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REGIONAL DISPERSION OF ECONOMIC ACTIVITIES
AND MODELS OF CAPITALISM IN EUROPE

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Abstract

This study hypothesises that the EU15 contains at least four models of capitalism which rely on some different institutional arrangements. Our aim is to show that some relationship exists between the different institutional settings and the different geographical patterns of development at regional level. After testing the statistical relevance of our territorial areas, we have calculated several concentration and dispersion indexes to the available regional economic data. We conclude that in Europe different institutional macro-configurations do display dissimilar growth models based on rather diverse core-periphery models.

Key words: *models of capitalism, dispersion of economic activity, core-periphery.*

JEL: *O11; P25; R12; R58*

1. Introduction: different core-periphery relationships in Europe

There is a diffused feeling among ‘dissenting’ economists that the European definition of structural goals has been designed starting from an unstructured market economy viewpoint characterized by little attention to institutional diversities. The strong emphasis on competition and flexibility has led to assumptions that the diversities in institutional arrangements are a subordinated element in the definition of policies, increasing the risk of reinforcing the two (or three) speeds of Europe. In this paper we describe the European dispersion of economic activities in space from the assumption that different capitalisms display different regimes of growth and these regimes are also characterized by various territorial patterns.

We simply hypothesise, according to the empirical study of Amable (2003) that the EU15 contains at least four models of capitalism which rely on some different institutional arrangements. Our aim is to show that some relationship exists between the different

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institutional settings and the different geographical patterns of development at regional level. Institutions coordinate the growth patterns of economic systems and may also have a relevant effect on the spatial distribution of GDP, productivity, employment, unemployment and other relevant variables. Economic activities may be more or less concentrated in a few growth poles, and investment in research and development may be diffused or localized in a few leading regions. Institutions relevantly define the redistribution of income, which also has a spatial dimension. This means that we are not experiencing a single European core-periphery pattern, but one of different core-periphery relationships due to the European variety of capitalisms. Some capitalisms better balance territorial disparities while others foster them, producing a path-dependent growth trajectory (dualism) which is hard to adjust.

The paper is organized as follows. The second section introduces the main goal of our empirical exercise and it places our contribution in the debate on European competitiveness. The third section presents the theoretical perspective of the variety of capitalism as a reference to suggest a territorial explanation different from that based on the resource allocation theory. The fourth section specifies our theoretical hypothesis. Section five illustrates data and the research methodology of the empirical analysis. Section six discusses the relevance of models of capitalism from the regional perspective and the last section discusses the main results. Conclusions follow on the diversities of core-periphery models in Europe.

2. European competitive regions and variety of capitalism

During the last fifteen years, many empirical analyses concerning the regional distribution of economic activities in Europe have been issued. Partly, they have tested the robustness of the New Economic Geography (NEG) theory (Krugman, 1991; Fushita et al. 1999) relative to the location of economic activities and partly, they have checked the structural distributive effects of the Single Market creation in Europe. This vast literature cannot be reviewed in this short section and we simply suggest referral to the recent review by Combes and Overman (2004). We nonetheless briefly outline some features of the European geographical concentration in order to introduce the aim of this paper.

First of all, no clear evidence exists of a converging pattern in the European distribution of economic activities after the creation of the Single Market. This result may be due to the selected statistical measures, that is variables, indexes and territorial units (countries or regions). On the other hand, this may also depend on the scarcity of homogenous European data at a very disaggregate territorial and sector level. However, there is a certain agreement among economists on the geographical persistence of the core-periphery pattern – also called

dualism² – which presents as stronger when measured by GDP and weaker when measured by per-capita GDP.

In contrast to the more homogenous pattern of specialization observed for the North American Countries, in Europe we have a very mixed pattern for industrial specialization and geographical concentration. Most of the empirical studies record small specialization changes across countries, even when observed using different datasets sources, variables,³ time series and indexes. However, only a few studies adopt a regional perspective because of the lack of a complete and homogeneous European regional dataset. In other words, specialization and concentration is observed across countries but only in few cases across regions. Moreover, an increase in specialization does not mean an increasing geographical concentration. European countries become more specialized through the exploitation of their comparative advantages (Amiti, 1997), but variations in concentration depend on the industry and the majority of industries show a decrease in concentration – even if in many cases the statistical variation is small. Some other studies have recorded small positive variations in concentration while others no variations at all. Scott and Storper (2003) explained that as the effect of historical and institutional factors. Brulhart and Traeger (2005) highlighted that we have to distinguish between the ‘relative’ and the ‘topographical’ concentration of total employment to understand the European concentration trend. They observe that differences in concentration recorded in different studies can depend on industry concentration, which changed according to the spatial diffusion of total employment and which has instead not changed with respect to physical space.

The approach claiming the existence of a variety of capitalisms contributes to a depiction of the differences in the distribution of economic activities in Europe. Regional differences can be more appropriately understood if we consider their inherence to the institutional context. From this perspective we may single out some differences in the spatial distribution of economic activities between spaces differently structured by institutional configurations. Regional diversities depend on many historical and physical factors. We cannot ex ante exclude that institutions equally contribute to the differentiation of regional performance, engendering some positive or negative inter-regional feed-back. The hypothesis is that the design of macro-economically defined institutions may alternatively help regions to increasingly exploit some specific competitive advantage, or be trapped in underdevelopment. In other cases it can induce an equalization of resources endowment between regions helping in this way a certain converge. As a consequence, regional disparities may exist (or not) consisting of territorial concentration of economic activities and production specialization that

² Dualism theory had its heydays in the 1960s with works of many authors among which we remember Vera Lutz (1962).

³ In general, employment, value added, gross output for different NACE classification of manufacturing

define a specific and stable core-periphery model of productivity for each model of capitalism.

We therefore suggest a fresh discussion of the content of the geographical concentration process that is under way. The relevance of this issue for the definition of structural policies is evident. Firstly, we cannot simply conceive a region as an isolated entity. Each region is part of a specific (national) growth regime and macro-institutions may constrain its development path. Consequently, no development policy fits the less developed regions. Secondly, some models of capitalism let its growth processes unfold by creating huge differences between territories and institutions and do not contribute to any regional redistribution. In this case the same macro-economic patterns of development hinge the convergence process. In both cases, by assuming a benchmark or the best practice principle, we incur the risk of expressing de-contextualized policies and unfit measures.

Two key questions stem from these general remarks which require some empirical evidence; are there any specific core-periphery relationships within and between models of capitalism in Europe? Does the European regional distribution of economic activities converge between different models of capitalism? The first question is addressed in order to understand the European spatial economic distribution according to the variety of capitalism point of view. Secondly, similar or different as they may be, we analyse whether these models present a convergence in their regional spatial pattern, that is, whether they display a common or a different core-periphery pattern.

3. Different Models of Capitalism and Regions in Europe

Institutions are synthetically introduced into the study of the concentration of economic activities through the concept of *model of capitalism* (MC). The latter is defined by a configuration of typical institutions which shape national economic systems at a macroscopic level. Theories concerning the variety of capitalism state that we cannot conceive the economy as an unstructured market. Economic co-ordination is not achieved through the price system alone. Prices emerge as the result of many interacting factors and are relevantly affected by the form and the strength of institutions. At the national level institutional arrangements act as co-ordination mechanisms which are differently shaped in different countries. The institutional set-ups tend to assume some typical form due to a limited combination of preferential complementarities and hierarchies between institutions. As a consequence, growth processes tend to assume specific shapes largely determined by the different form of institutional configurations. Our hypothesis is that the regional distribution of economic activities is also related in part to the specific institutional configurations.

industries.

Schonfield (1965) was a forerunner of this perspective. Looking at the state's role in modernization, he highlighted the differences of institutional configurations in mixed economies. His contribution was fruitful for economic sociologists engaged in detecting differences in the structure of national labour markets, especially with respect to the wage-labour nexus. Other authors have identified ideal types of capitalism focusing on the solutions of coordination problems at the firm level, producing some specific matching between organizational models and institutions.⁴ Albert (1991) introduced a distinction between Anglo-Saxon and Renanian capitalism, taking the USA and Germany as benchmarks. Lazonick (1990) looked at the beginning of the XX century and opposed the coordinated capitalisms of Japan and Germany with preference for the managerial capitalism of Anglo-Saxon countries. The *Régulation* theory has particularly developed this perspective from the macro-economic perspective and made many interesting institutional comparisons between economies. Amable (2003) provided the most recent theoretical contribution to the analysis of variety of capitalism.⁵ A fundamental finding of his analysis was that the existence and persistence of different institutional macro-configurations depends on multiple equilibria of institutional complementarities. A basic assumption of this study is that the best contribution to economic co-ordination derives from the *coherence* of institutional arrangements which reduces uncertainty, and not from the adoption of a best set of institutions (as in the best practice approach). Therefore, a plurality of these configurations may be equally efficient in the co-ordination of the economic growth process. This means that a strong linkage between the institutional configuration and the production specialization of countries exists. Institutional configurations fit particular technological specializations and they foster different investment patterns. As an example, the German institutional model has favoured a growth strategy based on large firms specializing in the chemical and electromechanical sectors. Mediterranean countries have not followed this path but have nonetheless achieved successful growth strategies (Italy in the past, Spain at present). Again, the Eastern-Asian institutions did much to help specialisation in consumption electronics and microelectronics. The literature on variety of capitalism has not investigated the regional dimension and location patterns of economic activities engendered by national institutional configurations. The *Régulation* theory recognised that space plays a major role in economic processes (Lipietz, 1977), but adopted a theoretical strategy which avoided any endogenous role of space besides that given by the national institutional forms in defining economic systems. As

⁴ Cf. Dore, Lazonick and O'Sullivan (1999), Hall and Soskice (2001), Hollingsworth, Streck and Schmitter (1994), Aoki (2001), Whitley (2000).

⁵ In order to identify different models of capitalism, he uses indicators associated with five fundamental institutional areas for 21 OECD countries: a) product-market competition, b) the wage-labour nexus and labour market institutions, c) the financial intermediation sector and corporate governance, d) social protection and Welfare State, e) the education sector. Using a principal component analysis, he represents the institutional design of different capitalisms and, by applying a cluster analysis, he collects countries with

a consequence, the *Régulation* studies have concentrated on macroeconomic growth regimes without inquiring into the forms of the spatial deployment of accumulation and the contribution of space to the coordination of economic processes. The evolution of the *Régulation* studies to include national innovation systems (SSIP, Amable et al., 1997) still did not include the spatial definition of growth regimes. The same can be noted for other studies such as Aoki's (2001) Comparative Institutional Analysis or the Variety of Capitalism (Hall and Soskice, 2000) which did not consider space.

Nonetheless, empirical studies assuming an institutionalist viewpoint have produced a rich literature in regional studies. Most of them, however, are microeconomic studies investigating regional factors producing positive externalities and increasing returns, especially knowledge spillovers (Doring and Schnellenbach, 2006). Broadly speaking, they show that regions have different knowledge production functions because of institutional differences in terms of human relations (social organization), institutional actors and historical events (path-dependency) (Saxenian, 1994; Audretsch and Feldman, 2004; Pecqueur and Zimmermann, 2004). In this paper we do not go into microeconomic differences and we do not analyse causation processes which are typical of each region. Instead, we *describe* the role of homogeneous macro-institutional configurations in the spatial distribution of economic activities starting from the European models of capitalism (MC) as statistically defined by Amable (2003). Therefore, we focus on what is common between regions and not on what differs (which is not reachable). As a consequence, our perspective is that of *structural macroeconomics* and we simply neglect factors (of any kind) specific to single regions (which may contribute to the relative position of regions) to focus on macro-institutions common to groups of European regions. We are aware that regional economic performance depends on many elements of a physical, historical, cultural and local-institutional nature. The interaction between local and national institutions can also produce a further reason for differentiation⁶ but we restrict our investigation to the hypothesis that different MCs can imply different regional distribution of economic activities. Consequently, we assume that the level of regional differentiation can depend on the patterns of growth which encourage or discourage differentiation or agglomeration. Moreover, also the form of welfare institutions may have a territorial redistributive impact. Therefore, core-periphery relationships may be both part and effect of the way institutions coordinate growth processes in a model of capitalism.

4. Models of capitalism as macro-regions

The attention of scholars and technicians is generally focused on the empirical identification of growth and competitiveness indicators. This allows for better evaluation of European

similar institutional characteristics.

regions with regards to economic performance. However, this effort to specify the best regional performance is usually based on assumptions implying institutional homogeneity, and the possibility of rapid adjustments of less well performing regions through the reallocation of resources. On the contrary, we suppose that resources of less well performing regions are often specific or cannot be rapidly adjusted. There is no necessary best practice in regional development in the sense that the growth strategy is always relative to the configuration of the general economic system to which the region belongs and to the constraints imposed by path dependence. The ‘general system’ is not the European Union, which has not achieved an institutional homogeneity yet, but it is still the national state or some broader area – as in the case of continental Europe – enjoying some institutional coherence and spatial proximity. What is relevant here is that macro-institutions which give form to national growth patterns may reinforce dualism by exalting increasing returns or, on the contrary, help to distribute income equally among regions by equalizing productivity and the concentration of labour activities. In particular, some systems may systematically achieve growth by sacrificing some regions while other systems may display a more territorially balanced way of growing. This phenomenon is not only related to the issue of ‘growth poles’; it may also be related to the specific innovation regime which is the source of productivity (the way innovation is produced and adopted), to labour market institutions which help to redistribute income (e.g. by national contracts) and to welfare institutions which redistribute disposable income. We do not intend that institutions cause regional differentiation. We simply suppose that regional differentiation and the institutional configuration may be complementary to define a broadly defined growth regime.

Most of the studies we discussed in the first part of this paper tend to calculate concentration and specialization at country level. On the one hand, this is a correct practice because of the homogeneity of institutions. On the other hand, this presents some difficulty. Firstly, large countries cannot be meaningfully compared to the small ones because of the different extent and number of regions (e.g. U.S. vs. Germany or Germany vs. Austria). Secondly, comparisons of similarly sized economic systems would always limit the study to a few representative countries (France, Great Britain, Italy, Germany and Spain), leaving aside interesting and successful nations such as Austria, The Netherlands and the like. In particular, the study of the dispersion of economic activities in Europe is presently performed at the whole European level or within single nations, which leads small states to be considered as an appendix of the larger. On the contrary, the ‘blue banana’, which is the centre of Europe, is a trans-national set of regions.

⁶ See Solari (2003) on this particular aspect.

Figure 1a – Dispersion of regional per-capita GDP (2003)

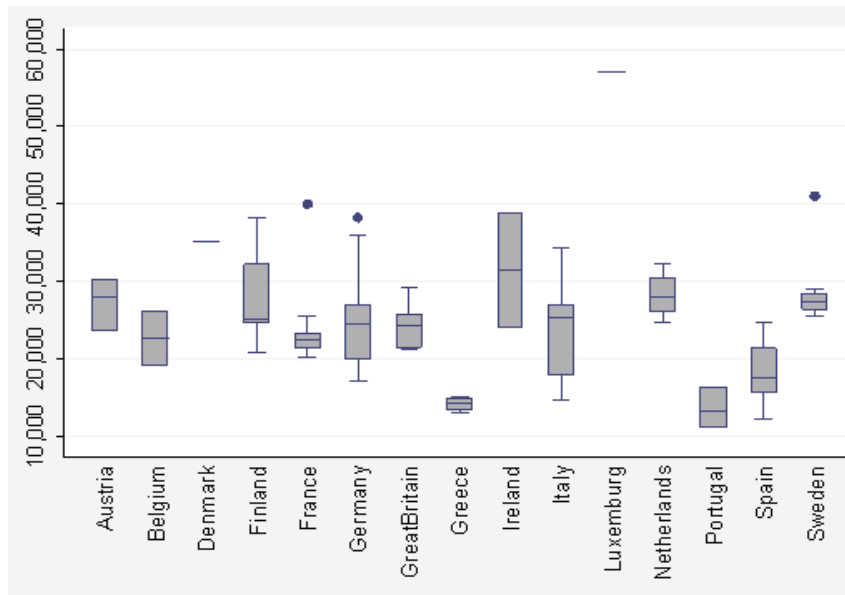
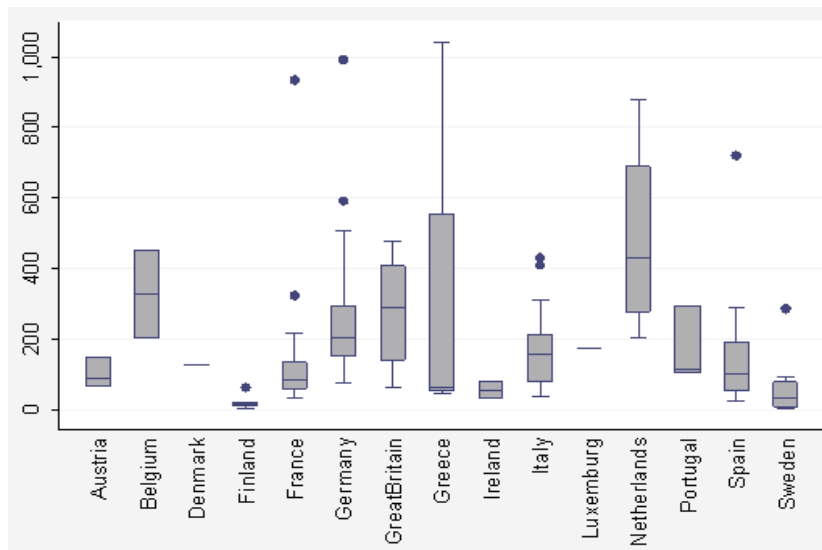


Figure 1b – Dispersion of regional population density (2004)



At first sight, in figure 1a and 1b it is hard to detect any homogeneity in the dispersion of per capita GDP or in that of population density. The outlook changes when we aggregate regions trans-nationally. Our (tentative) solution is to consider the homogeneity given by the similarity of institutional configuration – model of capitalism – as a source of geographical area definition. Therefore, we assume geographical distinction of MC as a trans-national region with a ‘reasonably’⁷ homogeneous macroscopic institutional configuration and analyse to what extent such distinctions reveal differences in spatial concentration of economic

⁷ Obviously, some difficulties exist in the collocation of Ireland and the Netherlands, which still are ‘corporatist’ systems but which tend to approach respectively the market and the Scandinavian models. Amable’s (2003)

activities. This method presents some difficulties because national boundaries still exist and are relevant. However, firstly, this is a tentative empirical study which will also test the relevance of this geographical partition of Europe. Secondly, most of the regions contained in a MC are geographically contiguous. As a consequence this hypothesis is not totally hazardous. Some perplexity may be raised by the inclusion of France in the same MC as Germany. This is particularly because there has been twenty years of studies of the *Régulation* school based on the comparison of these two countries, which exalt their differences. However, after the reforms of the 1990s, and with the enlarged perspective which includes countries such as the Scandinavian or Mediterranean countries, differences in this field tend to be relative (Amable, 2004). This is particularly true for institutions which have a more direct impact on regional competitiveness; innovation, labour markets and welfare. It is not the case for institutions which determine the form of state intervention in the economy since we find a centralized state in France and a federal state in Germany. For this reason we have also proposed some measures which exclude France from the Continental MC.

Two key questions stem from these general remarks, and these questions will be addressed in our study: do the European MCs converge in the regional distribution of economic activity? Are there different core-periphery relationships between MCs? The first question is addressed in order to understand the European spatial economic distribution from the variety of capitalism point of view. Secondly, similar or different as they may be, we analyse whether these models present a convergence in their internal regional spatial differentiation, that is, whether they have a common/different core-periphery pattern. This inquiry is particularly relevant if we focus on the high-tech poles in Europe, asking whether they have a different intensity and concentration in the different models. We will relate this to the differences in institutional architectures in order to rank regions more easily with respect to the European goal of the knowledge society. We suppose that the EU's effort to reduce regional disparities may fail if institutional features are not taken into account.

5. The regional data and territorial definition

In order to describe the European regional geography with respect to the variety of capitalisms, we have used the REGIO dataset of Eurostat. It is common knowledge that the data coverage of this dataset is unsatisfactory because of many missing data and for the suspect that different criteria are used by the various national statistical offices; however, no better regional data sources are available at European level (Combes and Overman, 2004).

The role of macro-institutional configurations in the spatial distribution of economic activities is studied starting from the European models of capitalism (MC) as defined by Amable

clusters however confirm their belonging to the Continental model and we have no interest in discussing that here.

(2003).⁸ Starting from a regional perspective, a model of capitalism (MC) is here defined as a *set of regions belonging to countries sharing a reasonably homogeneous macroscopic institutional configuration*. We are interested in observing European differences in geographical patterns of economic development and thus we will firstly investigate the descriptive power of MC by studying the regional variance of a set of macroeconomic variables.

Eurostat classifies regions at different territorial levels: three regional levels (NUTS1, NUTS2, NUTS3) and two local levels (NUTS4, NUTS5). The latter are not interesting for this study. The first three ‘NUTSs’ represent the administrative organization, which generally consists of two really existing administrative levels and a ‘step level’.⁹ However, national administrative partitions are very different among countries and are difficult to compare. In our study, in order to improve the significance of the comparative analysis and to obtain a more homogeneous territorial set of regions, we took a mix of NUTS1 and NUTS2. Our choice was determined by the aim of treating regions with a similar geographical spatial extension (minimizing its variance) in order to better analyse the concentration of both population and economic activities. We consequently took the NUTS1 level for Belgium, Greece, Luxemburg, the Netherlands, Austria, Portugal and the UK to aggregate the too small administrative regions at NUTS2. For the other European countries, we took the NUTS2 level, i.e. the administrative regions. As a consequence we find 75 regions in the Continental model, 12 in Great Britain, 45 in the Mediterranean model and 14 in the Scandinavian area.¹⁰ To describe the European spatial distribution of economic activity with respect to MC, we analysed variance using the following dataset for the period 1994-2004. Missing data were estimated by linear interpolation. (see table 1)

⁸ Amable (2003) determined four models in Europe: the Continental (Germany, France, Austria, Belgium; the Netherlands, Luxembourg and Ireland), the Market-based (Great Britain), the Social-democrat (Denmark, Finland and Sweden) and the Mediterranean (Italy, Spain, Portugal and Greece). Here, we will refer to Great Britain by its name and to the “Scandinavian model” instead of to the Social-democrat one.

⁹ The third level (for some countries like Italy and France, it corresponds to NUTS1, for others like Germany and the UK, it is NUTS2 and for Belgium, it is NUTS3) has only a statistical usefulness. For more information, www.eurostat.it

¹⁰ The average area is between 15 and 23 thousand square metres, with the exception of Scandinavia where it reaches 58.7 thousand. The average population size is between 1.4 thousand in the Scandinavian regions and 4.9 in Great Britain.

Table 1 - missing data and percentage of estimations (1994-2004)

STATE	Re-gions	Popula-tion	Den-sity	gdp	gdp per capita	househ old income	Emplo yment rate	fem. Emplo yment rate	HRST per capita	HRST core per capita	r&d/ emplo yment	r&d expen-diture
Austria	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	0	100.0	78
Belgium	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	78
Denmark	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0
Finland	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43.6	40	0.0	38
France	22	9.1	9.0	0.0	0.0	7.0	3.0	3.0	9.1	0	100.0	0
Germany	40	0.0	27.0	4.2	5.6	0.0	4.0	4.0	12.8	16	0.0	52
Great Britain	12	37.9	9.0	0.0	0.0	0.0	0.0	0.0	12.1	17	-	56
Greece	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	56
Ireland	2	18.2	9.0	0.0	0.0	11.0	0.0	0.0	18.2	36	0.0	78
Italy	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	6	0.0	22
Luxembourg	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	9	0.0	-
Netherlands	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.3	9	0.0	22
Portugal	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.4	58	0.0	22
Spain	17	0.0	82.0	0.0	0.0	3.0	2.0	2.0	0.0	0	0.0	0
Sweden	8	0.0	0.0	0.0	0.0	0.0	2.0	2.0	27.3	18	100.0	0
Total/average	146	4.7	0.0	1.1	1.5	2.0	2.0	2.0	14.0	11	0.0	-

Percentage of data estimated by extrapolations

6. The significance of models of capitalism at regional level

In order to detect the power of the MCs in explaining regional differences in Europe we analysed the variance (η^2) of a set of economic indicators. We look for territorial concentration/dispersion of economic phenomena *within* each MC and for regional disparities *between* MC. In table 2 we report the η^2 measure (explained variance) for each of the variables we analysed. The following emerges:

- Differences in regional (average) demographic density are not, in the main, explained by MC. This means that the concentration of population is relatively neutral with respect to institutional settings and the pattern of historical settlements.
- GDP per capita is a measure which is significantly determined by regions belonging to different MCs. However, while 36.3% of variance of regional GDP per capita was explained by MC in 1995, it drops to 17.1% in 2003. This means that in the 8 years from 1995 to 2003, the regional distribution of average GDP per capita has become more homogeneous in Europe. Nonetheless variance remains significant and it shows that macro institutions still have some impact on regional growth differences.
- Labour productivity *between* MCs – defined as Value added per employee – is less differentiated than GDP and it declined slightly from 17.0% in 1999 to 12.0% in 2003. Average regional productivity tends to be a more homogeneous variable and differences between MCs tend to disappear.
- Average regional household income per person, on the other hand, is one of the variables which are best defined according to MC. Also in this case the value of η^2 drops, from 43.3% to 31.9%, but it remains a significant source of differentiation.

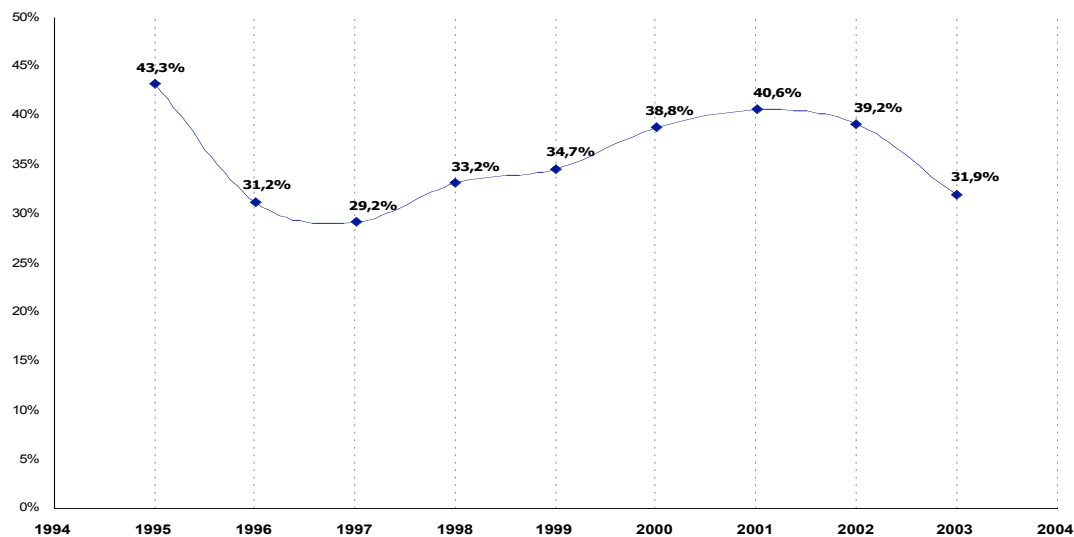
This is particularly interesting if we consider that this variable, relatively to GDP per capita, incorporates the redistributive effect of the welfare state (it includes the effect of taxes and transfers and other forms of redistribution). Consequently the different regional concentration of per capita GDP and household income tells us something about the spatial impact of welfare institutions.

Table 2 - Variance explained by Models of Capitalism, based on η^2 for each observed variable

Regional Eurostat data	1995	2000	2004
Demographic density	4.7	4.6	4.4**
GDP per capita	36.3	23.6	17.1**
Labour productivity (GDP/L)	17.0*	17.0	12.0**
Household income per person	43.3	38.8	31.9**
Employment ratio	48.2*	45.5	36.2
Unemployment ratio (long-term)	27.1*	25.4	38.7
HRST (% of active population)	45.3	35.7	33.3
HRST Core (% of population)	62.7	55.9	46.6
Employment in R&D (%active pop.)	-	-	19.0**
R&D expenditure (% of GDP)	22.9	22.1	23.3**

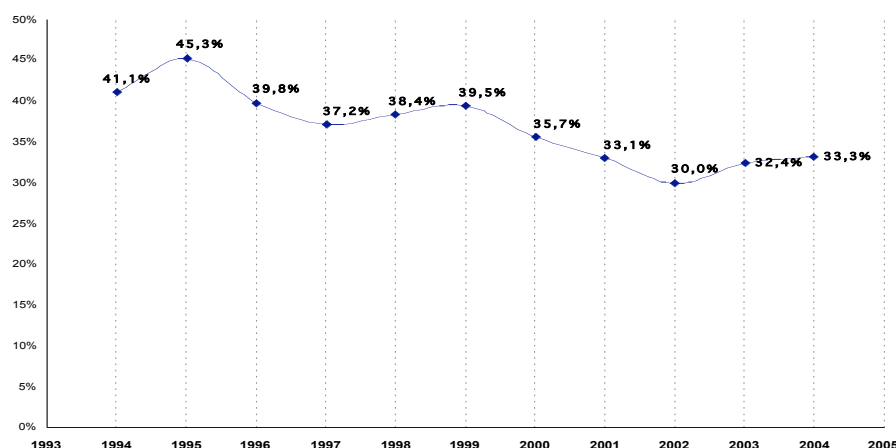
Processing of Eurostat data – percentages; () 1999; (**) 2003.*

Figure 2 - η^2 pattern for disposable income of households



- The employment and (long-term) unemployment ratio is another variable which has a different regional distribution according to MC. The former is quite high and, although it declines, it testifies that important differences exist for labour participation in Europe. The latter is lower but, disappointingly, rises in the course of time, so in 2004 MCs explain relatively well the regional distribution of unemployment.

Figure 3 - Percentage of variability in R&D personnel explained by models of capitalism, 1994-2003



- The last variables focus on the protagonists of the Lisbon strategy: R&D and Human resources in science and technology (HRST), both total and core definition.¹¹ These are the variables which are best defined in this variance test because a very high percentage of variance of such variables is explained by regions belonging to specific MCs. Also in this case the η^2 decreases, but in 2004, 33.3% and 46.6% of variance was still explained by MC. R&D expenditure, on the other hand, tends to increase its regional differentiation according to MC. As a consequence, the regional differences in high tech and R&D, which are central to the Lisbon strategy, tend to be closely associated with MC and this legitimises the analysis which follows.

7. The concentration of GDP, employment and population

Four different measures have been used for concentration analysis: the ratio of the first 5 and 10 regions to the total,¹² the Theil index and the adjusted geographic concentration index (AGC) proposed by OCDE.¹³ The last index can be split into two components: territorial disparities in GDP and population concentration. We have applied it also to employment, productivity and income per-capita.

¹¹ The 'core' is defined by the employees working in science and technology sectors who are effectively qualified for such jobs (high degree).

¹² Although this measure is widely used, it is controversial because its calculation is sensitive to the number of regions. In our analysis, this concentration measure can be best used to compare Great Britain and the Scandinavian regions on the one hand, and the Continental and Mediterranean regions on the other.

Indexes

In the following tables we use a set of different indicators. The ratio of the first 5 or 10 regions on the total is a rough indicator (due to the different number of regions between capitalisms) but, it nonetheless supplies good results. The Theil index is derived from Shannon's entropy and takes a normal distribution as reference. 'N' is the number of regions, 'y_i' the observed variable of the ith region.

$$T = \frac{1}{N} \sum_{i=1}^N \left(\frac{y_i}{y} \cdot \ln \frac{y_i}{y} \right)$$

The AGC index (Adjusted Geographical Concentration) is due to OCDE (2003) researcher Spiezia and includes the differences in regions' size: 'a' is the area of a region, 'p' is population. It corrects some distortions of the GC index proposed by Ellison and Glaeser (1997) and normalises it as $AGC = GC/GC^{\max}$.

$$GC = \sum_{i=1}^N |y_i - a_i|$$

It can be further decomposed into two sub-indexes.

$$AGC = \sum_{i=1}^N \frac{y_i - p_i}{y_i - a_i} |y_i - a_i| + \sum_{i=1}^N \frac{p_i - a_i}{y_i - a_i} |y_i - a_i|$$

The first term on the right-hand measures the effect of territorial disparity in 'GDP' and the second term the effect of 'geographic concentration of population' (tab.3). The same is done in tab.4 where we have changed variables 'y' and 'p' in 'employment rate' and 'active population' concentration, and in tab.5 where the first became 'value based labour productivity'.¹⁴

The first analysis of concentration concerns GDP. As we can see in Table 3, GDP is highly regionally concentrated in the Scandinavian and Mediterranean models relatively to the other MC. This result stems from both the Theil index and the AGC. The ratio of the first 5 and 10 regions gives us a different result but we can see that the number of regions affects results. The most explanatory index is the AGC: the concentration of GDP in space is always mainly due to the concentration of population (from 77% to 94% – ratio of 1st and 2nd component) and not to differences in GDP per capita. However, in Scandinavian countries concentration of GDP is mainly due to the concentration of population in a few regions while, in the Mediterranean regions, the component of disparities in GDP per capita is relatively high (more than 20% of the total index). France contributes to increase the concentration in the Continental model, which otherwise is more homogeneously defined. However, the exclusion of France does not alter significantly the ordering of data.

¹³ For a detailed analysis of concentration measures, see OCDE (2003).

¹⁴ OECD (2003) "Geographic concentration and territorial disparity in OECD countries" Territorial development policy committee, <http://www.oecd.org/dataoecd/43/1/15179757.DOC>

Table 3 - Concentration of GDP

	Top 5		Top 10		Theil Index	Adjusted Geographic Concentration Index (AGC)				
	% area	% income	Concentration Ratio	Concentration Ratio		% income	% area	% income	1 st component Territorial differ. income per person	total
Continental										
1995	5.3 (9.5)	22.8 (24.6)	4.28 (2.59)	14.7 (24.1)	35.4 (39.7)	2.41 (1.65)	0.065 (0.53)	0.074 (0.63)	0.396 (358)	0.322 (295)
2000	5.3 (9.5)	23.8 (25.6)	4.46 (2.69)	14.7 (24.1)	36.8 (41.9)	2.51 (1.74)	0.068 (0.56)	0.065 (0.57)	0.383 (353)	0.319 (297)
2003	5.3 (9.5)	23.9 (25.7)	4.48 (2.70)	14.7 (24.1)	37.2 (42.8)	2.53 (1.78)	0.069 (0.58)	0.061 (0.51)	0.377 (349)	0.316 (299)
Great Britain										
1995	54.2	59.4	1.10	90.6	94.0	1.04	0.047	0.019	0.335	0.316
2000	54.2	60.6	1.12	90.6	94.3	1.04	0.055	0.034	0.344	0.309
2003	54.2	60.6	1.12	90.6	94.3	1.04	0.055	0.034	0.344	0.310
Mediterranean										
1995	16.5	34.3	2.08	33.6	57.5	1.71	0.114	0.091	0.423	0.332
2000	16.5	34.4	2.09	33.6	57.7	1.72	0.115	0.096	0.426	0.330
2003	16.5	34.3	2.08	33.6	59.3	1.69	0.111	0.087	0.420	0.333
Scandinavian										
1995	20.4	71.3	14.16	60.0	92.8	5.39	0.165	0.047	0.551	0.504
2000	20.4	72.3	14.35	60.0	93.5	5.44	0.165	0.052	0.564	0.512
2003	20.4	72.5	14.40	60.0	93.6	5.44	0.169	0.049	0.564	0.516

Values between brackets are calculated excluding France.

Table 4 - Geographical concentration of employment (total employed people, in thousands)

	Summary statistics			Concentration Ratio		Adjusted Geographic Concentration Index (AGC)		
	Mean	St. Dev	Coeff. of variation	Top 5	Top 10	Total	1st component Territorial difference in employment rate	2nd component Geographical concentration of active population
Continental								
1999	1008.01 (1001.76)	751.69 (647.31)	0.745 (0.646)	2.648 (2.961)	2.668 (2.362)	0.349 (0.309)	0.008 (0.005)	0.341 (0.303)
2004	1038.44 (1009.48)	762.42 (675.20)	0.734 (0.669)	2.614 (3.038)	2.624 (2.390)	0.337 (0.309)	0.001 (0.005)	0.335 (0.304)
Great Britain								
1995	2227.65	938.99	0.421	2.059	1.033	0.322	0.001	0.321
2004	2334.96	961.50	0.411	2.043	1.032	0.319	0.000	0.320
Mediterranean								
1999	984.04	983.35	0.999	1.492	1.671	0.356	0.015	0.340
2004	1105.85	1084.34	0.980	1.519	1.668	0.350	0.009	0.341
Scandinavian								
1999	646.40	671.34	1.038	3.386	1.747	0.532	0.009	0.523
2004	670.91	685.23	1.021	3.396	1.746	0.536	0.005	0.531

Values between brackets are calculated excluding France; due to missing values, the number of employed people – proposed by OCIDE – has been substituted by active population.

Table 5 - Differences in the distribution of productivity and employment

	Adjusted Geographic Concentration Index (AGC) (99-2004)			Adjusted Geographic Concentration Index (AGC) (95-2003)		
	total	1 st component Territorial disparity income per employee	2 nd component Geographical Concentr. of employment	total	1 st component Territorial disparity income per-capita	2 nd component Geographical Concentr. population
Continental						
1995- 1999	0,331 (0,321)	0,000 (0,000)	0,331 (0,321)	0,396 (0,358)	0,074 (0,063)	0,322 (0,295)
2003- 2004	0,338 (0,311)	0,019 (0,018)	0,319 (0,293)	0,377 (0,349)	0,061 (0,051)	0,316 (0,299)
Great Britain						
1995- 1999	0,271	0,000	0,271	0,335	0,019	0,316
2003- 2004	0,273	0,000	0,273	0,344	0,034	0,310
Mediterranean						
1995- 1999	0,423	0,174	0,249	0,423	0,091	0,332
2003- 2004	0,429	0,182	0,247	0,420	0,087	0,333
Scandinavian						
1995- 1999	0,530	0,000	0,530	0,551	0,047	0,504
2003- 2004	0,534	0,000	0,534	0,564	0,049	0,516

In both the Continental model and Great Britain, GDP is less spatially concentrated. However, per capita GDP carries greater weight in the concentration index composition for the Continental model compared to Britain where population density is more relevant (no relevant change is obtained excluding France). Regional disparities are higher in the other models, depending on scarcely populated regions in the Scandinavian model and on strong income inequality in the Mediterranean model.

The second measure (table 4) concerns employment, another measure related to regional competitiveness and production growth. In the Scandinavian model employment is more spatially concentrated than in other models. However, even in this case, the result is mainly determined by the concentration of active population and not by regional differences in employment opportunities. The opposite is true for the Mediterranean and, to a lesser extent, for the Continental models. In the Mediterranean model, regional disparities in economic activity plays a significant role while for the other cases population concentration is crucial. We cannot say what the direction of the relationship is between population agglomeration and regional employment growth. However, broadly speaking, what emerges is that we must pay greater attention to population concentration tendencies in order to understand regional growth capability. The importance of regional differentiation of unemployment is in any case decreasing everywhere.

The most striking results are given by table 5 where the value-based productivity of labour is analysed. GDP per employee is perfectly distributed among British and Scandinavian regions (suspects on the estimation techniques of these data are legitimated) and show slight relevance in the Continent. A relevant differentiation of productivity exist only in the Mediterranean area. As a consequence, the concentration of the workforce explains most of differences in regional income, except for the latter model.

Table 6 - Descriptive statistics of GDP per capita, 2003 (euro)

Model of capitalism	MIN	MAX	1st QUARTILE	2nd QUARTILE	3rd QUARTILE
Continental	17,045	57,075	21,624	23,800	27,327
Great Britain	12,173	42,476	23,150	24,365	25,812
Mediterranean	11,038	34,396	15,399	17,935	24,583
Scandinavian	15,065	41,178	22,339	24,844	27,800

8. Different patterns of agglomeration in models of capitalism

The last tables (7a and 7b) show the results of a set of variability and inequality indicators. These are the coefficient of variation (cv), the variance of logarithm (varlog) and the Gini index.¹⁵

The data (varlog) show a similar concentration of population density in the Continental model and in Great Britain, even though the average density is different, respectively 389 and 641 inhabitants per km². The average density is low (175) in the Mediterranean regions where population is more uniformly distributed and very low (56) in the Scandinavian countries where regional concentration is fairly high.

In 2003, the average (of regional average values) labour productivity reached the highest levels in the Continental model (60.4 thousand euro) and in the Scandinavian regions (61.6). This value is slightly lower in the British regions (55.3) and in the Mediterranean model (49.6). However, the regional differentiation is quite high in the Continental model and in the Mediterranean regions while it is fairly low in the Scandinavian and British regions.

This resulted, in 2003, in very high GDP per capita values in the Continental and British regions, while they are considerably lower in the Mediterranean model and much higher in the Scandinavian one. The regional differentiation is very high in the Mediterranean model, it achieves a medium intensity in the Continental model, and is much lower in Great Britain and in the Scandinavian model. All statistical indexes of the British regions show a tendency towards a higher concentration in GDP per capita from 1995 to 2003.

The tendency is towards a rise in regional equality in the South. However, it is worth noting that in the Continental regions the very high differentiation in regional productivity persists only at the level of GDP, while in the Mediterranean model a high differentiation in productivity is transformed into an even higher regional concentration of per capita GDP. A similar effect of increasing differentiation of per capita GDP compared to productivity exists in the British and Scandinavian regions.

¹⁵ The coefficient of variation (variance/average) simply shows the variability, it can be compared between variables. Varlog is the variance of the logarithm (of the variable), it can be used as a good measure of inequality but it cannot be compared horizontally in tables. The Gini index has been criticized for this use, but it remains the only index which allows comparisons between different measures. We have equalized the size of regions to minimize disturbances.

Table 7a - Regional inequality, all indexes

	Demographic density			Value added per employed person			GDP per capita			Household income per capita		
	cv	varlog	gini	cv	varlog	gini	cv	varlog	gini	cv	varlog	gini
Continental												
1995	2,180	0,194					0,282	0,012	0,148	0,152	0,005	0,086
2000	2,182	0,194	0,281	0,010	0,135	0,139	0,280	0,011	0,139	0,118	0,003	0,067
2003	2,206	0,193	0,299	0,011	0,135	0,137	0,284	0,011	0,137	0,099	0,002	0,056
Great Britain												
1995	1,948	0,199					0,176	0,004	0,083	0,095	0,002	0,052
2000	1,965	0,200	0,187	0,004	0,073	0,099	0,212	0,006	0,099	0,131	0,003	0,070
2003	1,989	0,203	0,191	0,005	0,077	0,098	0,204	0,006	0,098	0,117	0,002	0,065
Mediterranean												
1995	1,034	0,142					0,315	0,018	0,179	0,287	0,015	0,161
2000	1,046	0,141	0,249	0,013	0,144	0,179	0,315	0,018	0,179	0,269	0,014	0,154
2003	1,047	0,142	0,231	0,011	0,133	0,163	0,286	0,015	0,163	0,257	0,012	0,147
Scandinavian												
1995	1,356	0,313					0,168	0,005	0,096	0,102	0,002	0,059
2000	1,375	0,328	0,124	0,003	0,066	0,112	0,202	0,007	0,112	0,122	0,003	0,069
2003	1,385	0,333	0,126	0,003	0,069	0,107	0,194	0,006	0,107	0,112	0,002	0,064

Table 7b - Regional inequality, all indexes

	Employment rate			Female employment rate			% employment in science & technology (core)			% employment in R&D			% expenditure in R&D		
	cv	varlog	gini	cv	varlog	gini	cv	varlog	gini	cv	varlog	gini	cv	varlog	gini
Continental															
1995							0.240	0.012	0.135				0.652	0.095	
2000	0.088	0.001	0.036	0.111	0.003	0.059	0.239	0.011	0.133				0.632	0.071	
2003	0.086	0.001	0.035	0.099	0.002	0.054	0.224	0.009	0.124	0.511	0.053	0.273	0.683	0.076	
Great Britain															
1995							0.091	0.002					0.572	0.050	
2000	0.059	0.001	0.035	0.061	0.001	0.029	0.177	0.005	0.097				0.567	0.049	
2003	0.046	0.000	0.037	0.050	0.000	0.029	0.167	0.005	0.095				0.574	0.063	
Mediterranean															
1995							0.354	0.020	0.190				0.603	0.075	
2000	0.142	0.004	0.081	0.235	0.012	0.178	0.360	0.021	0.193				0.452	0.038	
2003	0.134	0.004	0.076	0.216	0.011	0.117	0.359	0.021	0.196	0.451	0.042	0.251	0.487	0.050	
Scandinavian															
1995													0.650	0.333	
2000	0.105	0.002	0.059	0.128	0.003	0.078	0.305	0.015	0.168				0.600	0.244	
2003	0.112	0.002	0.065	0.135	0.003	0.078	0.270	0.011	0.143	0.511	0.105	0.299	0.623	0.195	

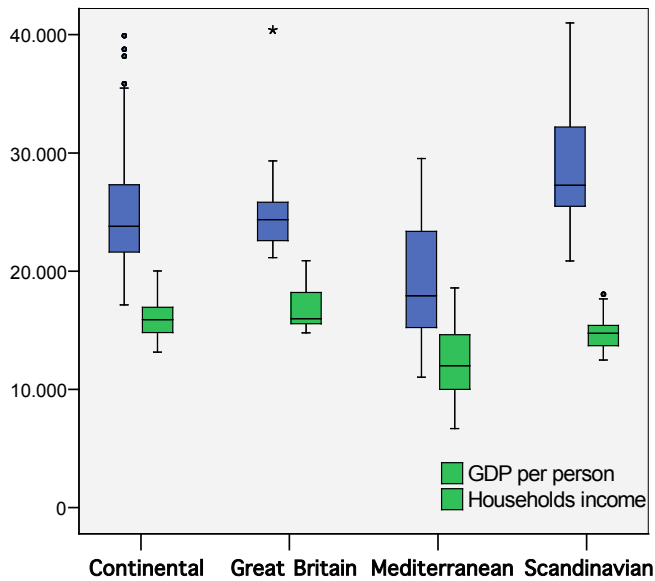


Figure 4 - The regional dispersion of GDP and Household income per capita (2003)

The comparison of differentiation between related variables is even more interesting when we consider household income since the impact of institutions is significant. As expected, institutions help to reduce inter-regional differences. The average household income is the highest in Britain (16.8 thousand euro in 2003) and much lower in the Scandinavian regions (14.8), in the Continental model (16.0) and in the South (12.4)(fig. 4). Variability remains very high in the Mediterranean model, although with a tendency to reduction, and practically the same in Great Britain. Variability is mostly reduced in the Continental and Scandinavian regions and in, although at the expense of a higher reduction in average income. As a consequence we can say that macro-institutional configurations tend to equalize regional household income except in Great Britain and in the South. While in the former regional inequality is not high, in the latter it is an important phenomenon which is only marginally reduced. The tendency is not clear because varlog and Gini indexes provide different answers.

Employment rate is also a source of regional inequality. The higher average values are recorded in the Scandinavian (60.2%) and British regions (58.2%). It reaches 52.0% in the Continental region and falls to 47.2% in the South. These values are also the result of different ways of life. In the Mediterranean and in the Scandinavian regions we perceive significant regional differences in this variable (tab. 7b). The spatial concentration of female employment rate in the Mediterranean regions is quite high. Here the average value is low (35.3%) which means that there are few regions with high female employment rates. Unexpectedly, there is also quite a difference in Scandinavian female employment between regions but the average ratio is the highest (56.8%) and this means

that there are few regions with low rates. These differences explain, in part, the differences we recorded between per capita GDP and labour productivity.

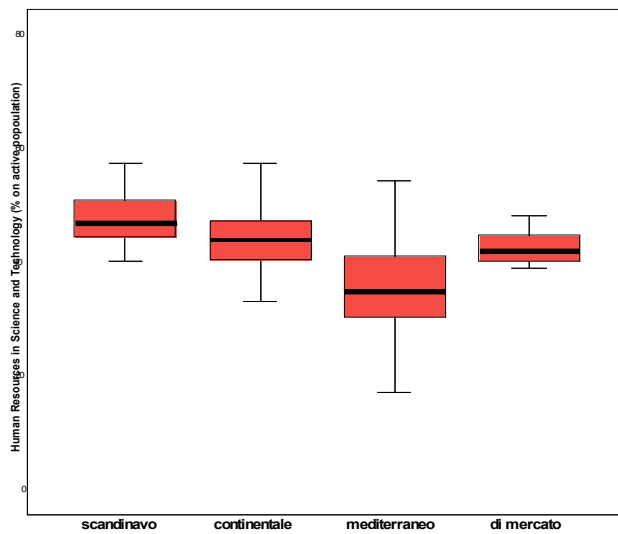
The core of our analysis concerns the data on R&D and employment in science and technology sectors (tab. 7b). We analysed the data of qualified (core) employment in science and technology sectors, employment in R&D and expenditure in R&D. In all these cases regional differentiation indexes tend to be high and this means that investments in this kind of knowledge are generally concentrated in a few regions. Unfortunately, the detailed comparison of these data let appear their scarce reliability due to different national standards in their collection. The elaboration of concentration ratios, however, is less affected by this problem.

Employment in HRST is highly regionally concentrated in both the Mediterranean and Scandinavian regions while the Continental model shows intermediate levels of concentration. However, while Continental and Scandinavian regions show a tendency towards equalisation, the Mediterranean regions display a worsening of inequalities. The average levels are similar for the British and Continental regions (7.7% and 7.0% respectively) while they are low in the South (5.1%) and very high in the North (11.7%).

As expected, the percentage of expenditure in R&D reaches high levels in the Scandinavian regions (2.8%), a medium-high value for the Continental (1.9%) and British model (1.5%) and a low value for the South (0.8%). However, this expenditure is fairly concentrated everywhere, even though it achieves the highest levels in the Continental and Scandinavian regions. It is interesting to note how this variable was highly concentrated in the Mediterranean region in 1995 while it became more generalised in 2004, but that homogenisation is due to a reduction of virtuous regions. Conversely, concentration decreases in the Scandinavian model. Employment in R&D tends to show similar concentration results with the highest scores in Scandinavian regions.

R&D personnel data confirm this result. For 2003, Eta squared is 33% which means that variability in the population ratio employed in the Science and Technology sector is explained by MCs and their different propensity to induce investment in knowledge production. This value decreases by 8 percentage points in the 1994-2003 period which means that in every MC we observe increasing investments in R&D (Figure 4 and 5). However the *within* variance is very large in the Mediterranean model (it contains some very high R&D intensity regions), while the Market and Scandinavian clusters show a more equal regional distribution of R&D personnel.

Figure 5 - Ratio of human resources in science and technology on total active population by model of capitalism (2003)



9. Conclusion: different dispersion and different peripheries

In order to better understand the influence of institutional settings on economic geography, we apply the factor analysis to our variables associated with the four MCs. The total factor loadings of the two extracted factors is 73.8%, respectively 51.4% for the first factor and 22.4% for the second. Observing the rotated factor matrix, it emerges that the first factor represents the *distribution of income* per capita (both GDP and household income) in MC while the second factorial dimension gives us a profile of the relationship of *employability* with respect to regional population density in MC.

Figure 6 and 7 well summarize our previous results with respect to the different institutional settings of models of capitalism. As far as the growth model of the CONTINENTAL model of capitalism is concerned (DE, FR, BE, NL, AUT, IRL), the factor analysis shows its relationship with high levels of GDP. Household income per capita is high and regionally evenly distributed even though there is a strong variability in regional population density and labour productivity. We can say that institutions balance regional economic differences, especially in Germany. However, employability is not well distributed and strong regional disparities exist. This is partly due the effects of German unification, to path-dependence phenomena – such as population agglomeration or long-term unemployment - but it also depends on high territorial concentration of the R&D expenditure.

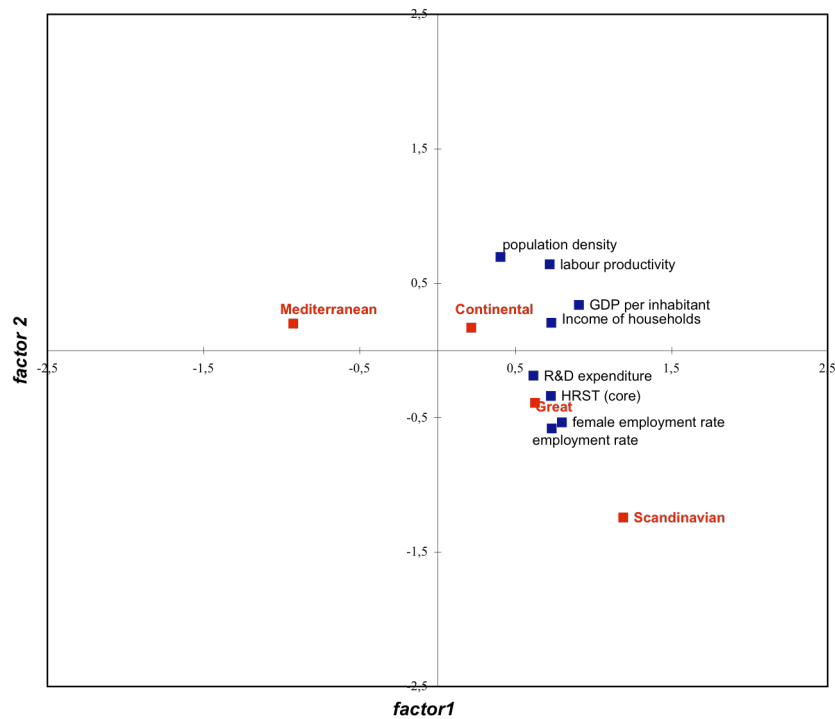
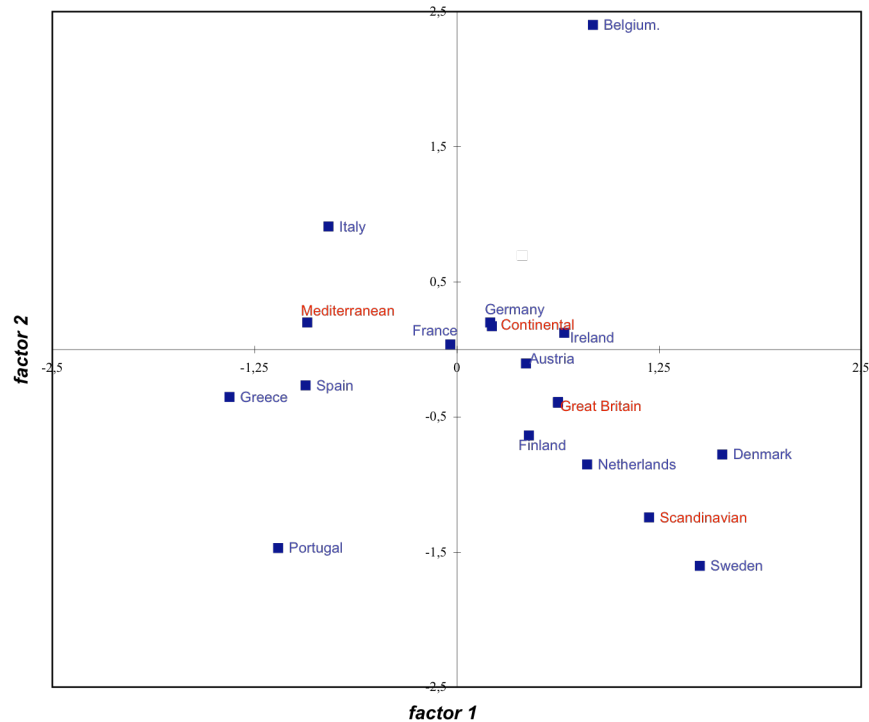


Figure 6 (above) and 7 (below) Graphic representation of factor loadings for MC



GREAT BRITAIN' capitalism presents a different economic geography profile. The growth model is strongly characterized by its widespread employability and by a large number of regions with high population density. In addition, the innovation system is quite uniformly spread among regions distributing regional growth opportunities and sustaining regional growth capability. The

result is a low concentration of productivity levels and a relatively low concentration of GDP per capita and household income.

The SCANDINAVIAN model (FI, SW, DK) shows quite a different territorial pattern of economic growth. It has a large number of less densely inhabited regions and a large concentration of productivity and innovation investments in few regions. Nevertheless, wealth is produced in a well regionally distributed way and presents the highest values among MCs. Institutions play a crucial role in assuring that a concentrated economic push results in an evenly regionally distributed income for households.

The MEDITERRANEAN model of capitalism (IT, ES, POR, GR) has a regionally unbalanced mode of growth. In spite of a fairly evenly distributed population, the per capita GDP and employability are low on average and spatially concentrated. R&D investments are also low but not very differentiated in space. After the redistribution effect of the institutions, household income and long-term unemployment remain badly distributed in space. This is the most “spontaneous” of the models, with very specific agglomeration effects for different territories and little redistribution within regions. The main problem, differently from other MCs, is the low productivity of labour in its periphery.

We can conclude that different institutional macro-configurations do display different patterns of regional distribution of growth processes. In Europe we can distinguish two kinds of macroscopic regional agglomeration patterns related to macro-institutional configurations: the one prevailing in the North, based on high levels of regionally concentrated investments in knowledge, and the one prevailing in the South, with spontaneous agglomeration phenomena not driven by R&D. These growth models are further differentiated according to how institutions give form to other economic processes. Besides the universally studied problem of employability – which is best in Scandinavia and Great Britain also from the regional point of view – institutions also play an important role in the redistribution of income. They considerably reduce regional GDP concentration in the Scandinavian area and in the Continental model, they do not modify much the disparities of income in the other models. Finally, two peripheries characterized by low productivity of labour emerge from this analysis: that of the Continental model, which is represented by former socialist regions, and that of the Mediterranean less developed regions where the problem is aggravated by other inequalities.

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