Intangible capital and business productivity in the hotel industry

Paz Rico (prico@uv.es)*
Bernardí Cabrer-Borrás (cabrer@uv.es)*
María del Mar Benavides-Espinosa (maria.m.benavides@uv.es)**
*Departamento de Análisis Económico
**Departamento de Dirección de Empresas, J.J. Renau Piqueras
Universitat de València
Avd. de los Naranjos, s/n
46022 Valencia (España)
Tel. 34 96382 87 86

Abstract
Intangible capital is a key factor of productivity growth. This paper analyses how the internal intangible capital of the company and external intangible capital influence its productivity. This contribution focuses on the hotel industry since it is a key industry of the Spanish economy, such that any increase in its productivity has an impact on the entire economy. Both, the intangible capital of the company and that of the region in which the company is located are considered as determinants of productivity. Likewise, the importance of other agglomeration economies in the productivity of hotel companies is taken into account. A model estimates firm level determinants of productivity, controlling for regional characteristics that include intangible capital. The findings suggest that, as expected, investment of innovation by hotel companies and regions positively affects company productivity. In addition, there is evidence of the presence of agglomeration economies, both in specialization and urbanization economies. Also, the elasticity of the intangible capital itself is higher in smaller hotel companies.

Keywords: Business productivity, intangible capital, externalities, hotel industry

JEL classification: C13, D24, O33

1. INTRODUCTION

Total Factor Productivity (TFP) is a fundamental variable for measuring the growth and development of an economy or of a particular business. The TFP reflects the productive efficiency of an economy, an economic sector or a company. For Krugman (1994) "productivity is not everything, but in the long term it is almost everything". The growth of productivity generates economic growth since technical progress leads to an increase in the yields of all productive factors, especially those of labour. Therefore, the growth capacity of an economy, a sector or a company depends, fundamentally, on technical progress, and this capacity is reflected in the rate of growth of the TFP.

The importance of **intangible capital** as a determinant of productivity growth is recognised both at a macroeconomic level (Corrado et al., 2009 and 2012; Goodridge et al., 2017) and at a microeconomic level (Piekkola, 2010; Riley and Robinson, 2011; Marrocu et al., 2012; Verbic and Polanec, 2014). However, in general, there is a lack of strong empirical evidence in the relevant literature on the connection between micro and macro approaches (Riley and Robinson, 2011; Marrocu et al., 2012).

This paper sets out to analyse both the micro and the macro channels. Micro data is used to assess the effect on a company´s productivity of the intangible capital directly cumulated by the companies and of the regional intangible assets that are supposed to enhance a company´s productivity as positive externalities.

Therefore, both intangible “business capital” and “regional capital” are considered in order to analyse how they are associated with efficiency at the company level. In addition and in line with Riley and Robinson (2011), other agglomeration economies are considered, differentiating between economies of localisation, Marshall (1890), and urbanization of the region, Jacobs (1969).

This paper specifically addresses the effect that the intangible capital of hotel companies has on their efficiency, taking into account where their productive activity is geographically located, with the aim of analysing the importance of the intangible capital endowment of that region.

The paper is divided into six sections. Following the introduction, the second section reviews the literature. The third section presents the methodology used and the fourth section analyses the data used in the research. The fifth section shows the empirical results obtained and the last section contains the main conclusions of the research.

2. LITERATURE REVIEW

In the current economic environment, intangible assets are becoming highly relevant in business organizations. In this regard, Haskel and Westlake (2017) consider the intangible asset as a strategic opportunity for a company. In general, there is a growing recognition of the importance of the investment in intangibles as a vital factor in productivity. The literature that demonstrates the importance of intangible capital, as a determinant of productivity, is quite extensive and can be analysed through two approaches: microeconomic and macroeconomic.

2.1. Microeconomic approach

From a microeconomic approach, intangible assets of companies, including knowledge and organisational capital, affect their productivity. The competitiveness and success of companies, in industrialized countries, is increasingly based on intangible capital that includes, among other assets, the innovation in new processes and products, the improvements in the skills of employees and the creation of a reputation for the company's products, Marrocu et al. (2012). In line with this, Griliches (1979) considers the knowledge, measured by R&D expenditure, patents and new products, as an input into the company production function in addition to physical capital and labour.

Unlike traditional capital and labour resources, **knowledge** has unlimited potential for the growth of a company because it provides a sustainable competitive advantage and generates increasing returns (Grant, 1996; Lee et al., 2016). However, knowledge in itself is not the basis for achieving a competitive advantage but rather the ability of the company to effectively control and apply the knowledge acquired, developing appropriate management systems and procedures (Phipps and Prieto, 2012; Shahzad et al., 2016). This allows organizations to be more efficient and innovative (Shahzad et al., 2016). Without the acquisition and application of knowledge, innovation is only an exercise in creativity and experimentation. An alignment with the strategic framework of the organization is required to guarantee the dedication of resources to projects related to the strategic objectives. Once the benefits of the innovation process have been realised, they must be captured, organized and disseminated through knowledge management processes. All this makes up what is referred to as **intellectual capital**.

Lately, many innovative companies have devoted minimal financial resources to R&D activities and yet still achieve successful innovations due to the knowledge and experience of a wide range of external sources (Laursen and Salter, 2006). This is reflected in numerous research projects, which propose that knowledge, beyond the organizational limits of the company, is useful for innovation (Bossink, 2002; Chang, 2003; Phene et al., 2006). Innovative enterprises can be reflected through the sale of products and services, organizing their own business and so on. In addition to the innovation necessary to develop and many other skills that would be managed successfully mastered. Very few organizations can survive indefinitely without innovation, Obradovic and Obradovic (2016). Piekkola (2010) states that intangible capital, which includes organisational, information and communication technology (ICT) and R&D capital, can explain the evolution of the results and the increase in the market value of companies. Verbic and Polanec (2014) analyse the role of intangibles in the Slovenian economy. They consider the organisational, information and communication technology and R&D as intangibles and conclude that organisational workers had higher productivity than the average worker.

2.2. Macroeconomic approach

From the **macroeconomic approach,** Romer (1986) and Lucas (1988 and 1993) establish that knowledge spillovers are an important mechanism underlying endogenous growth. Likewise, Marrocu et al. (2012) indicate that the effects of regional intangible capital are interpreted as externalities that lead to agglomeration economies.

In general, **externalities** are classified into two types: localization or specialization economies, Marshall (1890), and urbanization economies, Jacobs (1969). Literature has often referred to Marshall-Arrow-Romer (MAR) externalities and Jacobs's externalities, respectively.

Duraton and Puga (2004) and Rosenthal and Strange (2004) offer a comprehensive review of the literature on agglomeration economies and classify the sources of the agglomeration economies into three types: sharing, matching and learning.

a) Sharing is related to the existence of economies of scale in production.
b) Matching refers specifically to the labour market, in particular to the way in which the supply and demand of employers and workers is met.
c) Learning is known as knowledge spillovers.

For Rosenthal and Strange (2004), knowledge spillovers are the most interesting but the authors recognize the difficulty of identifying knowledge empirically, since it is difficult to measure. Likewise, Griliches (1992) points out the difficulty of directly measuring knowledge and presents a review of the literature that uses indirect methods to quantify it. For Marrocu et al. (2012) intangible capital includes human capital, technological capital, public or institutional capital, social capital and entrepreneurial capital.

Human capital is, in fact, one of the most employed factors in growth models. Human capital affects economic growth since a knowledgeable workforce can lead to increased productivity. Based upon the work of Schultz (1971), and Psacharopoulos and Woodhall (1997), human capital theory rests on the assumption that formal education is highly instrumental and even necessary to improve the production capacity of a population.

Human capital theory emphasizes how education increases the productivity and efficiency of workers by increasing the level of cognitive stock of economically productive human capability which is a product of innate abilities and investment in human beings. Generally, the literature measures human capital by the workers' educational level (Acemoglu and Angrist, 1999; Moretti, 2000).

Technological capital is basically the expenditure on R&D. The contribution of investment in R&D to economic growth is recognized by both theoretical and empirical literature (Griliches and Lichtenberg, 1984; Coe and Helpman, 1995; Griliches, 1998; Jacobs et al., 2002; Guellec and Van Pottelsberghe de la Potterie, 2004; Vila et al., 2015). It has been one of the most widely used variables as a proxy for knowledge or innovation. Similarly, Audretsch and Feldman (1996) consider the innovative activity as a reflection of the level of research in universities, the investment in R&D and the degree of qualified work. Goodridge et al. (2017) consider there to be sufficiently extensive literature to demonstrate the spillover effect of investment in R&D but also argue that it is widely recognized that expenditure on R&D is only a part of what is considered to be investment in intangible assets, as intimated by Corrado et al. (2005). These authors analyse the relationship, at industry level, between the growth of the TFP and the growth of the stock of knowledge, distinguishing between R&D expenditure and the rest of intangible expenditure.

With respect to **entrepreneurial capital**, Audretsch (2007) considers that entrepreneurial activity promotes economic growth. As pointed out by Acs et al. (2018), the theory that there is a positive relationship between entrepreneurship and economic growth can be traced back to Schumpeter (1934). Since then, there has been extensive literature that aims to demonstrate the existence of this positive relationship. Wennekers and Thurik (1999) and Carree and Thurik (2010) provide a review of the literature that covers the relationship between entrepreneurship and economic growth. Likewise, Callejón and Segarra (1999) analyse the relationship between business dynamics and the growth of TFP and find evidence of a positive impact of business dynamics on TFP. Similarly, Holtz-Eakin and Kao (2003) quantify the linkage between productivity growth and entrepreneurship, analysing the relationship between businesses´ birth rates, death rates and productivity. They show that increases in the birth rates of businesses leads to higher levels of productivity. Audretsch and Keilbach (2004), Audretsch et al. (2006) and Audretsch and Keilbach (2008) consider the rate of new business as a proxy for entrepreneurial capital and find that knowledge-intensive businesses increase economic growth. Van Stel et al. (2005) find the Total Entrepreneurial Activity (TEA) of the Global Entrepreneurship Monitor (GEM) to be directly correlated with growth in rich countries and inversely associated in low-income countries. Similarly, Prieger et al. (2016) use data from GEM and differentiate between developed and developing countries. They highlight that entrepreneurship in developing countries has a positive effect on growth while having no effect in developed countries.

Erken et al. (2018) examine the role of entrepreneurial activity as a determining factor of TFP and conclude that there is a stable and significant impact of entrepreneurship in the TFP. Likewise, Acs et al. (2018) consider whether the combination of institutions and entrepreneurship, known as an “entrepreneur ecosystem”, influences economic growth and find this to be affirmative. Finally, Rico and Cabrer-Borrás (2019), using regional data from the Spanish economy, find that entrepreneurial capital; innovation and human capital have a positive effect on regional productive efficiency.

2.3. Macroeconomic and microeconomic approach

The concepts of "intangible assets" and "intellectual capital" share common points. Although these concepts can be considered synonymous, in fact they work at different levels. According to Lev (2001), the term "intangible assets" is related to the Economic area, and the term "intellectual capital" is used in the area of Business Organization. Specifically, Edvinsson and Malone (1999) describe intellectual capital as "the possession of knowledge, applied experience, organizational technology, customer relations and professional skills."

Considering the two approaches together is very important since one of the key elements stressed by the literature is the necessity for enterprises to build up “internal knowledge capabilities” in order to absorb the “external”, often codified, technological opportunities, Cohen and Levinthal (1990).

Regarding the environment, and specifically at a local level, many of the studies that review territorial development focus on the exploitation of resources, the establishment of networks and relations in the territory and, of course, innovation processes. Some of these innovation processes do not depend on the individual character represented by the business community but are promoted by the community and by existing social

relationships, especially in those environments in which the adoption and adaptation of knowledge take on greater importance. Innovation gives rise to territorial differences, such that we can identify innovative areas where territories are capable of responding successfully to adversities and problems, and other areas which are excluded and marginalized outside of the processes of innovation and development.

Innovative territories, more often than not, display a series of conditions, such as: (a) business initiative, capable of transmitting easily reproducible knowledge; (b) social and institutional innovation based on an interactive network of economic, political, social and cultural factors, which facilitates the use of territorial resources; (c) the active participation of civil society in these processes, a form of territorial governance, fundamental in the incorporation of society in innovation processes; (d) and the progressive implementation of a relational government system, based on cooperation between the various institutions with competences in the territory.

The performance of a company is affected by its economic and institutional environment. Riley and Robinson (2011) estimate the determinants of productivity at the company level, and, among the determinants, they consider company intangible capital and agglomeration economies with special emphasis on the economies that entail business and regional intangible capital. Likewise, Marrocu et al. (2012) analyse the effect that the intangible capital accumulated by companies and their local environment have on the productivity of companies. O'Mahony and Vecchi (2009) analyse the relationship between intangible assets and productivity but integrate the company data with industry information on tangible and intangible investment and skill composition of the labour force.

2.4. Regional intangible capital: the hotel industry in Spain

The hotel industry is one of the most important economic industries of the Spanish economy, hence the interest that it has always attracted both from academia and institutions. According to a report of the World Travel & Tourism Council (2019), tourism has become the sector that brings more wealth to the Spanish economy, representing 14.6% of GDP in addition to 14.7% of total employment.

The growth of this industry, and therefore of the Spanish economy, depends on the evolution of the productivity of hotel companies, so analysis of this productivity is valuable. Likewise, the hotel industry is an important industry in the global economy both for its economic impact and for its social and environmental effects. In addition, this industry is challenging traditional structures in redefining structures and forms of management within its environment by putting the focus of value on knowledge and new information technologies.

The hotel industry has been chosen since its characteristics make it ideal for contrasting the arguments presented in the theoretical framework. Two of its main distinguishing features are the intangibility of the service and the location factor; factors which acquire great importance as they are more decisive than in other types of companies. It also shows a trend towards business concentration which aims to take advantage of economies of scale, such as hotel chains, by carrying out joint marketing or knowledge sharing, among other initiatives, Martín (2004).

In addition, running a hotel requires specialized knowledge of the actual environment and of the company itself as well as the ability to create knowledge within the hotel, to manage and disseminate the knowledge, and to introduce innovations in service and the way it is offered. At present, the study of the **institutional environment** has become very important since it can influence the organization of companies so that they are more open to entrepreneurial ideas (Baumol et al., 2009; Bruton et al., 2010).

The boom and evolution of this industry brings new business opportunities, creating companies that respond to new needs. Not everything depends on the big hotel chains or consolidated companies. Sun et al. (2015) also conclude that technological progress is the main factor in the variations of the TFP in the tourism industry.

3. METODOLOGY

The neoclassical theory of growth, developed by Solow (1956), states that production is determined by labour and capital factors. However, Solow (1956) conceded that growth was influenced by technological change but in the formalization of its production function he considered it exogenous. In fact, Solow considered that productive factors, capital and labour, did not necessarily explain the growth variation, given that most of its variation was explained by the residual contained in technological progress. In particular, Solow (1957) evidenced that around 87% of the growth of output per worker in the US was due to growth in technological change.

Subsequently, Romer (1986) and Lucas (1988 and 1993) criticized Solow's growth model and considered that growth was also determined by knowledge, which could be considered endogenous. Using the production function of Cobb-Douglas (1928), the following equation is obtained:

$$Y_{it} = A_{it} K_{it}^{\alpha} L_{it}^{\beta} \quad (1)$$

where: Y_{it} is the production in real terms of firm i in time t, A_{it} measures the technological advance or productive efficiency, K_{it} is the physical capital stock, L_{it} is the employment level, whilst α is the elasticity of production for the factor of physical capital and β the elasticity of production for labour.

The TFP is defined as part of the production that is not explained by all the inputs used to obtain production. In this study the TFP is used to avoid the possible problems of endogenity and multicollinearity that the estimation of a production function involves. Endogenity appears when the explanatory factors in the models are not exogenous and the labour factor is not in the production function. The labour input determines the volume of production but, in turn, is determined by the production itself. Also, among the determining factors of production, that of volume of capital and labour, there is usually a high degree of collinearity, which influences the accuracy of the estimates.

Taking logarithms from equation (1), the following equation is obtained:

$$\ln Y_{it} = lnA_{it} + \alpha lnK_{it} + \beta lnL_{it} \quad (2)$$

After estimating equation (2), the TFP is obtained as:

$$lnA_{it} = lnY_{it} - \hat{\alpha} lnK_{it} - \hat{\beta} lnL_{it} \quad (3)$$

For each year of the period considered, the TFP is obtained from the hotel companies that make up the sample. Next, a model is specified that includes the characteristics of the hotel companies, such as the intangible assets, the benefits, the age of the company, the liquidity and the size. Likewise, regional factors that explain the TFP of the companies are also considered, such as the volume of human capital, the entrepreneurial capital and the R&D expenditure of the region in which the companies operate. In addition, the effect that other agglomeration economies can have on business productivity is taken into account, in line with Riley and Robinson (2011): regional specialization, Marshall (1890) and sectoral concentration of the region, Jacobs (1969).

The specified model is:

$$lnTFP_{ijt} = \alpha_1 + \sum_{i=1}^{I} \beta_i X_{ijt} + \sum_{j=1}^{J} \gamma_j Z_{ijt} + u_{ijt} \quad (4)$$

where vector X_{ijt} represents the characteristics of the company i in the region j in year t, Z_{ijt} represents the regional characteristics in year t for the region j where the company i is localised.

Equation (4) permits analysis of the effect that intangible capital of the company and that of the region has on the productivity of hotel companies. For this, the impact that intangible assets of companies have on their productivity is analysed. With respect to the environment in which companies operate, several variables are considered which include intangible capital: entrepreneurial activity, human capital and R&D expenditure in each region. Likewise, the cluster effect is analysed through measures that include the location and sectoral concentration of the region.

4. DATA

To estimate model (4) proposed in the previous section data from different sources have been used. Thus, hotel company data comes from the Iberian Balance Sheet Analysis System (SABI) database. This database provides information on the economic and financial accounts of Spanish companies. From this database a sample of Spanish companies of the hotel sector[1] with an asset size exceeding 30 million euros was extracted, as suggested by Marrocu et al. (2012), for the years 2015, 2016 and 2017. In addition, the following three filters were considered when extracting the data sample: the company had to be active, not present negative personal funds and be able to provide information on the number of workers it had and the intangible capital. Thus, the sample size, after eliminating the observations that did not provide information on any of the variables considered, amounted to 7,794 observations. The intangible capital of companies is the variable for which most information is missing.

The endogenous variable of model (4), TFP, is obtained as the Solow residual since TFP is defined as that part of the production that is not explained by the inputs or basic

[1] Code 55 from CNAE 2009: Accommodation Services.

factors of capital and labour, used to obtain the production level. For this, the added value of the companies is used, in real terms the number of employees and the volume of liabilities and capital, and the TFP is estimated for each of the years and companies considered.

The information obtained from SABI for each of the companies in the sample is the number of employees, the tangible fixed assets, the intangible fixed assets, the added value, the sales, the economic profitability, the date of incorporation, and the liquidity and the location of the company. The profitability of the companies is measured through the ROA, which is defined as the quotient between the profit before interest and taxes and the total assets of the company. With the objective of collecting the possible different response of the TFP to profitability, a dichotomous variable is generated that takes value one if the ROA of the company is positive and zero if not. Regarding the liquidity, this variable is the quotient between current assets and current liabilities. The age of the company is the period in years since its establishment until the date of extraction of the sample. Finally, with regards to business size, measured by the number of employees, four categories are considered: microenterprises (companies with fewer than 10 workers), small companies (between 10 and 50 workers), medium-sized companies (between 50 and 150 workers) and large companies (with more than 250 workers).

For the data characterizing the intangible capital valuation of the regions, several sources have been used. Thus, the stock of regional human capital (HK) comes from the estimates made by the BBVA-IVIE Foundation, while the R&D expenditure per inhabitant of each region for each year of the sample period is obtained from the National Institute of Statistics (INE).

To quantify the agglomeration economies of the regions, two indices have been defined: concentration index and specialization index. The variable used for the calculation of the representative variables of agglomeration economies is the level of employment in the hotel industry. The index of concentration will be greater the less homogeneous the sectorial distribution of employment is within a region, and therefore, sectorial concentration will be lesser, and vice versa. A value close to hundred will denote maximum concentration in the hotel industry in region j.

$$CON_j = \frac{Employment\ in\ hotel\ industry\ region_j}{Employment\ in\ hotel\ industry\ in\ Spain} * 100 \qquad (5)$$

The index of specialization makes it possible to quantify the difference or similarity of the productive structures of the regions by comparing them with the national average. A value close to hundred will reflect maximum specialization in the hotel industry in region j.

$$ESP_j = \frac{Employment\ in\ hotel\ indutry\ region_j}{Employment\ total\ in\ Spain} * 100 \qquad (6)$$

Finally, the indicator of entrepreneurship activity of the regions is obtained from the GEM, which each year provides TEA. TEA assesses the percent of working age population both about to start an entrepreneurial activity, and that have started one from a maximum of three years and half. As a summary, Table 1 includes the definition of the variables considered.

Table 1. Definition of the variables used.

	Definition
Firm' variables	
TFP	Total Factor Productivity
Intangible capital	Intangible fixed assets
Liquidity	Current assets over current liabilities
ROA	Profit before interest and taxes over total assets
AGE	Age in years
Sales	Sales in thousands euros
Regional variables	
HK	Stock of regional human capital
R&D	R&D expenditure per inhabitant
CON	Concentration index
ESP	Specialization index
TEA	Total Entrepreneurial Activity

5. EMPIRICAL RESULTS

Table 2 shows the simple correlation between some variables considered as explanatory factors of the TFP. As can be seen, there is a high collinearity between human capital and R&D expenditure in the regions. Likewise, the correlation between agglomeration measures (specialization and concentration) with human capital (HK) and R&D expenditure in the regions is also high. This highlights the fact that introducing these variables together in an econometric model could present problems of high collinearity.

Table 2. Correlation matrix between explanatory variables.

	HK	R&D	CON	ESP	TEA
HK	1				
R&D	0.50***	1			
CON	0.02***	0.47***	1		
ESP	-0.26***	-0.76***	-0.18***	1	
TEA	0.06***	0.23***	0.67***	0.15***	1

Note: *** denotes 1% significance.

Source: Compiled by the authors.

Given the existence of significant correlations between the explanatory variables, different econometric models are estimated which will enable analysis of the variables that best explain the TFP while mitigating, at the same time, the multicollinearity

problems that can be generated when including all variables together in the model. Firstly, the characteristic of the company is taken into account and to this basic model is added, subsequently and alternatively, the rest of the variables: the regional variables of HK and investment in R&D, entrepreneurial capital and the variables that collect agglomeration economies, with reference to specialization and concentration.

The results of the different estimated models are collected in Table 3. The models have been estimated with the Eviews 8.1 Software package. In addition, all models have been estimated in a consistent way with the existence of heteroscedasticity in the sample using White's method. As can be seen, the intangible capital of companies positively affects the productivity of companies. Therefore, the investment in intangible capital has a positive effect on the efficiency of the companies and, one can assume, in the development of the regions in which they are located. On the other hand, the profitability of the company also positively affects productivity and also presents a different response to positive profitability, given that there is evidence of a positive differential effect with respect to unprofitable companies. Finally, it can be seen that the age of the company has a negative effect. This negative effect decreases very slowly, given that age squared has a significant and positive coefficient, although very small.

Table 3. Regression equation (4).

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Constant	3.271***	2.925***	3.139***	3.209***	3.250***	3.109***	3.161***	2.888***	2.776***	2.706***
ln(Intangible capital)	0.006***	0.006***	0.006***	0.006***	0.006***	0.005**	0.006***	0.006***	0.006***	0.005*
ln(Liquidity)	0.044***	0.044***	0.043***	0.043***	0.044***	0.045***	0.044***	0.043***	0.044***	0.045***
ROA	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***
ROA>0	0.241***	0.242***	0.247***	0.238***	0.237***	0.236***	0.247***	0.239***	0.238***	0.238***
AGE	-0.007***	-0.007***	-0.006***	-0.007***	-0.008***	-0.008***	-0.006***	-0.007***	-0.007***	-0.007***
AGE^2	0.001***	0.001**	0.001**	0.001***	0.001***	0.001***	0.001**	0.001**	0.001***	0.001***
ln(Sales)	0.089***	0.089***	0.091***	0.085***	0.086***	0.086***	0.091***	0.085***	0.084***	0.085***
HK		0.029***					-0.002	0.027***	0.040***	0.034***
R&D			0.101***				0.103***			
CON				0.009***				0.009***		
ESP					0.005***				0.007***	
TEA						0.035***				0.036***
R-squared	0.187	0.189	0.194	0.194	0.189	0.197	0.194	0.196	0.191	0.199
Adjusted R-squared	0.187	0.188	0.193	0.194	0.188	0.196	0.193	0.195	0.190	0.198
Akaike info criterion	1.544	1.543	1.536	1.536	1.542	1.532	1.536	1.534	1.539	1.530
Observations number	7794	7794	7794	7794	7794	7794	7794	7794	7794	7794

Note: ***, ** and * denote 1%, 5% and 10% significance, respectively.
The estimate is consistent with heteroscedasticity in the sample.

Models 2 to 6 of Table 3 add to the basic model (Model 1) a regional variable that includes intangible capital endowments (HK, R&D), agglomeration economies (CON and ESP) and entrepreneurial activity (TEA). All of them show an improvement in results with respect to the basic model, and therefore in all cases such determinants turn out to be statistically significant.

Models 7 to 10 all include the HK variable and an additional regional variable. In model 7, human capital is no longer significant as a result of the high correlation between HK and R&D expenditure, as shown in Table 2. The evidence obtained from other models is that there are positive economies of agglomeration; both of specialization and concentration, and that there is a significant effect of regional allocations of entrepreneurial capital on the TFP of companies (see Model 10).

To summarize, the results indicate that both the intangible capital itself and that external to the company positively affect its productivity. Therefore, the investment in innovation by the company positively affects its productive efficiency. In addition, the endowments of the region in which the company is located also affects its productivity, due to the spillover effects of the investment in intangible capital of the region. Likewise, it can be concluded that there are agglomeration economies due to both the specialization and the urbanization of the regions.

In order to check if the factor productivity response is different according to the size of the company, the sample has been divided into three quartiles with respect to the number of employees. In this way, the basic model is estimated for companies with less than 9 workers (D1), for companies between 9 and 27 workers (D2) and, lastly, for companies with more than 27 workers (D3). The results, in Table 4, show that the intangible capital of companies always has a positive and significant effect in smaller companies while it is not a significant factor in larger companies. This result is consistent with that obtained by Marrocu et al. (2009), who indicate that intangible assets not only encompass expenditure on R&D, which is higher in larger companies, but also include the training expenses of workers that are essential for the absorption of external, fundamental knowledge in smaller companies, Macpherson and Holt (2007). Similarly, the differential effect of positive ROA is also higher in small businesses.

As for the external determinants of hotel companies, it should be noted that the endowment of human capital of the region in which the company is located favours to a greater degree the productivity of large companies compared to smaller ones. However, agglomeration economies as a result of the location of hotel companies as well as R&D expenditure in the region are factors that catalyse the productivity of smaller companies. Finally, the rate of entrepreneurial activity in the region is a determining factor in the total productivity of the factors of larger companies while not affecting small businesses.

6. CONCLUSIONS

The analysis of the productivity of hotel companies in Spain is essential, given that the tourism sector is a key sector of its economy. Indeed, increases in the productivity of hotel companies mean improvements not only in the sector but also in local economies where these companies are located and, in short, they generate greater growth in the medium and long term for the economy as a whole.

This paper has considered two complementary approaches, the microeconomic and the macroeconomic, with the objective of analysing the role that intangible capital, both internal and external, has on the productivity of hotel companies. Other economic agglomerations that can determine the productivity of hotel companies have also been included in the model under study. In this way, data has been used at company level, combining them with variables of regional intangible capital and measures representative of the agglomeration of the regions.

The empirical results of the estimates lead to conclude that there is evidence that the productivity of hotel companies is positively related to both the intangible capital of the company itself and the regional intangible capital, where the company in question is

located. The empirical evidence also leads to conclude that there are positive agglomeration economies, both of specialization and concentration. Therefore, agglomeration economies, human capital, R&D expenditure and the rate of entrepreneurial activity in the region are decisive in the TFP of Spanish hotel companies.

As regards the size of the companies, the evidence indicates that the intangible capital itself affects smaller companies while it has no effect on larger companies. This result would indicate that, although small companies have less capacity to invest in intangible assets, the positive effect of intangible capital partially compensates for their lower investment capacity. Furthermore, small companies benefit more from the endowments of the regional environment, such as expenditure on R&D and agglomeration economies while large companies, which require a greater labour source, benefit more from the larger allocations of human capital of the region.

With regard to business and regional policies, the results obtained lead to conclude that institutions should encourage the increase of regional intangible capital at the same time as promoting investment in innovation in hotel companies, since these are two complementary channels that increase business productivity. Likewise, institutions should consider the promotion of regional entrepreneurship with the aim of increasing entrepreneurship and investment in innovation. This will ultimately have an impact on the productivity of companies, and in particular, on the hotel industry.

As a limitation of this study it should be noted that the database includes hotels located in the Spanish territory and as a future course of action the database could be expanded to include hotels from other countries. Another possible extension of the study could be to include, as a determining factor of the TFP of the hotel companies, the management in charge of the companies, which other studies have shown to be a determining factor in company productivity. This would require complementing the database used with other sources that provide data on business management.

Table 4. Regression model (4) by firm dimension

	D1					D2					D3				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15
Constant	1.569***	1.599***	1.651***	1.655***	1.659***	-0.267***	-0.163***	-0.127***	-0.107***	-0.145***	2.505***	2.801***	2.868***	2.963***	2.737***
ln(Intangible capital)	0.019***	0.018***	0.018***	0.018***	0.018***	0.003*	0.003*	0.003	0.003*	0.002	0.000	0.000	0.000	0.000	0.000
ln(Liquidity)	0.033***	0.032***	0.031***	0.032***	0.033***	0.031***	0.031***	0.031***	0.031***	0.032***	0.029***	0.029***	0.028***	0.029***	0.031***
ROA	0.005***	0.0059***	0.005***	0.005***	0.005***	0.004***	0.004***	0.004***	0.004***	0.004***	0.006***	0.006***	0.007***	0.006***	0.007***
ROA>0	0.195***	0.198***	0.197***	0.194***	0.195***	0.066***	0.070***	0.061***	0.064***	0.060***	0.121***	0.127***	0.116***	0.117***	0.114***
AGE	-0.009***	-0.007***	-0.008***	-0.010***	-0.009***	-0.008***	-0.007***	-0.007***	-0.008***	-0.008***	-0.002*	-0.002*	-0.003***	-0.003**	-0.004***
AGE^2	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001	-0.001	0.001	0.001	0.001
ln(Sales)	0.408***	0.406***	0.403***	0.403***	0.407***	0.582***	0.582***	0.578***	0.581***	0.574***	0.109***	0.116***	0.108***	0.109***	0.105***
HK	0.011					0.014**					0.038***				
R&D		0.093***					0.050***					0.089***			
CON			0.008***					0.005***					0.009***		
ESP				0.009***					0.001					0.001	
TEA					0.009					0.019***					0.046***
R-squared	0.461	0.463	0.464	0.463	0.461	0.633	0.635	0.636	0.633	0.637	0.210	0.220	0.221	0.206	0.247
Adjusted R-squared	0.459	0.462	0.463	0.461	0.459	0.632	0.634	0.635	0.632	0.636	0.207	0.218	0.218	0.204	0.245
Akaike info criterion	1.750	1.745	1.743	1.746	1.749	0.409	0.404	0.401	0.411	0.400	0.642	0.629	0.628	0.647	0.594
Observations number	2652	2652	2652	2652	2652	2565	2565	2565	2565	2565	2577	2577	2577	2577	2577

Note: ***, ** and * denote 1%, 5% and 10% significance, respectively.

The estimate is consistent with heteroscedasticity in the sample. D1= companies with less than 9 workers, D2= companies with between 9 - 27 workers, and D3= companies with more than 27 workers.

REFERENCES

Acemoglu, D. and Angrist, J. (1999). How large are the social returns to educations? Evidence from compulsory schooling laws, *NBER Working Paper*, No. 7444.

Acs, Z.J., Estrin, S., Mickiewicz, T. and Szerb, L. (2018). Entrepreneurship, institutional economics, and economic growth: an ecosystem perspective, *Small Business Economics*, https://doi.org/10.1007/s11187-018-0013-9

Audretsch, D.B. (2007). Entrepreneurship capital and economic growth, *Oxford Review of Economic Policy*, 23(1), 63-78.

Audretsch, D.B. and Feldman, M. (1996). R and D spillovers and the geography of innovation and production, *American Economic Review*, 86(4), 253-273.

Audretsch, D.B. and Keilbach, M. (2004). Entrepreneurship capital and economic performance, *Regional Studies,* 38(8), 949-959.

Audretsch, D.B. and Keilbach, M. (2008). Resolving the knowledge paradox: Knowledge-spillover entrepreneurship and economic growth, *Research Policy,* 37(10), 1697-1705.

Audretsch, D.B., Keilbach, M. and Lehmann, E.E. (2006). *Entrepreneurship and economic growth*, New York: Oxford University Press.

Baumol, W.J., Litan, R.E. and Schramm, C.J. (2009) *Good capitalism, bad capitalism, and the economics of growth and prosperity*. New Haven, CT: Yale University Press

Bossink, B.A.G. (2002). The development of co-innovation strategies: stages and interaction patterns in interfirm innovation, *R&D Management*, 32(4), 311-320.

Bruton, G.D., Ahlstrom, D. and Li, H.L. (2010). Institutional Theory and Entrepreneurship: Where Are We Now and Where Do We Need to Move in the Future?, *Entrepreneurship: Theory and Practice,* 34(3), 421-440.

Callejón, M. and Segarra, A. (1999). Business dynamics and efficiency in industries and regions: the case of Spain, *Small Business Economics*, 13(4) 253-271.

Carree, M.A. and Thurik, R. (2010).The impact of entrepreneurship on economic growth, in Z.J. Acs and D.B. Audretsch. D.(Eds) *Handbook of entrepreneurship research*, International Handbook Series on Entrepreneurship, 5, 557-594, Springer, New York.

Chang, Y. (2003). Benefits of co-operation on innovative performance: evidence from integrated circuits and biotechnology firms in the UK and Taiwan. *R&D Management*, 33(4), 425-437.

Cobb, C. and Douglas, P. (1928). A theory production, *The American Economic Review*, 18(1), 139-165.

Coe, D.T. and Helpman, E. (1995). International R&D spillovers, *European Economic Review*, 38(5), 859-887.

Cohen, W.M. and Levinthal, D.A. (1990): Absorptive Capacity: A New Perspective on Learning and Innovation, *Administrative Science Quarterly*, 35(1), 128-152.

Corrado, C., Haskel, J., Jona-Lasinio, C. and Iommi, M. (2012). Intangible capital and growth in advanced economies: Measurement methods and comparative results. How large are the social returns to educations?, *IZA Discussion Paper*, No. 6733.

Corrado, C., Hulten, C. and Sichel, D. (2005). Measuring capital and technology: An expanded framework, in C. Corrado, J. Haltiwanger and D. Sichel (Eds.), *Measuring capital in the new economy*, The National Bureau of Economic Research Book Series Studies in Income and Wealth, 65, 11-45, University Chicago Press, Chicago.

Corrado, C., Hulten, C. and Sichel, D. (2009). Intangible capital and U.S. Economic growth, *Review of Income and Wealth*, 55(3), 661-685.

Duraton, G. and Puga, D. (2004). Micro-foundations of urban agglomeration economies, in Vernon Hendersom and Jacques_François Thisse (Eds.), *Handbook of regional and urban economics: Cities and Geography*, Amsterdam: Elsevier.

Edvinsson L. and Malone, M.S. (1999). *El capital intelectual: cómo identificar y calcular el valor inexplorado de los recursos intangibles de su empresa*, Editorial Gestión.

Erken, H., Donselaar, P. and Thurik, R. (2018). Total factor productivity and the role of entrepreneurhip, *The Journal Technology Transfer*, 43(6), 1493-1521.

Goodridge, P., Haskel, J. and Wallis, G. (2017). Spillovers from R&D and other Intangible Investment: Evidence from UK Industries, *Review of Income and Wealth*, 63(S1), 22-48.

Grant, R.M. (1996). Toward a knowledge-based theory of the firm, *Strategic Management Journal*, 17 Winter Special Issue, 109-122.

Griliches, Z. (1979). Issues in Assessing the Contribution of Research and Development to Productivity Growth, *The Bell Journal of Economics*, 10(1), 92-116.

Griliches, Z. (1992). The search for R&D spillovers, *Scandinavian Journal of Economics*, 94, supplement, S29-S47.

Griliches, Z. (1998). *R&D and productivity: the econometric evidence*, Chicago: University of Chicago Press.

Griliches, Z. and Lichtenberg, F.R. (1984). R&D and productivity growth at the industry level: Is there still a relationship? in Z.Griliches (Ed.), *R&D, patents, and productivity*, Chicago: Chicago University Press and NBER, 465-496.

Guellec, D. and Van Pottelsberghe de la Potterie, B.P. (2004). From R&D to productivity growth: Do the institutional settings and the source of funds of R&D matter?, *Oxford Bulletin of Economics and Statistics*, 66(3), 353-378.

Haskel, J. and Westlake, S. (2017). Capitalism without capital. The rise of the intangible economy. Princeton University Press.

Holtz-Eakin, D. and Kao, C. (2003). *Entrepreneurship and economic growth: The proof is in the productivity*, Syracuse: Center for Policy Research Working Paper, No. 50.

Jacobs, B., Nahuis, R. and Tang, P.J.G. (2002). Sectoral productivity growth and R&D spillovers in the Netherlands, *De Economist*, 150(2), 181-210.

Jacobs, J. (1969). *The Economy of Cities*. New York: Random House.

Krugman, P. (1994). *The age of diminished expectations*, The MIT Press, Cambridge, MA.

Laursen, K. and Salter, A. (2006) Open for innovation: the role of openness in explaining innovation performance among U.K. manufacturing firms, *Strategic Management Journal*, 27(2), 131-150.

Lee, V.H., Foo, A.T.L., Leong, L.Y. and Ooi, K.B. (2016). Can competitive advantage be achieved through knowledge management? A case study on SMEs, *Expert Systems with Applications*, 65(Issue C), 136-151

Lev, B. (2001). *Intangibles: Management, Measurement and Reporting,* Bookings Institution Press. Washington D.C.

Lucas, R. (1988). On the mechanics of economic development, *Journal of Monetary Economics*, 22(1), 3-42.

Lucas, R. (1993): Making a miracle, *Econometrica*, 61(2), 251-272.

Macpherson, A. and Holt, R. (2007). Knowledge, learning and small firm growth: A systematic review of the evidence, *Research Policy*, 36(2), 172-192.

Marshall, A. (1890). *Principles of Economics*. London: McMillan

Marrocu, E., Paci, R. and Pontis, M. (2009). *Intangible capital and firms productivity*, Working Paper CRENoS 2009/16, Centre for North South Economic Research, University of Cagliari and Sassari, Sardinia.
Marrocu, E., Paci, R. and Pontis, M. (2012). Intangible Capital and Firms Productivity, *Industrial and Corporate Change*, 21(2), 377-402.
Martín, I. (2004). *Dirección y gestión de empresas del sector turístico* (3ª ed.) Editorial Pirámide.
Moretti, E. (2000). Estimating the social return to higher education. NBER Working Paper No. 9018.
Obradovic, D. and Obradovic, D. (2016). The role of innovation on strategic orientations and competitiveness of enterprises, *Ecoforum*, 5(1), 90-95.
O'Mahony, M. and Vecchi, M. (2009). R&D, knowledge spillovers and company productivity performance, *Research Policy*, 38(1), 35-44
Phene, A., Fladmoe-Lindquist, K. and Marsh, L. (2006). Breakthrough innovations in the U.S. biotechnology industry: the effects of technological space and geographic origin, *Strategic Management Journal*, 27(4), 369-388.
Phipps, S.T.A. and L.C. Prieto, (2012). Knowledge is power? An inquiry into knowledge management, its effects on individual creativity, and the moderating role of an entrepreneurial mindset, *Academy of Strategic Management Journal*, 11(1), 43-58.
Piekkola, H. (2010). *Intangibles: Can They Explain the Unexplained?*, Innodrive Working Paper, No. 2.
Prieger, J.E., Bampoky, C., Blanco, L.R. and Liu, A. (2016). Economic growth and the optimal level of entrepreneurship, *World Development*, 82 (issue C), 95-109.
Psacharopoulos, G. and Woodhall, M. (1997). *Education for Development: An Analysis of Investment Choice*. New York Oxford University Press.
Rico, P. and Cabrer-Borras, B. (2019). Entrepreneurship, firms creation and regional performance, *European Journal of Management and Business Economics*, 28(2), 158-173, https://doi.org/10.1108/EJMBE-07-2018-0077
Riley, R. and Robinson, C. (2011). *Agglomeration Spillovers from Intangible Capital: An Analysis of UK City Regions*, Innodrive Working Paper, No. 15.
Romer, P.M. (1986). Increasing returns and long-run growth, *The Journal of Political Economy*, 94(5), 1002-1037.
Rosenthal, S. and Strange, W. (2004). Evidence on the nature and sources of agglomeration economies, in Vernon Henderson and Jacques_François Thisse (Eds.), *Handbook of regional and urban economics: Cities and Geography*, Amsterdam: Elservier.
Schultz, T.W. (1971). *Investment in Human Capital.* New York. The Free Press.
Schumpeter, J. (1934). *Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*, Harvard University Press, Cambridge, MA.
Shahzad, K., Bajwa, S.U., Siddiqi, A.F.I., Ahmid, F. and Raza, A. (2016). Integrating knowledge management (KM) strategies and processes to enhance organizational creativity and performance: an empirical investigation, *Journal of Modelling in Management*, 11(1), 154-179.
Solow, R.M. (1956). A contribution to the theory of economic growth, *The Quarterly Journal of Economics*, 70(1), 65-94.
Solow, R. M. (1957). Technical Change and the Aggregate Production Function. *Review of Economics and Statistics,* 39(3), 312-320.

Sun, J., Zhang, J., Zhang, J., Ma, J. and Zhang, Y. (2015). Total factor productivity assessment of Tourism Industry: Evidence from China, *Asia Pacific Journal of Tourism Research,* 20(3), 280-294.

Van Stel, A.J., Carree, M.A. and Thurik, A.R. (2005). The effect of entrepreneurial activity on national economic growth, *Small Business Economics*, 24(3), 311-321.

Verbic, M. and Polanec, S. (2014). Innovativeness and intangibles in transition: the case of Slovenia, *Economic Research*, 27(1), 67-85.

Vila L., Cabrer-Borras B. and Pavia J.M. (2015). On the relationship between knowledge creation and economic performance, *Technological and Economic evelopment of Economy*, 21(4), 539-556.

Wennekers, A.R.M. and Thurik, A.R. (1999). Linking entrepreneurship and economic growth, *Small Business Economics*, 13(1), 25-55.

World Travel & Tourism Council (2019). *Travel & Tourism. Economic Impact. Spain*, London, UK. http://www.wttc.org (accessed on November 19, 2019).