The impact of export-oriented entrepreneurship on regional economic growth

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Abstract: We analyze the impact of export-oriented entrepreneurship on regional growth using data provided by the Global Entrepreneurship Monitor project and the Spanish Institute of Statistics, for the 17 Spanish regions over a period of six years. After controlling for catching-up effects, as well as, other drivers of economic growth (e.g. change in technology capability and human capital), we found evidence that those regions with a higher percentage of adult population involved in export-oriented entrepreneurship experience a higher GDP growth. This relationship is greater as the intensity of foreign customers served by the entrepreneurial initiatives is substantially higher.

Keywords: Export Orientation; Entrepreneurial Activity; Economic Growth; International Trade; Regional Studies.

1 Introduction

Economic growth is a key element for competitiveness, which represents the ability of a Society to sustainably improve the living standards of its citizens in terms of real incomes and job opportunities for those willing to work (OECD, 1990). Economic growth and competitiveness are achieved by producing more goods and services that satisfy not only the domestic demand (Backman & Gainsbrugh, 1949), but also international markets (Fagerberg, 1996). Entrepreneurship plays an important role in attaining these goals since it is a mechanism to transfer the knowledge not exploited by incumbents to the market in form of new goods and services (Acs, Braunerhjelm, Audretsch, & Carlsson, 2009). Nonetheless, not all entrepreneurial initiatives equally contribute to competitiveness and economic growth (Autio, 2007; Stam & van Stel, 2009; Wong, Ho, & Autio, 2005). In particular, considering the relationship between exports and economic growth suggested by the empirical literature on economic development (Giles & Williams, 2000a, 2000b), export-oriented entrepreneurship is expected to enhance economic growth by serving both domestic and foreign markets.

Although export-oriented new ventures and the field of international entrepreneurship have received considerable attention by scholars during the last decade (Oviatt & McDougall, 2005), their potential economic impact has not been sufficiently analysed yet. Recently, Hessels and van Stel (2009) analysed the role of export-oriented entrepreneurship at aggregated level. Their findings reveal that this kind of entrepreneurial activity is a relevant driver of economic growth in developed countries. However, to the best of our knowledge, no studies on this issue have been carried out at regional level. Despite the increasing impact of globalization, regions have emerged as the essential and active unit of economic development process (Scott & Storper, 2003). Regions are influential environments fostering entrepreneurship (Feldman, 2001). This is

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especially true for knowledge-based entrepreneurship, since proximity to knowledge sources matters (Audretsch, 1998) and may influence the process through which opportunities are recognised and exploited (Shane & Venkataraman, 2000). Moreover, regions as spatial units of observation differ culturally and economically, and such differences encourage or discourage people to venture in entrepreneurial activity and compete internationally. Therefore, the aggregated impact of entrepreneurship in it different dimensions should be measured at regional level too.

We analyse the impact of export-oriented entrepreneurship on regional growth using data provided by the Global Entrepreneurship Monitor (GEM) project and the Spanish Institute of Statistics (Instituto Nacional de Estadística, INE), for 17 NUTS-2 level Spanish regions over a period of six years. After controlling for catching-up effects (van Stel, Carree, & Thurik, 2005), as well as, other drivers of economic growth (e.g., stock of technological knowledge and human capital endowment), we found evidence that those regions with a higher percentage of adult population involved in export-oriented entrepreneurship experience a higher GDP growth in addition to the contribution made by general entrepreneurial activity. This relationship is greater as the level of foreign customers served by export-oriented entrepreneurs is substantially higher (i.e., at least 1%, 25% or 75% of customers located abroad).

These results support those found at national level by Hessels and van Stel (2009). However, our paper adds to the extant literature on entrepreneurship by analyzing the role of entrepreneurial activity with different levels of foreign customers (i.e., at least 1%, 25% or 75% of customers located abroad) on economic growth, under a longitudinal and regional context. Implications derived from these results suggest the development of trade policies for export promotion at regional level, using programs which not only encourage entrepreneurs to become exporters, but also help them increase their commitment to foreign customers in terms of exports intensity.

Following this introductory section, we develop the theory and hypotheses of this study. The third section describes the methods and data used to test our hypotheses. Results are presented and discussed in the fourth section. Finally, conclusions and implications derived from the results are summarised in the fifth section.

2   Theory and hypotheses

2.1   International trade and export-led growth

The literature on international trade suggests that exports have a positive impact on economic growth (Giles & Williams, 2000a, 2000b). Different reasons have been proposed for explaining the evidence found in previous studies dealing with this issue on export-led growth. The simplest explanation is that, as the contribution to growth made by domestic consumption is limited to the size of regional (or national) markets, sales to foreign markets represents an additional consumption demand which increases the amount of real output produced in the economy (Giles & Williams, 2000a). Another more elaborated explanation is that exporting is associated with more productive firms (Bernard & Jensen, 1999; Bernard & Wagner, 1997), and thus export-led growth at aggregate level may be the result of both the accumulation of within-firm productivity gains from export participation, or the reallocation of resources from comparatively less productive non-exporters to more productive exporters (Bernard & Jensen, 2004; Roberts & Tybout, 1991).

Actually, there are different mechanisms through which export activity increases productivity. First, export activity influences the exploitation of economies of scale which are usually referred as main sources of economic growth in the literature (Feder, 1982; Smolny, 2000). By serving foreign customers, firms expand their scope and sell goods and services to a broader market, which results in cost advantages provided that the increase in the level of inputs needed to satisfy the production is lower than the increase in the level of output (Bernard & Wagner, 1997; Castellani, 2002; Porter, 1986). This is reflected in above average home market performance, especially when there are some quasi-fixed inputs (e.g., initial investment of capital) the costs of which can be spread over an increasing number of additional output units, leading thus to increased output with some unchanged inputs. Second, closely related to the exploitation of economies of scale, business expansion towards foreign markets fosters specialization in the production through the division of labour into specialised (more efficient) task, or the specialisation of managers as the scale of the business increases (Dunning, 1989), which in turn leads to productivity gains at firm level. Third, international trade involves transferring technological knowledge in both outward and inward ways (Grossman & Helpman, 1991). Exporters not only commercialise new technological innovations in their host countries – which help to increase living standards of final consumers – but also acquire and assimilate new knowledge from foreign markets through a learning-by-exporting process (Clerides, Lach, & Tybout, 1998) which improves productivity in their home markets. Moreover, although the advantages of international trade are mainly took by exporters, purely domestic firms can also benefit from the exposure to their export-oriented counterparts due to intra-national knowledge spillovers (Branstetter, 2001) which can help them to improve innovation and productivity too, and, eventually, have an impact on economic growth at aggregate level.

During the post-World War II period and until recently, large multinational companies were at the core of economic growth (Audretsch, 2007), and this was essentially due to their superior ability to gain returns from exploiting their unique resources across foreign countries. Nowadays, multinational companies still benefit from the advantages of international trade and undoubtedly make a great contribution to the economy (Cummings et al., 2010). However, large evidence exists that international markets are not longer an exclusive domain of large established corporations, but also a domain of an increasing number of new ventures which dare to exploit business opportunities at global level, challenging both domestic and foreign incumbents (Bell, 1995; Knight & Cavusgil, 1996; McDougall & Oviatt, 2000; Oviatt & McDougall, 1997, 1999; Shrader, Oviatt, & McDougall, 2000; Turnbull, 1987). Below, we explain the emergence of entrepreneurship as a driving force of growth and the economic impact of its export orientation.

2.2 Entrepreneurial activity, export orientation and economic impact

During the last decade, the analysis of entrepreneurial activity and economic growth has attracted the attention of an increasing number of scholars and policy-makers (Audretsch, 2004; Carree & Thurik, 2003; Sternberg & Wennekers, 2005; Wennekers & Thurik, 1999). Actually, economic growth does not result solely from increases in labour or capital, as suggested by neoclassical growth models (Solow, 1956), neither it comes automatically from investments in knowledge generation activities, as suggested by endogenous growth models (Romer, 1986). Audretsch & Keilbach (2004b) showed that a significant amount of the variance in economic performance across countries and regions which is not explained by traditional growth models may depends on entrepreneurial activity.

Entrepreneurial activity generates wealth in the economy by introducing new combinations of knowledge (Schumpeter, 1934), which create markets for novel products (Casson & Wadeson, 2007), as well as highly skilled jobs (van Stel & Storey, 2004). Besides, new business formation derived from entrepreneurial activity is linked to increased competition (Porter, 1998), and productivity improvements within existing industries (Segarra & Callejón, 1999).

From an evolutionary economics perspective, diversity and selection are two mechanisms through which an economy changes (Nelson & Winter, 1982). Entrepreneurial activity is a source of diversity which drives economic growth through the selection and exploitation of new business opportunities that have been recognised from existing knowledge. Given that knowledge is characterised by the uncertainty of its economic value (Arrow, 1962), different economic agents are expected to perceive value a given knowledge in very different ways according to their own experience and knowledge corridor (Shane, 2000). When an individual discovers that a particular piece of knowledge has a high economic value and decides to exploit it through a new venture, he or she contributes to the economy by generating value from the knowledge that would otherwise have remained non-commercialised (Acs et al., 2009). Thus, entrepreneurial activity functions as a mechanism for spreading knowledge in the Society, and constitutes a vehicle linking general knowledge and economic knowledge (Audretsch & Keilbach, 2004a).

Certainly, knowledge is a necessary, but not sufficient, condition for economic growth. For knowledge to have an impact, it must be introduced in the market in form of new methods, products and services. Entrepreneurial activity plays a significant role in enhancing economic growth through the exploitation of knowledge. As a result, regions with similar levels of knowledge investment may experience different rates of economic growth as a result of the variance in entrepreneurial activity. In line with this view, we propose the following hypothesis:

Hypothesis 1:   Regions with higher levels of general entrepreneurial activity exhibit higher rates of economic growth.

In general, entrepreneurial activity is a source of economic growth. However, different types of entrepreneurial activity are expected to exert a different influence on economic growth (Carree & Thurik, 2003). For instance, Wong et al. (2005) provides evidence that, while general entrepreneurial activity does not guarantee economic development, the segment of high-growth entrepreneurs makes a significant contribution to economic performance. Stam &van Stel (2009) support this view with similar findings showing a significant relationship between growth-oriented entrepreneurship and economic growth in most developed countries. Other type of entrepreneurial activity with a likely stronger influence on economic growth is export-oriented entrepreneurship. Entrepreneurs who decide to grow through exporting are expected to enhance economic growth by serving both domestic and foreign markets. Consistent with this view, Hessels & van Stel (2009) found a significant relationship between export-oriented entrepreneurship and economic growth in developed countries.

Exporting as an internationalization activity involves a process of adapting to and learning from new markets. While adaptation consists in generating new routines and changing old ones, learning is a path-dependent process through which firms learn on the basis of what they already

know (Cohen & Levinthal, 1990; Zahra & George, 2002). In particular, as argued by Autio, Sapienza & Almeida (2000), new (young) ventures (possessed of fewer cognitive, political and relational barriers to learning) might benefit from some learning advantages in international markets because they are able to absorb foreign knowledge more rapidly than their older counterparts. The rationality behind this idea is supported by the fact that very young firms usually have low levels of structural inertia (Hannan & Freeman, 1984) and learn through less time-consuming processes (Zahra, Sapienza, & Davidsson, 2006).

As described above in section 2.1, the exposure to international markets provides firms with some sources of productivity growth, namely the access to new knowledge, the development of economies of scale and the specialization of the production. We believe that exporting-oriented new ventures have a greater impact on economic growth not only because they may benefit from learning advantages to increase productivity at firm level when they get involved in international trade, but also because productivity at aggregate level may increase through the reallocation of resources from (less productive) domestic firms to (more productive) exporting firms (Bernard & Jensen, 2004); or through the generation of knowledge spillovers that make it possible that technological and operational efficiencies gained by exporting-firms from the exposure to international markets may be shared with other firms in the (intranational) domestic market (Branstetter, 2001).

Regarding the last point, most of the knowledge acquired from foreign markets is translated into experience and firm specific skills (Johanson & Vahlne, 1977), a kind of knowledge which is usually complex and tacit. In contrast to codified knowledge, which is easily replicated and transferred in the distance, tacit knowledge is linked to people, and better transferred on face-to-face basis (Polanyi, 1958; von Hippel, 1994). Hence, geographic proximity is important for knowledge spillovers to emerge and have an effect on economic agents located in the same region (Audretsch, 1998). Interactions between export-oriented and domestic new ventures are likely to be stronger – and more effective in terms of transferring productivity-related knowledge – within a region (or among neighbour regions) than across regions located in opposite ends of a country. Thus, the impact of export-oriented entrepreneurship on economic growth should be more relevant at regional level. Accordingly, we propose our second hypothesis as follows:

Hypothesis 2: Regions with higher prevalence of export-oriented entrepreneurial activity exhibit higher rates of economic growth which are additional to the impact of general entrepreneurial activity.

One could reasonably argue that the benefits derived from selling to foreign markets depend on the extent (degree) of exports. Low levels of export intensity may represent sporadic sales which are not part of the firm's strategy, but the result of unsolicited orders (Bilkey & Tesar, 1977; Czinkota, 1982). While firms with a small percentage of total sales achieved abroad have contact with a few number of foreign customers who provide limited access to new knowledge, more internationally engaged firms accumulate new knowledge from a broader flow of sources. Therefore, the former ones are presumably less able to take advantage of export activities than the former ones, for which export activities are an ordinary and substantial part of the firm's activities.

In agreement with these ideas, Fryges & Wagner (2008) related productivity to export sales ratio, and found that higher export intensity is related to higher productivity growth. In the same way, we argue that the impact of export-oriented entrepreneurship on economic growth varies according to the level of commitment to foreign markets. This leads to propose the third and final hypothesis of the present study:

Hypothesis 3: Regions with higher prevalence of export-oriented entrepreneurial activity that serve to substantially high levels of foreign customers exhibit higher additional rates of economic growth.

3   Methods and data

3.1   Estimation framework

In this paper, we analyze the relationship between entrepreneurial activity and economic growth at regional level. Likewise, we examine whether export-oriented entrepreneurial activity in particular has an impact on economic growth in addition to that made by general entrepreneurial activity. Consistent with previous studies, we control for catching-up processes and include variables of human capital and technological knowledge that might account for regional differences in economic growth.

3.1.1   Catching-up effects

Catching-up processes suggest that economic growth varies across regions (or countries) according to their proximity to the technology frontier. More specifically, regions which are further behind the technology frontier will grow faster provided that they have the institutional conditions which facilitates technology transfer by imitation (Aghion & Howitt, 2006). Distance to the technological frontier is commonly measured by the income level in terms of GDP per capita. Therefore, following van Stel, et al. (2005), we use (the log of initial) GDP per capita to correct for catch-up effects among regions.

3.1.2   Human capital endowment and technological knowledge

Technological knowledge and human capital are some of the drivers of economic growth commonly analyzed in the empirical literature. While globalisation has made it possible for physical capital to be transferred to countries where labour is cheaper, the knowledge base which encourages technological change and growth is harder to delocalise (Arrow, 1962). Hence, public policies in advanced economies focus on the strengthening of knowledge and innovation platforms through investment in human capital and research and development (R&D) activities.

The human capital endowment of a region (or country) influences its economic growth by enhancing the ability to develop innovations in the domestic market and adopt technologies developed abroad (Barro, 1999). In particular, the qualification of the labour force in terms of educational attainment is commonly regarded as a measure of human capital linked to growth. Hence, education have been a relevant policy for growth (Aghion & Howitt, 2006; Barro, 1999).

On the contrary, R&D activities are expected to generate new knowledge leading to product innovations that generate value added (e.g., new goods and services), as well as, innovations in

processes that improve productivity (e.g., though the increment of output with unchanged input). Moreover, the quasi-public nature of knowledge, which cannot be fully patented or kept secret (and therefore, can be easily reused without incurring substantial costs), suggests the existence of externalities that are of benefit to economic agents who have not invested in knowledge generating activities. Thus, as proposed by Romer (1986) in his model of endogenous growth, knowledge is considered to be a key production input which increases output with increasing returns to scale.

Accordingly, we control for changes in the stock of technological knowledge and human capital endowment at regional level.

In addition, we also control for labour force growth since an increase of the population which is able to work contributes to produce more goods and services that eventually raise the amount of GDP.

3.1.3 Empirical model

In order to test our hypotheses, we estimate the following fixed-effects linear model[1] using OLS:

$$\Delta GDP_{it} = \alpha_0 + \beta_1 TEA_{it} + \gamma_n Export_{it} + \delta_1 \log(GDPC_{it-1}) + \delta_3 \Delta Labour_{it}$$
$$+ \delta_4 \Delta SkilledLabour_{it} + \delta_5 \Delta R\&Dstock_{it} + \mu_i + \varepsilon_{it} \qquad (1)$$

where i denotes regions and t denotes time instances; ΔGDP is the rate of economic growth; TEA stands for the level of entrepreneurial activity; $Export$ represents the percentage of overall entrepreneurs who are export-oriented; $GDPC$ is the per capita income level; $\Delta Labour$ corresponds to the rate of growth in the segment of population which is able to work; $\Delta SkilledLabour$ indicates the increase in the level of human capital embedded in the labour force; $\Delta R\&Dstock$ refers to the growth of the accumulated stock of technological knowledge; μ_i represents the unobserved region-specific and time-invariant effects of omitted variables and ε_{it} is an idiosyncratic disturbance term that changes across regions and time (Wooldridge, 2009). Finally, $Export$ is disaggregated into different ranges of export-oriented entrepreneurial activity according to the percentage of foreign customers.

$$\gamma_n Export_{it} \begin{cases} \gamma_1 Export1 - 25_{it} \\ \gamma_2 Export26 - 75_{it} \\ \gamma_3 Export76 - 100_{it} \end{cases}$$

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[1] As mentioned before, Spanish regions differ each other in terms of economic development and culture. In order to limit the effects of this unobservable heterogeneity across cases, we control for region-specific, time-invariant variables not included in the model by employing a specification with fixed effects. We assume that omitted variables may be correlated to observable explanatory variables and that the unobservable heterogeneity across cases does not change over time. A Hausman test comparing fixed and random effects was run to determine whether this assumption is reasonably justified in our sample. The results of this test support for using the fixed-effects model.

More specifically, *Export1-25* represents the percentage of export-oriented entrepreneurial activity that serves between 1% and 25% of foreign customers; *Export26-75* represents the percentage of export-oriented entrepreneurial activity that serves between 26% and 75% of foreign customers; and *Export76-100* represents the percentage of export-oriented entrepreneurial activity that serves between 76% and 100% of foreign customers.

If higher levels of entrepreneurial activity are linked to higher rates of economic growth (Hypothesis 1), then we expect coefficient β_1 to be significantly positive. If higher prevalence rates of export-oriented entrepreneurship are linked to additional rates of economic growth (Hypothesis 2), at least one of the coefficients γ_n is expected to be significantly positive. Finally, if more internationally engaged export-oriented entrepreneurship is linked to stronger additional rates of economic growth (Hypothesis 3), the corresponding coefficient γ_n for each substantially higher range of export-oriented entrepreneurship is expect to be stronger so that: $\gamma_1 < \gamma_2 < \gamma_3$.

3.2 Sample and context

For this research, we analyse the 17 Spanish autonomous communities (sub-national regions at NUTS-2 level) over the period 2003-2009. The case of Spain is suitable for the analysis of regional growth because its autonomous communities – or regions[2] – differ each other in terms of economic development and performance; that is, there is a variance across regions, which needs to be explained. What is more, due to the high level of decentralization in Spain, the implications derived from this study can be applied at regional level by the corresponding policy makers.[3] Data used in our analysis comes from two different sources, namely the Global Entrepreneurship Monitor (GEM) project, and the Spanish National Institute of Statistics (*Instituto Nacional de Estadística*, INE).

The GEM project is an international research consortium focused on the analysis of entrepreneurial activity and the environmental conditions influencing it, which annually conducts a standardised study in more than forty countries since the end of the Nineties (see Reynolds et al., 2005 for more details). Spain joined the project in 1999 on the basis of a country sample. However, Spanish GEM project have expanded the representativeness of the sample to a regional level since 2003, and nowadays all Spanish regions are covered by the GEM project with their own representative sample of adult population (18-64 years of age).

We use Spanish GEM data on entrepreneurial activity and export orientation aggregate at regional level from years 2003 to 2009, gathered in a merged dataset with data on regional growth, technological knowledge and human capital endowment from the INE. These years include data from a varied range of regions; initially 3 regions in 2003, 8 regions in 2004, 10 regions in 2005 and 17 regions in the subsequent years, respectively. Overall, we have an unbalanced panel of 89 observations corresponding to 17 regions over an average period of 5.2 years. Below, we provide a description of the variables used in our analysis.

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[2] We will refer to the Spanish NUTS-2 regions as autonomous communities or regions interchangeably.
[3] Since 1978, Spain has developed a unique system of regional autonomy which is known as the "State of the Autonomies". All Spanish regions have their self-government with different degrees of legislation and execution autonomy. Basque Country, Catalonia and Galicia have the strongest regional autonomy due to historical reasons (Indeed, all of them have their own official language which reflects their respective cultures under a historical perspective). Andalusia and Navarre are also regions with a strong autonomy. In particular, Basque Country and Navarre have their own tax system. The rest of regions do not have fiscal autonomy, but they are responsible for the majority of public spending decisions and have competences in industry policy.

3.2.1 Measurement of variables

Economic Growth (ΔGDP_{it}) is the dependent variable, which is measured by the annual percentage change in real gross domestic product (GDP, constant prices of 2000) for region *i* and year *t*. Data for this variable is publicly available in the Regional Accounting Database provided by the INE.

Level of Entrepreneurial Activity (TEA_{it}) is measured by the Total Entrepreneurial Activity index (TEA) which describes the percentage of adult population (18-64 years of age) in region *i* and year *t* that either is involved in the start-up process of a nascent business, or owns and manages a new business that has paid salaries for less than 42 months. Data on TEA indexes for Spanish regions is taken from the Spanish GEM project.

Percentage of Export-oriented Entrepreneurial Activity ($Export_{it}$) refers to the percentage of nascent and new entrepreneurs in region *i* and year *t*, whose goods and services are served to foreign customers. In line with our hypotheses, we disaggregate this variable into three ranges of intensity (i.e., low, medium and high). First, the low range considers the percentage of nascent or new entrepreneurs whose foreign customers represents from 1% to 25% of his/her total customers (*Export1-25$_{it}$*). Second, the medium range considers the percentage of nascent or new entrepreneurs whose foreign customers represents from 26% to 75% of his/her total customers (*Export26-75$_{it}$*). Finally, the high range considers the percentage of nascent or new entrepreneurs whose foreign customers represents from 76% to 100% of his/her total customers (*Export76-100$_{it}$*). Data for the construction of these variables comes from the Spanish GEM project.

Initial income level ($GDPC_{it-1}$) is measured by the real GDP per capita (constant prices of 2000) for region *i* in the preceding year *t-1*. Data comes from the Regional Accounting Database provided by the INE.

Labour force growth ($\Delta Labour_{it}$) is the annual percentage change of population which is officially able to work (16 years old or older) in region *i* and year *t*. Data is publicly available in the Labour Force Survey conducted by the INE.

Human capital endowment growth ($\Delta SkilledLabour_{it}$) is measured by the annual percentage change of labour force in region *i* and year *t* with higher education (i.e., college degree or higher). Data is taken from the Labour Force Survey provided by the INE.

Stock of technological knowledge growth ($\Delta R\&DstockC_{it}$) refers to the annual percentage change in the stock of knowledge per capita which has been accumulated over time in region *i* and year *t*. Based on the methodology proposed by Soete & Patel (1985), this variable is calculated from the flows of R&D expenses at regional level.[4] The data used to estimate this variable is from the Statistics about R&D activities made available by the INE.

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[4] Soete & Patel (1985) assume that R&D expenses in a given year take an average period of 5 years to be completely assimilated as part of the stock of technological capital. Apart from that, they also take into account the depreciation due to the obsolescense of the knowledge accumulated in previous years. Accordingly, the stock of technological knowledge is estimated as follows:

$$R\&DstockC_{it} = \frac{(1-0.15)\,R\&Dstock_{it-1}+0.2\,R\&D_{it-1}+0.3\,R\&D_{it-2}+0.3\,R\&D_{it-3}+0.2\,R\&D_{it-4}}{Population_{it}}$$

where *R&Dstock* denotes the stock of technological knowledge, *R&D* denotes the flows of R&D expenses, and *Population* is the total among of inhabitants at regional level.

3.2.2 Descriptive statistics

Table 1 shows some summary statistics for the variables used in the present study, and Table 2 shows the correlation among these variables. Over the period of analysis, the average economic growth across Spanish regions is 1.81%, and this value ranges from -4.4% to 4.4%.[5] Regarding the remainder of variables, regions show an average 6.43% of TEA rate, and the percentage of this which is export-oriented represents on average 35.81%. The relative importance of export-oriented entrepreneurship varies depending on the range of foreign customers percentage analysed here. For instance, nascent and new entrepreneurs highly involved in exports (between 75% and 100% of foreign customers) represent an average 5.7% of TEA rate, while the percentage of those involved in exports at an intermediate level (between 26% and 75% of foreign customers) is on average 11.16%, and that of those included in the low range (between 1% and 25% of foreign customers) is on average 18.95%. Likewise, Spanish regions have an average GDP per capita of 17,121 Euros; they also have experienced a labour force growth of 1.34%, and the annual percentage change of regional labour force highly educated represents on average 2.71%. Finally, the annual percentage change of the stock of technological knowledge per capita across regions is 5.94%.

Table 1: Descriptive statistics of dependent and explanatory variables[a]

Variables	N	Obs.	Mean	s.d.	Min.	Max.
(1) ΔGDP_{it}	17	89	1.81	2.82	-4.40	4.40
(2) TEA_{it}	17	89	6.43	1.51	2.36	9.28
(3) $Export_{it}$	17	89	35.81	9.43	7.24	71.06
(4) $Export1\text{-}25_{it}$	17	89	18.95	5.84	5.15	38.18
(5) $Export26\text{-}75_{it}$	17	89	11.16	4.90	0.00	32.88
(6) $Export76\text{-}100_{it}$	17	89	5.70	3.35	0.00	13.14
(7) $GDPC_{it-1}$	17	89	17.12	3.49	10.65	23.59
(8) $\Delta Labor_{it}$	17	89	1.34	0.93	-0.20	3.10
(9) $\Delta SkilledLabor_{it}$	17	89	2.71	4.33	-7.60	14.66
(10) $\Delta R\&Dstock_{it}$	17	89	5.94	2.98	-0.29	14.72

[a]All monetary values are expressed in thousands of Euros.

The correlation matrix shown in Table 2 reflects that both the level of entrepreneurial activity in general, and the percentage that which is export-oriented in particular, have a positive and significant correlation with regional economic growth. Excepting the percentage change of the stock of technological knowledge, the control variables also show a positive and significant correlation with economic growth.

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[5] Observations with negative values of economic growth correspond to the last year of the analysis, that is, the year 2009 in which the financial and real estate crisis has affected the Spanish economy.

Table 2: Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) ΔGDP_{it}	1.000									
(2) TEA_{it}	0.529***	1.000								
(3) $Export_{it}$	0.366***	0.391***	1.000							
(4) $Export1\text{-}25_{it}$	0.197†	0.246*	0.722***	1.000						
(5) $Export26\text{-}75_{it}$	0.325**	0.183†	0.717***	0.174	1.000					
(6) $Export76\text{-}100_{it}$	0.211*	0.403***	0.507***	0.035	0.251*	1.000				
(7) $GDPC_{it-1}$	-0.09	-0.011	0.158	-0.043	0.246*	0.161	1.000			
(8) ΔPop_{it}	0.242*	0.367***	0.378***	0.275**	0.277**	0.18†	0.097	1.000		
(9) $\Delta SkilledLabor_{it}$	0.226*	0.012	0.134	0.045	0.266*	-0.092	-0.167	-0.049	1.000	
(10) $\Delta R\&Dstock_{it}$	-0.182†	-0.147	-0.285**	-0.146	-0.311**	-0.093	-0.133	-0.377***	-0.047	1.00

Level of statistical significance for the two-tailed test: *** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$, † $p \leq .10$

4   Results

Table 3 shows the results of the estimation of equation (1). Model 1 reflects the impact of only control variables on economic growth. In Model 2, we examine the relationship between general entrepreneurial activity and economic growth. Models 3 to 4 analyze the additional effect of the prevalence of export-oriented entrepreneurial activity as a whole on economic growth, and disaggregating it into different ranges of export intensity. All estimated models are based on fixed-effects a specification, which allows controlling for region specific characteristics.[6]

After controlling for catching-up effects, as well as, for the increase in human capital endowment and stock of technological knowledge, the estimate coefficient of TEA_{it} is positively significant at the 0.001 level for all estimated models (See Models 2 to 4). This implies that entrepreneurial activity exerts an unquestionable positive impact on regional economic growth, which allows us to accept Hypothesis 1 and be consistent with the extant literature (see for instance Audretsch & Keilbach, 2004a; Audretsch & Keilbach, 2004b; van Stel et al., 2005).

The additional contribution of export-oriented entrepreneurship to economic growth is supported by the results. For instance, the estimated coefficient of $Export_{it}$ in Model 3 is statistically significant at the 0.05 level. These findings suggest that the prevalence of export-oriented entrepreneurship exert a positive impact on regional economic growth in addition to the influence exerted by general entrepreneurial activity. Thus, we cannot reject our Hypothesis 2 that regions with higher prevalence of export-oriented entrepreneurial activity exhibit higher rates of economic growth. Indeed, we support the study of Hessels and van Stel's (2009) who provide similar findings for developed countries.

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[6] A Hausman test supports using a fixed-effects specification against a random-effects specification.

Table 3: Estimation results

		Model 1	Model 2	Model 3	Model 4
TEA_{it}			0.671*** (0.128)	0.583*** (0.120)	0.569*** (0.135)
$Export_{it}$				0.046* (0.017)	
$Export1\text{-}25_{it}$					0.005 (0.023)
$Export26\text{-}75_{it}$					0.079* (0.034)
$Export76\text{-}100_{it}$					0.089† (0.045)
$Log(GDPC_{it\text{-}1})$		-30.177*** (4.949)	-29.180*** (5.937)	-31.253*** (6.168)	-33.276*** (6.407)
ΔPop_{it}		4.447*** (0.573)	3.426*** (0.481)	3.092*** (0.515)	3.104*** (0.519)
$\Delta SkilledLabour_{it}$		0.109* (0.040)	0.099** (0.030)	0.083* (0.031)	0.073* (0.030)
$\Delta R\&Dstock_{it}$		-0.361* (0.140)	-0.387** (0.113)	-0.400** (0.105)	-0.373*** (0.096)
Constant		291.246*** (47.646)	278.781*** (57.146)	298.429*** (59.283)	318.226*** (61.678)
Observations			89		
Cases			17		
R^2:	Within	0.7622	0.8505	0.8638	0.874
	Between	0.0369	0.0269	0.0226	0.0177
	Overall	0.0706	0.1019	0.0999	0.0964
R-squared		0.7683	0.8543	0.8672	0.8772
Adj. R-squared		0.7001	0.8086	0.8230	0.8311

Heteroscedastic-consistent standard errors in parentheses

Level of statistical significance: *** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$, † $p \leq .10$

There is a significantly additional contribution of export-oriented entrepreneurship to economic growth which is accounted for by those entrepreneurs who sell their goods and services to a substantial amount of foreign customers. In particular, the estimated coefficients of $Export26\text{-}75_{it}$ and $Export76\text{-}100_{it}$ in Model 4 are positive and statistically significant at the 0.05 and 0.10 level, respectively. According to these findings, the economic impact exerted by the prevalence of export-oriented entrepreneurship is stronger as the level of export intensity is higher. Moreover, the estimated coefficients of $Export26\text{-}75_{it}$ and $Export76\text{-}100_{it}$ in Model 4 are higher than the estimated coefficient of $Export1\text{-}25_{it}$ which is not statistically significant. Therefore, for entrepreneurial new ventures, substantial export activity represents a strategic activity which may influence performance at firm level according to the intensity of foreign sales (Fryges & Wagner, 2008); for regions, entrepreneurial new ventures involved in increasing levels of export intensity represent a relevant phenomenon influencing economic growth at aggregate level. This finding allows us to accept Hypothesis 3.

Regarding the remainder of variables, the coefficient of $Log(GDPC_{it-1})$ is significantly negative, implying that, as a result of a catching-up process, regions with a higher income level exhibit a subsequent low rate of growth in comparison with regions with a lower income level (Aghion & Howitt, 2006). As expected, the percentage change in labour force population also contributes to explain economic growth, as indicated by the coefficient of ΔLabourit which is significantly positive. However, while the coefficient of ΔSkilledLabourit is positively significant implying that the increase in human capital endowment improves economic growth, the coefficient of ΔR&DstockCit is negatively significant suggesting that regions with higher levels of stock of technological knowledge exhibit low growth rates. Actually, this contradictory finding is a result of the catching-up effects since regions which are close to the technology frontier make higher investments in knowledge generating activities, and are usually the same regions with higher income level for which subsequent growth rates are relatively low (though high in absolute terms).

Due to globalization, changes in the external environment worldwide are likely to influence the generalised economic growth within a country in the short term. In particular, the global economic crisis affected the market conditions in Spain during 2009. As a robustness check, we run our model excluding observations of year 2009 and found similar results to those reported above.[7]

5   Summary and conclusions

Previous research has provided empirical evidence on the relationship between entrepreneurship and economic growth at country (van Stel et al., 2005; Wong et al., 2005) and regional level. Likewise, the role of export-oriented new ventures has been analysed by Hessels & van Stel (2005) at country level. The present paper contributes to the extant literature by analysing this issue at (sub-national) regional level. Regions are at the core of development processes (Scott & Storper, 2003), and entrepreneurship is essentially a regional event that emerges from the interactions within geographically close areas (Feldman, 2001). Accordingly, we have found that Spanish regions with higher levels of entrepreneurial activity exhibit higher rates of economic growth, supporting thus the idea that entrepreneurship is a mechanism of knowledge exploitation enhancing regional development (Audretsch & Keilbach, 2004a). Moreover, our results reveal that export-oriented entrepreneurial activity makes an additional positive contribution to regional economic growth in Spain. Such contribution may take place because export activity is associated with learning processes leading to improved productivity at firm level (Clerides et al., 1998); but it also may take place due to the reallocation of resources from non-exporting firms to (probably more productive) exporting new ventures (Bernard & Jensen, 2004), or due to the influence of the latter on the former's productivity via knowledge spillovers at (sub-national) aggregate level (Branstetter, 2001). The additional economic impact of export-oriented entrepreneurship is especially noticeable when we consider the role of entrepreneurs committed to a substantially higher proportion of foreign customers. Exports become a strategic activity for any firm when a significant proportion of its revenue comes from foreign customers. Hence, new ventures involved in high levels of export intensity may be more likely to take advantage from international activities (which are in line with their strategy), and therefore to cause a stronger impact in the economy.

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[7] Results of the estimation excluding observations of year 2009 are not reported, but can be provided by the authors upon request.

The concentration of exporting new ventures only on certain regions may contribute to increase differences in growth within a nation. Thus, policy implications derived from our results suggest that trade programs for export promotion among new ventures should be carried out homogenously across regions and connected with economic growth policies. Moreover, public policies and programs should not only facilitate the foreign market entry, but also provide tools to help export-oriented entrepreneurs reach higher levels of export intensity. Low levels of export intensity represent a non-strategic activity for firms, and for that reason the efforts made to encourage only foreign market entry (without exports growth) may eventually have no economic impact.

This study is not without limitations. First, although exporting is the most common entry mode to reach foreign markets (Bell, 1995), it is not the only way through which new ventures can compete internationally and improve economic growth in domestic markets. More committed entry modes than exporting (e.g., contractual agreements, joint ventures or wholly owned subsidiaries, among others) may have a different impact on productivity at firm level, and economic growth at aggregate level. We have tried to proxy the effect of high commitment to foreign markets by individually analysing the impact of different ranges of export-oriented entrepreneurship (e.g., the impact of entrepreneurs with 75% or more of customers located abroad); however, future research should consider the role of different entry modes in this analysis. A second limitation has to do with the sample size, which is limited to Spanish regions over an average period of 5.2 years. Studies including a broader geographic scope of regions across different countries would provide a better insight into the impact of export-oriented entrepreneurship on export-led growth. Likewise, a longer temporal scope would allow analysing the effect of lagged determinants to determine causality in the relationship between export-oriented entrepreneurship and economic growth.

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