REGIONAL CONVERGENCE: THE GREEK CASE

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INTRODUCTION

An important[1] economic regional issue is whether poor regions tend to grow faster than rich ones, this is called convergence. The growth may be expressed in terms of per capita product or income. Convergence is currently investigated using the neoclassical growth models as a framework.

Two concepts of convergence are currently investigated using statistical measures: (i) the catch-up, where convergence occurs when a poor economy tends to catch up with the rich one in terms of GDP per capita (ii) the homogenization, where convergence occurs when the dispersion, expressed as the standard deviation of the logarithm of per capita GDP across a group of countries or regions, declines over time.

These two concepts of convergence use statistical measures without any attention to the nature of the leading region's economy. However, there exist concepts of convergence concerning primarily the development level of the leader at some particular time, the causes of that economy's leadership, and the relationships between the leader and the remainder of the group. Baumol et al. (1994) argues that none of the different concepts of convergence is inherently superior or inferior to the others, and each can be used without apology. In this study the convergence was investigated using the catch-up criterion.

This paper presents the first results of a project on the Greek regional convergence in the European context, which is undertaken by the Regional Development Institute (RDI), Panteion University, Athens. In particular, the paper concerns the initial stage of this research which is aiming to investigate the economic convergence of the greek regions to the national average growth rate. The convergence was investigating based on GDP per capita records and not on other additional data which may allow to estimate the «real» convergence.

In this study, the evolution of convergence of the 13 Greek program regions (level NUTS II) and the 51 nomoi (level NUTS III) in the periods 1970-1980 and 1980-1990, is investigated. These are also the periods before and after Greece has joined the European Union.

1. Region. Sc. Assoc. Interen., 35. Europ. Congress, Odense, Denmark, August 1995.

Convergence is currently detected using models based on the neoclassical growth models (Barro and Sala-i-Martin, 1992). This models have been applied to national, and to regional (e.g. USA states) data as well (Barro and Sala-i-Martin, 1991; Barro, 1991).

In neoclassical growth models for closed economies, as presented by Ramsey (1928), Solow (1956) and Koopmans (1965), the per capita growth rate tends to be negatively related to the starting level of GDP per capita. In economies are similar in respect to preferences and technology, then poor economies grow faster than rich ones and convergence in levels of GDP per capita is promoted.

The convergence among Greek nomoi and regions was investigated by applying a stochastic growth model of this nature. In addition to convergence, this model allows also to test whether the nomoi within a region converge with the same or different speed.

Accorcing to the neoclassical models the per capita growth rate tends to be inversely related to the starting level of output per capita (Koopmans, 1965). Then, if economies are similar in respect to preferences and technology, then poor economies grow faster than rich ones, i.e. convergence in levels of per capita product.

The Greek nomoi and regions provide an evidence of convergence, in the sense that poor economies tend to grow faster than rich ones in per capita terms, in the decade of '80. In particular, the nomoi and the regions converge with similar speeds, and the nomoi within regions converge with the same rate.

However, there is no evidence of significant convergence of the nomoi and regions in the decade of '70.

METHODS AND RESULTS

Convergence applies if a poor economy tends to grow faster than a rich one, so that the poor regions tends to catch up with the rich one in terms of the level of per capita product (Baumol, 1986). This type of convergence can be described by a growth model (Barro and Sala-i-Martin, 1991), where the growth rate of income per capita in a certain period is expressed as a function of the initial level of income. The average growth rate over the interval from O to T is given by:

$$\left[\frac{1}{T}\right]\log\left[\frac{y_{iT}}{y_{i0}}\right] = \alpha - \frac{1-e^{\beta T}}{T}.\log(y_{i0}) + \varepsilon_{i0,T} \quad (1),$$

where y denotes the GDP per capita, the subscript i denotes the nomoi or regions, α is a constand term, β is the parameter of convergence and, ε is an error term reflecting unxpected changes in production conditions in the examined period.

Convergence exists when $\beta>0$, i.e. poor economies tend to grow faster than rich ones. β indicates the speed of convergence.

The 51 nomoi are divided into 13 regions, then model (1) can be extended in order to test if the nomoi within regions have the same speed of convergence, and if the regions differ in terms of average growth rate, model (1) becomes

$$\left[\frac{1}{T}\right]\log\left[\frac{y_{ijT}}{y_{ij0}}\right] = \alpha - \frac{1-e^{\beta T}}{T}.\log(y_{ij0}) + rj + \delta_{ij}.\log(y_{ij0}) + \varepsilon_{ij0,T} \quad (2),$$

where the subscript i denotes the nomoi (=1-51), the subscript j denotes the regions

(j=1-13), (r) is a parameter corresponding to the 13 regions (j=1-13) where its value is incorporating, after the fitting of the model, in the parameter α, {δ.log(y)} is a parameter corresponding to the interactions between regions

and initial income, and its value is incorporated in the parameter $-\frac{1-e^{\beta T}}{T}$.

It can be seen whether the region has any effect on the growth rate after fitting the initial income by adding to model (1) the term r_j, if this term improves the fit of the model then there is indication that the data from the 51 nomoi can be modelled by parallel lines corresponding to the 13 regions, i.e. the 13 regions has the same speed of convergence but different average growth rates. The goodness of fit test is the change of deviance, a realization of the residual variation, which follows approximately the χ^2 distribution (McCullagh and Nelder, 1984).

It can be checked whether the speed of convergence is different for the 13 regions by fitting the full model (2) and checking the difference in deviance between model (1) with r_j parameter and model (2).

The model (1) was applied to GDP per capita data for the 51 nomoi, and for the 13 regions, for two periods (1970-1980 and 1980-1990). The estimates of β with their corresponding standard errors and the amount of variation explained by the model, R, are shown in table 1.

The estimate of β for the period 1970-1980 is possitive but not statistically significant (P>0.05) indicating that there is not enought evidence of convergence.

However, in the period 1980-1990 there is convergence, β>0. Thus, poor nomoi tend to grow faster than the rich ones. Figure 1, provides a plot of the growth rate of GDP per capita between 1980 and 1990 against the log of GDP per capita in 1980.

When the model is applied to the data for the 13 regions (the data of the nomoi are summed up to 13 groups, corresponding to 13 regions) there is no evidence of significant (P>0.05) convergence in the period 1970-1980. However, there is evidence of convergence among the regions in the period 1980-1990. The growth rate of the regions, between 1980 and 1990, is plotted against the log of the production per capita of the regions in 1980 in figure 2.

In the period 1980-1990, the regions tend to converge with higher rate than nomoi, 0.4652 and 0.3915 units of growth rate per one unit of initial income, respectively.

The effect of region can be investigating further by fitting the model (2) to the data from the 51 nomoi. The change in deviance by fitting the term rj to model (1) is significant (P<0.05), however, when the full model (2) is fitted the change in deviance is not significant (P>0.05). Thus the analysis indicated that indeed poor nomoi grow faster than rich nomoi, converging to the nations average growth rate. The speed of convergence of the nomoi within regions is the same for the 13 regions and the growth rate is statistically different between the regions.

Table 2 shows the common estimated speed of convergence of the nomoi within the 13 regions and the growth rates of the regions, for the two examined periods.

In the period 1970-1980, the inclusion of the region effect, by fitting model (2), does not change the previous result of not significant convergence of the nomoi.

DISCUSSION

The above analysis has shown that:

- there is convergence of the 13 program regions and the 51 nomoi in the period 1980-1990,
- the rate of convergence among regions is larger than the respective rate among nomoi,
- the intra-regional disparities converge with the same rate for all the 13 regions, i.e. the rate of convergence is the same among nomoi of the 13 regions (uniform rates of convergence within each region),
- the growth rate of GDP per capita differs between the 13 regions,
- there is convergence after the 1980, the year Greece joined the European Union. In the period 1980-1990, the Greek regional policy is reformated and becomes systematic, the 13 program regions with their administrative structures are established, the national economy is strengthened by the regional community policy (Mediterrenean Integrated Programs, Community Support Framework I, Structural Funds).

However, the convergence in this period might be also due to other factors, such as:

- the population reduction or the increase with rates substantially lower than the nation's average in the poorest border regions (National Statistics Services of Greece, 1991),
- the deindustrilization, which strikes the main urban centres after the end of the 80's. This is mainly due to the change of job specialization in Greece, following the European distribution of labor force (RDI, Study of Deindustrilized Regions, 1994).

The establishment of the 13 regions and their administrative structures, and the allocation of the regional operational programs, at the end of the decade of '80 may have strengthen the convergence of the 13 regions by absorbing funds at regional level (Konsolas et al., 1993).

The facts that (i) the speed of convergence among nomoi is lower than the convergence speed of the regions and (ii) the nomoi within regions converge with the same speed in all the regions, show that intra-regional disparities remain substantial and that the regional intervention through the regional operational programs, were not sufficient to push forward the intra-regional convergence.

CONCLUSION

Hence, there is convergence of the regions to the nation's average growth rate in the period 1980-1990. In this the period, Greece has joined the EU, the program regions and their administrative structures are established and the community's development programs are allocated.

The convergence concerns more th program regions (NUTS II) and less the smaller spatial units (nomoi-NUTS III). The observed common convergence at the intra-regional level implies lack of effective policy to capture benefits from internaly available growth potential in the lower regional classification level (nomoi).

The convergence was detected in a period of economic cricis with intensive deindustrilization of the main urban centres.

These conclusions will be investigated further at the second stage of the undergoing research project of IRD using data of the decade of '90. In this period there is a tendency of economic recovery and this might change the convergence scenario of the previous

decade. The convergence to the average 'EU's growth rate in terms of GDP per capita will be tested and the possible tendency to «real» convergence will be analysed. Then, the above conclusions will be re-evaluated.

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Table 1. Speed of convergence β and the corresponding standard errors (se) of the nomoi and regions, for the periods 1970-1980 and 1980-1990. The amount of variation of the data explained by the model, R, is also presented. The non significant results are denoted by ns (P>0.05).

	nomoi	regions
1970-1980	β=0.1625 ns	β=0.2310 ns
	se=0.0886	se=0.1665
	R=7%	R=18%
1980-1990	β=0.3915	β=0.4652
	se=0.0913	se=0.2504
	R=36%	R=34%

Table 2. Common estimated speed of convergence of the Greek regions and growth rates in the periods 1970-1980 and 1980-1990.

Common estimated speed of convergences β=0.2605,
standard error of β=0.0907,
amount of variation explained by the model R=68%.

Region	Growth rate (X100) 1970-1980	Growth rate (X100) 1980-1990
Eastern Macedonia & Thrace	695	616
Central Macedonia	571	553
Western Macedonia	701	605
Epirus	598	624
Thessaly	563	680
Ionian Islands	673	504
Western Greece	550	557
Central Greece	497	614
Attica	555	453
Peloponese	563	607
Northern Aegean Islands	612	507
Southern Aegean Islands	759	564
Krete	653	577

Figure 1. Plot shown the negative relathionship between the growth rate of GDP per capita between 1980 and 1990 against the log of GDP per capita in 1980, for the 51 nomoi.

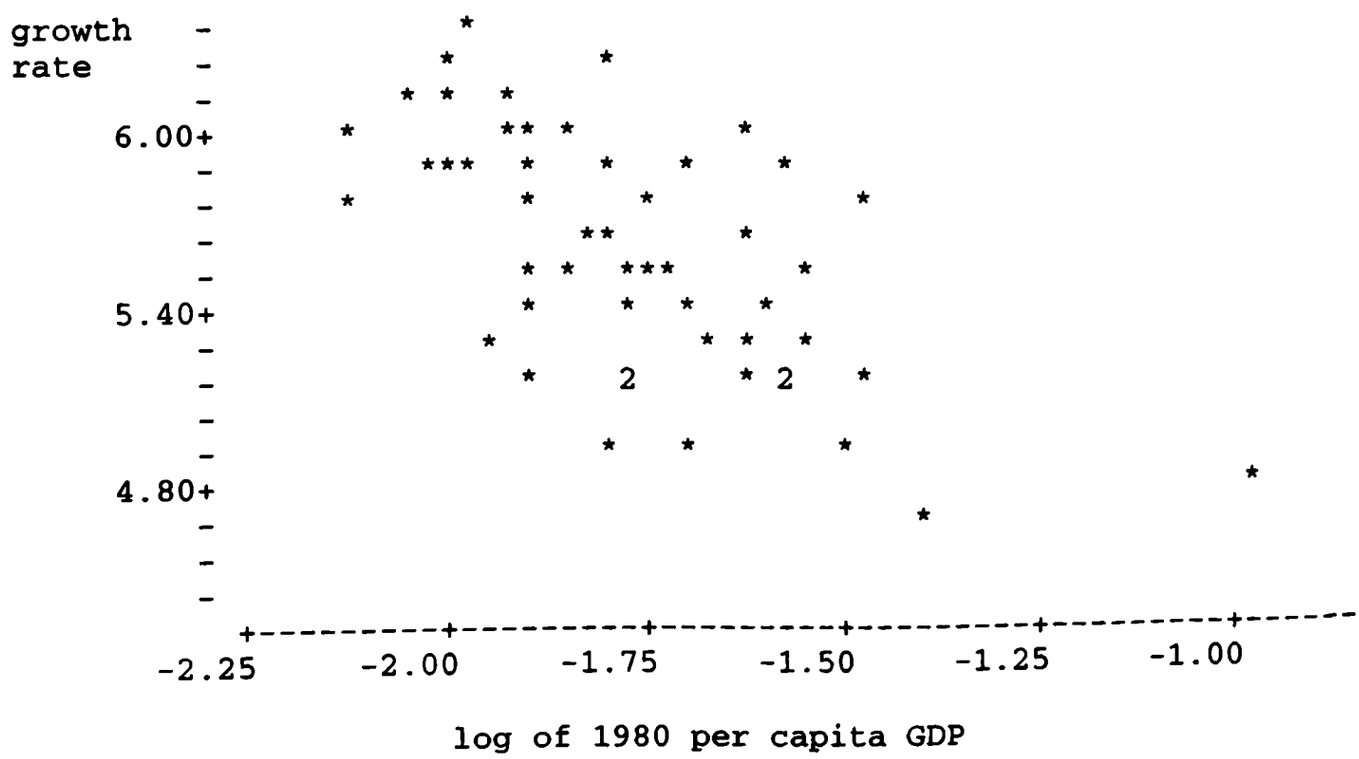

Figure 2. Plot shown the negative relationship between the growth rate of GDP per capita between 1980 and 1990 against the log of GDP per capita in 1980, for the 13 program regions.