THE ROLE OF SOCIAL CAPITAL IN ECONOMIC PERFORMANCE ACROSS EUROPEAN REGIONS

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1. Introduction

Economic growth is determined by a large range of aspects and the literature focuses on a variety of factors. Among these factors, scholars have also introduced social capital in recent decades. Social capital is defined by Poteyeva (2009) as the process of relationships, trust and reciprocal exchanges of benefits within social networks that ensure various advantages, also in problem solving. Considering these various characteristics, it could be a resource beyond economic aspects for a community and its inhabitants. This type of capital is composed of intangible elements, for example, personal values, norms, perceptions about behaviour, and opinions, as well as more concrete and objective measures.

Pioneers in the study of social capital include Coleman (1988) and Putnam (1993). They show that social capital has a (positive) impact on the sense of citizenship, a well-functioning society, and the point of view of people and firms in the development of collaboration and cohesion. Focusing on Italian regions, Putnam (1993) depicts civic culture as a determinant of economic growth, defining social capital as unique, composed of interdependent elements, such as trust, social norms, and networks. Moreover, he argues that non-hierarchical and spontaneous associative activities facilitate communication and relationships play a decisive role. These cultural characteristics are mostly inherited. Thus, any changes in a population could lead to a societal transform only in the long run.

The concept of social capital divides researchers. Some scholars maintain that the clear distinctions among different aspects of social capital do not allow everyone to work concurrently (Bjørnskov, 2006), nor is the impact unique. In fact, using different statistical techniques, studies provide diverging results. Moreover, with regard to territorial analysis (country or regional levels), there are also contrasting points of view, confirming the unique aspects of this field of study. Knack and Keefer (1997) state that trust, civic norms, and associational activities influence economic development in 29 market economies. These results were confirmed and strengthened in Zak and Knack (2001) and Beugelsdijk *et al*. (2004). Results show that the growth is affected mainly by variables related to economics rather than social

capital (Schneider *et al*., 2000) and others in which the incidence of trust and social capital indicators do not have a generalized effect on different economies (Peiró-Palomino and Tortosa-Ausina, 2013).

Therefore, the varied results of research in recent decades based on distinct statistical techniques, moving from descriptive statistics to Bayesian and non-linear regression analysis as in Forte *et al*. (2015) and Peiró-Palomino (2016), highlight the need for further investigation, encouraging a change in perspective.

Our idea is therefore to conduct an analysis of social capital on the local level, mixing objective and subjective measures. We analyse 20 European countries belonging to the OECD, collecting data for 194 European regions in 2014. We believe that the local dimension is central to the analysis of social capital because differences emerge not only between countries, but also and above all within countries. Moreover, regions of different countries could display similar performance and share common paths, and country-level analysis could mask these aspects.

The rest of the paper is organized as follows. Section 2 illustrates the adopted methodology and describes the dataset. Section 3 is devoted to the discussion of main results and Section 4 presents a conclusion.

2. Method and description of the data

We collect data Eurostat and OECD databases for 194 regions (NUTS2[1]) representing 20 countries that are both European and OECD countries in 2014[2]. We collect 12 variables, namely gross domestic product per capita (GDP), share of R&D total expenditure[3] (ERD), people with tertiary education and/or employed in science and technology (HC), education participation (ED), population growth (GPOP), economic activity rates (EAR), voter turnout (VOT), life expectancy (LFE), perceived social network support (SNS), perception of corruption (COR), unemployment rate (UNR), and life satisfaction (SAT).

[1] We use OECD territorial levels, which present some differences with the Eurostat nomenclature. See, https://www.oecd.org/regional/regional-statistics/.

[2] France is the sole exception since its GDP is from 2015 because Eurostat did not show regional values before this year.

[3] Territorial data of 2014 for Austria, Germany, Finland, and Sweden is obtained through the average between the 2013 and 2015 values; instead, for Greece, France, Slovenia, and the Netherlands, the national value is also assigned to the regions because these countries do not have local distinctions. At the end, Italy and United Kingdom have estimates made by OECD.

Table 1 – *Variables and descriptive statistics*

Variable	Tag	Description	Source	Minimum	Maximum	Mean
Gross Domestic Product per capita	GDP	Individual gross domestic product at current market prices by regions	Eurostat	6,694	90,643	27,655
Share of R&D total expenditure	ERD	Percentage of R&D total expenditure of regional GDP	OECD	0.180	4.980	1.652
HRST by category and regions	HC	People with tertiary education (ISCED) and/or employed in science and technology (percentage of active population)	Eurostat	22.40	65.40	40.65
Education participation	ED	Participation rate of group from 15 to 24 years in education	Eurostat	33.50	100.00	62.17
Population growth	GPOP	Growth of regional population in 2014	Eurostat	-1.3367	2.4156	0.2037
Economic activity rates	EAR	Economic activity percentage of people from 15 to 74 years	Eurostat	44.10	75.80	63.70
Voter turnout	VOT	Percentage voter turnout in general election	OECD	40.40	91.10	69.76
Life expectancy	LFE	Years of life expectancy at birth	OECD	74.20	84.80	80.86
Perceived social network support	SNS	Percentage of perceived social network support	OECD	68.80	100.00	90.99
Perception of corruption	COR	Percentage of perception of corruption	OECD	13.40	93.30	61.62
Unemployment rate	UNR	Unemployment rate in regions	OECD	2.20	34.80	10.59
Life satisfaction	SAR	Index of self-evaluation of life satisfaction	OECD	4.500	7.800	6.516

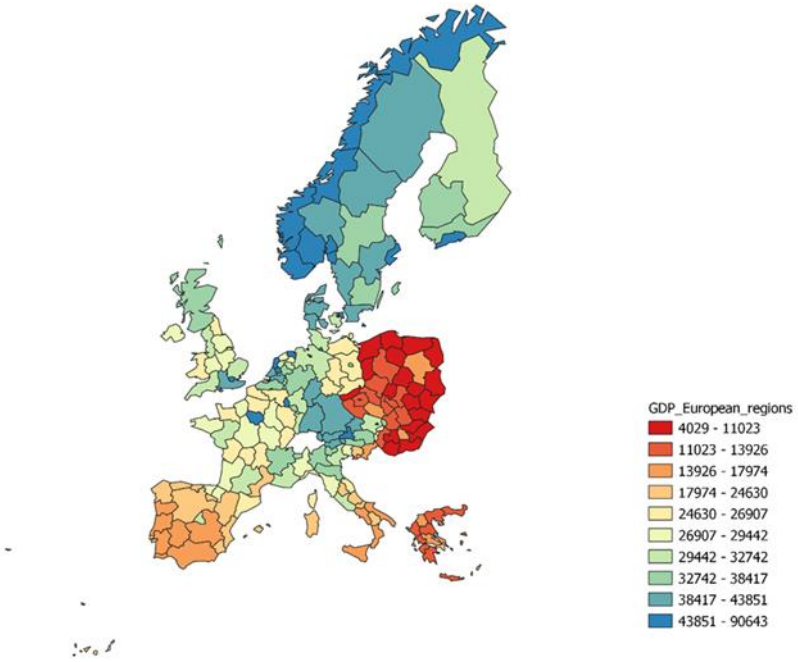
Source: Eurostat, OECD and preparation by the authors.

Table 1 reports the name of the variable, its acronym and a brief description, the source, and basic statistics (minimum, maximum and average value).

To obtain information about the role of social capital in economic growth, we initially calculate some basic descriptive statistics, focusing on GDP per capita. Figure 1 shows the GPD level for the regions analysed. Mediterranean regions (belonging to Southern Italy, Spain, and Portugal) display similar performance. The poorest countries are located in the Eastern and South-Eastern Europe. In contrast, the richer regions are found in Scandinavia.

From the overall database, what emerges is a significant heterogeneity in the various aspects in different parts of the continent. For instance, the perception of corruption (COR) registers a minimum value of 13.40 and a maximum of 93.30, covering practically the entire range of possible values.

Figure 1 – *Map of European regions based on GDP per capita levels*



Source: Prepared by the authors.

Thus, to investigate the relationships between economic variables, namely the gross domestic product per capita and the different features of social capital, we perform a multidimensional stepwise regression analysis. The model is defined in Equation 1:

$$GDP = \beta + \beta_1 ERD + \beta_2 HC + \beta_3 ED + \beta_4 GPOP + \beta_5 EAR + \beta_6 VOT + \beta_7 LFE + \beta_8 SNS + \beta_9 COR + \beta_{10} UNR + \beta_{11} SAT + \varepsilon \quad (1)$$

where β is the intercept, βi are the coefficients and ε is the statistical error. Looking at the selected variables, we expect that the perception of corruption and the unemployment rate are the only determinants with negative coefficients. We run a stepwise regression instead of a simple multiple regression analysis for two reasons. First, since the stepwise regression is an iterative procedure that removes predictor variables via a series of F-tests, that is, by testing for statistical significance after each iteration, the algorithm selects the best grouping of predictor variables that account for the greatest variance in the outcome (measured through R-squared). Consequently, the procedure will reduce the variance by estimating unnecessary terms. Second, since we have 11 independent variables, we can deal with multicollinear problems, and the output of stepwise regression will reduce this problem.

As a complementary step in the analysis and following the outcomes of the statistics, we perform a cluster analysis to highlight the discrepancies in the territories and to discover the similarities. We perform several cluster methods, both hierarchical and non-hierarchical cluster analysis, to find the most suitable method.[4] The next section is devoted to a discussion of the results.

To summarize the results of our analysis and conclude it, we create a composite indicator for social capital (SC) that summarizes all the information collected on social capital in a single number and also allows countries to be compared. For this step, we focus on seven variables that most affect social capital, namely 1) people with tertiary education and/or employed in science and technology (HC), 2) economic activity rates (EAR), 3) voter turnout (VOT), 4) life expectancy (LFE), 5) perceived social network support (SNS), 6) perception of corruption (COR), and 7) life satisfaction (SAT). Among the large range of composite measures, we adopt the Mazziotta and Pareto (2016) method (hereafter, MPI). MPI concerns the non-substitutability of the variables and the introduction of a type of penalty in determinate cases; this method also defines the normalization, using classical z-scores but with a mean equal to 100 and standard error equal to 10. The penalty is assigned after the arithmetic mean, considering the differences with the average (coefficient of variation), and the implications are the assignment of equal weights and the elimination of variability. This can be adapted for all cases because the penalty can be positive or negative (De Muro *et al*. 2011). Among the seven variables

[4] The results of the different methods implemented as well as a detailed description of the results of the cluster analysis are available upon request.

involved, only the perception of corruption has a negative polarity, meaning that an increase in corruption will lead to a drop in social capital. We account for this when we apply the aggregation method. Equation (2) reports the method:

$$SC_i = M_{z_i} \pm s_{z_i} \cdot cv_i \tag{2}$$

where SC_i denotes the value of the index for region *i* computed according to the MPI method, M_{z_i} and s_{z_i} represent the mean and standard deviation of standardized indicators[5], and cv_i is the coefficient of variation of the i-th unit, namely:

$$M_{z_i} = \frac{\sum_{j=1}^{m} z_{ij}}{m};\ s_{z_i} = \sqrt{\frac{\sum_{j=1}^{m}(z_{ij}-M_{z_i})^2}{m}};\ cv_i = \frac{s_{z_i}}{M_{z_i}} \tag{3}$$

This method focuses on horizontal variability, in which the regions with good performance in each factor are favoured and the normalization of z-scores is suitable for our single-year analysis.

3. Results

The results of the regression analysis demonstrate the important position held by factors constituting the social capital in determining the GDP per capita. Table 2 shows the results of the stepwise regression. From the initial model, the procedure suggests the elimination of two variables: participation in education and life satisfaction, neither of which are statistically significant in evaluating the impact on GDP per capita. The best predictors obtained, according to their relative levels, are HC, GPOP, VOT, LFE, SNS, COR, and UNR. The share of expenditure in research and development yields a value near significance.

As for the coefficients, corruption (-145.16) confirms the negative sign. This can be interpreted as a negative impact of this aspect of social capital on GDP. Similarly, unemployment rate (-245.42) reports the expected sign, confirming the initial hypothesis. The innovative results with respect to social capital are obtained in the coefficients of social network support and voter turnout. Indeed, the first has a low significant negative value (-302.53) while the second displays a positive incidence

[5] The standardized values are obtained by applying the usual z-score procedure and then rescaling the obtained values in order to obtain new values with mean equal to 100 and standard deviation equal to 10. See De Muro *et al*. (2011) for more details.

(202.61) with higher significance. The particularity lies in the fact that, as with civic engagement and distrust, the social network support should foster the development of cooperation and cohesion, which is useful for collaboration and the spread of innovation. It is also important to notice the coefficients of other variables in the model — life expectancy, population growth, and people with tertiary education or employed in science and technology — all of which have positive effects on economic growth. The multiple R-squared (about 0.81) and F-statistic (85.05) show that the regression has a good fit, and the entire model is statistically significant.

Table 2 – *Stepwise regression: dependent variable GDP per capita*

Variables	Estimates
Intercept	-94,722.48***
ERD	-1,279.74
HC	387.54***
GPOP	7,760.27***
EAR	176.74
VOT	202.61**
LFE	1,494.38***
SNS	-302.53*
COR	-145.16***
UNR	-245.42*
R-squared	0.8062
F-statistic	85.05

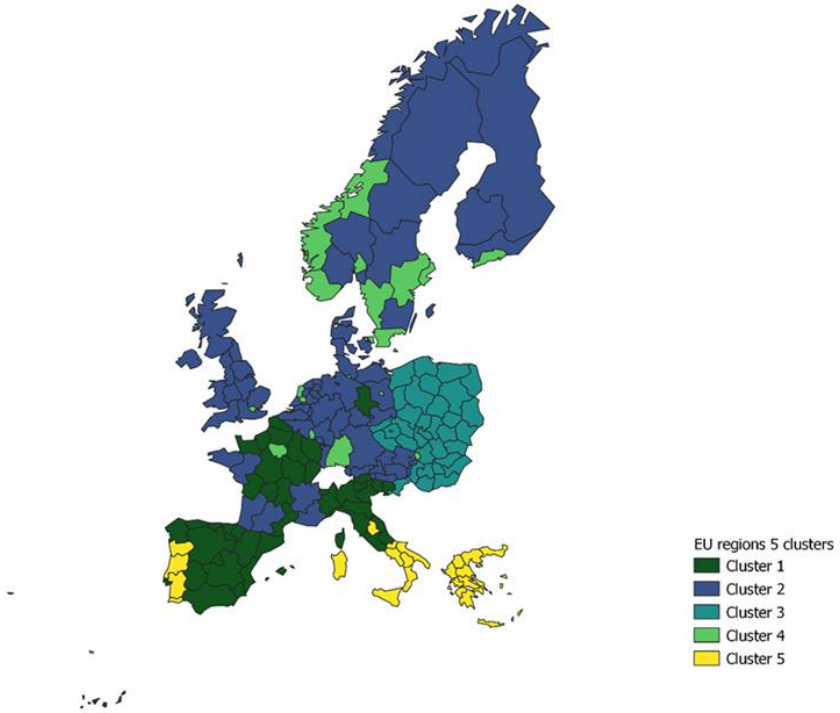
*Significance at *10%, **5% and ***1% levels.*

As second step in the analysis, we perform a cluster analysis to detect similarities in the regions according to the predictors selected. We implement both hierarchical and non-hierarchical methods, and, after comparing the results, we adopt the K-means method. We recall that the number of clusters must be chosen for the K-means method and, after computing statistical diagnostics, we fix K=5.[6] Figure 2 reports the results of the cluster analysis. Cluster 1 is composed of 47 regions in Central Europe (Figure 2 in dark green). Looking at the average values of variables of regions belonging to this cluster, we confirm that this cluster is made up of regions at an intermediate level in all indicators. Cluster 2 (blue) accounts for 64 developed regions in Northern and Central Europe. Cluster 3 (light blue) contains 35 regions,

[6] To be more precise, statistical tests suggested choosing K = 2. The result was a substantial division into regions of Central and Northern Europe versus the Mediterranean and Eastern European regions. However, this subdivision concealed all the differences. For this reason, we look at the resulting scree plot. Of course, as the number of clusters increases, the within-group sum of squares (variance) decreases, and we find a second peak at five clusters. This point represents the best balance between minimizing the number of clusters and minimizing the variance within each cluster.

mainly located in Eastern Europe, characterized by the lowest levels for all the indicators and, consequently, with the poorest performance in terms of social capital. Cluster 4 (green) is composed of 22 regions located in Western Europe and Southern Scandinavia and containing the capital cities (i.e. L'Île-de-France with Paris). This cluster is the richest group. Finally, Cluster 5 (yellow) contains 26 regions in Southern Europe, basically Portugal, Southern Italy, and Greece, summarizing more stagnant economies.

Figure 2 – *Map of groups according to the cluster analysis*



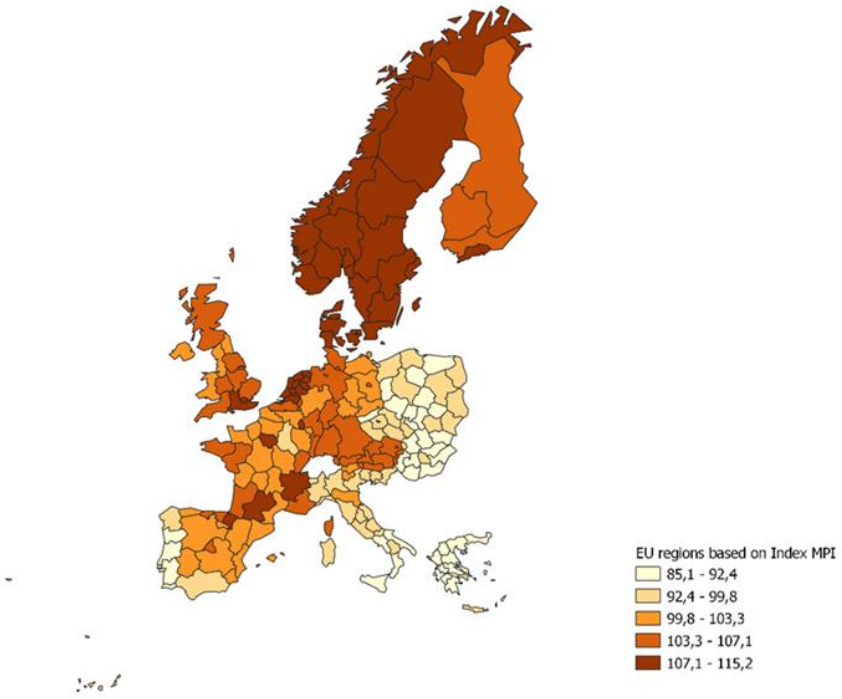
Source: Prepared by the authors.

As discussed in the Method Section, with the aim of expanding knowledge about social capital on European regions, we compute a composite index to summarize the seven variables related to social capital — namely HC, EAR, VOT, LFE, SNS, COR, and SAT — in a single number that simplifies comparisons.

Figure 3 shows the map of European regions based only the results of the social capital (SC) index. The map shows the values of SC per quantile; the darker the colour, the better the performance. What is evident is that the regions of Eastern Europe, with Greece, Portugal, and Southern Italy, have the lowest level of social

capital. On the contrary, the most developed in social capital are concentrated in Northern Europe. The map highlights interesting aspects: some regions of Central Europe (Spain and France) are in the highest positions of development of social capital while the United Kingdom is not at the same level as the other Northern countries as occurred for economic performance.

Figure 3 – *Map of regions according to SC index*



Source: Prepared by the authors

Another important result from the construction of the composite indicator is that regions belonging to the same country behave differently. We look at Spain as an example. This country exhibits at least three different levels of social capital. More specifically, regions in Northern Spain show a performance similar to Southern France or the South of Great Britain. Central regions are similar to Central France, whereas the Southern regions share a common path with Central Italy. Furthermore, Spain is just an example: France, Germany, Great Britain, just to name a few, have the same behaviour, displaying a huge variety in the values of the SC index. This means that an analysis made on a country level could hide various important differences, confirming the need for local analysis.

In our opinion, the formation of a regional social capital indicator that includes subjective information, for example, the perception of corruption, and objective measures, such as voter turnout in general elections, better represent the concept of Social Capital.

4. Conclusions

In the wider economic context, the relevance of social capital when analysing the performance of European regions is clear. Indeed, distrust, represented by the perception of corruption and civic commitment, have significant impacts on gross domestic product per capita.

Social capital has several facets, and, in a huge number of situations, it is difficult to measure them, basically due to the problem of uncertainty and the lack of available data, especially when moving from the country level to the regional scale. However, the result of the analysis concerning the construction of the composite indicator reveals the need to perform local analysis. In fact, we find that regions belonging to the same country behave differently, meaning that an analysis made for the country as a whole could hide several important aspects.

This work is a first attempt to analyse social capital by mixing several statistical methods. However, further work is necessary. First, more recent data must be obtained to evaluate the trend in composite indicators. More in general, an improvement in the available data specific to measuring social capital in terms of space and time is necessary. Second, to improve the analysis, the introduction of spatial components could add more appeal to the analysis. Finally, a robustness check on the construction of the composite indicator could round out the analysis.

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SUMMARY

The role of social capital in economic performance across European regions

In recent decades, there has been increasing interest in analysing social capital. However, the analysis is commonly conducted on the country scale, hiding the regional dimension and, consequently, neglecting regional disparities.

In this work, we investigate the diffusion of social capital across European regions, defining the different aspects through objective measurements as well as personal opinions and values. At the same time, the analysis also focuses on the effects that social capital has on economic performance, especially on gross domestic product per capita, underlining the relevant impacts. At the end, in order to highlight the stock of social capital in the European Union, particularly in 194 regions in 20 European countries in 2014, a composite index is developed to better evaluate the spread. More in detail, the variables defining social capital are summarized using the Mazziotta-Pareto method.

The results of the analysis show the positive impact of social capital on economic growth, mainly due to the development of trust, collaboration, and cohesion, which is also decisive for innovation. Moreover, the study exhibits remarkable differences among regions, even within countries. This suggests that region-specific policies could be more effective than country-specific policies.

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