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Social capital and growth in European regions

1. Introduction

The analysis of economic growth, both at national and regional level, have expanded the traditional production function of the Solow (1956; 1957) model towards a wider function collecting several factors that have some impact on growth. Thus, generalization of human capital in that function has been established as an undeniable element in the literature of the 1990s. Despite the inclusion of these new factors –such as human capital– it seems that all the measures together did not gather all the causes that can influence growth, because they were unable to explain why economies with very similar starting points evolve differently, even if the other elements analyzed were similar. As a consequence, according to Putnam's work (Putnam, Leonardi, & Nanetti, 1993) applied to Italian regions, the analysis resulted in what today is known as social capital, which encompasses different factors such as trust, memberships and so on, and it has been included in economic growth models. Recent research has resulted in numerous papers that confirm the importance of social capital in economic growth and development (Helliwell & Putnam, 1995; Knack & Keefer, 1997; Krishna & Uphoff, 1999; Whiteley, 2000; Zak & Knack, 2001; Grootaert & Narayan, 2004; Lyon, 2005).

In this paper, we try to analyze regional growth in several EU countries using classical factors and we add R&D expenditure, the number of patents, human capital or entrepreneurship rates and social capital to the function. This set of factors has been developed by authors such as Westlund (2006), Akçomak & ter Weel (2008), Hauser, Tappeiner, & Walde (2007) and Koo and Kim (2009).

2. Social capital

There are many definitions of social capital, since the idea is relevant to numerous disciplines such as sociology, political sciences, economics, amongst others. Nevertheless, most definitions include terms such as networks, trust and so on.

This concept of social capital became important after the publication of works on education published by Coleman. These studies define social capital as anything that facilitates individual or collective action, generated by networks of relationships, reciprocity, trust and social norms. Coleman conceived social capital as a neutral resource that promotes all kinds of action to make society better off, as long as its individual uses generate welfare. Essays by Robert Putman (1993, 1996) on civic participation and institutional performance defined social capital as: "features of social organization, such as networks, norms and trust, which facilitate co-ordination and co-operation for mutual benefit."

The OECD and the World Bank propose similar definitions. The former states that social capital includes the "*networks together with shared norms, values and understandings that facilitate co-operation within or among groups*" (p. OECD, 2001). The World Bank states that "*social capital refers to the institutions, relationships and norms that shape the quality and quantity of a society's social interactions*" (World Bank, 1988).

However OECD points out: "*There is no single definition of social capital. At least four broad approaches to the concept may be distinguished:*

1. The anthropological literature is the source for the notion that humans have natural instincts for association. For example, Fukuyama (1999) stresses the biological basis for social order and the roots of social capital in human nature.

2. The sociological literature describes social norms and the sources of human motivation. It emphasizes features of social organization such as trust, norms of reciprocity and networks of civic engagement.

3. The economic literature draws on the assumption that people will maximise their personal utility, deciding to interact with others and draw on social capital resources to conduct various types of group activities (Glaeser, 2001). In this approach, the focus is on the investment strategies of individuals faced with alternative uses of time.

4. A strand in the political science literature emphasises the role of institutions, political and social norms in shaping human behaviour. Recent work at the World Bank on the role of social capital in reducing poverty and promoting sustainable development has emphasised the role of institutions, social arrangements, trust and networks."

So, social capital is a multidimensional and complex concept. It does not have a single definition, but many of the existing definitions include terms like networks, trust, civic co-operation and norms. Besides, there is still much debate as to whether or not social capital constitutes a "capital" in the same way as a physical, natural and human capital. There are several researcher lines that show social capital is a "capital". So, Robison (1999), Adler and Known (2000) and Semith (2009) describe several characteristics of social capital similar to those of any other capital. Social capital, like other forms of capital, is a resource which may be the object of investment with the expectation of future profits and benefits. Further, social capital can be a substitute for, or a complement to other resources. As a substitute, agents can compensate for deficiencies in financial or human capital by establishing good relations amongst themselves. Social capital must be considered as complementary to the other forms of capital since it is not capable of generating development by itself. In addition, social capital needs to be "serviced" or maintained –like physical and human capital– in order to prevent its efficacy and efficiency from fading. Similarly, in consonance with human capital, the rate of depreciation for social capital is difficult to evaluate, as repeated usage might tend to strengthen stocks of capital rather than the reverse and, neglecting to use them, certainly leads to depreciation.

Therefore, social capital is the result of a process of dynamic interaction: it is created, may increase or be destroyed, either deliberately or otherwise, and requires constant investment. Hence, for all of the above reasons, social capital should be considered as a form of capital rather than influencing economic development, as other forms of capital such as, natural, physical and human capital.

3. Social capital and economic growth at a regional level

In the work of Hans Westlund and Adam (2009) performed a thorough review of the literature, considering three areas in which social capital can influence the corporate level, the

national level and the regional level. In this paper we will focus on the latter, for which we provide here a review of the literature related to these topic.

There are several papers analyzing the relationship between social capital and economic growth at a regional level. The most important one was written by Putnam, Leonardi & Nanetti (1993) about Italian regions and they find social capital has a positive impact in economic growth. In this work, social capital is measured by a mix of several indicators.

Beugelsdijk & Van Schaik (2001; 2005) –using trust and membership groups as proxy for social capital– analyze relationships between social capital and regional economic growth. They find that memberships are related to growth, but not trust. Beugelsdijk & Smulders (2003; 2009) divide social capital between bridging (social ties that link people together across a cleavage that typically divides society –such as race, class or religion– [The Saguaro Seminar, 2010]) and bonding (social ties that link together people who are primarily similar to each other along some key dimension [The Saguaro Seminar, 2010]) social capital. They find bridging social capital has a positive impact on economic growth while bonding social capital has a negative influence on it.

Using data on the 20 Italian regions for the period 1970-1995, Lyon (2005) examines whether the presence of social capital affects economic productivity. He finds three types of effects. First, when treated as an input to regional production, social capital has a positive and significant effect in the South, but a much weaker effect in the North. Second, some forms of social capital can significantly increase regions' propensities to make physical capital investments and, third, social capital contributes positively to the rate of total factor productivity growth in Italian regions.

Hauser, Tappeiner, & Walde (2007) analyze the impact of social capital on innovation in 51 European regions. The starting point is the hypothesis that social capital plays an important role spreading knowledge and regional innovative capacity. In order to measure social capital, they use several indicators obtained by the European Values Survey. Empirical results indicate that social capital is divided into several dimensions that are independent from each other and that the impact of social capital on regional innovation's processes is significant and comparable to the importance of human capital.

Akçomak & ter Weel (2008) use trust as a social capital variable in order to analyze the relationship between social capital, innovation and growth of income per capita in 102 European regions. Their results show that high levels of trust lead to a higher growth of GDP and that trust and innovation are related, because they find any given region's innovative output is higher when its level of social capital is higher. A similar study carried out by Kaasa (2009) investigates how different dimensions of social capital influence a region's innovative activity measured by patent applications. Social capital is measured by informal networks, formal networks, social trust, institutional trust and norms of civic behavior. The results show that among the dimensions of social capital, civic participation has the strongest and most positive effect on innovative activity measured by patent applications. The positive effect of both institutional trust and civic participation provide support for the argument that a reliable legal system is accompanied by an effective level of protection for the results of innovative activity, which in turn stimulates innovative activity.

The studies presented here focus on the European regions and show the influence of social capital in economic growth. Due to the absence of a single definition, researchers are faced with the difficulty to quantify social capital. As reflected in the studies, there are different variables to measure social capital, but few of them can collect the multi-dimensional effect previously mentioned. While developing these new indicators, the OECD believes that *"trust may be an acceptable proxy for social capital in the absence of a wider and more comprehensive set of indicators"* (OECD, 2001).

4. Social capital in European regions

In most of the studies that look at social capital, one of the main variables used is trust (Knack and Keefer, 1997; Whitely, 2000; Helliwell 1996; Roth, 2007; Berggren, Elinder & Jordahl, 2007; Dinda, 2008, Neira, Vázquez y Portela, 2009). The variable usually includes different types of trust or confidence, ranging from confidence in members of the family, neighbours, the people of one's country, etc.

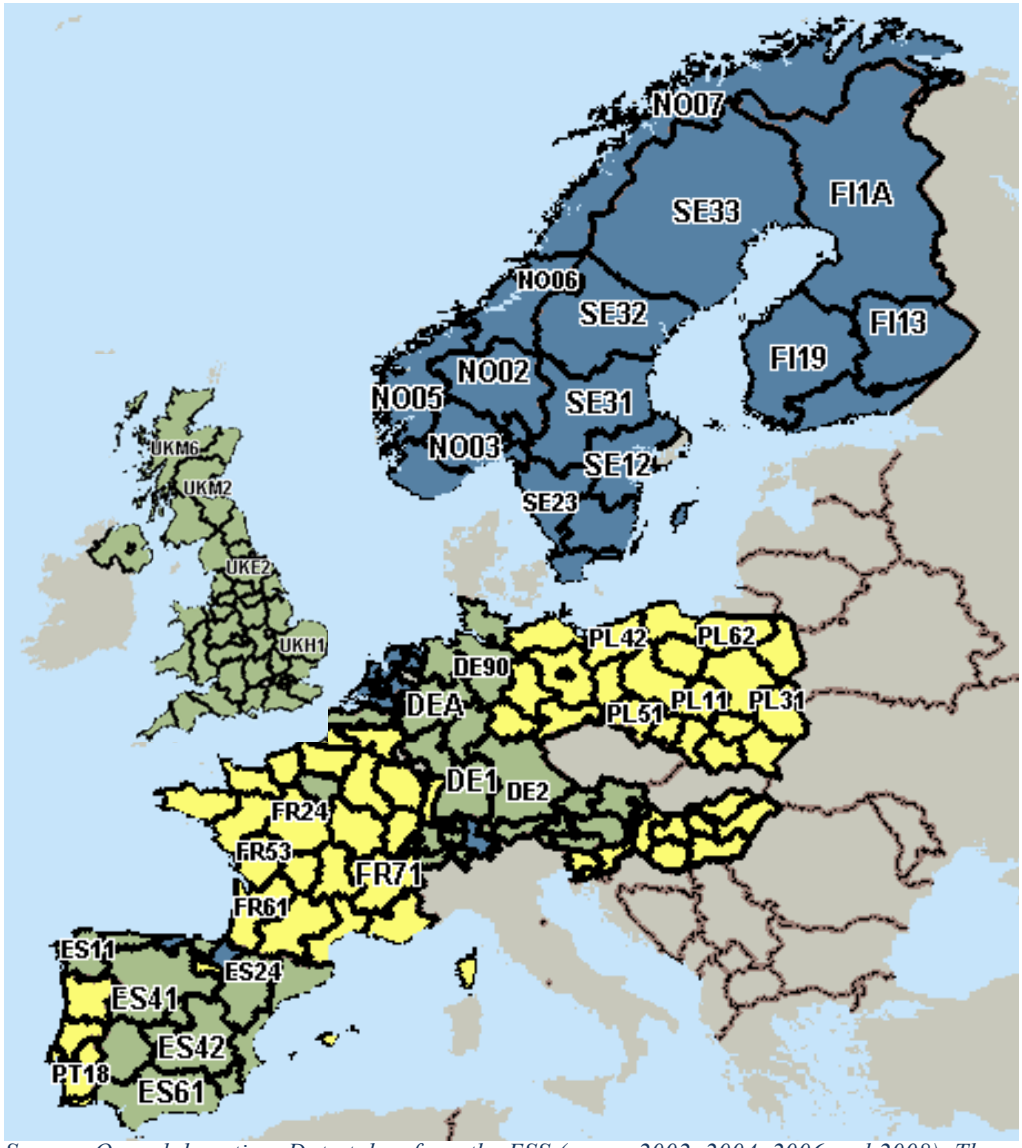
Other studies have group like proxy for social capital (Helliwell, 1996; Knack, 2003; Coates & Heckleman, 2003). While the trust or confidence shown in most studies as a positive variable for developing economies, being a member of a group may have positive or negative effects depending on the type of partnership which we are talking about

We now turn to the analysis of the social capital situation in European regions. In order to measure social capital, we shall use data by the European Social Survey (waves one to four). The variables we select to quantify social capital measure trust and memberships. Trust is derived from the question: *"Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?"* Answers vary from 1 (you can't be too careful) to 10 (most people can be trusted). We have grouped 6 to 10 values resulting in the percentage of interpersonal trust. Memberships are derived from two questions of the survey: *"During the last 12 months, have you done any of the following: (...) worked in a political party or action group?"* and *"(...) worked in another organisation or association?"* Answers are *"Yes"* or *"No"*. We take the percentage of "Yes" as membership.

The European Social Survey provides us with data at a regional level applied to a set of European Countries, but a different level of NUTS. So, for Belgium, Germany, France and the United Kingdom, the level is NUTSI. For Austria, Spain, Finland, Hungary, Norway, Poland, Sweden and Switzerland, the level is NUTSII, and for the Netherlands and Slovenia, NUSTIII is the regional level. We have grouped the regions of these last two countries into level NUSTII. In the countries at level NUTSI, we assign the data of the main region to the sub-regions (level NUTSII).

We shall start with the analysis of trust. In the map, we present the situation of social capital at a regional level taking the average values of the survey's four waves.

Map 1: Social capital

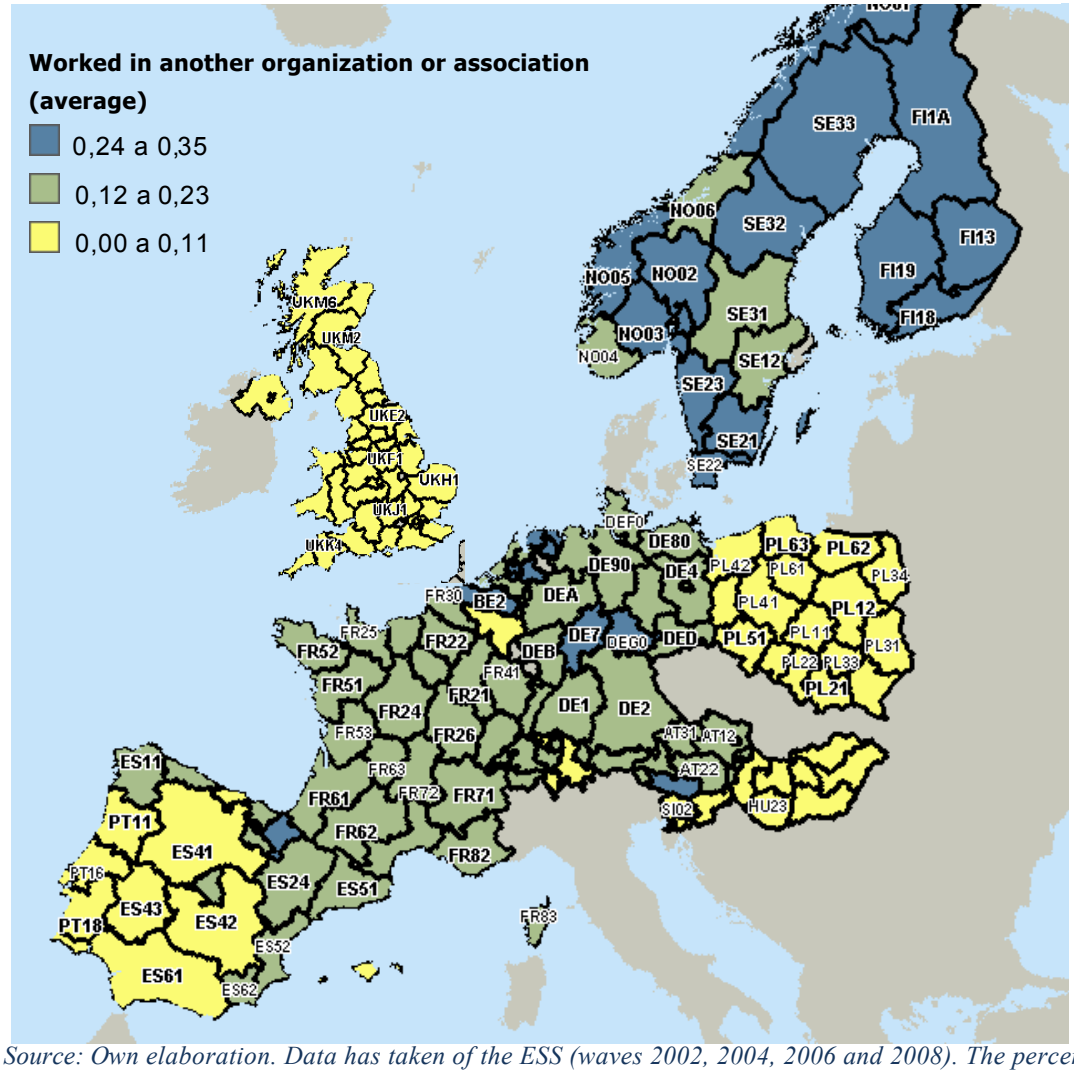


Source: Own elaboration. Data taken from the ESS (waves 2002, 2004, 2006 and 2008). The percentage of trust is the sum of values 6-10.

As we can see in the map, the Nordic countries plus the Netherlands and Switzerland are countries with a high level of trust, with values above 55 per cent. In the other end of the spectrum are France –except the region of Île de France, Portugal, Poland, Hungary, Slovenia and East Germany –except Berlin.

We analyze now the participation in social activities. The first variable to analyze is worked in another organization or association in the last 12 months. The situation of this variable in European regions is shown in map 2:

Map 2: Active Memberships (I)

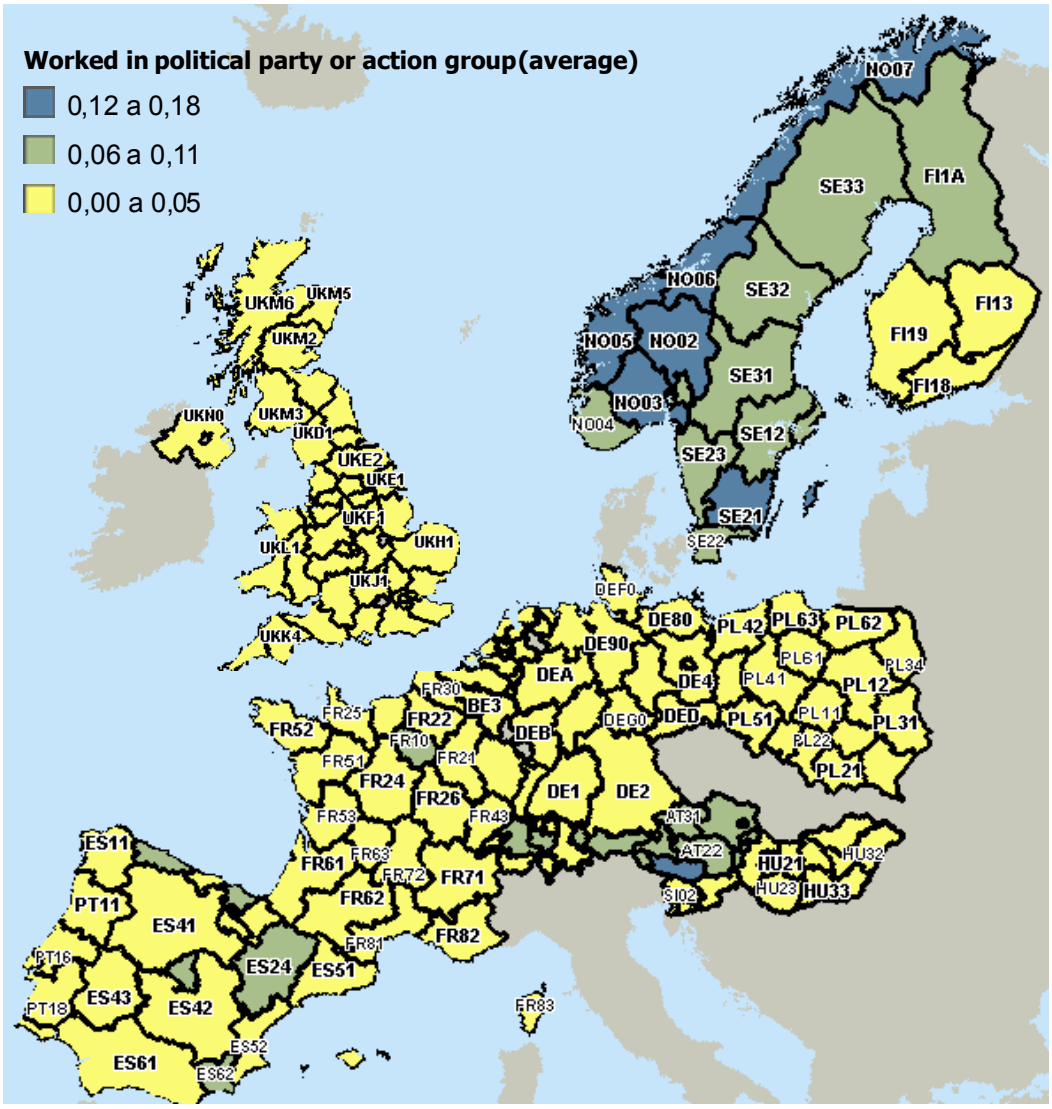


Source: Own elaboration. Data has taken of the ESS (waves 2002, 2004, 2006 and 2008). The percentage of participation is answer "yes".

In this map we can see the Nordic regions shown, again, higher values with Nederland and some regions of Austria and Germany. Values of participation are too much lower than trust. Central countries of Europe show medium values and ex-communist countries, as well as most of Spanish Regions, Portugal and United Kingdom have lower values.

The second variable we have chosen to measure active membership measures political or action group participation. Values of this variable are very lowers, it does not reach 20 per cent in any region. Highest values correspond to regions of Norway, one region of Sweden and one region of Austria. The rest of European regions show values less than 5 per cent, except Sweden, Austria, some regions of Switzerland, few regions of Spain and regions include capital of country in Belgium and France. We can see this in the map 3:

Map 3: Active memberships (II)



Source: Own elaboration. Data has taken of the ESS (waves 2002, 2004, 2006 and 2008). The percentage of participation is answer "yes".

If we take the results of the analysis as a whole can we say that there are three large blocks to speak of social capital in Europe. Thus, a first block would consist of the Nordic countries with Switzerland and the Netherlands. A group with a medium level of social capital, which could include Germany, United Kingdom, Austria and Spain; and a final group, with a low level of social capital which would be the former communist regions with France and Portugal.

5. Empirical analysis

Since the appearance of the first works by Solow (1956, 1957) in which the function of production is related to savings (i.e., capital investment), population growth (i.e., labour), and technological change, the number of factors to be considered have increased.

In line with the work presented at national level (the revision of this models can be found in Guisán, M.C. and Neira, I. (2006) initially used by Barro (1991, 2001) and Mankiew, Romer and Weill (1992), and Noneman and Vanhoudt (1996), they include human capital as an explanatory variable within the production function in order to study how variations in this kind of capital affect the rate of economic growth. In the second kind of model, human capital does not exert a direct influence on growth, but acts indirectly by increasing the accumulation of technology. These models are analysed by Romer (1990), Kyriacou (1991) and Benhabid and Spiegel (1994). Some of these works - Romer (1990), Benhabid and Spiegel (1994), and Barro (2001) go further by suggesting that there is a relationship between physical and human capital, in the sense that human capital might contribute to the accumulation of R+D and, in so doing, it may contribute to economic growth.

In most of the studies that look at social capital, one of the main variables used is trust (Knack and Keefer, 1997; Whitely, 2000; Helliwell 1996; Roth, 2007; Berggren, Elinder & Jordahl, 2007; Dinda, 2008, Guisán, 2009, Neira, Váquez y Portela (2009). The variable usually includes different types of trust or confidence, ranging from confidence in members of the family, neighbours, the people of one's country, etc. Other studies have group like proxy for social capital (Helliwell, 1996; Knack, 2003; Coates & Heckleman, 2003). While the trust or confidence shown in most studies as a positive variable for developing economies, being a member of a group may have positive or negative effects depending on the type of partnership which we are talking about.

In this work we have followed the proposed methodology at regional level, in line with works by Putnam, Leonardi & Nanetti (1993) about Italian regions; Beugelsdijk & Van Schaik (2001; 2005), Beugelsdijk & Smulders (2003; 2009), Lyon (2005), Hauser, Tappeiner, & Walde (2007), Akçomak & ter Weel (2008), Kaasa (2009). As a principal difference with these works we estimate the model through a panel data and , thus, we include measures of social capital in several years. This let us to develop an analysis along time and to view the

influence of social capital in economic growth in a time period. In this work we use data on social capital of the years 2002, 2004 and 2006.

We analyze a production function as the following:

$$GDP_{it} = f(L_{it}, K_{it}, HK_{it}, SK_{it}, RD_{it},)$$

The variables that we use in order to do the estimation appear listed in table 1:

Table 1: Variables

	VARIABLE		SOURCE
L	LTECH	Annual data on employment in technology and knowledge-intensive sectors	Eurostat
	LT	Total employment	
K	Cap=VA-WS	Cap_{it} represents the gross capital stock in state i in year t, VA_{it} represents the total value added (output) of state i in year t WS_{it} represents the total wages and salaries compensated for labour in state i in year t	Cambridge Econometrics and Eurostat
HK	HK	Pupils and students in upper secondary and post-secondary non tertiary education (ISCED 3-4) by NUTS2 regions % population aged 15-24 years old	Eurostat
RD	PAT	High-tech patent applications to the EPO by priority year. Number of applications per million of inhabitants	Eurostat
GDPH	GDPH	GDP per capital (base 2000)	Eurostat
SK	ACTASOC	Worked in political party or action group last 12 months	European Social Survey
	ASOC	Worked in another organization last 12 months	European Social Survey
	TRUST	Most people can be trusted or you can´t be too careful	European Social Survey

The results of estimation show in table 2:

Table 2: Results of estimation

	Dependent Variable: log (GDPH)			Dependent Variable: PAT/LI		
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Independent Variables (log)						
PAT	0.0116** (0.0052)	0.0116** (0.0052)	0.0110** (0.0057)			
LTECH/LI	0.0579 *** (0.0205)	0.0567*** (0.0206)	0.0578*** (0.0205)	0.411309*** (0.1073)	0.1864*** (0.030)	0.2228*** (0.0258)
KH	0.0544** (0.0205)	0.0586*** (0.0243)	0.0543** (0.0243)	2.197246*** (0.3788)	1.7628*** (0.1284)	1.6258*** (0.1002)
TRUST	0.0014 (0.0212)					0.9146*** (0.0987)
ACTASOC (%)		0.122 (0.1610)		17.8344*** (4.1430)	2.7484*** (4.1430)	
Pat*ACTASOC			0.0133 (0.062)			
GDP/LI					2.0461*** (0.0456)	1.7377*** (0.0523)
Method	FE	FE	FE	MCO	MCG	MCG
R2	0,99	0,99	0,99	0.290114	O,67	0,68
N	230	230	230	230	230	230

Notes: (Years 2002-2004-2006-2008, European regions) *<0.1, **<0.05,***<0.01

FE: Fixed Effects: cross-section and period (Redundant Fixed Effects Testing: reject)

The estimation results indicate a significant positive effect of employment relate to technology and patents on the growth of GDP per capita.

Regarding social capital, although there was a positive effect, the social capital variables are not significant. However and as occurs in the works of Beugelsdijk & van Schaik (2001; 2005), Hauser et al (2007) or Kaasa (2009) the effect is greater for the networks than the trust.

In Viera, E.; Vázquez, E.; Neira, I; (2010) obtain in their results that the activities of innovation, measured by the expenditure in R&D, are positively related to labour productivity in European regions. Likewise, we believe that this positive influence has an exponential effect in long term labour productivity, since the return of the investments is not immediate, and takes place in the medium to long term, a return that ultimately enhances the competitiveness of the regional economy

Akçomak & ter Weel (2008), that they use trust as a social capital variable in order to analyze the relationship between social capital, innovation and income per capita growth; or Kaasa (2009) who investigates how different dimensions of social capital influence a region's innovative activity measured by patent application. In this line, models 4 to 6 present results that show us a positive effect of capital variables on innovation. So, it is possible to consider regional social capital, both at through trust and networks, as an enhancer element of regional innovative activity.

6. Conclusions

As depends on the work in the field of innovation in this paper demonstrates the positive and significant relationship between innovation variables and economic development. Moreover, social capital variables constitute, along with human capital, a basic pillar in regional development, but the econometric results obtained are not conclusive in this subject.

In this work we have perform cross-section estimations where social capital was significant. The small sample size, as well as the greater robustness of the results using a panel data has led us to select this approach. However the results obtained still have some estimation problems due to gaps in the samples; this is one of the objectives of current debugging work. So here are some action lines, waiting for the suggestions in this and other areas.

Future lines:

Regarding the results of this first approach we propose to improve estimates in several lines:

- To include the year 2008, in which there are gaps in some variables, but it is necessary to complete try to quantify more clearly the effect of social capital

- To separate the regions based on productivity and levels of wealth because it is possible that the behavior is different in relation to the analyzed variables.

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