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# Export-oriented entrepreneurship and regional economic growth

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**Abstract** We analyse the impact of export-oriented entrepreneurship on regional economic growth using data for Spanish regions over the 2003–2013 period. We draw on economic growth, knowledge spillover and international entrepreneurship theories to assert that export-oriented entrepreneurship is important for the economic development of sub-national regions. Consistent with previous findings, we found that Spanish regions with higher levels of opportunity-driven entrepreneurial activity exhibit higher rates of economic growth. Moreover, regions with a higher percentage of the adult population engaged in export-oriented entrepreneurial activity show higher GDP growth rates. This effect also seems to be stronger as the intensity of export-oriented entrepreneurial activity increases up to a threshold level.

**Keywords** Export orientation · Entrepreneurial activity · Economic growth · International entrepreneurship · Regional competitiveness

**JEL Classifications** R11 · L26

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## 1 Introduction

Entrepreneurship, understood as the creation of new ventures, plays an important role in attaining economic growth for competitive societies, as it acts as a spillover mechanism through which the knowledge not exploited by incumbent organisations can be transferred to the market. This process generates economic value from ideas that would otherwise remain unexploited (Acs et al. 2009). Using existing knowledge left unexploited by incumbents, entrepreneurs identify opportunities linked to the needs of customers. They then exploit them by launching new ventures aimed at meeting these needs with innovations in the form of new goods and services. This eventually results in higher levels of economic wealth through the process of creative construction (Agarwal et al. 2007).

Indeed, several studies have shown that the effect of entrepreneurship on economic growth varies depending upon the type of entrepreneurial activity undertaken by the owners of business start-ups. Not all new ventures contribute equally to economic growth (Acs 2006; Acs and Varga 2005; Hessels and van Stel 2011; Shane 2009; Wong et al. 2005). While launching a new venture to exploit a unique business opportunity can be expected to provide new jobs and contribute to prosperity, creating a new firm in response to the need for survival (i.e. due to obstacles faced by individuals in finding a job) may in fact not lead to economic growth (Acs 2006).

Among the different types of new ventures driven by a business opportunity, those which are oriented towards export markets have been little studied in the literature. Nonetheless, there is evidence which indicates that export-oriented entrepreneurship seems to influence growth at a national level in advanced economies (Hessels and van Stel 2011). Competitive societies achieve economic growth and ensure their level of well-being by producing more goods and services that satisfy not only domestic demand, but also international markets (Fagerberg 1996). Following this line of thinking, in this article we contend that export-oriented entrepreneurship enhances regional wealth more than general (and domestic-oriented) entrepreneurship. Furthermore, this is particularly true as the intensity of export-oriented entrepreneurship increases. This may happen for essentially two reasons. First, by entering foreign markets, local entrepreneurs can augment profits beyond those yielded at the local level. This often happens when entrepreneurs develop and market unique groundbreaking technologies, products and services. And secondly, new knowledge can be imported from abroad via export-oriented entrepreneurship. Such knowledge can then be transferred and profitably exploited by other neighbouring firms via local knowledge spillover effects.

Although the subject of international entrepreneurship has received increasing attention over the last two decades (Coviello et al. 2011), the potential economic impact of export-oriented entrepreneurship on economic growth has not been explored in depth (Keupp and Gassmann 2009). Hessels and van Stel (2011) examined the role of export-oriented entrepreneurship at the national (country) aggregate level. Their findings revealed that export-oriented entrepreneurial activity is a relevant driver of economic growth in developed countries, but not in developing economies. It is well known that the conditions for entrepreneurship vary substantially across (sub-national) regions within a country, and in this study, we account for this regional heterogeneity. To the best of our knowledge, no studies have been carried out to examine the impact of export-oriented entrepreneurship at the regional level within a country.

Despite the increasing impact of globalisation, regions have emerged as the essential and active unit of the economic development process (Scott and Storper 2003). Moreover, regions are influential environments which foster entrepreneurship (Feldman 2001). From a knowledge spillover perspective, this is especially true for knowledge-based entrepreneurship, as proximity to knowledge sources matters and may influence the process through which opportunities to innovate are recognised and exploited (Audretsch and Feldman 1996). Additionally, regions as spatial units of observation within a country differ from each other culturally and economically, and such differences encourage (or discourage) venturing entrepreneurially into global markets. Therefore, evaluating the aggregate impact of entrepreneurship at the regional level in its different forms (e.g. export-oriented entrepreneurship) becomes a pertinent undertaking.

We analyse 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 17 NUTS-2 level Spanish regions over a period of about 10 years (2003–2013). Our findings represent a modest contribution to the field of international entrepreneurship and regional economic growth. The results of our study conducted at the *regional* (sub-national) level complement the findings obtained by Hessels and van Stel (2011) at the *country* (national) level. That is, we provide evidence that export-oriented entrepreneurship positively influences economy growth *at the regional level*. Moreover, our paper adds to the extant literature on entrepreneurship by further analysing the marginal effect of young ventures with different intensity levels of export-oriented entrepreneurial activity on economic growth (i.e. ventures with a percentage of foreign customers between 1 and 25 %, between 26 and 75 % or between 75 and 100 %). In brief, both a higher share of export-oriented entrepreneurship and a higher share of '*more intense*' export-oriented entrepreneurship established in a territory positively influence regional economic growth, but this relationship holds only up to a threshold exporting intensity level. The implications of these results suggest a need for the development of region-specific trade policies, targeting young ventures to promote exports and design programmes which encourage entrepreneurs not only to become exporters, but also to increase the intensity of exports towards foreign markets.

Following this introductory section, we present the theoretical background leading to the hypotheses of this study. The third section describes the methods and data used to test our hypotheses. The results are

presented and discussed in the fourth section. Finally, conclusions and implications of the results are summarised in the fifth section.

## 2 Entrepreneurship, export orientation and economic impact

### 2.1 Linking entrepreneurial activity to economic growth

In recent years, the contribution of entrepreneurship to economic growth has attracted the attention of an increasing number of policy makers and scholars (Acs 2006; Acs and Varga 2005; Audretsch and Keilbach 2004, 2008; González-Pernía et al. 2012; Hessels and van Stel 2011; van Stel et al. 2005; Wennekers and Thurik 1999; Wong et al. 2005). Entrepreneurship is expected to generate wealth in the economy by introducing new combinations of knowledge (Schumpeter 1934), which create markets for novel products and services (Casson and Wadeson 2007), as well as highly skilled jobs (van Stel and Storey 2004). Additionally, new business formation deriving from entrepreneurial activity is linked to increased competition and productivity improvements within existing industries (Callejón and Segarra 1999).

Entrepreneurship is a source of diversity which drives economic growth by identifying and exploiting new business opportunities that have been recognised based on existing knowledge. Given that knowledge is characterised by the uncertainty of its economic value, Arrow (1962) distinguishes general knowledge from economic knowledge. This distinction makes it possible to see that economic agents perceive the value of a given item of 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 the creation of a new venture, he or she contributes to the economy by generating value from knowledge that would otherwise have remained uncommercialised (Acs et al. 2009).

Consistent with this view, the precursors of the so-called knowledge spillover theory of entrepreneurship (Acs et al. 2009; Agarwal et al. 2007; Braunerhjelm et al. 2010) argue that economic growth does not result solely from increases in labour or capital, as suggested by neoclassical growth models (Solow 1956), and nor does it come automatically from investment in knowledge generation activities, as suggested by endogenous growth models (Romer 1986). According to them, entrepreneurship—as a mechanism of knowledge spillover—constitutes an important missing link between general knowledge and economic knowledge that has been ignored in traditional growth models.

Conventional wisdom suggests that entrepreneurial activity is a source of economic growth. However, its impact varies across types of entrepreneurship. For instance, Wong et al. (2005) found that *overall* entrepreneurial activity does not guarantee economic growth as *high-growth* entrepreneurship does. In the same vein, Acs and Varga (2005) found that *opportunity-driven* entrepreneurship has a positive and significant effect on technological change and therefore economic growth, whereas *necessity-driven* entrepreneurial activity does not. Accordingly, it is important to distinguish the entrepreneurial activity with the potential to use knowledge and have an impact (i.e. that based on pursuing an opportunity with ambitious to grow) from the overall entrepreneurial activity. Fortunately, this is something that available data allow to do (Reynolds et al. 2005).

Certainly, knowledge is a necessary, but not sufficient, condition for economic growth. For knowledge to have an impact, it must be introduced into the market in the form of new methods, products and services which add economic and social value. Instead of analysing the role played by entrepreneurship *in general* in creating economic value, for the purpose of this study, we focus on studying the effect exerted by opportunity-driven entrepreneurship (in other words, the impact of necessity-driven entrepreneurship is ignored). In short, regions with similar levels of knowledge stock may experience different rates of economic growth due to variation in opportunity-driven entrepreneurial activity. Thus, we propose the following hypothesis:

**Hypothesis 1** A region's level of *opportunity-driven entrepreneurial activity* is positively related to its rate of economic growth.

### 2.2 The differentiated impact of export-oriented entrepreneurship on regional economic growth

Among *opportunity-driven* entrepreneurs, we can distinguish between those who target *local markets*

and those who obtain some percentage of their revenue from *foreign markets*. The existence of export-oriented entrepreneurial activity in a country seems to be positively linked to economic growth. In a study using data from more than thirty countries, Hessels and van Stel (2011) showed a positive relationship between export-oriented entrepreneurship and economic growth in developed countries.

Exporting, as a form of internationalisation, involves a process of adapting to and learning from new markets. In this process, new ventures seem to benefit from learning advantages as they often are able to absorb and exploit knowledge more rapidly than their older counterparts. As argued by Autio et al. (2000), for new ventures in international markets, this enhanced capability might be due to entrepreneurs facing fewer cognitive, political and relational barriers to learning new foreign knowledge, compared to managers of more mature firms. Indeed, new ventures usually have low levels of structural inertia (Hannan and Freeman 1984), and it seems that they learn through less time-consuming processes (Zahra et al. 2006), which is in line with the idea that they may possess a learning advantage compared to older firms.

Apart from that, the internationalisation process facilitates access to new knowledge, the development of economies of scale and specialisation of production. Export-oriented new ventures may exert a remarkable impact on economic growth not only because they benefit from increased learning advantages yielding higher productivity for the firm, but also because productivity at an aggregate level usually increases through the reallocation of resources from (less productive) domestic firms to (more productive) exporting firms (Bernard and Jensen 2004). Likewise, it is possible that technological and operational efficiencies gained by exporting firms may be shared with other firms located nearby in the (intranational) domestic market (Branstetter 2001).

Most of the knowledge acquired from foreign markets is translated into experience and firm specific skills (Johanson and Vahlne 1977), a kind of knowledge which is usually complex and tacit. Unlike codified knowledge, which is easily replicated and transferred in the distance, tacit knowledge is sticky and linked to people, and better transferred on face-to-face basis (von Hippel 1994). Hence, geographic proximity becomes crucial for knowledge spillovers to emerge and have an effect on economic agents (Audretsch and Feldman 1996). We argue that export-oriented new ventures are more likely to interact with other firms—and accordingly transferring productivity-related knowledge—within a region than across regions located in opposite ends of a country. For that reason, it is reasonable to expect an impact of export-oriented entrepreneurship on economic growth at the sub-national regional level, rather than at the country level. Accordingly, we propose the following second hypothesis:

**Hypothesis 2** A region's level of *export-oriented* entrepreneurial activity is positively related to its rate of economic growth.

### 2.3 Export intensity of entrepreneurship and economic growth

One could reasonably argue that the benefits derived from selling to foreign markets depend on the intensity (degree) of export activity. Low levels of export intensity may represent unexpected sales which are not part of the firm's strategy, but rather the product of unsolicited orders (Bilkey and Tesar 1977), and this will result in lower economic growth.

Owners of new ventures with a small percentage of sales from international markets typically sell their products and services to only a few foreign customers, who provide limited access to new knowledge. Often, low foreign revenue may reflect insignificant events (e.g. an unexpected order from a foreign customer), rather than strategic choices by entrepreneurs to actively approach foreign markets. Conversely, entrepreneurs who obtain higher percentages of foreign revenue usually have access to a broader range of customers and accumulate new knowledge from several sources. Therefore, when exports are an ordinary and substantial part of the firm's activities, the intensity of export-oriented entrepreneurship is higher and the resulting enhanced knowledge derived from a broader foreign customer base can be expected to benefit the local economy via enhanced knowledge spillover effects.

Supporting this argument, Fryges and Wagner (2008) explored the connection between productivity and export–sales ratio and found that higher export intensity has an influence on higher productivity growth at the firm level. In the same vein, we argue that, at the regional, the impact of export-oriented

entrepreneurship on economic growth becomes higher as the level of export intensity of new ventures increases. This brings us to the third and final hypothesis of the present study:

**Hypothesis 3** The positive relationship between a region's level of export-oriented entrepreneurial activity and its rate of economic growth becomes stronger *with higher levels of export intensity.*

## 3 Methods and data

### 3.1 Estimation framework

Audretsch and Keilbach (2008) developed an estimation framework to analyse the interdependent relationship between entrepreneurship and regional growth. They formally took into consideration not only that entrepreneurship has an influence on regional growth by exploiting the business opportunities derived from investments in knowledge, but also that regional growth has a recursive impact on entrepreneurship. We follow this bidirectional framework to model the relationship between opportunity-driven entrepreneurship and economic growth at a regional level, and examine in particular whether the part of opportunity-driven entrepreneurship that is export oriented has an impact on economic growth over and above that of purely domestic entrepreneurial activity. The starting point is a Cobb-Douglas function of the form:

$$Y_{it} = K_{it}^{\alpha} L_{it}^{\beta} R_{it}^{\gamma} E_{it}^{\delta} \quad (1)$$

where $i$ denotes regions and $t$ denotes time instances; $Y$ is the total output, as measured by gross domestic product (GDP); $K$ is the capital input, as measured by capital services, $L$ is the labour input, as measured by the total employment; $R$ is the knowledge input, as measured by the stock of R&D, and $E$ is the level of opportunity-driven entrepreneurial activity.

Due to the interdependence between knowledge, entrepreneurship and economic growth explained above, the estimation of Eq. (1) faces two obstacles. First, a positive association between output and entrepreneurship may simply be a consequence of reverse causality with growing regions offering a better environment for entrepreneurship. Second, there may be unobserved factors—such as those associated to regional productivity—that explain both regional levels of growth and entrepreneurship. To solve this endogeneity problem, an additional (first step) equation is specified to take into account this recursive structure. This equation takes the following form:

$$E_{it} = f(Y_{it-1}, X_{it-1}) \quad (2)$$

where $Y$ is a lagged measure of regional output and $X$ is a vector of lagged instrumental variables influencing entrepreneurship that will be described later on.[1]

As we are interested in analysing the impact on growth of entrepreneurs oriented towards export markets, our measure of entrepreneurship, $E_{it}$, is disaggregated into different ranges of export-oriented entrepreneurship according to the percentage of foreign customers, as follows:

$$E_{\text{it}} \begin{cases} E\_domestic_{it} \\ E\_export_{it} \\ E\_export1-25_{it} \\ E\_export26-75_{it} \\ E\_export76-100_{it} \end{cases}$$

where *E_domestic* is the measure of purely domestic entrepreneurship; *E_export* is the measure of export-oriented entrepreneurship; *E_export*1–25 represents the export-oriented entrepreneurship that has between 1 and 25 % foreign customers; *E_export*26–75 represents the export-oriented entrepreneurship that has between 26 and 75 % foreign customers; and *E_export*76–100 represents the export-oriented entrepreneurship that has between 76 and 100 % foreign customers.

Equations (1) and (2) are estimated simultaneously through the two-stage least-squares (2SLS) estimator for panel data using heteroskedasticity and autocorrelation consistent standard errors. Regions may differ from each other in terms of economic development, culture and other institutions. In order to limit the effects of this unobservable heterogeneity across cases, we correct for region-specific, time-invariant

[1] A main concern with the use of this approach is the exogeneity of the variables included in the first-step equation. For that reason, we include lagged variables in Eq. (2) to avoid that the instruments are contemporaneously correlated with the error terms of Eq. (1).

variables not included in the model by employing a specification with fixed effects.[2]

Additionally, Eq. (1) is also estimated through the system generalised method of moment (GMM) estimator (Blundell and Bond 1998). More specifically, we simultaneously estimate first-difference and level versions of Eq. (1) using lagged values of the endogenous variables as the instruments for first-difference estimates and lagged differences for level estimates. In this case, we take the most conservative assumption and consider as endogenous not only entrepreneurship but also capital, labour and knowledge inputs. The rationale behind this is that economic growth may in turn stimulate investments in physical capital, the creation of job opportunities, as well as the funding of knowledge generating activities. The system GMM estimator is implemented using a two-step procedure with finite sample correction for standard errors in accordance with Windmeijer (2005). Likewise, due to the size of our sample we restrict moment conditions of endogenous variables to the interval $t - 2$ and $t - 4$ to keep the number of instruments manageable. Apart from the lagged values and differences of the endogenous variables, we also add as additional instruments the specification defined in Eq. (2).

## 3.2 Sample

For this research, we analyse 17 out of the 19 Spanish autonomous communities (NUTS-2 level sub-national regions) over the 2003–2013 period.[3] The case of Spain is suitable for the analysis of regional growth because its autonomous communities—or regions[4]—differ from each other in terms of economic development and performance; in other words, there is variance across regions, which needs to be explained. What is more, due to Spain's high level of decentralisation, the implications derived from this study can be applied at a regional level by the corresponding policy makers.[5] The data used in our analysis come from four different sources, namely the Global Entrepreneurship Monitor (GEM) project,[6] the Spanish National Institute of Statistics (Instituto Nacional de Estadística, INE in its Spanish acronym), the Valencian Institute of Economic Research (IVIE in its Spanish acronym) and the Spanish Ministry of Industry, Tourism and Trade.

Due to the availability of GEM data, the period of analysis includes a varied range of regions: initially 3 regions in 2003, 8 regions in 2004, 10 regions in 2005 and 17 regions in subsequent years. Overall, we have an unbalanced panel of 157 observations corresponding to 17 regions over an average period of 9.2 years. Below, we provide a description of the variables used in our analysis.

### *3.2.1 Measurement of variables*

In order to estimate Eq. (1), we employ variables that are commonly used in the analysis of economic growth under a production function approach. *Output* ($Y_{it}$) is measured by the real GDP (constant 2008 prices) for region $i$ and year $t$. GDP data and their corresponding deflators are publicly available in the Spanish Regional Accounts database provided by the INE. *Capital* ($K_{it}$) is measured by the stock of

[2] Apart from the fixed-effects estimation, we also run alternative specifications based on random effects, but the Hausman's test provided evidence against the use of the random effects estimation at the 1 % level of significance or lower for all estimated models. Therefore, the results reported here are from the fixed-effects estimation.

[3] We excluded Ceuta and Melilla from the analysis because they are cities rather than regions.

[4] We will refer to the Spanish NUTS-2 regions as autonomous communities or regions interchangeably.

[5] 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 own self-government, with different degrees of legislative and executive autonomy. The Basque Country, Catalonia and Galicia have the greatest regional autonomy for historical reasons. (In fact, all of them have their own official language, which reflects the historical nature of their respective cultures.) Andalusia and Navarre are other regions with significant autonomy. Specifically, the Basque Country and Navarre have their own tax system. The remaining regions do not have fiscal autonomy, but they are responsible for the majority of public spending decisions and have authority over industrial policy.

[6] The GEM project is an international research consortium focused on the analysis of entrepreneurship and the environmental conditions influencing it. Since the late 1990s, it has conducted an annual standardised study across a wide number of countries (see Reynolds et al. 2005 for more details). Spain joined the project in 1999 at the country sample level. However, the Spanish GEM project began to expand the representativeness of the sample to the regional level since 2003. Nowadays, all Spanish regions are included in the GEM project, with their own representative sample of the adult population (18–64 years of age).

productive capital or capital services in real terms (constant 2005 prices) for region $i$ and year $t$. Data on capital stock and their corresponding deflators come from the database Capital Stock in Spain and its Distribution by Territories, which is maintained by the IVIE. *Labour* ($L_{it}$) is measured by the total number of employees for region $i$ and year $t$. These data are taken from the Labour Force Survey conducted by the INE. *Knowledge* ($R_{it}$) refers to the stock of technological knowledge in real terms (constant 2008 prices) which has been accumulated over time in region $i$ and year $t$. Based on the methodology proposed by Soete and Patel (1985), this variable is calculated using a perpetual inventory method from the flows of R&D expenditure at a regional level after being deflated by the GDP deflator.[7] Data on the flows of R&D expenditure are from the Statistics on R&D Activities made available by the INE.

We measure *Entrepreneurship* ($E_{it}$) as the percentage of adult population in region $i$ and year $t$ that, driven by the desire to pursue a business opportunity, 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 or three years and a half (i.e. a special version of the so-called total entrepreneurial activity—TEA—index that captures the activity of entrepreneurs pursuing perceived opportunities). This aggregate measure is estimated using individual-level data from the Adult Population Survey (APS) conducted by the GEM project in Spain, which allows us to identify whether individuals are involved in entrepreneurial activity to take advantage of a business opportunity or because they have no better choices for work (Reynolds et al. 2005). In this way, since we are interested in the impact of individuals identifying and exploiting new business opportunities, our measure of entrepreneurship distinguishes opportunity-driven entrepreneurs from those who are driven purely by necessity or other motives. *Domestic entrepreneurship* ($E\_domestic_{it}$) is the percentage of adult population in region $i$ and year $t$ that qualifies as opportunity-driven entrepreneurs whose goods and services are provided only to national customers. *Export-oriented entrepreneurship* ($E\_export_{it}$) is the percentage of adult population in region $i$ and year $t$ that qualifies as opportunity-driven entrepreneurs whose goods and services are (at least partially) provided 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 adult population in region $i$ and year $t$ that qualifies as opportunity-driven entrepreneurs whose foreign customers represent from 1 to 25 % of his/her total customers ($E\_export1\text{–}25_{it}$). Second, the medium range considers the percentage of adult population in region $i$ and year $t$ that qualifies as opportunity-driven entrepreneurs whose foreign customers represent from 26 to 75 % of his/her total customers ($Export26\text{–}75_{it}$). Finally, the high range considers the percentage of adult population in region $i$ and year $t$ that qualifies as opportunity-driven entrepreneurs whose foreign customers represent from 76 to 100 % of his/her total customers ($Export76\text{–}100_{it}$). Following the methodology described by Reynolds et al. (2005), the data used to construct these variables come from the Spanish GEM project.

Consistent with previous studies, instrumental variables explaining entrepreneurship in Eq. (2) can be classified in at least three groups. The first group of instruments captures the economic environment conditions. As previously argued, there exists an interdependent relationship between entrepreneurship and economic growth so that growing regions, by increasing their wealth and market size, nurture the generation business opportunities and therefore the likelihood for entrepreneurship in general (Audretsch and Keilbach 2008). Accordingly, we control for the *output growth* ($\Delta Y_{it-1}$), as measured by the annual percentage change in real GDP (constant 2008 prices) for region $i$ and year $t-1$. This is the annual change in the dependent variable of Eq (1), which we expect to have a positive impact on entrepreneurship. Several authors argue that also the level of economic development may determine the rate of entrepreneurship. Indeed, cross-sectional evidence across nations has

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

$$R_{it} = (1 - 0.15)R_{it-1} + 0.2R\&D_{it-1} + 0.3R\&D_{it-2} + 0.3R\&D_{it-3} + 0.2R\&D_{it-4}$$

where $R$ denotes the stock of technological knowledge and $R\&D$ denotes the annual flows of R&D expenditure at a regional level.

shown that the link between per capita income and entrepreneurship is a U shape (Wennekers et al. 2005). However, this relationship is not as straightforward as one may think within a given country (or region) over time. While it is true that higher levels of economic development imply greater income and enhanced demand for variety, and therefore a larger number of entrepreneurial opportunities in new market niches, it is also true that as the level of economic development increases, better wages are paid and fewer individuals are willing to run the risk linked to an entrepreneurial venture (Iyigun and Owen 1998). Assuming that both types of effects may hold at a regional level, we control for the *output per capita* ($Y\ per\ capita_{it-1}$), which is measured by the real GDP per capita (constant 2008 prices) for region $i$ in the preceding year $t-1$. The data come from the Regional Spanish Accounts database maintained by the INE.

The second group is related to the knowledge spillover theory of entrepreneurship, developed by Acs et al. (2009). According to this theory, entrepreneurial opportunities emerge from the endowment of knowledge that is not exploited by incumbents. Thus, we control for the *knowledge intensity* ($R\ \%\ of\ GDP_{it-1}$), which in this case refers to the size of the stock of technological knowledge in region $i$ and year $t-1$ relative to its GDP. Regions with a relatively strong stock of technological knowledge will be home of a relatively high level of entrepreneurial opportunities. Furthermore, as the number of entrepreneurial opportunities available to be exploited will depend on the commercialisation capabilities of incumbents, we include a measure of the prevalence of *established business owners* ($BizOwners_{it-1}$), calculated as the percentage of population being involved as owners managers in an established business that has paid salaries for more than 42 months. Another indicator of the extent to which incumbents use the endowment of knowledge is *patent activity* ($Patents_{it-1}$), as measured by the number of patent applications per million people in region $i$ and year $t-1$. Even though patent activity is related to the knowledge intensity, the protection granted by patents guarantees a monopoly on the returns of knowledge leaving less room for spillovers. Therefore, according to Acs et al. (2009), both the prevalence of established business owners and the number of patents applications are expected to have a negative impact on entrepreneurship. Data on established business owners are gathered from the Spanish GEM project, whereas the data on the stock of technological knowledge and patents applications come, respectively, from the Statistics on R&D Activities and the Statistics on Industrial Property provided by the INE. In addition, we control for the level of *foreign direct investment* (FDI), understood as the per capita stock of tangible assets attributable to inward FDI in region $i$ and year $t-1$ ($FDI\ per\ capita_{it-1}$). It is commonly believed that foreign firms conducting FDI activities possess superior knowledge (e.g. management and marketing know-how, breaking technologies or efficient production systems) the returns of which are difficult to be fully appropriated by them (Liu 2008). Although the literature has traditionally emphasised the productivity gains of domestic firms derived from the exposure to inward FDI, an emerging stream of research has uncovered that inward FDI also has spillover effects on export decisions of domestic firms. De Clercq et al. (2008) argue that this effect is specifically relevant for new ventures, since they rely more on external knowledge spillovers than their established counterparts. Consequently, we expect a positive effect of inward FDI on entrepreneurship, particularly in the case of export-oriented entrepreneurship. Data on the stock of inward FDI come from the Secretary for Foreign Trade of the Spanish Ministry of Industry, Tourism and Trade.

The third group includes additional controls that capture other conditions fostering or constraining entrepreneurship. First, *population density* ($PopDensity_{it-1}$) is the number of people per square kilometre in region $i$ and year $t$. As Fritsch and Mueller (2007) argue, a high density of population may lead to high levels of entrepreneurship due to the better access to input factors and the exposure to knowledge spillovers derived from agglomerations. However, they also suggest that the costs of starting a business in densely populated areas are higher than in less populated ones, as well as that agglomeration is home of a large number of existing businesses which cause intense competition and discourage new entrants. Accordingly, population density is included to capture these effects with an unclear expected impact on entrepreneurship. Apart from that, we control for the *percentage of people between* 35 *and* 44 *years old* ($Pop\_35\text{–}44years_{it-1}$). Evidence across nations and regions based on GEM data has shown that early-stage entrepreneurs are mostly individuals with certain

experience and that the likelihood to start up a business increases among those who are around the 40 years old.[8] As a result, regions with a higher share of population aged 35–44 years may be expected to show a higher level of entrepreneurship. Finally, *human capital endowment* ($SkilledPop_{it-1}$) is measured by the percentage of the population in region $i$ and year $t$ with an advanced education (i.e. university degree or higher). Human capital is among the drivers of entrepreneurship commonly analysed in the empirical literature because it allows individuals to perceive greater variety of opportunities and achieve desirable outcomes. Individuals with superior human capital are more able to identify and exploit opportunities than others, especially in knowledge-based sectors (Marvel and Lumpkin 2007) and also in international markets (Westhead et al. 2001). Formal education is a proxy of general human capital; for that reason, the regions with a higher share of population having tertiary education attainment will have more individuals likely to become entrepreneurs. The data on these three variables are taken from the Labour Force Survey conducted by the INE.

### 3.2.2 *Descriptive statistics*

Table 1 shows the summary statistics for the variables included in Eq. (1), whereas Table 2 shows the summary statistics for the instruments included in Eq. (2). Over the period of analysis, the average percentage of adult population involved in opportunity-driven entrepreneurship across Spanish regions is 4.21 %, and this value ranges from 1.49 to 7.36 %. The level of opportunity-driven entrepreneurship that is export oriented represents 1.32 % of the adult population on average, while that which is purely domestic represents 2.89 %. The relative importance of export-oriented entrepreneurship varies depending on the percentage range of foreign customers. For instance, nascent and new entrepreneurs highly involved in exports (between 76 and 100 % foreign customers) represent an average of 0.23 % of the adult population, while the percentage of those with a medium level of export intensity (between 26 and 75 % foreign customers) is on average 0.38 % of the adult population, and the percentage of those with a low level of export intensity (between 1 and 25 % foreign customers) is on average 0.72 %. The correlation matrix indicates that both the level of opportunity-driven entrepreneurship in general and the part of that which is export oriented in particular have a positive and significant correlation with regional economic output. However, there are some indications of collinearity between input factors (Pearson's correlation above 0.85). This problem could add some difficulties to the estimation of the individual effects of those correlated variables on the dependent variable. However, high correlation among inputs in production functions is a common pattern found in other studies (see, e.g., Audretsch and Keilbach 2004). Endogenous growth theories clearly suggest that economic output depends on labour, capital and knowledge inputs, and therefore, all of them must be included in the production function. In this sense, the model is well specified and the omission of any of these input variables would lead to biased coefficients (Studenmund 2000). What is important here is that the variables of interest, namely opportunity-driven entrepreneurship in general and export-oriented entrepreneurship in particular, are not highly correlated with other right-hand-side variables.

Regarding the instruments, Spanish regions included in the sample have experienced a GDP change of 1.15 % over the period of analysis.[9] Their average GDP per capita is 22,840 euros per person. Their accumulated stock of technological knowledge is around 4.53 % of the GDP. Business owners across these regions represent 8.09 % of the adult population on average, whereas the patent activity implies 70.79 patent applications per million people. They have average FDI per capita of 2,130 euros per person, and population density of 164.68 people per square kilometre. The population aged 35–44 years represents 16.40 % of the total population, while the percentage of population with tertiary educational attainment is 22.98 % on average. At a first glance, the correlation matrix reveals that some instruments are highly correlated. To check whether multi-collinearity raises a problem, we computed the variance inflation factor (VIF) scores for all variables included in the analysis. The human capital endowment

[8] See, for example, the reports available at http://gemconsortium.org.

[9] After 2008, the GDP change has been negative in some regions as a result of the recession that has affected the Spanish economy in recent years.

**Table 1** Descriptive statistics and correlation matrix of dependent and explanatory variables

| | Variable | Obs. | Mean | SD | Min | Max | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | $Y_{it}$ | 157 | 65,341.18 | 59,292.77 | 7696.85 | 200,818.60 | 1.00 | | | | | | | | |
| (2) | $K_{it}$ | 157 | 95,392.14 | 80,350.27 | 10,309.80 | 310,894.20 | 0.984*** | 1.00 | | | | | | | |
| (3) | $L_{it}$ | 157 | 1204.93 | 1064.46 | 125.30 | 3673.20 | 0.992*** | 0.967*** | 1.00 | | | | | | |
| (4) | $R_{it}$ | 157 | 3865.13 | 5091.59 | 186.11 | 21,757.33 | 0.907*** | 0.92*** | 0.854*** | 1.00 | | | | | |
| (5) | $E_{it}$ | 157 | 4.21 | 1.51 | 1.49 | 7.36 | 0.212** | 0.148$^{\dagger}$ | 0.239** | 0.116 | 1.00 | | | | |
| (6) | $E\_domestic_{it}$ | 157 | 2.89 | 0.89 | 0.93 | 5.32 | 0.121 | 0.074 | 0.148$^{\dagger}$ | 0.031 | 0.876*** | 1.00 | | | |
| (7) | $E\_export_{it}$ | 157 | 1.32 | 0.77 | 0.17 | 3.26 | 0.244** | 0.181* | 0.265*** | 0.166* | 0.869*** | 0.543*** | 1.00 | | |
| (8) | $E\_export1\text{–}25_{it}$ | 157 | 0.72 | 0.41 | 0.10 | 2.25 | 0.247** | 0.197* | 0.272*** | 0.155$^{\dagger}$ | 0.701*** | 0.402*** | 0.849*** | 1.00 | |
| (9) | $E\_export26\text{–}75_{it}$ | 157 | 0.38 | 0.32 | 0.00 | 1.45 | 0.156$^{\dagger}$ | 0.087 | 0.176* | 0.081 | 0.776*** | 0.542*** | 0.845*** | 0.528*** | 1.00 |
| (10) | $E\_export76\text{–}100_{it}$ | 157 | 0.23 | 0.22 | 0.00 | 1.01 | 0.16* | 0.135$^{\dagger}$ | 0.158* | 0.171* | 0.579*** | 0.346*** | 0.659*** | 0.312*** | 0.489*** |

All monetary values are given in millions of euros

Level of statistical significance for the two-tailed test: *** $p \leq .001$; ** $p \leq .01$; * $p \leq .05$; $^{\dagger}$ $p \leq .10$

**Table 2** Descriptive statistics and correlation matrix of instruments

| | Variable | Obs. | Mean | SD | Min | Max | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | $\Delta Y_{it-1}$ | 157 | 1.15 | 2.70 | −5.88 | 5.39 | 1.00 | | | | | | | |
| (2) | $Y\ per\ capita_{it-1}$ | 157 | 22.84 | 4.48 | 13.81 | 31.24 | 0.072 | 1.00 | | | | | | |
| (3) | $R\ \%\ of\ GDP_{it-1}$ | 157 | 4.53 | 2.27 | 1.10 | 11.38 | −0.223** | 0.665*** | 1.00 | | | | | |
| (4) | $BusinessOwners_{it-1}$ | 157 | 8.09 | 2.27 | 2.79 | 15.08 | −0.217** | −0.033 | 0.069 | 1.00 | | | | |
| (5) | $Patents_{it-1}$ | 157 | 70.79 | 42.94 | 14.37 | 212.91 | −0.019 | 0.737*** | 0.586*** | 0.107 | 1.00 | | | |
| (6) | $FDI\ per\ capita_{it-1}$ | 157 | 2.13 | 1.05 | 0.38 | 5.08 | −0.104 | 0.549*** | 0.405*** | 0.159* | 0.454*** | 1.00 | | |
| (7) | $PopDensity_{it-1}$ | 157 | 164.68 | 178.82 | 23.59 | 798.05 | 0.008 | 0.522*** | 0.609*** | −0.176* | 0.169* | 0.272*** | 1.00 | |
| (8) | $Pop\_35\text{–}44years_{it-1}$ | 157 | 16.40 | 0.82 | 14.69 | 18.62 | −0.287*** | 0.218** | 0.154$^{\dagger}$ | −0.027 | 0.04 | 0.188* | 0.481*** | 1.00 |
| (9) | $SkilledPop_{it-1}$ | 157 | 22.98 | 5.16 | 13.57 | 36.43 | −0.177* | 0.804*** | 0.83*** | 0.083 | 0.663*** | 0.509*** | 0.468*** | 0.129 |

All monetary values are given in thousands of euros

Level of statistical significance for the two-tailed test: *** $p \leq .001$; ** $p \leq .01$; * $p \leq .05$; $^{\dagger}$ $p \leq .10$

($SkilledPop_{it-1}$) and the stock of technological knowledge as percentage of the GDP ($R\ \%\ of\ GDP_{it-1}$) have the highest VIF scores, which reach 6.0 in both cases. Nonetheless, Kutner et al. (2004) suggest as a rule of thumb that a VIF score of 10.0 is a good cut-off value, so that lower scores are an indication that multicollinearity is not unduly influencing the estimates.

## 4 Results

Tables 3 and 4 show the 2SLS estimation results, while Table 5 shows the system GMM estimation results. Consistent with the Sargan–Hansen test of overidentifying restrictions reported in Table 4, we cannot reject in any case the validity of the instruments used for the entrepreneurship variables included in the 2SLS estimation. Similarly, the instruments used for the endogenous variables that included the GMM estimation in Table 5 are valid according to the Hansen test, and the absence of second-order autocorrelation of the residuals supports the choice of second- and higher-order lags as instruments.

The first-stage coefficients of the 2SLS estimation, shown in Table 3, confirm the expected effect of some instrumental variables on the different types of entrepreneurial activity (i.e. overall opportunity-driven entrepreneurship in Model 1, domestic-oriented entrepreneurship in Model 2, export-oriented entrepreneurship in Model 3 and disaggregated export-oriented entrepreneurship for different export intensity levels in Model 4–Model 6). The results indicate that the economic environment conditions of the regions are relevant for understanding entrepreneurship over time. Consistent with Audretsch and Keilbach (2008), the impact of lagged output growth ($\Delta Y_{it-1}$) on the percentage of adult population involved in opportunity-driven entrepreneurship is positive and significant at the 0.1 % level. The sign and significance of this impact remain the same for purely domestic and export-oriented entrepreneurship, but in the latter case the impact becomes insignificant when the export intensity is low. Conversely, as the output per capita ($Y\ per\ capita_{it-1}$) increases the level of entrepreneurship in general decreases, but this effect is more statistically significant in the case of domestic entrepreneurship than in the case of export-oriented entrepreneurship.

The results are also consistent to some extent with Acs et al. (2009), since the measure of knowledge intensity ($R\ \%\ of\ GDP_{it-1}$) shows a positive and significant impact on overall entrepreneurship, which suggests that entrepreneurial opportunities within a region tend to be more prevalent as its knowledge endowment increases. Yet, when disaggregated, the impact of knowledge intensity is positive and significant only on export-oriented entrepreneurship with low export intensity. Another source of spillovers is derived from the exposure to foreign firms, and accordingly, the stock of FDI per capita ($FDI\ per\ capita_{it-1}$) shows a positive and significant impact on entrepreneurship in general, as well as on domestic entrepreneurship and export-oriented entrepreneurship in particular, though in the latter case this impact is significant only with low levels of export intensity. On the other hand, given that the prevalence of incumbents reduces the number of opportunities available to be exploited by entrepreneurs, the percentage of established business owners ($BizOwners_{it-1}$) shows a negative and significant effect on overall entrepreneurship. This effect is negative and significant in the case of export-oriented entrepreneurship too, but not in the case of domestic entrepreneurship in which case the influence of the prevalence of incumbents is still negative but not significant. Patents activity ($Patents_{it-1}$) shows no impact on any type of entrepreneurship, but this finding is perhaps specific to the Spanish context given that, unlike other developed countries, incumbent firms in Spain are not used to patent in order to appropriate new knowledge.[10]

Among the rest of variables, population density ($PopDensity_{it-1}$) is negatively related to opportunity-driven entrepreneurship, and this relationship is significant for both domestic entrepreneurship and export-oriented entrepreneurship, particularly that with medium level of export intensity. For export-oriented entrepreneurship, this finding might imply that a higher potential demand within a region, reflected as an increase in population density, reduces

[10] Data from the Spanish Patent and Trademark Office (available at http://www.oepm.es) show that, from 2007 to 2013, around 40 % of patent applications in Spain came from individuals, while another 40 % came from private firms. The remainder applications were from public research institutes and universities. Moreover, the number of patent applications by individuals was clearly higher than the number of patent applications by private firms in 2012 and 2013.

**Table 3** 2SLS estimation of the effect of entrepreneurship variables on economic growth: first-stage coefficients

| | Model 1: $E_{it}$ | Model 2: $E\_domestic_{it}$ | Model 3: $E\_export_{it}$ | Model 4: $E\_export1–25_{it}$ | Model 5: $E\_export26–75_{it}$ | Model 6: $E\_export76–100_{it}$ |
|---|---|---|---|---|---|---|
| $\Delta Y_{it-1}$ | 0.303*** | 0.186*** | 0.117*** | 0.020 | 0.051*** | 0.046*** |
| | (0.053) | (0.036) | (0.027) | (0.016) | (0.012) | (0.010) |
| $Y\ per\ capita_{it-1}$ | −0.546** | −0.378*** | −0.168$^{\dagger}$ | −0.040 | −0.049 | −0.078* |
| | (0.141) | (0.080) | (0.085) | (0.062) | (0.048) | (0.031) |
| $R\ \%\ of\ GDP_{it-1}$ | 0.326$^{\dagger}$ | 0.169 | 0.157 | 0.167* | −0.001 | −0.009 |
| | (0.171) | (0.128) | (0.101) | (0.074) | (0.070) | (0.067) |
| $BizOwners_{it-1}$ | −0.078* | −0.027 | −0.051** | −0.032$^{\dagger}$ | −0.015** | −0.003 |
| | (0.029) | (0.025) | (0.017) | (0.016) | (0.004) | (0.012) |
| $Patents_{it-1}$ | 0.004 | 0.006 | −0.003 | −0.002 | 0.001 | −0.002 |
| | (0.008) | (0.007) | (0.003) | (0.003) | (0.002) | (0.001) |
| $FDI\ per\ capita_{it-1}$ | 0.514* | 0.314$^{\dagger}$ | 0.200$^{\dagger}$ | 0.233*** | −0.011 | −0.021 |
| | (0.235) | (0.153) | (0.096) | (0.050) | (0.062) | (0.043) |
| $PopDensity_{it-1}$ | −0.028*** | −0.018** | −0.011* | −0.003 | −0.005$^{\dagger}$ | −0.003 |
| | (0.007) | (0.006) | (0.005) | (0.003) | (0.002) | (0.002) |
| $Pop\_35–44years_{it-1}$ | 0.439 | 0.599* | −0.161 | −0.127 | −0.103 | 0.069 |
| | (0.354) | (0.276) | (0.205) | (0.095) | (0.154) | (0.076) |
| $SkilledPop_{it-1}$ | 0.183 | 0.068 | 0.115* | 0.028 | 0.049* | 0.038$^{\dagger}$ |
| | (0.109) | (0.076) | (0.051) | (0.039) | (0.021) | (0.021) |
| *Intercept* | −186.417* | −69.353 | −117.064* | −49.000$^{\dagger}$ | −31.234 | −36.830$^{\dagger}$ |
| | (76.729) | (50.200) | (44.397) | (26.760) | (22.690) | (19.251) |
| Observations | 157 | 157 | 157 | 157 | 157 | 157 |
| Regions | 17 | 17 | 17 | 17 | 17 | 17 |
| $R^2$ | | | | | | |
| Within | 0.785 | 0.600 | 0.743 | 0.557 | 0.629 | 0.392 |
| Between | 0.045 | 0.013 | 0.132 | 0.393 | 0.011 | 0.005 |
| Overall | 0.030 | 0.024 | 0.036 | 0.065 | 0.018 | 0.004 |

Heteroskedasticity and autocorrelation consistent standard errors in parentheses

Level of statistical significance: *** $p \leq .001$; ** $p \leq .01$; * $p \leq .05$; $^{\dagger}$ $p \leq .10$

the incentives of entrepreneurs in that region to go abroad.[11] Apart from that, while the percentage of population aged 35–44 ($Pop\_35–44years_{it-1}$) shows a positive and significant impact only on domestic entrepreneurship, the percentage of population with advanced education ($SkilledPop_{it-1}$) shows a positive and significant impact only on export-oriented entrepreneurship.

[11] Nonetheless, when the first-stage models are replicated using pooled regressions (instead of fixed-effects), the results across regions (unlike those within regions) indicate that higher population density is positively related to higher levels of entrepreneurial activity, which is coherent with the idea that agglomerations are home of more entrepreneurial opportunities (Fritsch and Mueller 2007).

The second-stage coefficients of the 2SLS estimation, which assess the impact of different measures of entrepreneurial activity on economic growth, are presented in Table 4. In particular, Model 1 shows the effect of overall opportunity-driven entrepreneurship ($E_{it}$). Model 2 highlights the different effects of domestic-oriented ($E\_domestic_{it}$) and export-oriented entrepreneurship ($E\_export_{it}$). Finally, Model 3 compares the impact of domestic entrepreneurship with that of export-oriented entrepreneurship disaggregated into low ($E\_export1–25_{it}$), medium ($E\_export26–75_{it}$) and high ($E\_export76–100_{it}$) export intensity. All these models are replicated with similar results in Table 5 using system GMM estimation. The elasticities of capital ($K_{it}$) and labour ($L_{it}$) are positive and

**Table 4** 2SLS estimation of the effect of entrepreneurship variables on economic growth: second-stage coefficients

| | Model 1: $LnY_{it}$ | Model 3: $LnY_{it}$ | Model 3: $LnY_{it}$ |
|---|---|---|---|
| $LnK_{it}$ | 0.092* | 0.121$^{\dagger}$ | 0.117** |
| | (0.046) | (0.063) | (0.040) |
| $LnL_{it}$ | 0.610*** | 0.504*** | 0.487*** |
| | (0.030) | (0.057) | (0.059) |
| $LnR_{it}$ | 0.109*** | 0.091*** | 0.098*** |
| | (0.017) | (0.027) | (0.024) |
| $E_{it}$ | 0.002$^{\dagger}$ | | |
| | (0.001) | | |
| $E\_domestic_{it}$ | | −0.012* | −0.011$^{\dagger}$ |
| | | (0.005) | (0.006) |
| $E\_export_{it}$ | | 0.023*** | |
| | | (0.007) | |
| $E\_export1–25_{it}$ | | | 0.013 |
| | | | (0.012) |
| $E\_export26–75_{it}$ | | | 0.052* |
| | | | (0.024) |
| $E\_export76–100_{it}$ | | | 0.003 |
| | | | (0.034) |
| *Intercept* | 11.504*** | 12.604*** | 12.872*** |
| | (0.562) | (0.874) | (0.861) |
| Observations | 157 | 157 | 157 |
| Regions | 17 | 17 | 17 |
| $R^2$ | | | |
| Within | 0.907 | 0.836 | 0.758 |
| Between | 0.997 | 0.997 | 0.997 |
| Overall | 0.996 | 0.996 | 0.996 |
| Sargan–Hansen test (*df*) | 11.215 (8) | 7.683 (7) | 7.176 (5) |
| Prob > chi$^2$ | 0.190 | 0.361 | 0.208 |

Level of statistical significance: *** $p \leq .001$; ** $p \leq .01$; * $p \leq .05$; $^{\dagger}$ $p \leq .10$

Heteroskedasticity and autocorrelation consistent standard errors reported in parentheses

significant, within the usual range reported by Cobb and Douglas (1928) and other subsequent studies. Moreover, the estimate for knowledge input ($R_{it}$) is also positive and significant as expected by endogenous growth theory (Romer 1986).[12] Below we discuss the economic impact of entrepreneurship in detail.

### 4.1 The impact of opportunity-driven entrepreneurship on economic growth

After controlling for the level of capital, labour and knowledge inputs, the results obtained from both the 2SLS and system GMM estimation show that opportunity-driven entrepreneurship ($E_{it}$) in general is positively and significantly related to economic growth (see Model 1 in Tables 4 and 5). A one-unit increase in the regional percentage of adult population involved in entrepreneurial activity to pursue an opportunity is associated with a change in regional output that ranges between 0.2 and 0.7 %. This finding lends support to our Hypothesis 1, in line with the extant literature that analyses the benefits of general entrepreneurial activity for regional (Audretsch and Keilbach 2004, 2008; González-Pernía et al. 2012) and national economies (van Stel et al. 2005). The question now is: what is the contribution of opportunity-driven entrepreneurship to economic growth according to the market scope of the businesses?

### 4.2 The specific impact of export-oriented entrepreneurship on economic growth

The specific contribution of export-oriented entrepreneurship to economic growth is as expected. More specifically, when the percentage of adult population involved in opportunity-driven entrepreneurship is divided into domestic ($E\_domestic_{it}$) and export oriented ($E\_export_{it}$), the latter shows a positive and significant impact on economic growth at the 0.1 % level, while the former shows a negative impact that is significant at the 5 % level under the 2SLS estimation and insignificant under the system GMM estimation (see Model 2 in Tables 4 and 5). A one-unit increase in the percentage of adult population involved in the start-up process of an export-oriented new venture raises the regional output by around 2.3 or 2.4 %. A Wald test confirms that this contribution to regional economic growth is significantly higher than the contribution of domestic entrepreneurship at the 1 % level or lower. Moreover, the combined contribution of both domestic and export-oriented entrepreneurship to regional economic growth is different from zero at the 1 % level too.

[12] In all cases, the sum of the elasticities of output with respect to capital ($K_{it}$), labour ($L_{it}$) and knowledge ($R_{it}$) is consistently lower than one ($\alpha + \beta + \gamma < 1$) at the 0.1 % level, suggesting the presence of decreasing returns to scale.

**Table 5** System GMM estimation of the effect of entrepreneurship variables on economic growth

| | Model 1: $LnY_{it}$ | Model 4: $LnY_{it}$ | Model 8: $LnY_{it}$ |
|---|---|---|---|
| $LnK_{it}$ | 0.166*** | 0.163** | 0.149* |
| | (0.033) | (0.044) | (0.064) |
| $LnL_{it}$ | 0.653*** | 0.646*** | 0.652*** |
| | (0.024) | (0.032) | (0.046) |
| $LnR_{it}$ | 0.145*** | 0.154*** | 0.159*** |
| | (0.008) | (0.012) | (0.017) |
| $E_{it}$ | 0.007*** | | |
| | (0.001) | | |
| $E\_domestic_{it}$ | | −0.005 | −0.005 |
| | | (0.004) | (0.007) |
| $E\_export_{it}$ | | 0.024*** | |
| | | (0.005) | |
| $E\_export1–25_{it}$ | | | 0.008 |
| | | | (0.007) |
| $E\_export26–75_{it}$ | | | 0.064* |
| | | | (0.023) |
| $E\_export76–100_{it}$ | | | −0.029 |
| | | | (0.031) |
| *Intercept* | 8.237*** | 8.230*** | 8.423*** |
| | (0.412) | (0.477) | (0.758) |
| Observations | 157 | 157 | 157 |
| Regions | 17 | 17 | 17 |
| Hansen test (*df*) | 10.685 (21) | 12.422 (24) | 8.821 (30) |
| Prob > chi$^2$ | 0.982 | 0.999 | 1.000 |
| AR(1) | 0.599 | 0.300 | 0.267 |
| AR(2) | 0.260 | 0.282 | 0.692 |

Two-step robust standard errors—based on Windmeijer's (2005) finite sample bias correction—reported in parentheses

Level of statistical significance: *** $p \leq .001$; ** $p \leq .01$; * $p \leq .05$; $^{\dagger}$ $p \leq .10$

The estimate for export-oriented entrepreneurship is also higher than the average impact of overall entrepreneurship described in Model 1, which not only gives support to our Hypothesis 2 that export-oriented entrepreneurship positively affects economic growth, but also corroborates that the average contribution made by overall entrepreneurs is not homogeneous across different types of entrepreneurial activity. The extent to which the level of entrepreneurial activity is export oriented exerts a positive impact on regional economic growth, in addition to the influence exerted by the overall entrepreneurial activity. This finding reinforces the notion that the export orientation of entrepreneurship matters for economic growth, and supports the study by Hessels and van Stel (2011) that obtained similar results at the national level for developed countries. Moreover, this finding confirms that the positive impact of export-oriented entrepreneurs on economic growth also holds at regional level within a developed country, namely Spain.

### 4.3 The impact of entrepreneurship with different levels of export intensity on economic growth

We took a step forward and examined the extent to which the level of export intensity pursued by new ventures affects regional growth. Our results indicate that the contribution of export-oriented entrepreneurship to regional economic growth is in fact accounted for by those entrepreneurs who sell their goods and services to a substantial percentage of foreign customers (i.e. between 26 and 75 % of customers abroad). While the estimates for the measures of entrepreneurship with low degree of export orientation ($E\_export1–25_{it}$) and high degree of export orientation ($E\_export76–100_{it}$) are not significant, the estimates for that with a medium share of foreign customers ($E\_export26–75_{it}$) is positive and significant at the 5 % level (see Model 3 in Tables 4 and 5). This means that a one-unit increase in the percentage of the adult population involved in the start-up process for a new venture with 26–75 % foreign customers increases regional output by between 5.2 and 6.4 %. A Wald test confirms that the magnitude of this impact significantly surpasses the impact of domestic entrepreneurship (i.e. $E\_export26–75_{it} > E\_domestic_{it}$), but not the impact of the two other disaggregated measures of export-oriented entrepreneurship (i.e. $E\_export1–25_{it} = E\_export26–75_{it} = E\_export76–100_{it}$). Note that, again, when compared to the three disaggregated measures of export-oriented entrepreneurship, the effect of domestic entrepreneurship ($E\_domestic_{it}$) is negative and significant at the 10 % level under the 2SLS estimation, but negative and insignificant under the system GMM estimation.

In view of these findings, the economic impact exerted by the involvement of the adult population in export-oriented entrepreneurship gets stronger as the level of export intensity increases, though up to a certain point, which partially supports our Hypothesis 3. Therefore, for a new venture, exporting represents a

strategic activity that influences performance at the firm level according to the intensity of foreign sales (Fryges and Wagner 2008), while for a region, the presence of more new ventures involved in increasing levels of export intensity represents an important phenomenon influencing economic growth at the aggregate level.

## 5 Summary and conclusions

Previous research has provided empirical evidence on the relationship between entrepreneurship and economic growth at the country (van Stel et al. 2005) and regional level (Audretsch and Keilbach 2004, 2008; González-Pernía et al. 2012). Likewise, the specific role of export-oriented entrepreneurial activity has been analysed at the country level (Hessels and van Stel 2011). However, to the best of our knowledge, no previous studies have analysed the economic impact of export-oriented entrepreneurship at a (sub-national) regional level. The present study contributes to the extant literature by analysing this issue at a regional level.

Regions are at the core of development processes (Scott and Storper 2003), and entrepreneurship is essentially a regional event that emerges from interactions within geographically close areas (Feldman 2001). Accordingly, we have found that Spanish regions that increase their levels of opportunity-driven entrepreneurial activity exhibit higher rates of economic growth, thus supporting the idea that entrepreneurship is a mechanism for knowledge spillover, and enhancing regional development (Braunerhjelm et al. 2010).

The impact of entrepreneurship on economic growth seems to vary between different types of entrepreneurial activity. Acs (2006) highlights that it is the exploitation of business opportunities which makes entrepreneurship good for economic growth. One can see that new ventures seeking to sell products and services in foreign markets are indeed driven by business opportunities. We found that export-oriented entrepreneurship is a specific type of opportunity-driven entrepreneurship that positively affects economic growth. The additional economic impact of any firm involved in export activity may occur because exporting is associated with learning processes that lead to improved productivity at the firm level (Clerides et al. 1998). However, this may also be due to the reallocation of resources from non-exporting firms to (probably more productive) exporting firms (Bernard and Jensen 2004), or due to the influence of the latter on the former's productivity via knowledge spillover at the (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 of international activities (which are in line with their strategy) and therefore exert a stronger impact on the economy. These findings complement the study by Hessels and van Stel (2011), showing that there is also a positive relationship between export-oriented entrepreneurship and economic growth at the regional level, and that the extent of this relationship depends on the proportion of foreign customers to whom the entrepreneur sells goods and services (i.e. export intensity). Likewise, our study complements the work by Audretsch and Keilbach (2004, 2008) and González-Pernía et al. (2012), as our framework accounts for the local transfer of *imported* knowledge via export-oriented entrepreneurship. The combination of *local* and *imported* knowledge enhances spillover capacity, and therefore the growth potential of regions.

### 5.1 Policy implications

Our findings suggest that the concentration of exporting new ventures in certain regions may contribute to increasing existing differences in economic growth across regions within a nation. The policy implications of our results suggest that not only public policies and programmes should facilitate access to foreign markets for entrepreneurs, but government action should also provide tools to help export-oriented entrepreneurs reach a substantial level of export intensity, but not necessarily so high. In most instances, low levels of export intensity indicate a non-strategic activity for firms. For that reason, efforts made only to encourage entry into foreign markets (without export

growth) may eventually have a weak economic impact.

This idea is consistent with earlier claims by Shane (2009), who recommends that new policies should carefully target the subset of new ventures with growth potential. As he suggests, economic growth is related to fostering high-quality and high-growth new ventures. Therefore, instead of subsidising the creation of all types of new businesses, policy makers should recognise and target the few new ventures that are more productive. Exporting is a way for new ventures to grow, provided that they achieve a medium level of export intensity. Accordingly, policy makers should consider shifting resources from programmes that only support *general* entrepreneurial activity to new programmes that encourage (opportunity-driven) *export-oriented* entrepreneurial activity through the creation of new ventures that actively, strategically and *intensely* approach foreign markets. Nonetheless, policy designers should bear in mind that the relationship between the export intensity of entrepreneurship and economic growth is not monotonically increasing.

### 5.2 Limitations and future research

This study is not without limitations. Firstly, although exporting is the most common method of entering foreign markets (Bell 1995), it is not the only way to approach international markets in order to compete globally. More committed modes of entry than exporting (e.g. contractual agreements, joint ventures or wholly owned subsidiaries, among others) may have a different impact on productivity at the firm level, as well as economic growth at the aggregate level. We have tried to replicate the effect of a significant commitment to foreign markets by analysing the impact of different ranges of export-oriented entrepreneurship. However, future research should consider the role of different entry modes in this analysis. Secondly, our analysis does not differentiate between export-oriented entrepreneurship specialising in high value-added products or services and export-oriented entrepreneurship specialising in low value-added products or services. Since it has been shown that there is a positive relationship between the specialisation in high value-added exports and regional growth (Minondo 2010), additional work is needed to determine whether the value added embedded in different categories of new ventures' products and services may better explain the relationship between export-oriented entrepreneurship and economic growth. Finally, another limitation has to do with sample size, which is limited to Spanish regions over a period of about 10 years. Studies including a broader geographic scope of regions across different countries for longer periods of time would provide better insight into the impact of export-oriented entrepreneurship on export-led growth. All these research issues provide a fertile ground for future investigation.

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