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**REGIONAL INEQUALITIES IN GREECE: DETERMINING
FACTORS, TRENDS AND PERSPECTIVES**
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REGIONAL INEQUALITIES IN GREECE: DETERMINING FACTORS, TRENDS AND PERSPECTIVES*

By

H. Caraveli and E. Tsionas[1]

In Greece, regional inequalities measured by per capita GDP have widened over time, through the augmentation of the capital region's relative size, and a polar development model has been established which economic policy has not achieved mitigating. This paper attempts to investigate the above issues, by empirically testing the impact of a number of basic determinants on regional growth and divergence, for the period 1995/97-2007/9. In interpreting empirical results, and beyond the model, factors like the deepening of European economic integration, globalization and economic crises will also be evaluated. Finally, the possible role of regional policy will be examined.

Key words: regional inequalities in Greece, convergence-divergence, econometric tests on divergence, regional policy, polar development pattern.

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1. Introduction

The persistence of regional inequalities between and within countries, on a global and regional level, has dictated the continuous investigation of the causes of this phenomenon and the contestation of the neoclassical paradigm of convergence, together with the rise in the significance of "disequilibrium theories"[2]. For the EU case, a number of studies have pointed out that half of the income inequalities existing between member states are attributed to regional inequalities within individual countries (Martin 1999, 2004; Puga 2002; Caraveli et al. 2008) - a phenomenon that has slowed down income convergence on a country level - with the level of domestic inequalities being positively correlated with a country's per capita GDP (Martin 1999, 2004; Dall' Erba 2003; Petrakos et al. 2003).

This paper examines the case of regional inequalities in Greece, a southern European country severely hit by the on-going financial and economic crisis. Measured by per capita GDP, internal inequalities have widened over time, resulting to the consolidation of a centre-periphery pattern, characterized by the augmentation of the capital region's (Attica) size, and the widening of the gap between this region and the rest of the country. Regional policy, implemented through the Community Support Frameworks, has proved inadequate to reverse the above trends. On the contrary, it seems to have encouraged the pattern of unequal development. The methodological approach is based on the empirical testing of the impact of a number of basic determinants on regional divergence and growth, for the period 1995/97-2007/9, for which data are available. Qualitative elements enter the analysis in interpreting empirical results and beyond, which means that factors like European economic integration, globalization and economic crises are also evaluated. The paper attempts to contribute to the search of the underlying causes of regional inequalities at a national scale (investigated thoroughly for the case of Greece by Petrakos & Saratsis 2000, Petrakos & Psycharis 2004, Petrakos & Artelaris 2008, Petrakos 2009), but furthermore to examine the relevance of this issue to structural changes of the economy, economic policy and external economic forces (widely discussed in the literature, as for example in Michailidis 2009, Haddad 2009, Onaran 2010).

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[2] Based on the older theories of the 'cumulative causation' school (e.g. Myrdal, 1957 and Hirschman, 1958) this strand has re-emerged with the 'new economic geography' and the 'new growth theory' approaches (e.g. Krugman, 1991a,b; Lucas,1988; Romer, 1986; Rebelo, 1991). It is generally agreed within this framework, that in the first phases of the development and/or the economic integration process, growth will be accentuated in one or a few regions (due to agglomeration economies and the attraction of factors of production from other regions), a process led by both market and non-market forces, but often aided by government policies aiming at strengthening dynamic regions and creating Perroux's 'growth poles' (Perroux, 1955). However, it is further assumed that in more advanced development and/or economic integration stages, centrifugal forces set in, either because of the "spread effects" from the advanced to the backward regions, or due to new migration of factors of production to the latter (resulting from increasing diseconomies of scale in central regions), an outcome similar to that predicted in the neoclassical framework (Haddad 1999, Caraveli et al. 2008, Caraveli & Tsionas 2009). Again (but contrary to the neo-classical assumption), economic policy (mainly regional policy) can be instrumental to this direction. Another school claims that theoretical strands which appeared in the 1990s, all based in the neoclassical tradition, "failed to incorporate structural changes …and neglected the geographical dimension of creative destrtruction [in the Schumpetarian sense] according to which catching up and falling behind of countries and regions is analyzed in terms of the rise and fall of industries" (Neffke et al. 2009).

The second part of this paper presents graphically regional inequalities in Greece and estimates empirically, through a dynamic factor model, their persistence through time. The third part tests econometrically some basic determinants for regional divergence and growth. The fourth part examines structural imbalances in the domestic economy, in the light of globalization/European economic integration and economic crises, and assesses their relevance to regional inequalities. The fifth part evaluates the failures and the possible future role of economic policy. Finally, the sixth part draws the conclusions and relates the qualitative discussion with empirical results.

2. Empirical investigation of regional disparities in Greece

3.1 Graphing regional disparities

Using data from the National Statistical Authority and Eurostat, regional disparities, relative to the country average, are examined by developing graphs of $V_{rt} = \left| \log \dfrac{Y_{rt}}{Y_t} \right|$, where Y_{rt} is real per capita GDP[3] in region r ($r = 1,...,R$) and time t ($t = 1,...,T$), while Y_t is the national level of GDP per capita. These are shown in figure 1. Essentially V_{rt} is a measure of 'sigma convergence'. Regional disparities relative to Attica are estimated with the use of measure $V_{rt} = \left| \log \dfrac{Y_{rt}}{Y_{0t}} \right|$, where Y_{0t} is Attica's GDP per capita, and are shown in figure 2.

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[3] It should be noted that GDP is considered to be an inadequate measure of regional welfare by many researchers, so that other more complex indicators have at times been proposed. For example, Petrakos & Artelaris (2008) have constructed a "Composite Index of Development and Prosperity" (CIDP), which comprises more aspects of human welfare, such as demographic and geographic variables with equal weights (i.e. stated income, savings, sectoral GDP, active population, urban population, human capital, centrality, tourism). The use of the composite indicator reveals that GDP may in fact underestimate the degree of inequalities across regions.

Figure 1. Regional disparities in Greece (relative to national GDP per capita)
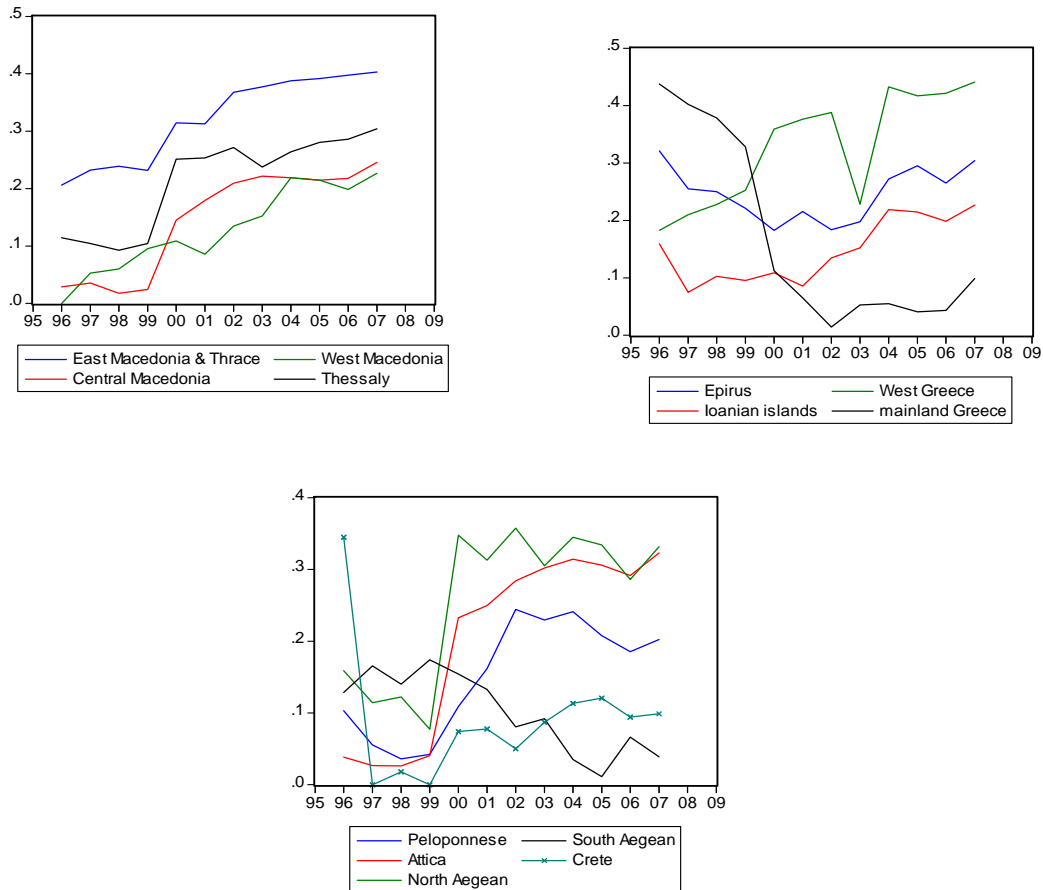

Figure 1 shows rising disparities of all regions relative to the country-average. Mainland Greece (or Sterea Ellada) appears to be one exception, as its divergence from the average decreases until 2002, but increases thereafter. South Aegean seems to be another region with an overall declining trend in its disparity from the average. The constantly rising trend in Attica's disparity shows its continuous augmentation relatively to the rest of the country, reflecting a centre-periphery pattern. Similarly, in figure 2, all regions are shown to diverge from Attica, with the exception of Western and mainland (Sterea) Greece, which show convergence in certain periods (2003 and 2000, respectively) and divergence afterwards. The trend towards convergence of mainland Greece is due to the fact that this region has become a site of industry location, resulting to a remarkable improvement in its relative income position at both the national and the EU level - a development leading to its exclusion from objective 1 of the structural funds and its gradual entrance in objective 2. The reversal of this trend towards divergence is basically due to GDP's

revision after 2000[4], which upgraded the position of prefectures and regions, heavily oriented towards tertiary sector activities (mostly Attica & South Aegean) – e.g. tourism, trade, public administration, real estate, etc.- at the expense of mountainous as well as inland prefectures of mainland Greece, i.e. areas still characterised by a strong dependence on the primary sector, a relatively small presence of the tertiary sector and lack of significant urban centres. The polarized structure of development was as a result further consolidated, with the strengthening of the largest urban concentration in the country - the metropolitan center of Athens (Papadaskalopoulos & Christofakis 2007).

Figure 2. Regional disparities in Greece (relative to Attica' GDP per capita)
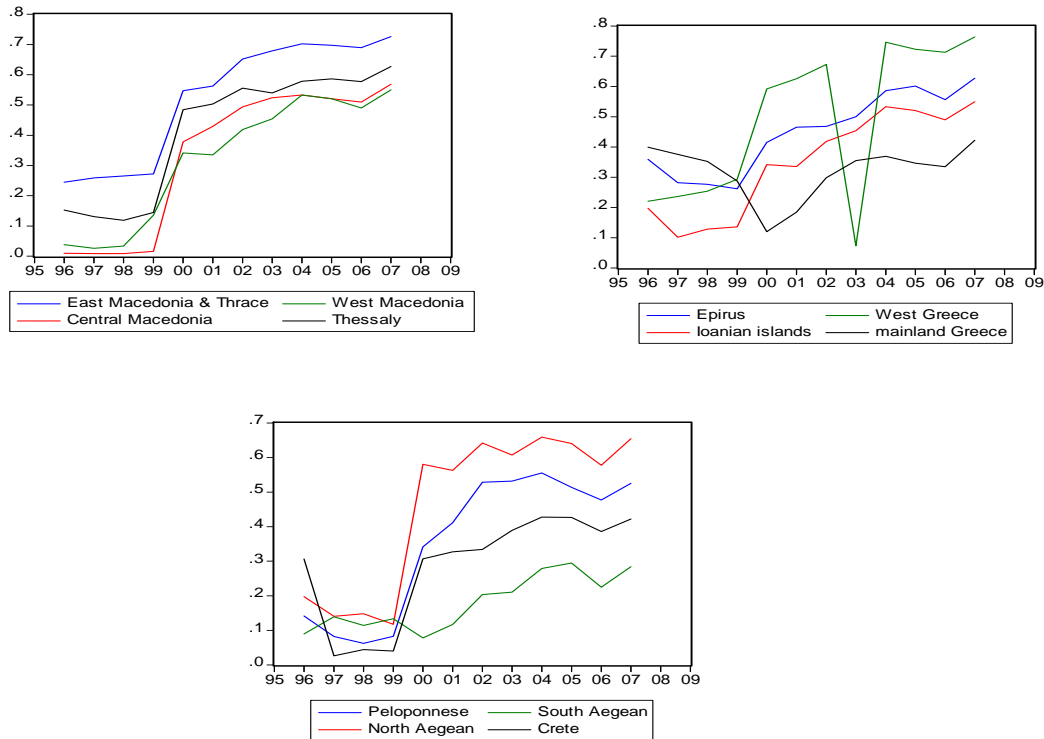
The rising disparities of Greek regions resulted in their divergence from the EU average real (PPS) per capita GDP of EU-27, in the period 1996-2007: Only Attica's and South Aegean's share rose - the former from 87% in 1996 to 128% in 2007 and the latter from 94% to 96% - while the share of mainland Greece fell dramatically - from 129% to 84%. Income disparities in Greece, measured by the coefficient of variation, increased, on the average, from 10% in 1996 to 27% in 2007, whereas in the EU, they decreased from 32,5% to 28,3%, respectively (European Commission, 2007).

2.2 A dynamic factor model for regional disparities

A dynamic factor model of regional disparities relative to Attica is then developed of the form:

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[4] The new method of calculating GDP was based on the co-estimation of the "unrecorded" or "non-observed", "hidden and informal", sector of the economy, amounting to about 30-40% of real economic activity (Michailidis, p. 411, Papadaskalopoulos and Christophakis 2007).

$V_{rt} = f_t + u_{rt}$, where $f_t = \alpha + \rho f_{t-1} + \varepsilon_t$, where $E\left(u_{rt}^2\right) = \sigma_u^2$ and $E\left(\varepsilon_t^2\right) = \sigma_\varepsilon^2$ **(1)**

The results are given in below:

	Estimate	s.e.	t-stat	p-value
α	0.035237	0.104387	0.337564	0.7357
ρ	0.905110	0.276130	3.277836	0.0010

Since α is not significant and ρ can be statistically close to 1 we conclude that regional disparities (relative to Attica) are highly persistent on the average for all other regions. The common factor f_t represents an "average" disparity and in our model it is assumed to follow an autoregressive scheme. Since ρ is close to unity, *"average disparity" tends to be highly persistent.*

The three major principal components (factors[5]) related to disparities (measured by V) are presented in figures 3, 4 and 5.

Figure 3. Major factors of regional disparities (relative to Attica)

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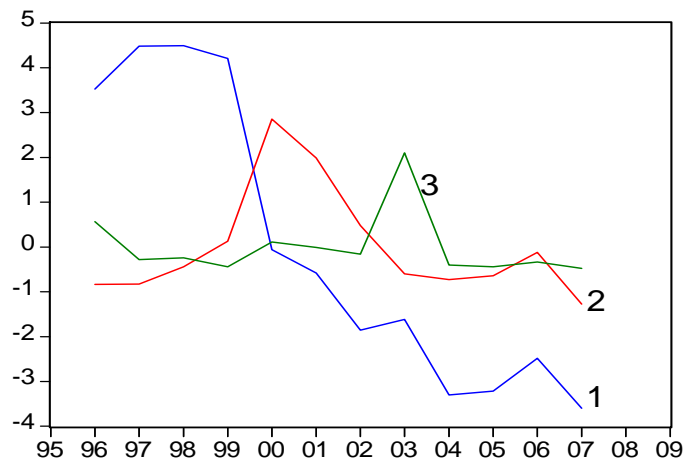
[5] A "factor" or "principal component" is a constructed variable (i.e. a weighted average) that accounts for a lot of variation and therefore explains "a lot" of the original series. To explain 90% one may need 1, 2 or more such "factors".

Figure 4. Major factor of regional disparities (relative to Attica), excluding West and mainland Greece.
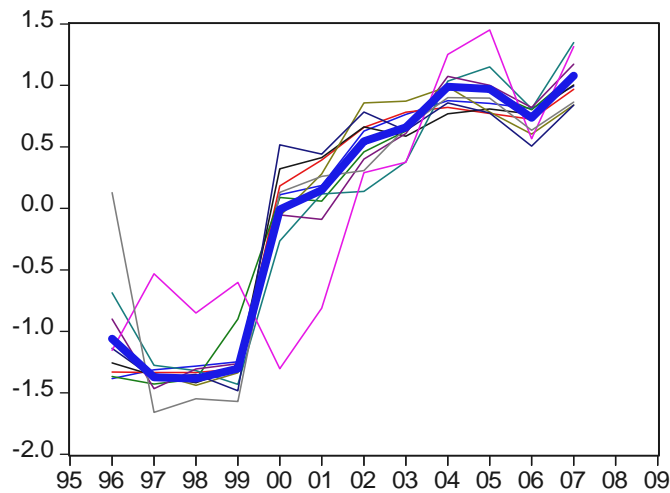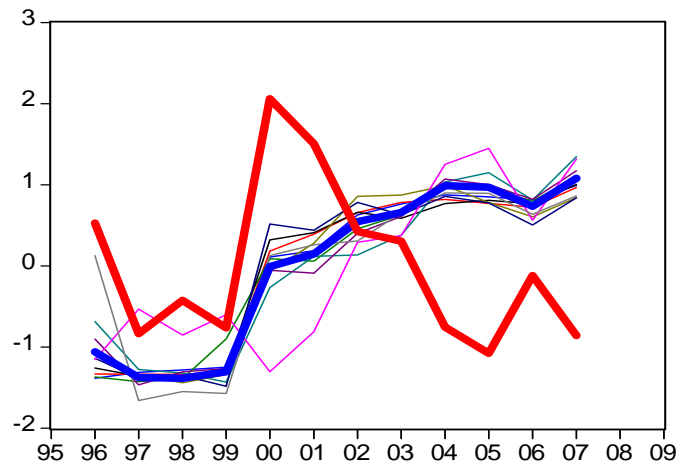

Figure 5. Major factors of regional disparities (relative to Attica), excluding West and mainland Greece

In figure 3 (which includes all regions), the first factor shows a strong downward movement in divergence i.e. a major tendency for convergence, while the second and third factors show breaks in the beginning of the decade of 2000, but convergence after these breaks. This effect is due to west and mainland Greece. If these two regions are excluded from the estimation, as in figures 4 and 5, slightly different results emerge: figure 4 reveals a clear tendency towards rising divergence, through the blue line, which represents the first factor (this 'distinctive' corresponds to South Aegean); figure 5, on the other hand, shows a break around 2000 and convergence thereafter, through the red line which expresses the second factor. This means that some regions showed a decrease

in divergence after 2000. However, in factor analysis the effect of the first factor is the most reliable one[6] and this explains the differences between the factor diagrams and figures 1 & 2.

3. Econometric tests of divergence

Since divergence was found to be a permanent characteristic of regional dynamics in Greece, the following model, estimating divergence from Attica, is used for its interpretation:

$$V_{rt} = \alpha_r + \beta_1 \log\left(\frac{PD_{rt}}{PD_{ot}}\right) + \beta_2 \log\left(\frac{K_{rt}}{K_{0t}}\right) + \beta_3\left(\frac{U_{rt}}{U_{0t}}\right) + \beta_4 \log\left(\frac{F_{rt}}{F_{0t}}\right) + \beta_5\left(\frac{ST_{rt}}{ST_{0t}}\right) + \rho V_{r,t-1} + u_{rt}$$

(2)

Where PD is population density, K is an investment measure (expressing gross fixed capital formation), U is the unemployment rate, F is investment in financial intermediation, insurance etc, and ST is the percentage of human resources in science & technology in total active population. The zero index denotes Attica, and r, any other region. The equations in (2) form a system which must be estimated using dynamic panel data techniques due to the presence of the lagged dependent variable, namely the presence of $V_{r,t-1}$

3.1 Estimation technique

We use nonlinear two stage least squares (2SLS) to estimate the system of equations in (2). This normally involves arbitrary choices concerning the nature of instrumental variables (basically, variables that cannot be considered endogenous). Such variables are hard to identify in the present instance. A significant advance in 2SLS has been provided by Lewbel (1997). Suppose we have the equation Y=f(W,Z) where W are predetermined variables, and Z are endogenous variables. Suppose further that G=G(W) is any function of W, for example G(W)=W. Let lower letters denote deviations from the means. Lewbel (1997) showed that valid instruments for this equation are: g*z, g*y, and y*z. Moreover, under symmetry of the error terms, valid instruments are also z^2 and y^2. Now if no "genuine" predetermined variables are available (that is, there are no variables in G and thus in g) then under broad conditions, y*z, z^2 and y^2 can be always considered as instruments satisfying at least the order condition for (local) identification.

In this context suppose $\mathbf{X}=\text{vech}[y\otimes z,\ z\otimes z,\ y\otimes y]$ is the entire set of instruments, stacked in a vector (vech selects only the different elements in the various cross products). Suppose there are K variables in the $\mathbf{X}$ vector. In our case we have K=28 for each region, and 28*13=364 instruments in total.

If we write the linear system in (2) as:

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[6] It should be noted that in figure 3, the first factor accounts for 81.4%, while the first and second factors account for 93% and all three for 97.1%. In figures 4 and 5, the first factor shown by the thick blue line accounts for 92.2%, while the first two factors for 97.1%.

$$V_{rt} = \alpha_r + \mathbf{z}'_{rt}\beta + \rho V_{r,t-1} + u_{rt} ,$$

the orthogonality conditions are the following:

$$\text{T}^{-1} \sum_{t=1}^{T} \left(V_{rt} - \alpha_r - \mathbf{z}'_{rt}\beta - \rho V_{r,t-1} \right) \mathbf{X}_{st,k} = 0, \quad \text{for k=1,...,K , for all } r, s = 1,...,n$$

This gives a total of 336 equations for the 18 parameters (including fixed effects) and provides the fundamental basis of 2SLS. One possibility is to use the regional instruments in **X** for the orthogonality conditions of the particular region: This practice never provided different results from those reported below. Since panel data is used, the error terms can be correlated and exhibit arbitrary patterns of autocorrelation,

An important problem in estimation is 'weak instruments'. If instruments are weak, 2SLS and GMM can lead to biases even in large samples, and the distributions can be far from normal. These problems are explored in Caner (2010), Donald, Imbens and Newey (2009), Hansen, Heaton and Yaron (1996), and Stock, Wright and Yogo (2002), who also propose tests to address the issues of "relevance" of the instruments. In our application the instruments pass these R^2 - based tests.

3.2 Empirical results

In some estimates, "K" denotes "aggregate capital formation", while in others it denotes "investment in industry", according to the type of data used. Furthermore, a number of choices can be made concerning the dynamics of the model, i.e., the usage of current or lagged values of certain variables (e.g. the use of F and ST or their lags). This permits dealing with endogeneity problems that might arise with the error terms of the system of equations in (2), but also answering the question of whether variables like F, ST and U have an immediate or lagged effect upon regional disparities. For example, investment in financial intermediation and human resources in science and technology may easily have a dynamic effect that materializes over a time horizon. More important is whether these results are robust across different specifications. Results from all types of estimates are given in Table 1.

Table 1

The effect of population density relative to Attica (PD) - expressed through β_1 - is ambiguous, as it is found to be negative in all estimates, but not always statistically significant. Equally ambiguous seem to be the effects of the other variables, depending on the 'choices' made - as explained above. In *table 1a*, PD is found to exert a significant negative effect upon divergence from the capital region, with the estimate of β_1 being -1.713 and t-statistic equaling -5.260. Strangely enough, gross fixed capital formation is found to have a positive and statistically significant effect on regional disparities (β_2 is 0.044 and the t-statistic 2.699). This could be attributed to the 'wrong' measure of 'investment' or the use of a 'wrong' time interval (i.e. the dynamic specification is not correct and a lagged value should have been used). Regional unemployment has a

positive and significant effect on disparities from Attica[7]; F has an insignificant effect while ST exerts a negative and statistically significant effect on disparity (through coefficient β_5). The positive and significant value of ρ documents the fact that regional disparities are persistent, although not to the extent predicted earlier by the dynamic factor model[8]. In *table 1b*, the use of a lagged value for F (i.e. F_{t-1} instead of F_t) gives a marginally significant effect of PD on regional divergence (at about 8%), a significant positive effect of capital accumulation (measured by β_2), an insignificant effect of unemployment and a significant negative effect of both F and ST. In *table 1c*, lagged values for both F and ST are used and the results are an unimportant effect of PD and unemployment, a positive effect of capital accumulation, a negative effect of F and a positive but insignificant effect of ST at 5% (the t-statistic is 1.791 which is insignificant at the 5% level but not at the 10% level). In *table 1d*, K measures "investment in industry" rather than "aggregate investment", while the lagged value of F is used. This gives significantly negative effects on divergence from PD and K, which is rational outcome, a positive effect from U, but no effects from F or ST. If, furthermore, "lagged investment in industry is used", along with the current values of F and ST and the lagged value of unemployment rate (U), as in *table 1e*, negative effects from PD and K are again obtained, a positive effect from U and a significantly negative effect only from F, but not from ST. When lagged values of all variables except PD are used, as in *table 1f*, PD and U are found to have an insignificant effect on disparities, total capital accumulation once more a positive impact, F, a significant negative effect and ST a positive but marginally significant effect. In *table 1g*, investment in commerce, tourism and transport are included in the estimates instead of PD, (coefficient β_1), to examine the impact of these important for Greek regional growth variables[9]. Results show that together these variables contribute marginally to convergence (at 5%), capital accumulation continues to increase divergence (with a positive and significant β_2, while unemployment does not seem to play a role; ST is marginally significant at 5%, but financial intermediation is found to have an insignificant impact.

Overall then, the results show that investment in commerce & tourism, financial intermediation and, to a lesser extent the proportion, of human resources in science and technology have been the major determinants of reducing regional disparities, indicating the areas in which regional policy should place emphasis. In particular, the contribution of financial intermediation in reducing regional disparities is statistically significant in most specifications while the contribution of human resources in science and technology is significant only in some specifications. The unemployment rate has not been found to be an important determinant of the time variation in regional disparities across all specifications. Where it is found to exert a significant effect, it obviously reveals the rise in unemployment in most regions to levels comparable to Attica and the national average.

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[7] A rise in the rate of unemployment was recorded between 2009 and 2010 in most regions, with the highest proportions being observed in the regions of mainland Greece (12.6 %), East Macedonia-Thrace (13,5%), Western Macedonia (13,9%), Attica (12,9%), Epirus (10,5%), Central Macedonia (13,5 %) and Thessaly (13,1%). One-digit percentages are recorded only in three regions, due to the rise in employment rates in high-season (tourist) periods, namely, South Aegean with a 5,9% unemployment rate, North Aegean with a 6,9% rate, and Ionian islands, with a 5,6% rate (TO VIMA, 2010).

[8] The estimate of ρ equals 0.292 with a standard error of 0.039 (and t-statistic 7.44), so this parameter hardly exceeds 0.38.

[9] 'Construction' is not included in the estimates due to the small number of observations available.

Moreover, aggregate capital accumulation is found to increase regional disparities. This result, which is robust across most specifications, probably implies that growth is uneven and has distinct regional characteristics, i.e. it is the type capital formation and not the *uniform* coefficient of expansion that matters. When "investment in industry", instead of aggregate investment, is used, it is found to have a positive impact on regional convergence. The statistical significance of the ρ coefficient, showing that regional disparities are persistent over time, is another robust finding of the estimations.

The principal 'factors' of financial intermediation, unemployment and science and technology are presented in figures 6-8.

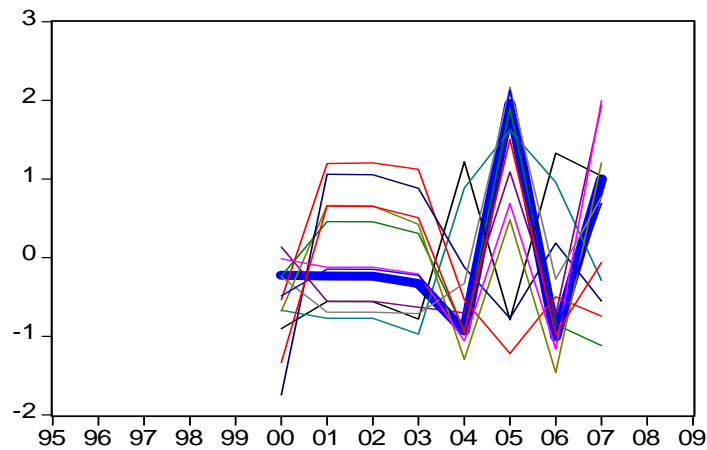**Figure 6. Financial intermediation and principal factor**

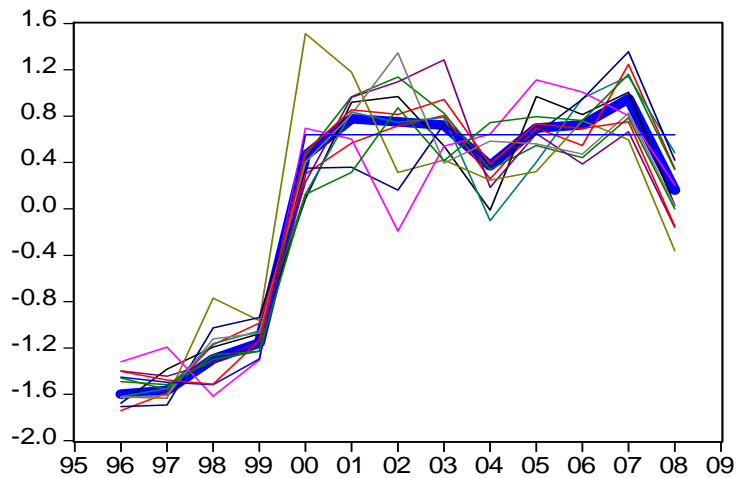**Figure 7. Regional ST and principal factor**

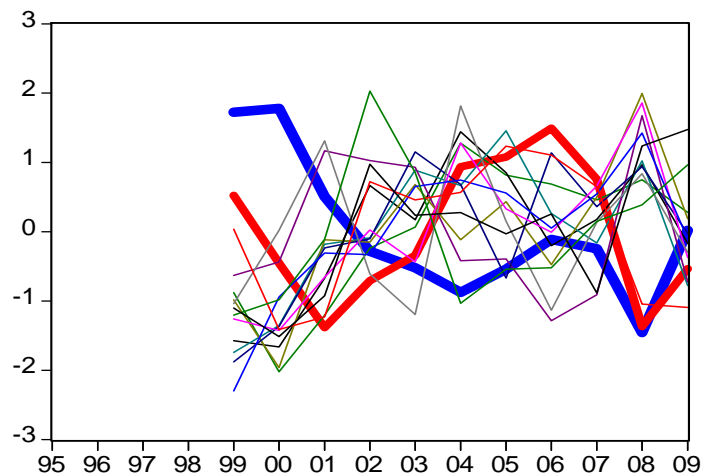**Figure 8. Regional unemployment and two principal factors**

Figure 6 shows that 'investment in finance etc.' along with the 'factor' (average) has a 'nation-wide' effect rather than a region one, thus relates to demand at the national, rather than the regional, level. Figure 7 shows a similar effect for 'science and technology', as one factor accounts for over 93% of variation in this variable. In figure 8, the 'blue factor" represents a general tendency of reduction in unemployment, while the "red factor" accounts for a cyclical tendency in unemployment. Both factors account for 70% of the total variation in the data. The two nation-wide components of unemployment – which are statistically the same across regions - explain the insignificant effect of unemployment on regional disparities in most specifications. To explain capital accumulation over 90% would require four 'factors' or principal components, pointing to the diversity of 'regional capital accumulation'. Thus, capital accumulation has a significant regional component. This also holds for 'investment in commerce & tourism', as the empirical analysis shows that 2 or 3 factors would be required to explain this variable at a level exceeding 90%[10].

The empirical findings are broadly in line with those of previous studies. For example, Caraveli et al. (2008) showed that expenditures for R&D, which create knowledge-related activities, can achieve higher overall regional growth rates and induce a reduction in regional inequalities. Petrakos and Saratsis (2000) found that "the prefectures with a

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[10] Results are available upon request.

relatively higher concentration of human resources develop faster" (p. 68) and that "the existence of touristic resources contributes to a more rapid growth of GDP per capita" (p. 69). Thus tourism can act as a counterbalancing force to the tendency of economic activity (industrial & tertiary) to concentrate in Attica, mainland Greece and Central Macedonia (Papadaskalopoulos & Christophakis, 2007). Finally, Psycharis (2009, p. 510) stresses the regional character of (public) investment, by showing that "as public investments are mainly directed to infrastructure (streets, schools, hospitals, land improvement etc.) they create capital stock which affects productivity and competitiveness of the local economy…Thus the regional allocation of public investment plays a significant role in regional development". The region –specific character of investment is also a key finding of this paper, but 'knowledge' factors (approached by ST) were found to be significant only in some specifications and overall less important than financial intermediation in diminishing regional disparities.

4. Regional as part of general structural imbalances of the Greek economy in the era of economic crises

The persistence (in the long-run) of regional inequalities in Greece and the strengthening of the leading position of Attica region, confirmed by the empirical estimates of this study, constitutes a serious structural problem, which several authors have attributed to a combination of factors. Such factors are historic (for example factors that led to the establishment of the capital region in the specific location), geomorphologic (e.g. the high proportion of less-favoured, mountainous and insular, areas), economic (e.g. economies of agglomeration, quality of human resources, European economic integration, etc.) and political, such as the centralized structure of public governance (Kostopoulou 2009, Petrakos 2009). Added to the severe overall structural imbalances – swelling debt[11], high deficit and low export potential/low competitiveness, in combination with rising unemployment – the 'regional problem' contributes to limiting the country's possibilities to escape the economy's 'development' trap, by inhibiting the exploitation of the periphery's resources (see also Petrakos, 2009, p. 374).

Regional disparities are to a great extent caused or accentuated by structural changes in the economy, characterized by the rise in consumer and producer services (most importantly financial services, real estate, etc.) at the expense of the 'productive sector' (e.g. industrial activities) of the economy, i.e. activities which tend to strengthen concentration tendencies in metropolitan centres. Such developments are in turn strengthened by globalization/internationalization of production and the free movement of capital (mainly financial capital) that it implies. The trend in the allocation of gross fixed capital formation by sector of economic activity in Greece, in table 2, reveals these changes. The rise in the relative importance of such sectors in the Greek economy has not however implied a shift towards 'modern', high value added sectors, based on innovation and 'knowledge' activities.

TABLE 2
Structure (%) of Gross Fixed Capital Formation in Greece: 2000-2007

Sector of economic activity	2000	2004	2007

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[11] It is estimated that in year 2012, total debt will reach 160-65% of GDP (Bank of Greece, personal communication).

Agriculture, etc.	4,2	4,2	5,6
Industry (including energy)	13	7,6	7,8
Construction	1,3	1,2	2,2
Commerce, hotels, transport	20	27,5	24,1
Finance and real estate	37,5	39,9	43,1
Other services	23,8	19,1	16,9

Source: Greek Statistical Authority

Dynamic sectors, i.e. 'entrepreneurial activity', are heavily concentrated in Attica (in particular, 34,4% of secondary and 55% of tertiary activities in total gross value added are located in the capital region), followed by Central Macedonia (which hosts 17% and 12,7% of the same sectors, respectively). As a result, Attica produces half of the country's GDP. The deepening of European economic integration in the decade of the 90s has contributed to this outcome, as it led to the de-industrialization of many industrial regions (mainly in northern Greece) which lacked a significant tertiary sector to counterbalance the loss in productive potential. On the other hand, the areas which attract a large proportion of economic activities and 'modern' sectors, such as finance and other 'new economy' activities (notably Attica and Central Macedonia) are those to be first and more severely hit by international economic crises. In fact, a number of empirical studies on the relationship between regional inequalities and microeconomic performance have shown that during such periods, a reversal of concentration trends with a tendency towards regional convergence becomes apparent (see Petrakos and Saratsis, 2000; Petrakos, 2009). Thus, inequalities are considered to be a phenomenon with counter-cyclical behaviour (Petrakos 2000, p. 61). In particular, Petrakos and Saratsis (2000, p. 62) give empirical evidence of the fact that, at least partly, regional inequalities in Greece decreased in the decade of the '80s as result of the prolonged recession which hit the economy in that decade. On the contrary, the recovery of the economy increased regional inequalities, since it began in the more advanced regions of the country. However, short periods of convergence (due to crises or other reasons) appear to be temporary and to be followed by even stronger divergence from Attica (Michailidis 2009) - as is also confirmed by the empirical analysis of this paper.

The inverse relationship between economic growth/recovery and regional inequalities is not supported by all authors. Thus, a number of studies on EU economic cycles, show the exact opposite effect, i.e. that regional disparities tend to rise in periods of severe recessions and fall in periods of economic growth (referred to in Petrakos 2004, 2009). At the same time, the view of many researchers that the restrained policy framework imposed within the Eurozone in periods of crisis leads to chronic structural imbalances, which preserve regional inequalities, increasingly gains in importance. This view draws on the experience of the crisis of the '80s which induced the adoption of a series of 'Stability Programmes' (see next section) as well as the current crisis (from 2008 onward) which has imposed austerity measures under the rules of the Stability and Growth Pact and the ECB: by prohibiting discretionary macroeconomic policies such measures have led to chronically low domestic demand and public investments, perpetuating the 'supply deficit' problem (which results in low international competitiveness and a high import/export ratio) and failing to generate convergence at the EU and national level (Argeitis, 2005; Onaran, 2010).

In an increasingly globalized environment, pressures for further reduction of the traditional production model and the transition towards new dynamic and innovatory sectors will become stronger and failure to adjust at the regional level will have

detrimental effects for regional development as well as for the overall macroeconomic imbalances. The recent financial and economic crisis will reflect the structural characteristics of individual regions, revealing the inability of regions with a high share in traditional sectors of low competitive advantage (i.e. sectors based on low cost, low value-added, with low level of labour force qualifications) to attract investments and create/maintain job opportunities. As, in the course of European integration, industries subject to economies of scale tend to concentrate in old industrial centres of Europe (see Brulhart, 2001), regional growth and development in the periphery of Europe should be based on investing in R&D and new technologies to compete in products and services with high technology content. Boosting growth on a regional/local level by channelling production to innovative sectors could best deal with the "equity versus efficiency dilemma" widely discussed in the literature. For many Greek regions, this might imply promoting the 'green economy' in industrial sectors (including energy), encouraging 'quality' farm production, or innovative tertiary activities in rural areas (i.e. rural or alternative tourism), depending on the existing structure of the local economy. This appears to be the only strategic option which would compensate for losses in traditional industrial production, construction, (mass) tourism & transport where a high dependence in these sectors exists (Kotios and Tselios 2009, 495; Commission of the EC 2009; European Commission, 2010).

6. The role of regional policy

Greek regional policy in the post-war period has been considered responsible for the gradual establishment of the polar development pattern, expressed by the strengthening of selected polar points in space, already enjoying significant economies of agglomeration due to the concentration of people and economic activity there. In the 1980s - a decade marked by Greek accession to the EC and the beginning of a prolonged recession which was to last until about the mid-90s - there was a shift in emphasis towards the model of localized endogenous development, following changes in the European regional policy model, aiming at the dispersion of responsibility to geographically lower administrative levels[12] (Christofakis 2001, p. 230). This was reflected in the Integrated Mediterranean programmes - IMP (1986-1992) - forerunner of the Community Support Frameworks (CSF) – the initiation of which coincided with the first 'stabilization programme' adopted by the Greek government in 1986[13]. While the IMP marked the shift of regional policy towards multi-annual programmes adapted to specific regional characteristics, the 1st CSF (1989-93) aimed at the reduction of regional inequalities by boosting small & medium enterprises (mainly in the area of tourism) and improving regional transport network in order to upgrade rural regions; the 2nd CSF (1994-99) emphasized the improvement of large-scale infrastructure works aiming at encouraging the country's linkages with the international economy rather than encouraging development at the regional level; the 3rd CSF (2000-06) was marked by the country's accession to the European Economic and Monetary Union in 2001 and focused on raising productivity & competitiveness and boosting employment at the regional level, through investments in human capital and information technology. This programme initiated special development criteria for

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[12] This would be implemented through the adoption of the principles of 'subsidiarity' and 'partnership' of the Structural Funds.

[13] This programme was the means to implement monetary stability, set at the centre of the government's macroeconomic policy until about mid-1990s, aiming at the curtailment of growing inflation, public debt and deficit. Austerity measures resulted in the dramatic rise in unemployment rates and production deficits. Clearly, public spending and income (including regional) distribution were the areas mostly hit by these measures (Argeitis 2005, p. 79).

mountainous and island regions[14], but also focused on the improvement of metropolitan regions, its ultimate aim being the strengthening of regional external linkages (Christofakis 2001, Kostopoulou 2009).

Despite the greater emphasis towards promoting development at the regional/local level in both the 1st and the 3rd programmes, results concerning convergence and socioeconomic cohesion on the intra-national level and between Greek and EU regions have not been satisfactory, as shown in previous sections[15]. Over concentration of resources to large-scale projects (mainly in transport infrastructure) in specific regions has been considered an important reason for this failure[16]. The 2007-13 CSF gives further emphasis in the regional and local dimension of development, as it was designed to be implemented mainly through regional and local entrepreneurial programmes. This implies that local actors should acquire the necessary knowledge in planning and managing local programmes in order to integrate them in the best possible way with regional programmes (Christofakis 2001, p. 228-229). Furthermore, there is a clear shift in emphasis towards the improvement of regional competitiveness, under the pressures of increased globalization, by boosting investment in research and innovation in order to promote the development of knowledge-based sectors at the regional level[17] (European Commission, 2007). Given the delay in the implementation of the ESPA[18] programme that the current debt crisis has brought about, the traditional low 'absorption rate' in Greece and the country's new administrative division (which involves a substantial reduction of the number of municipalities, leading to a more 'centralized' administrative model), the efficiency of the current programme in boosting regional growth and reducing disparities remains to be seen.

7. Conclusions

The empirical analysis of this paper has confirmed the persistence over time of regional inequalities in Greece and the polar development model which the country has followed in the whole post war period. This was shown by the rising divergence of all (other than Attica) regions from both the national average and the capital region.

Regional imbalances reveal the permanent structural imbalances in the country's production model, accentuated in periods of economic crises and assuming a more or less permanent character by policy measures adopted in such periods, so that a kind of vicious circle can be recorded. Increasing economic integration at the regional (EU) or global level contributes to the sharpening of regional disparities, but at the same time, it determines substantially the growth prospects at the regional level. For many Greek regions, this might imply promoting alternative development paths, i.e. sectors (at the primary, secondary or tertiary level) based on innovation and 'knowledge' (including 'green economy' methods, farm production with 'designation of origin', 'quality' tourist services etc.), adapting to regional/local comparative advantage. Such paths would possibly compensate for losses in traditional low-competition activities. Regional policy currently implemented through the fourth CSF places particular emphasis to this strategic

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[14] These are the 'integrated development programmes', designed to be applied in selected zones of the country-side, aiming at boosting rural development. The latter is increasingly becoming a major part of European agricultural policy.

[15] It should be noted that 8, out of the 13 Greek regions, still have a GDP below 75% of the EU average.

[16] Yet, concentrating resources on this type of projects, for avoiding dispersion of resources to small-scale inefficient works, is a precondition of the current memorandum – signed between the Greek government and its lenders - for the continuation of financial flows to Greece.

[17] Thus, although structural resources destined to poorer regions will have increased from 56% of total inflows from the structural funds in 1989 to 85% by the end of the current period, this increase mainly concerns regions which will raise investment in research and innovation (European Commision, 2007).

[18] Greek initials for National Strategic Reference Framework for the programming period 2007-13.

option, as it can be the key for promoting social and regional cohesion and convergence in the era of globalization and an acute economic crisis.

Empirical estimates of this study (based on the use the proper econometric techniques which emphasize the dynamic specification of the disparity equation) confirm the significance of the service sector in reducing regional inequalities (in particular tourism & commerce, on the one hand, and financial intermediation, real estate etc., on the other), as well as the 'regional' character of capital formation. The negative effect of the 'knowledge sector' (measured through 'human resources in science & technology') in regional inequalities is not however a robust finding, as it holds only in some econometric specifications. This could probably be due to the type of data used to measure this variable or the limited time period examined. On the contrary, the significance of the 'financial etc.' sector in reducing disparities appears to be a more robust finding, perhaps showing that improving the access to local capital markets may be a key determinant of regional economic growth and convergence.

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Table 1.Econometric tests: Total Results

1a. "K": aggregate capital formation

	Estimate	s.e.	t-stat.	p-value
β_1 PD	-1.713541	0.325727	-5.260657	0.0000
β_2 K	0.044398	0.016444	2.699935	0.0085
β_3 U	0.090026	0.029663	3.035010	0.0033
β_4 F	0.007687	0.004864	1.580288	0.1181
β_5 S&T	-0.184648	0.056351	-3.276767	0.0016
ρ	0.291782	0.039220	7.439638	0.0000

1b. Lagged value of F: F_{t-1}

	estimate	s.e.	t-stat.	p-value
β_1	-0.599616	0.336974	-1.779416	0.0798
β_2	0.064602	0.014910	4.332949	0.0001
β_3	-0.012322	0.027751	-0.444033	0.6585
β_4	-0.015228	0.003947	-3.858500	0.0003
β_5	-0.154312	0.056761	-2.718633	0.0084
ρ	0.596778	0.067480	8.843773	0.0000

1c. Lagged values of F & S: F_{t-1} and S_{t-1}

	estimate	s.e.	t-stat.	p-value
β_1	-0.191175	0.310583	-0.615538	0.5403
β_2	0.033417	0.012488	2.675989	0.0094
β_3	-0.008052	0.027764	-0.290004	0.7727
β_4	-0.013428	0.003768	-3.563682	0.0007
β_5	0.085154	0.047533	1.791481	0.0778
ρ	0.596993	0.068696	8.690334	0.0000

1d. "K": investment in industry and F_{t-1}

	estimate	s.e.	t-stat.	p-value
β_1	-0.978313	0.232210	-4.213052	0.0001
β_2	-0.022559	0.008441	-2.672534	0.0095
β_3	0.073703	0.016129	4.569667	0.0000
β_4	-0.002709	0.002414	-1.121888	0.2660
β_5	-0.046787	0.035647	-1.312536	0.1939
ρ	0.137281	0.011860	11.57474	0.0000

1e. Lagged investment in industry (K_{t-1}), F, S and lagged unemployment rate (U_{t-1})

	estimate	s.e.	t-stat.	p-value
B_1	-0.611098	0.244289	-2.501540	0.0145
B_2	-0.025490	0.008781	-2.902793	0.0048
B_3	0.098197	0.015682	6.261747	0.0000
B_4	-0.010904	0.002129	-5.122118	0.0000
B_5	-0.005560	0.041589	-0.133684	0.8940
P	0.148078	0.013045	11.35178	0.0000

1f. Lagged values from all variables (K, F, ST, U) except PD

	estimate	s.e.	t-stat.	p-value
β_1	-0.244722	0.296807	-0.824517	0.4126
β_2	0.034360	0.011915	2.883687	0.0053
β_3	-0.018304	0.024232	-0.755387	0.4527
β_4	-0.014101	0.003491	-4.039029	0.0001
β_5	0.088987	0.046865	1.898790	0.0620
ρ	0.609340	0.074861	8.139617	0.0000

1g. Inclusion of investment in tourism and commerce β_1

		estimate	s.e.	t-stat.	p-value
β_1	TOURISM	-0.019212	0.010046	-1.912424	0.0595
β_2	CAPITAL ACC.	0.056501	0.023537	2.400524	0.0188
β_3	UNEMPL.	0.045091	0.034451	1.308839	0.1944
β_4	FINANCIAL	0.001806	0.006946	0.260032	0.7955
β_5	SCIENCE	-0.116426	0.059938	-1.942447	0.0557
ρ		0.349563	0.039067	8.947861	0.0000