena, Kreisfreie Stadt; Suhl, Kreisfreie Stadt; Weimar, Kreisfreie Stadt; Nordhausen; Eisenach, Kreisfreie Stadt; Wartburgkreis		

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

Table A.8: Greece – Examining the Formation of Convergence Clubs, Period 1991-2007		
Lead region		Divergence
(richest region in 2007)	(richer than the lead region in 1991)	(divergence from the lead region; internal divergence)
Attiki	Kavala; Kozani; Voiotia; Evvoia; Fthiotida; Fokida; Korinthia; Dodekanisos	Magnisia; Trikala; Arta; Thesprotia; Ioannina; Preveza; Zakynthos; Kerkyra; Kefallinia; Lefkada; Aitoloakarnania; Achaia; Ileia; Evrytania; Argolida; Arkadia; Lakonia; Messinia; Lesvos; Samos; Chios; Kyklades; Irakleio; Lasithi; Rethymni; Chania

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

Table A.9: Hungary – Examining the Formation of Convergence Clubs, Period 1991-2007		
Lead region	1st convergence club	
(richest region in 2007)	(divergence from the lead region; internal convergence to a gap of 0.950)	(convergence to the lead region; internal convergence to a gap of 0.950)
Budapest	Fejér; Komárom-Esztergom; Veszprém; Gyor-Moson-Sopron; Vas; Zala; Baranya; Somogy; Tolna; Borsod-Abaúj-Zemplén; Heves; Hajdú-Bihar; Jász-Nagykun-Szolnok; Szabolcs-Szatmár-Bereg; Bács-Kiskun; Békés; Csongrád	Pest; Nógrád

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

Table A.10: Italy – Examining the Formation of Convergence Clubs, Period 1991-2007			
Lead region	1st convergence club	2nd convergence club	
(richest region in 2007)	(convergence to the lead region; internal convergence to a gap of 0.000)	(divergence from the lead region; internal convergence to a gap of 1.009)	(convergence to the lead region; internal convergence to a gap of 1.009)
Milano	Torino; Biella; Novara; Cuneo; Valle d'Aosta/Vallée d'Aoste; Como; Lecco; Bergamo; Brescia; Mantova; Provincia Autonoma Bolzano-Bozen; Provincia Autonoma Trento; Vicenza; Belluno; Pordenone; Parma; Reggio nell'Emilia; Modena; Bologna; Forlì-Cesena; Rimini; Firenze; Prato; Roma	Vercelli; Verbano-Cusio-Ossola; Asti; Alessandria; Imperia; Savona; Genova; La Spezia; Varese; Sondrio; Pavia; Lodi; Cremona; Verona; Treviso; Venezia; Padova; Rovigo; Udine; Gorizia; Trieste; Piacenza; Ferrara; Ravenna; Massa-Carrara; Lucca; Pistoia; Livorno; Pisa; Arezzo; Siena; Grosseto; Perugia; Terni; Pesaro e Urbino; Ancona; Macerata; Ascoli Piceno; Viterbo; Rieti; Latina; Frosinone; L'Aquila; Teramo; Pescara; Chieti; Isernia; Campobasso; Caserta; Benevento; Napoli; Avellino; Salerno; Foggia; Bari; Taranto; Brindisi; Lecce; Potenza; Matera Cosenza; Catanzaro; Reggio di Calabria; Trapani; Palermo; Messina; Agrigento; Caltanissetta; Enna; Catania; Ragusa; Siracusa; Sassari; Nuoro; Oristano; Cagliari;	Crotone; Vibo Valentia

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

Table A.11: Netherlands – Examining the Formation of Convergence Clubs, Period 1991-2007			
Lead region		1st convergence club	Divergence
(richest region in 2007)	(richer than the lead region in 1991)	(convergence to the lead region; internal convergence to a gap of 0.000)	(divergence from the lead region; divergence from the 1st convergence club; internal divergence)
Groot-Amsterdam	Overig Groningen	(none)	Oost-Groningen; Delfzijl en omgeving; Noord-Friesland; Zuidwest-Friesland; Zuidoost-Friesland; Noord-Drenthe; Zuidoost-Drenthe; Zuidwest-Drenthe; Noord-Overijssel; Zuidwest-Overijssel; Twente; Veluwe; Achterhoek; Arnhem/Nijmegen; Zuidwest-Gelderland; Flevoland; Utrecht; Kop van Noord-Holland; Alkmaar en omgeving; IJmond; Agglomeratie Haarlem; Zaanstreek; Het Gooi en Vechtstreek; Agglomeratie Leiden en Bollenstreek; Agglomeratie 's –Gravenhage; Delft en Westland; Oost-Zuid-Holland; Groot-Rijnmond; Zuidoost Zuid-Holland; Zeeuwsch-Vlaanderen; Overig Zeeland; West-Noord-Brabant; Midden-Noord-Brabant; Noordoost-Noord-Brabant; Zuidoost-Noord-Brabant; Noord-Limburg; Midden-Limburg; Zuid-Limburg

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

Table A.12: Poland – Examining the Formation of Convergence Clubs, Period 1991-2007	
Lead region	Divergence
(richest region in 2007)	(divergence from the lead region; internal divergence)
Miasto Warszawa	Lódzki; Piotrkowsko-skierniewicki; Miasto Lódz; Ciechanowsko-plocki; Ostrolecko-siedlecki; Radomski; Warszawski; Krakowsko-tarnowski; Nowosadecki; Miasto Kraków; Czestochowski; Bielsko-bialski; Centralny slaski; Rybnicko-jastrzebski; Bialskopodlaski; Chelmsko-zamojski; Lubelski; Rzeszowsko-tarnobrzeski; Krosniensko-przemyski; Swietokrzyskie; Bialostocko-suwalski; Lomzynski; Pilski; Poznanski; Kaliski; Koninski; Miasto Poznan; Szczecinski; Koszalinski; Gorzowski; Zielonogórski; Jeleniogórsko-walbrzyski; Legnicki; Wroclawski; Miasto Wroclaw; Opolskie; Bydgoski; Torunsko-wloclawski; Elblaski; Olsztynski; Elcki; Slupski; Gdanski; Gdansk-Gdynia-Sopot

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

Table A.13: Portugal – Examining the Formation of Convergence Clubs, Period 1991-2007			
Lead region	1st convergence club		Divergence
(richest region in 2007)	(divergence from the lead region; internal convergence to a gap of 0.651)	(convergence to the lead region; internal convergence to a gap of 0.651)	(divergence from the lead region; divergence from the 1st convergence club; internal divergence)
Grande Lisboa	Grande Porto; Algarve; Alentejo Litoral; Lezíria do Tejo	Minho-Lima; Cávado; Ave; Tâmega; Entre Douro e Vouga; Douro; Alto Trás-os-Montes; Baixo Vouga; Baixo Mondego; Pinhal Litoral; Pinhal Interior Norte; Dão-Lafões; Pinhal Interior Sul; Serra da Estrela; Beira Interior Norte; Beira Interior Sul; Cova da Beira; Oeste; Médio Tejo; Península de Setúbal; Alto Alentejo; Alentejo Central; Baixo Alentejo	(none)

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

Table A.14: Spain – Examining the Formation of Convergence Clubs, Period 1991-2007			
Lead region		1st convergence club	
(richest region in 2007)	(richer than the lead region in 1991)	(divergence from the lead region; internal convergence to a gap of 0.634)	(convergence to the lead region; internal convergence to a gap of 0.634)
Álava	Tarragona	La Coruña; Lugo; Orense; Pontevedra; Principado de Asturias; Cantabria; Guipúzcoa; Vizcaya; Comunidad Foral de Navarra; La Rioja; Huesca; Teruel; Zaragoza; Comunidad de Madrid; Avila; Burgos; León; Palencia; Salamanca; Segovia; Soria; Valladolid; Albacete; Ciudad Real; Cuenca; Guadalajara; Toledo; Barcelona; Gerona; Lérida; Alicante; Castellón de la Plana; Valencia; Illes Balears; Almería; Cadiz; Córdoba; Huelva; Jaén; Málaga; Sevilla; Región de Murcia; Ciudad Autónoma de Ceuta (ES); Ciudad Autónoma de Melilla (ES); Las Palmas; Santa Cruz De Tenerife	Zamora; Badajoz; Cáceres; Granada

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

Table A.15: Sweden – Examining the Formation of Convergence Clubs, Period 1991-2007		
Lead region	1st convergence club	
(richest region in 2007)	(divergence from the lead region; internal convergence to a gap of 0.536)	(convergence to the lead region; internal convergence to a gap of 0.536)
Stockholm	Uppsala län; Södermanlands län; Östergötlands län; Örebro län; Västmanlands län; Blekinge län; Skåne län; Värmlands län; Dalarnas län; Gävleborgs län; Västernorrlands län; Jämtlands län; Västerbottens län; Norrbottens län; Kronobergs län; Kalmar län; Gotlands län; Hallands län; Västra Götalands län	Jönköpings län

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration

Table A.16: United Kingdom – Examining the Formation of Convergence Clubs, Period 1991-2007					
Lead region	1st convergence club		2nd convergence club		Divergence
(richest region in 2007)	(divergence from the lead region; internal convergence to a gap of 1.023)	(convergence to the lead region; internal convergence to a gap of 1.023)	(divergence from the lead region; divergence from the 1st convergence club; internal convergence to a gap of 1.864)	(convergence to the lead region; internal convergence to a gap of 1.864)	(divergence from the lead region; divergence from the 1st and from the 2nd convergence club; internal divergence)
Inner London - West	Nottingham; North Eastern Scotland; Edinburgh, City of	Cheshire CC; Leeds; Derby; Leicester City; The Wrekin; Coventry; Luton; Bedfordshire CC; Hertfordshire; Inner London – East; Outer London - West and North West; Berkshire; Milton Keynes; Buckinghamshire CC; Oxfordshire; Surrey; Portsmouth; Southampton; City of Bristol; Swindon; Cardiff and Vale of Glamorgan; Flintshire and Wrexham;	Hartlepool and Stockton; South Teeside; Darlington; Durham CC; Northumberland; Tyneside; Sunderland; West Cumbria; East Cumbria; Halton and Warrington; Greater Manchester South; Greater Manchester North; Blackburn with Darwen; Blackpool; Lancashire CC; East Merseyside; Liverpool; Sefton; City of Kingston upon Hull; East Riding of Yorkshire; North and North East Lincolnshire; York; North Yorkshire CC; Barnsley, Doncaster and Rotherham; Sheffield; Bradford; Calderdale, Kirklees and Wakefield; East Derbyshire; South and West Derbyshire; North Nottinghamshire; South Nottinghamshire; Leicester CC and Rutland; Northamptonshire; Lincolnshire; Herefordshire; Worcestershire; Warwickshire; Shropshire CC; Stoke-on-Trent; Staffordshire CC; Birmingham; Solihull; Dudley and Sandwell; Walsall and Wolverhampton; Peterborough; Cambridgeshire CC; Norfolk; Suffolk;	(none)	Wirral; Isle of Wight; Isle of Anglesey

		Glasgow City; Belfast	Southend-on-Sea; Thurrock; Essex CC; Outer London - East and North East; Outer London – South; Brighton and Hove; East Sussex CC; West Sussex; Hampshire CC; Medway Towns; Kent CC; North and North East Somerset, South Gloucestershire; Gloucestershire; Wiltshire CC; Bournemouth and Poole; Dorset CC; Somerset; Cornwall and Isles of Scilly; Plymouth; Torbay; Devon CC; Gwynedd; Conwy and Denbighshire; South West Wales; Central Valleys; Gwent Valleys; Bridgend and Neath Port Talbot; Swansea; Monmouthshire and Newport; Powys; Angus and Dundee City; Clackmannanshire and Fife; East Lothian and Midlothian; The Scottish Borders; Falkirk; Perth and Kinross, Stirling; West Lothian; East and West Dunbartonshire, Helensburgh and Lomond; Dumfries and Galloway; East Ayrshire and North Ayrshire Mainland; Inverclyde, East Renfrewshire and Renfrewshire; North Lanarkshire; South Ayrshire; South Lanarkshire; Caithness and Sutherland, Ross and Cromarty; Inverness and Nairn, Moray, Badenoch and Strathspey; Lochaber, Skye and Lochalsh, Argyll and The Islands; Comhairle Nan Eilan (Western Isles); Orkney Islands; Shetland Islands; Outer Belfast; East of Northern Ireland; North of Northern Ireland; West and South of Northern Ireland		

Source: European Regional Database (Cambridge Econometrics, 2008) – Own Elaboration