ENTREPRENEURSHIP AND ECONOMIC GROWTH IN SPANISH AND PORTUGUESE REGIONS

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Abstract
This paper seeks to examine the relationship between entrepreneurship and economic growth at a regional level in Spanish and Portuguese NUTS II. Our panel model is based on the idea by Audrestsch et al (2006), Koo and Kim (2009), and other authors, about the importance of adding economically useful local knowledge variables to the classical model of economic growth, that only included labor and capital. Theses variables are: research and development, human capital, entrepreneurship and social capita. We built two different measurements for entrepreneurship : the ratio of companies created over the total in each region for the years of study, and a cross-section measurement that can be considered as an indicator of survival. These measurements do not offer similar results, which shows the importance of achieving a good measure of entrepreneurship, one ideally combining many different aspects. We find a positive effect of the entrepreneurship variable on GDP growth, in per capita terms and in absolute values
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1. Introduction: definition and importance of entrepreneurship.

Interest in the study of entrepreneurship re-emerged with greater intensity in the late '70s, with an emphasis on economic theories through empirical findings and theoretical reflections. In empirical terms, it was found that several developed countries, mainly in Europe, launched new initiatives, after years of economic downturn and decline in business creation. On the other hand, widespread theoretical reflections about events that marked the world economy are reflected in national economies. These changes indicate that economic growth was not only sustained in economies of scale or scope, but that the companies had an important role in growth. Thus, Audretsch and Thurik (2004) concluded that the change in consumption patterns, the rise of more flexible production processes and more competition among small and medium enterprises were striking in the transition from an economy of management to an entrepreneurial economy.

There are different definitions of entrepreneurship that have evolved over time. According to several authors (Kilby, 1971, Carland et al., 1984; Leite, 2002), the concept of entrepreneurship was first mentioned by Richard Cantilon in the eighteenth century. For him the function of entrepreneurship in the economy was the purchase of services and inputs at a certain price, and its subsequently sale at an unknown price and, therefore, assuming a risk. Later, Jean Baptiste Say offered a broader definition that combined capital, physical resources and manpower in an original and innovative way. For Adam

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Smith ("father" of the economy), the concept of entrepreneurship is confused with capitalism, whose function was providing the resources for entrepreneurs and capital accumulation. Back to the ideas raised by Cantillon and Say, John Stuart Mill separates the concepts of capitalism and entrepreneurship, assuming that the latter involves risk, effort and dificulties in most cases. Wennekers and Thurik (1999) mentioned three definitions of entrepreneurship. For example, entrepreneurship may lead to an economic function, a resource allocation or an innovation. Also it may report a particular behavior, it has intrinsic characteristics, it implies the creation of new businesses or the importance of an entrepreneur within a company. Baumol (1993) and Dejardin (2001) stress that entrepreneurial activity may indicate productivity in society regarding the provision of income, depending on the existing structure of incentives and possibilities.

Wennekers and Thurik (1999), covering most primary settings, defined it as a manifestation of entrepreneurial ability and willingness of individuals within and outside organizations with the objectives: (1) to perceive and create new economic opportunities (new products, new production methods, new organizational structures and new combinations of products and markets) and (2) to introduce the entrepreneur's ideas on the market, facing obstacles and uncertainties, making decisions about the location, while shaping and using resources and institutions at the same time.

For Shane and Venkataraman (2000), entrepreneurship is a response to the following economic question: "How, by whom and with what effect are discovered, evaluated and exploited opportunities to create goods and services in the future." Davidsson, Low and Wright (2001) argued that entrepreneurship can be seen as the emergence of new economic activity, which includes imitation and innovation.

It is also appropriate to distinguish entrepreneurial activity as a result of establishing a new company from creating a new business within an existing company. Emerging business activity may be new on the market or may already exist. It follows that we have innovative or imitative entrepreneurship depending on the company providing a new business or merely competing with existing businesses within their target market, with the same business model. From this analysis, it also appears that corporate entrepreneurship consists in the creation of a new activity within an existing business, which is different from acquiring or merging other companies, which may result in the addition of new activities to the company.

Entrepreneurship and economic growth.

Since the first works by Solow, the theory of economic growth distinguishing production growth is explained by an increase in the primary resources of capital and labor employed in production and the growth of total factor productivity. The theory of economic growth includes institutional, market and company internal factors that explain the differences in welfare between countries at any given moment in time. He also questions the dynamics of growth of well-being leading to the convergence or divergence of income levels per capita (Solow, 1956-1957; Romer , 1990, Lucas 1988, Barro and Sala -i-Martin, 1992.

The starting hypothesis of the economic theory of entrepreneurship is that the economy is endowed with certain factors, so entrepreneurship contributes to production through a combination of productive factors (capital and labor), and therefore more entrepreneurial resource allocation implies a greater level of production and well-being. This feature is taken as exogenous in the model, and more recent work now seek to identify particular aspects of the contribution factor of entrepreneurship in economic growth. Koo and Kim

(2009) say that R&D policies need to be discussed in the broader context of related regional issues, such as entrepreneurship, university research, human capital, social capital and industry structures. These are interrelated policy issues that need to be examined in a more comprehensive policy framework.

There are several studies that establish a direct link between entrepreneurship and economic growth. Other empirical studies address an indirect relationship, in particular, by establishing an interaction between entrepreneurship and employment growth. Both these models lead to the formulation of an empirical model which is subsequently estimated with available data, not having a clear and distinct relation to the theoretical arguments that some authors previously established between entrepreneurship and economic growth.

Increasingly, there are studies that attempt to analyze the relationship between the level of entrepreneurship and economic growth in countries or regions of a country. They try to explain how entrepreneurship is an important factor to explain higher levels of economic growth.

At a country level, there are many studies that take into account the relation between entrepreneurship and economic growth. Van Stel et al. (2004 and 2005) propose three explanatory variables for a country's economic growth: the entrepreneurship rate, the global competitiveness index and per capita output, and they also include the dependant variable in an earlier period to minimize contingencies. After using the Global Enterpreneurship Monitor (GEM) database at different periods, they conclude that the effect of the activity entrepreneurship rate on economic growth affects the level of economic development positively. Wenneker et al (2005) used the country's entrepreneurship level as an independent variable, expressed by the Rate of Embryonic entrepreneurs, defined in the GEM 2002 database on 36 countries. The main conclusion was that the flow of new entrepreneurs tends to decrease with a development level at a certain point, only to grow again from that point (U function). Using the GEM 2002 database concerning 37 countries, Wong, Ho and Autio (2005) start from a Cobb-Douglas production function to explain entrepreneurship and technological innovation as determining factors of growth, and concluded that a rapid growth of new enterprises generates job creation in small and medium business in developed countries.

The GEM 2008 report (Bosma *et al.* 2008) affecting 43 countries explains the graphic relationship amongst the aforementioned variable presents a typical U-form, that is, entrepreneurship rates in countries with lower incomes is very high. It gradually decreases as the income level of the country increases up to a minimum level from which it increases once again in more affluent countries. On the other hand, Wennekers *et al* (2008) provides an alternative analysis of the "income-entrepreneurship" relationship in a group of developed countries. They employ OCDE data and an entrepreneurship rate based on the total proportion between businesses owners and the active population between the years 1972 and 2004. In this case, the graphic is L-shaped in the long term, so the proportion of entrepreneurial activity would not increase according to income levels, instead it would tend to remain stable.

Thurik (2009) studied the distinction between models of economic management and economic entrepreneurship in order to explain why entrepreneurship economic models are a better reference to explain the role of contemporary entrepreneurship in developed countries. An economy based on production requires entirely different conditions from an

economy based in venture capital (Audrestch and Monsen, 2007). Thus, there are necessary policies and institutions to successfully produce management economies, as opposed to the cycle of entrepreneurial economies. The role of entrepreneurship typically includes a variety of models on emerging countries (Naudé, 2008), not only because the role of entrepreneurship in developed economies is complex but also because it is not included in the models of these economies.

Audretsch an Thurik (2001) used a panel data of 23 OECD countries between 1974-1998 to analyze the relationship between entrepreneurship and unemployment. Theoretically, there is evidence that entrepreneurship reduces unemployment but also that unemployment increases the level of entrepreneurship.

Acs et al. (2005) also used samples of OECD countries to empirically test the effect of entrepreneurship on economic growth, adding a proxy of technical knowledge generated in these countries as an explanatory variable of economic growth. The hypothesis tested is that entrepreneurship is the channel that facilitates the spillover of technical knowledge. It should be noted that in endogenous models technical knowledge generation and spillover are an endogenous stimulus to growth. They tested a model in 20 OECD countries, finding the R&D variable and entrepreneurship level have a positive effect on economic growth. R&D alone may not have the expected effect on economic growth and the same can be said of the level of entrepreneurship by itself. However, the combination of two variables has a considerable effect on economic growth. In a second study, Acs et al (2005) formulated an alternative model they developed in two phases. In a first equation, they estimated the level of entrepreneurship as a function of a vector of control variables and in a second equation, they used the first equation as an explanatory variable for economic growth. This is an attempt to neutralize the effect of simultaneous causality between entrepreneurship and economic growth. Both studies were tested for a sample of 18 OECD countries, concluding that entrepreneurship produces economic growth, while the effect of R&D remains uncertain. A variable for the educational level of population (technical knowledge proxy) also showed a positive effect on economic growth.

Salgado-Banda (2005) presented a new variable based on patent data as a proxy of productive entrepreneurship instead of a proxy based on self-employment data. He considered 22 OECD countries and he found a positive relationship between the proposed measure for productive entrepreneurship – the degree of innovativeness in different nations – and economic growth, while the alternative measure based on self-employment appears negatively correlated with economic growth.

In their studies of the Theory of Regional Growth Regimes, Audretsch and Fritsch (2002) proposed four different growth regimes at a regional level: the entrepreneur, the routine, rotational and shrinkage levels. The concept of the growth regime was operationalized according to the degree of entrepreneurship, as measured by the creation of new businesses and employment growth in each specified region In terms of population density, it is concluded that regions with a higher population density have greater difficulty in generating employment and regime changes occur in less dense regions in terms of population, indicating an effect of diseconomies of scale that outweigh the positive effects of agglomeration. Thus, small businesses and start-ups may not be necessary for regional growth in the short term, but are important in economic development over the long term. Fritsch and Mueller (2004) replicated the study by Audretsch and Fritsch (2000) for the districts of former West Germany. They conducted

their study in two phases: (1) they analyzed the effect of short-term entrepreneurship on the creation of businesses and (2) they sought to capture the effect of long-term business creation. The results were similar to the pioneering work.

In 2004, Fritsch conducted a study that compared business creation and their performance. To explain the creation of enterprises, he used eight independent variables: the number of employees in their sector, the unemployed, the percentage of employees with college degrees, the percentage of jobs in the SME sector, the capital intensity, the unit cost of work, the cost of capital and GDP growth. The author concluded that the characteristics of a growth regime may change over time but that this development depends on its historical background. As such, growth regimes do not arise from nothing but evolve in a period of time that can be long.

Van Stel and Storey (2004) analyzed the relationship between business creation through a proxy of entrepreneurship and employment growth, using the United Kingdom between 1980 and 1998 as a sample. This study links the effect of creating new businesses and employment growth to specific public policies that supported entrepreneurship in the UK. The difference between entrepreneurial and non-entrepreneurial regions depends on the stock and quality of its human capital.

Audretsch and Keilbach (2004) tested the concept of venture capital and the effect of this on regional growth. The concept of venture capital entrepreneurial activity proposed equals a factor of production such as capital and labor. Thus, the availability of venture capital in a region may be more important to promote economic growth than the inputs. They found a positive effect of venture capital on regional economic growth, and for determining the level of venture capital in the region, the level of investment and unemployment have a negative effect. The educational level, crowding, social diversity and participation in public employment have a positive effect on venture capital.

Audretsch *et al.* (2006) estimated a production function for German regions in the 90s, which concluded that there is a positive relationship between entrepreneurship, venture capital and regional economic growth.

For U.S. states, Holtz-Eakind and Kao (2003) concluded that entrepreneurship measured by the rate of entry and exit of businesses positively affects growth measured in terms of productivity.Also for American States, Koo and Kim (2009) proposed a model of economic growth in which the rate of regional economic growth is a function of the growth rate of economically useful local knowledge, combined with the growth rates of capital and labor. The growth of economically useful local knowledge is a function of R&D, entrepreneurship, university research, human capital, social capital and the industry's structure. Their results indicate that entrepreneurship plays a significant role in regional growth. Moreover, for any given level of industry R&D spending, the level of entrepreneurial activity determines how much benefit a state can garner from its research activity.

2.Empirical approach.

2.1.*Descriptive analysis.* Several indicators to measure the entrepreneurial activity can be found in the literature (please refer to Godin *et al.*, 2008). We can highlight the Total Entrepreneurial Activity (TEA) from the GEM, that indicates the proportion of individuals who are starting new businesses at the time of the survey; Kauffman's Index for the USA, which measures the proportion of adults "No owner of a business" creating a new business each month; Denmark's entrepreneurship index, that also take into

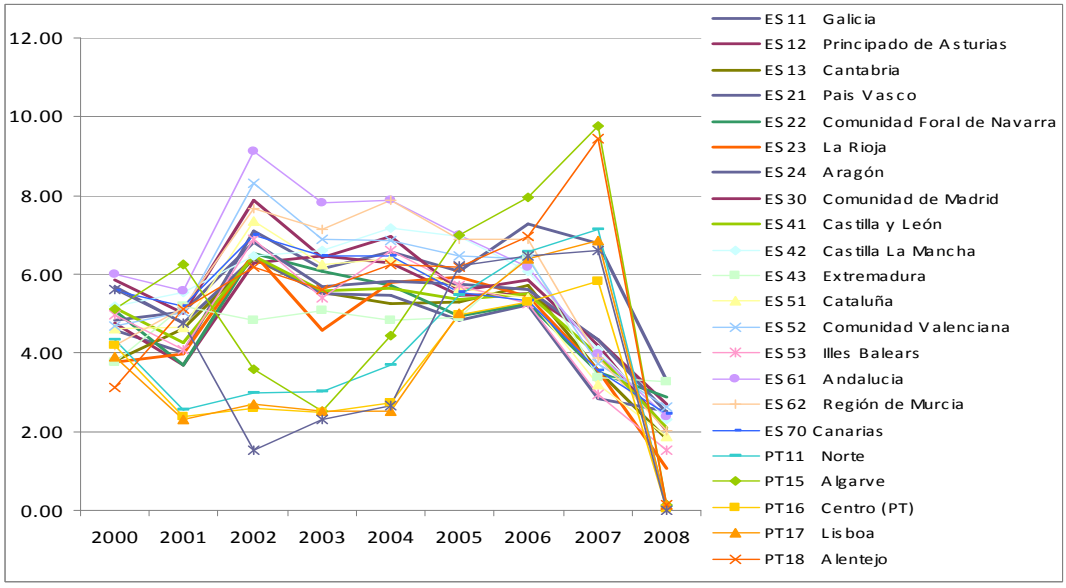
account business growth; the Database of Entrepreneurship by the World Bank, that monitors the implementation of new business; OECD and Eurostat indicators consider business survival, "gazelle" or fast growth business and "churn rate" that take into account not only the creation of new businesses, but also the destruction of businesses within a period of time. One interesting measurement is the net business creation index, that also considers the disappearance of businesses. Other measurements are self employment, creation of small business, expenditure in research and development, investment expenditure, and other indicators related to personal intentions regarding the establishment of a business.

Although we are aware of the difficulty involved in measuring many of the components of entrepreneurship, a defining characteristic of entrepreneurial capital is the implementation of new businesses. Therefore, we use the ratio of companies created over the total in each region for the years of study, as a measure of entrepreneurial capital. We use the SABI (Analysis System of Iberian Account Balances) database by *Informa D&B company* that includes the annual accounts of the leading Spanish and Portuguese business. Furthermore, we construct a cross-section measurement of entrepreneurship following GEM methodology and using data of the SABI database, that can be considered as an indicator of survival.

This ratio is: *Number of businesses created in last 42 month / Number or businesses working in the most recent year.*

The next graph represents the evolution of the business creation ratio in Spanish and Portuguese regions from 2000 to 2008. The ratio was calculated with estimated data of total and new businesses for each region and year. "Total business" is the number of firms that have official accountancy in one year, and "new business" is the number of businesses created in one year. Graph 1 does not include data for Madeira, but the percentage of new businesses in this region achieved a 20% in 2000 and 2004.

Graph 1. Business creation ratio (%). Spanish and Portuguese regions. 2000-2008.



Source: own elaboration, SABI database.

The evolution of Spanish regions is similar, in 2000 all regions have a ratio of creation around 4 or 5%, and have had increases for two years or three years, after that the ratios decrease until 2008, with the lowest data. Portuguese regions have similar data in the beginning of period, but the creation rate slowly fell for the first years and began to increase in 2003. In particular, Alentejo and Algarve have higher rates in 2007, after some years increasing their ratios, but they decreased last year.

The maps we present in graph 2, in the Annex, show the results of our entrepreneurship measures. The first map represents the business creation ratio average for the nine years of study. All regions have ratios between 3 and 6%. Madeira (7.2%), the Canary Islands (5.2%) and Açores (4%) are not represented in the map. There are not great differences between regions, but the poor positions are from Portuguese regions, except touristic regions (Algarve and islands).The second map in graph 2 indicates the position of regions analyzed by our indicator of business survival based in the GEM methodology. All regions share a rate of survival between 8.1% for Madeira (Madeira, Azores 15.5%, the Canary Islands13.5% are not shown in map), and Algarve (21%). These values indicate the percentage that represents businesses created in each region in last 42 month over the total businesses in present time (data of 2008). The maps presented do not offer similar results. This indicates the importance of achieving a good measure of entrepreneurship, one that includes many different aspects. Although for some regions, like Madrid or Andalucía, it is possible that many businesses have been created when the economic expectation was good, after a few years many businesses closed down, pointing to a poor survival rate.We can highlight the Galician case. This region had a good economic evolution in the recent years, and the businesses in this region are small in general. These issues, and the conservative spirit of Galician people, can explain the good position of Galicia in our two measurements.

2.2. Econometric Model of Economic Growth and Entrepreneurship in Spanish and Portuguese Regions.

Our model is based on the idea of Audrestsch et al (2006) and Koo and Kim (2009) about the importance of adding economically useful local knowledge variables to the classical model of economic growth, that only included labor and capital. Theses variables are: research and development, human capital, entrepreneurship and social capital. In this sense, Westlund (2006) has launched the hypothesis that stable conditions –of which trust can be regarded as a measure– were of greatest importance for economic growth during the late manufacturing-industrial economy, while the current knowledge economy has a greater need for qualities like entrepreneurship, creativity and tolerance.

The economic growth model is:

$$GDP_{it} = f(L_{it}, K_{it}, EC_{it}, HC_{it}, SC_{it}, RD_{it}, FDI_{it})$$

Where Gross Domestic Product (GDP), Employment (L) and Capital (K) are expressed as variation rates. To these, we add variables concerning Entrepreneurship Capital (EC), Human Capital (HC), Social Capital (SC) and Innovation (RD), as well as Direct Foreign Inversion (FDI). We also consider the effect of the production structure, measured by the importance of the primary sector and the weight of the technological industry over the total.

2.3. Data sources and definition. Table 1 present a summary of variables definition used for the estimation of our model.

Table 1. Variables definition

GDPHit	Gross Domestic Product per inhabitant (euros, at 2000 constant prices) for the region i, year t. Rate of increase
LT_{it}	Total employment, thousands, for the region i, year t. Rate of increase
$FisK_{it}$	Stock of physical Capital (euros, at 2000 constant prices), for the region i, year t. Rate of increase
EntCit	Entrepreneurship: ratio of companies created in each region i, year t
SocCjit	Social capital region 1, year t. j=1,2,3 indicates different measurements (% of population): Trust, membership in civil organizations and membership in politic organizations
HumCit	Proxy of human capital for the region i, year t. Pupils and Students in upper secondary and post-secondary non-tertiary education as % of the population aged 15-24.
RDit	Total intramural R&D expenditure, region i year t. (2000m euros)
INVit	Total investement region i, year t. (2000 m euros).
$LTEC_{it}$	Weight of workers employed in technological sectors, over the total employment for the region i, year t.
POPit	Population region I year t. Thousand.

Capital: Data of the capital stock of the Portuguese regions are not available. Therefore, we adopt the idea of Yilmaz et al. (2002) to our regions. Following this study, the capital stock for any given year can be estimated by substracting the total wages and salaries compensated by the total value added labor in the state. It estimates returns to capital, which can serve as an indicator of the capital stock in a state or region. Our database is the Cambridge Econometrics database (winter 2009).

Labor: We should measure labor force by worked hours, but no data are available, thus, we use the number of workers in the different regions. We use the Eurostat regional database and the Cambridge Econometrics database (winter 2009).

Entrepreneurship: The economic study of entrepreneurship is concerned with identifying factors that influence the dynamics of business creation and the consequences of the dynamic economic growth, thatching the knowledge gap that existed since the neoclassical theory. The starting hypothesis of the economic theory of entrepreneurship is that the economy is endowed with certain entrepreneurial factors contributing to production through a combination of productive factors (capital and labor), so that the largest the entrepreneurial resource allocation is, the greater the production and well-being. This feature is taken as exogenous in the model, and more recent work now seek to identify particular aspects of the contribution the entrepreneurial factor has in economic growth. There are multiple measures of entrepreneurship reflected in the relevant literature. Such indicators usually refer to the number of new businesses, the proportion of self-employed population or the total expenditure on R & D-public and private, as they affect the GDP accumulated in a region. Despite several existing indicators and variables on entrepreneurship, it is often difficult to grasp the complex relationships among the social, economic and demographic aspects targeting entrepreneurial activity.

In our econometric model, we include the ratio of businesses created in each region over the total number of businesses for nine years (2000 to 2008) as a proxy of entrepreneurial capital.

Human Capital: Human capital theory considered education as a form of investment, generating an income that could not be obtained otherwise in the absence of such capital. Besides, it provides a greater cultural baggage for society and an increase in labor productivity. From the very beginning, the quantification of human capital has been the basic handicap in the implementation of empirical models. Since its inclusion as a productive factor in the work of Shultz (1963) and Becker (1964), the database and the variables used to measure it became the cornerstones for its development. In the first models, there were problems to quantify the human capital variable (H), and a variable describing the number of years of schooling, enrollment rates and, in some works, the population's years of study were included as proxy. In the early nineties, the work of Barro and Lee created a new database on human capital stock, re-launching empirical studies on the subject and presented the human capital variable as significant in a wide number of works. There are two fundamental kinds of econometric models that attempt to describe the relationship between human capital and economic growth. The revision of this models can be found in Guisán, M.C., and Neira, I. (2006). Initially used by Barro (1991) 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. Data availability problems lead us to use the percentage of pupils and students in upper secondary and post-secondary non-tertiary education of the population aged 15-24 years old as a proxy of human capital. (Source Eurostat). This proxy is only useful it is related with the stock of human capital.

Social Capital: All forms of capital may be understood to be assets of varying types that provide benefits and make productive processes more efficient. In this sense, social capital may be interpreted as an agglomeration of corporate, psychological, cultural and institutional assets. These increase the amount (or the probability) of mutually beneficial or co-operative behavior for the people involved and for society in general, Neira, Vázquez and Portela (2009). At a regional level, several studies have been developed at level NUTSII, following the work of Putnam (Putnam, Leonardi & Nanetti, 1993) regarding Italian regions, considered a reference in social capital and economic growth,.. Portela, Neira and Vieira (2010) have a good summary with the most important studies that show the influence of social capital in economic growth in European regions. Measuring social capital is difficult, because there are no tangible elements that might aid identification in order to carry out an exact measurement, the usual proxies being trust, or formal and informal networks. Trust speeds up informal information flows and knowledge exchange as it reduces the need for controls. In this sense, trust contributes to innovation. There is nothing to object to these arguments Westlund (2009). However, numerous authors have pointed out that collective social capital must be more than simply the sum of individual units of social capital. In order to measure social capital we use data of the European Values Survey (waves one to four). The variables we select to quantify

social capital measure trust and active 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 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.

*Research and Development:*Empirical studies establish the relationship between productivity and innovation, which –though distinct– point to a positive relationship between the two variables. Guisán and Aguayo (2005), Parisi, Schiantarelli and Sembenelli (2005), whose study addressed Italy, Criscuolo and Haskel (2003), who focused their attention on the UK, Gomes, Person and Veloso (2003), who sought to understand the evolution of the total factor of productivity in the Brazilian economy, Gu and Tang (2003), who focused their analysis on Canada, and Benavente (2002), whose research focused on Chile, and Neira, Vázquez and Vieira (forthcoming) conclude a positive relation between innovation and productivity in European regions. The positive effects of investing in R&D are also taken into consideration by Crepon, Duguet and Mairesse (1998), Griffith, Redding and Reenen (2001), Comín (2002), Rao, Ahmad, Horsman and Kaptein - Russell (2001) Mairesse and Mohnen (2003), because, in addition to stimulating innovation and increasing the capacity of absorbing technological progress, this is a significant factor in the process of productivity convergence of the countries and regions (see also Alexiadis and Tomkins, 2008), Atkinson (2007). Koo and Kim (2009) insist on the fact that innovation variables are not independent of the entrepreneurship "environment" of a region, and, therefore, it is not enough for a state or region to have high figures of investment in R&D, but to provide the necessary conditions so that R&D can translate into growth. Therefore they incorporated into its growth model interrelationships between R&D and entrepreneurship variables, which are based on a tripod approach of knowledge creation, the implication being commercialization and retention provides a comprehensive and systematic framework that explains the mechanism of R&D and regional growth. As noted by Koo and Kim (2009) some studies collected the idea that the most advanced regions heavily investing in R&D can grow faster than other less developed. This issue could indicate a divergence process between regions, however Neira, Vázquez and Vieira (forthcoming) obtain that the effect of R&D investment on economic growth is higher in less developed European regions than in the richest ones. Measures used to test the importance of innovation at a regional level are: Employment in technology and knowledge-intensive sectors, Total intramural R&D expenditure, Patent applications (Eurostat database), and Total Investments (Cambridge Econometric database).

Foreign Direct Investment: Numerous studies focus on studying the importance of FDI on economic growth, as in Neuhaus (2006), Borensztein, De Gregorio and Lee (1997), Markus and Venables (1998), Bengoa (2000) DeMello (1999). Works like that of Haskel et al. (2002) confirm the existence of productivity spillovers form inward FDI to domestic plants in their study on a plant-level panel for UK manufacturing. The absorption capacity is also essential to Rodríguez-Pose and Crescenzi (2008). The importance of FDI is also found at the regional level; Jones and Wren (2006) , Caves (1974), Rodríguez-

Pose and Crescenzi (2008) (2008) distinguish between intra and extra regional spillovers and consider regional investments in R&D as an indicator of not only regional innovative effort but also impact of intraregional spillovers. Data of FDI Spanish regions are available in Spain (Ministry of Commerce, Industry and Tourism) but there are no data classified by regions available for Portugal.

3. Estimation of a panel econometric model.

In order to empirically identify the contribution of entrepreneurial activities to the economic growth in Spanish and Portuguese regions we have estimated a regional econometric model, based on the theoretical assumptions presented in the previously mentioned scientific literature. The sample used for the empirical study corresponds to Spanish and Portuguese NUTS II regions analyzed in a time frame of 9 years, between 2000 and 2008, which has allowed us to estimate panel data. An important advantage of the panel data compared to the cross section data is that they allow for the identification of certain parameters without the need to make restrictive assumptions; it is thus possible, for example, to analyze changes at an individual level. Our cross section econometric model and time series data is a log-linear model of panel data. The general pool equation is:

$y_{it} = x'_{it}\beta + \varepsilon_{it}$ i = 1, …, N regions;t = 1, …, T_i years

where x_{it} may contain observable variables that change over t but not in i, variables that change over i but not in t and variables that change over i and t. In this equation β_{it} measures the partial effects of x_{it} in the year t, for the region i. Since this model is too general, it is possible to confer greater subjectivity to the coefficients. A standardized assumption is that β_{it} is constant for all i and t, with the exception of the term of interception. Thus in our case[1], the term of disturbance is the compound error which can be represented as follows:

$\varepsilon_{it} = \alpha_i + v_{it}$

where α_i is an unobserved variable, constant in time, usually designated as an individual effect, and v_{it} are the idiosyncratic errors, which change over time and across regions.

In order to choose an estimation method, a key point is to determine whether the unobserved individual effect is not correlated to the observed explanatory variables. The term "fixed effect" provides an arbitrary correlation between the unobserved individual effect and the observed explanatory variables; in this sense α_i is designated an "individual fixed effect", and the estimated model will be a fixed effects model. The fixed effects model explains how far y_{it} differs from $\bar{y}_i$, but it does not explain, however, why $\bar{y}_i$ is different from $\bar{y}_j$.

An alternative approach maintains that the unobserved variables are independent from the explanatory variables, which leads to the random effects model, where α_i is treated as random. We can obtain consistent estimators, conducting a regression with an equation for all regions, with the explanatory variable coefficients being equal for all regions. In this case, it is hardly credible that this assumption may occur, since we are working with economic units which are structurally different. The common coefficients can not be

[1] Our estimation does not include a timeframe specific component. Indeed, temporal effects can not be accepted in our regressions.

accepted; in fact, on conducting the F test of common parametric stability, the model shows a lack of stability. We have taken into account the individual effects using estimations of Fixed (FE) and Random Effects (RE), through the Eviews software (version 6). The ordinary least squares estimation with FE, as well as the use of a redundancy test of fixed effects, leads to the rejection of the null hypothesis of redundant coefficients.

In order to select individual fixed or random effects, we have used the Hausman test which is based on the differences between the estimators of the random effects model (RE) and the fixed effects model (FE). The null hypothesis is that regressors and individual effects are uncorrelated. In all estimations we concluded with the rejection of the null hypothesis. Thus the assumptions of the random effects are not met, and the estimator of the fixed effects is the only consistent one. Furthermore, we have not rejected (at 5% level) the null hypothesis that the variance between the series of residuals are equal when we ran the Bartlett test . This test compares the logarithm of the weighted average variance with the weighted sum of the variances logarithms. Under the null hypothesis that the variance subgroups are equal and that the sample is distributed normally, the statistical test is distributed as a Chi-square.

Table 2 present the results obtained. Equations 1 and 2 estimate models to explain the growth of GDP per inhabitant, and in equation 3 and 4, the dependent variable is the GDP growth. For the estimation we have used an unbalanced pool equation, due to the lack of data in some regions.

Table2. Econometric results. Models in per capita

Dependent variable	GDPH (1)	GDPH (2)	GDP (3)	GDP (4)
Total (unbalanced) observations	188	87	188	167
C	-0.0275(-2.7)*	-0.0137(-2.1)**	0.0513(2.1)**	0.0274(1.6)***
FisK/POP	0.2214 (7.8)*	0.2653 (10.5)*		
FisK			0.2044 (8.2)*	0.2019 (7.4)**
LT/POP	0.2131 (9.3)*	0.2417 (6.2)*		
LT			0.1687 (8.0)*	0.1720(7.5)*
EntC	0.1576 (3.6)*	0.1325 (3.9)*	0.1082 (2.7)*	0.0947 (2.00)**
HumC	0.0012 (3.4)*	0.0004 (1.9)***	0.0007 (2.4)**	0.0009 (2.4)**
SocC		0.004861 (1.1)		
POP			-2.83E-05 (2.3)**	-1.43E-05 (3.4)*
INV			1.08E-06 (1.3)	
LTEC				0.1239 (0.8)
R-Squared	0.73	0.92	0.75	0.77
Bartlett Test (prob.)	30.85 (0.08)	23.58 (0.31)	27.34 (0.16)	29.23 (0.08)
Hausman Test(prob.)	55.96 (0.00)	19.06 (0.00)	75.16 (0.00)	64.93 (0.00)

Note: t-stat in brackets. * significant at 1%, ** at 5%, *** at 10%.

The constant term indicates the average effect for all regions and the coefficients of the fixed effects indicate the differences in relation to the average. We find negative values from Portuguese regions.We find the positive effect of the entrepreneurship variable on the GDP growth, in per capita terms and in absolute values. Human capital is also

significant, but the only measurement of social capital that we found significant is the one concerning political membership, however this can be due to missing data.
There is a strong relation between entrepreneurial capital and variables related to innovation. We do not find R&D expenditure, employment in technological industries and investment expenditure statistically significant. The introduction of these variables lead us to find problems with estimators.

5. Conclusions

Although we are aware of the difficulty involved in measuring many of the components of entrepreneurship, a defining characteristic of entrepreneurial capital is the implementation of new firms We built two different measurements for entrepreneurship : the ratio of companies created over the total in each region for the years of study, and a cross-section measurement that can be considered as an indicator of survival. These measurements do not offer similar results, which shows the importance of achieving a good measure of entrepreneurship, one ideally combining many different aspects.
The situation of Spanish and Portuguese regions with regards to entrepreneurship are similar at the beginning of period. In 2000 the ratio of business creation was around 4 or 5%, and also similar in the last year when the ratio fell down. However, the business creation ratio began to increase later and stronger in Portuguese regions compared to Spanish regions. All regions have ratios between 3 and 7%. There are not great differences between regions, but the poor positions are from Portuguese regions, except touristic regions (Algarve and islands).
This measurement does not consider whether the business created is a small or a big company, although that could be interesting to explain economic growth in each region. Also, this measurement does not make differences between regions according to the number of companies in each region.
The percentage representing the rate of businesses created in each region in last 42 month over the total business in present time ranges between 8.1% for Madeira and 21% for the Algarve It could be very interesting come back to analyze the survival rates after the current crisis, once we have data from 2009 and 2010. We expect decreases in survival rates for last years and small rates of business creation.
We have estimated a regional econometric model, based on the theoretical assumptions presented in the previously mentioned scientific literature. We find a positive effect of the entrepreneurship variable on GDP growth, in per capita terms and in absolute values. Human capital is also significant, but the only measurement of social capital we found significant is the one concerning political membership, but this can be due to missing data. In future studies we hope improve the outcomes.

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Annex on line at the journal Website: http://www.usc.es/economt/rses.htm

Annex

European Commission(2003)

According to a green paper by the European Commission (2003), there are four main reasons that justify the importance of entrepreneurship:

1) Entrepreneurship contributes to job creation and growth.

The creation of new small businesses typically means greater job creation. Countries that exhibit higher rates of entrepreneurship tend to show, therefore, lower unemployment rates. Recent studies suggest that entrepreneurship promotes a positive contribution to economic growth, although growth of Gross Domestic Product (GDP) is influenced by many other factors. The entrepreneurship can also help promoting social and economic cohesion of the regions, stimulating economic activity, job creation or the integration of the unemployed.

2) Entrepreneurship is crucial to competitiveness.

New entrepreneurial initiatives such as the beginning of a new company or re-orientating an existing one (eg, transfer of the business to new owners) boost productivity as these facts increase competitive pressure, forcing other companies to react by promoting efficiency or the introduction of innovations. Increasing efficiency and innovation within companies in terms of organization, processes, products, services or markets, reinforce the competitive strength of the economy as a whole.

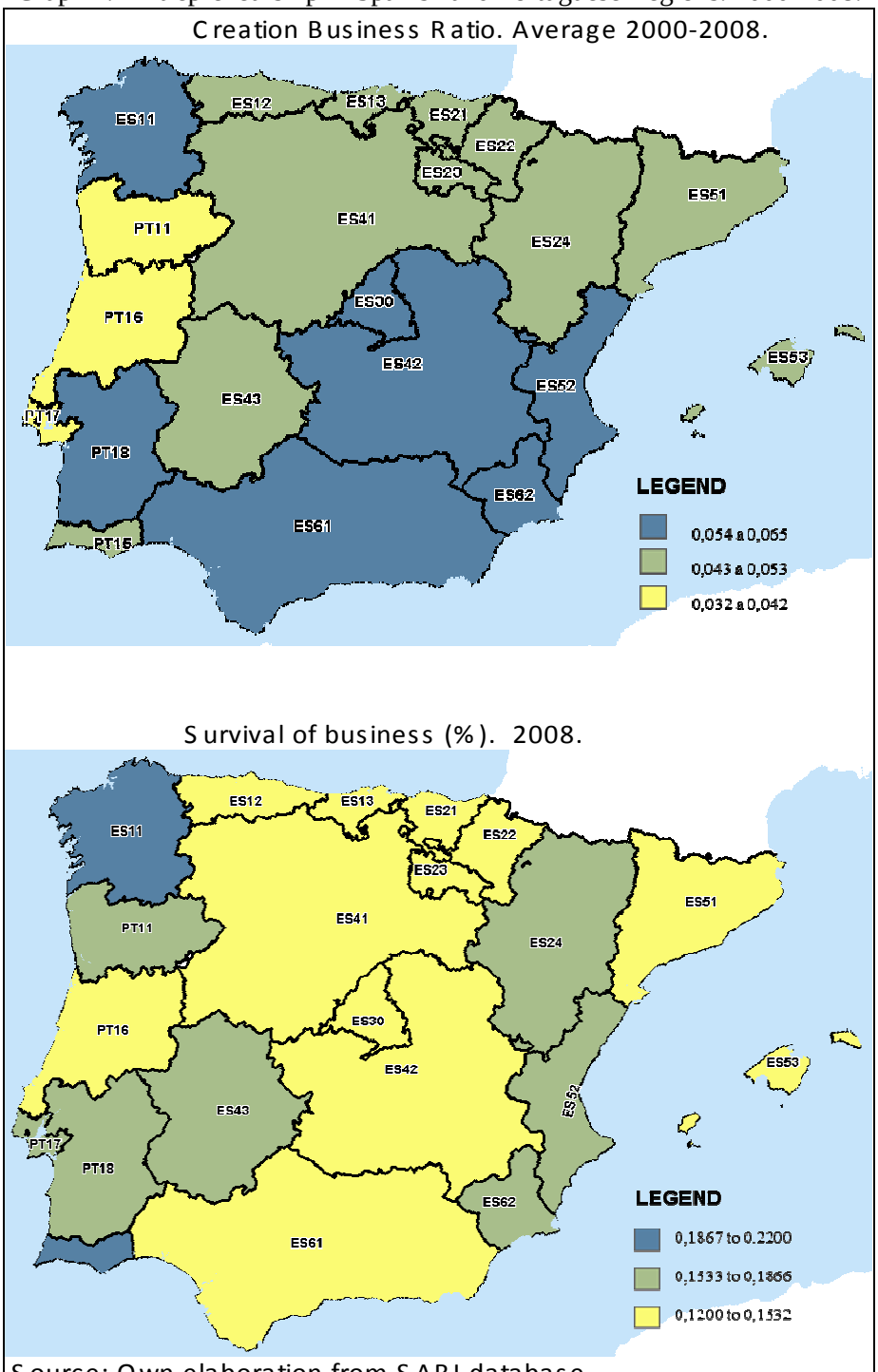
3) Entrepreneurship unlocks personal potential.

An occupation is not simply a way of getting money. People use other criteria in their choice of careers such as security, the level of independence, the variety of tasks and interests in their work. High income levels may induce individuals to a high standard of needs including self-fulfillment and independence through entrepreneurship.

4) *Entrepreneurship and the interests of society.*

Entrepreneurship can be considered the motor of the market economy, as it provides wealth, employment and choice variety for consumers. On the other hand, a considerable number of large companies have been adopting formal strategies concerning social responsibility, and have integrated social and environmental issues in their philosophy, either voluntarily or after the intervention of the State. Somehow the Green Book recognizes a responsible behavior can favor success for the entrepreneurial initiative

Graph 2. Entrepreneurship in Spanish and Portuguese Regions. 2000-2008.



Source: Own elaboration from SABI database.