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## The examination of the regional level entrepreneurship: The Spanish case

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# The examination of the regional level entrepreneurship: The Spanish case

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**Abstract:** Based on the Global Entrepreneurship and Development Index methodology, this paper constructs a Regional Entrepreneurship Index for Spain that captures the contextual feature of entrepreneurship across regions. The entrepreneurial disparities among the Spanish regions are analyzed in aggregate GEDI, the sub-index and in the pillar levels. For an optimum configuration of a public policy to improve entrepreneurship we propose the use of the GEDI index to suggest different levels of public policy action as national, multi- and single levels depending on how many regions are affected by the weakness of a particular pillar.

**Keywords:** *Entrepreneurship, Regional Development, Stages of Growth, GEDI, Entrepreneurship policy*

**JEL:** L26, R11, R58

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## 1. Introduction

This paper builds on Acs and Szerb (2011) and aims to provide a regional application of the Global Entrepreneurship and Development Index (GEDI). The purpose of this paper is to contribute to our understanding of regional economic development by constructing a regional entrepreneurship index that captures the essence of the contextual features of entrepreneurship and fills a gap in the measurement of economic and social development in the cases where high heterogeneity is found in the entrepreneurial climate between countries and regions. Originally the GEDI has been developed to measure national level of entrepreneurship. The GEDI refers to the contextual feature of entrepreneurship by focusing on the twelve pillars of entrepreneurial attitudes, entrepreneurial action and entrepreneurial aspirations.

The country level index construction integrates 31 variables, 16 from the GEM (Global Entrepreneurship Monitor data)<sup>1</sup> adult population survey, and 15 from other data sources (OECD, Eurostat, among other national data sources), into 14 pillars, three sub-indexes and a 'super index'. One of the most important finding of Acs and Szerb (2011) is that the relationship between entrepreneurship and economic development appears to be mildly S-shaped. This finding suggest moving away from simple measures of entrepreneurship across countries illustrating a U-shaped or L-shaped relationship to more complex measures, which are positively related to economic and social development.<sup>2</sup> The interaction between institutions and individual entrepreneurs varies with the stages of economic development (OECD 2007). Institutional change is more important at lower levels of development and individual entrepreneurial initiatives become vital at higher levels of development. The model has important implications for development policy.

The regional application of the GEDI is relatively straightforward, since the GEM related variables are available in regional levels for a few countries. Germany, Spain, and the United Kingdom have been collecting regional GEM data for many years. Since the Spanish GEM team has focused on collecting regional level data, this sample is particularly appropriate to analyze regional variations in entrepreneurship.

While individual variables from the GEM data collection are available for regional level, the proper institutional variables were lacking for a long time. Over the last decades, there is an increasing movement in the European Union to collect institutional variables not only at the country but also at the regional levels (NUTS-1, NUTS-2 and NUTS-3)<sup>3</sup>. This increasing data collection activity provides a unique opportunity to construct an entrepreneurship index similar to the national GEDI. The idea behind the regional entrepreneurship index construction is to find regional level institutional data that are available also in the country level. If the regional institutional data are lacking then we apply the country level institutional data. Out of the 15 institutional variables we apply for the entrepreneurship index construction

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<sup>1</sup> <http://www.gemconsortium.org/>

<sup>2</sup> About the 'U' shape 'L' shape issue see Acs, Audretsch and Evans 1994; Wennekers and Thurik 1999; Carree et al. 2002; Wennekers et al. 2005 and 2010 in the case of the U-shaped or van Stel and Carree 2004 or Carree et al. 2007 in the case of the L-shaped.

<sup>3</sup> See the Eurostat regional homepage:

[http://epp.eurostat.ec.europa.eu/portal/page/portal/region\\_cities/introduction](http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/introduction)

10 are available in the NUTS-2 regional levels<sup>4</sup>. To be able to relate the entrepreneurial performance of the 19 Spanish autonomous regions<sup>5</sup> to the regional variables we used either the same variable (GERD, tertiary education, internet penetration), or similar variables collected from the EU regional competitiveness index (Annioni and Kozovska 2010). In the later case we recalculated the regional variable values to the same scale. Because of the lack of the remaining four pillars we used the Spanish country level variables (economic freedom, market dominance, globalization, venture capital). As a consequence, real Spanish regional differences may be higher than our analysis shows. The overall regional level entrepreneurship and development index for the Spanish regions are calculated as benchmarking the country level pillars. While this combined methodology makes possible to contrast the entrepreneurial performance of the Spanish regions to other countries, it is more appropriate to compare the regions to one another.

This paper provides tailor-made entrepreneurship policy suggestions for the different autonomous Spanish regions by showing the relatively weak and strong points of their entrepreneurial climate. For an optimum configuration of a public policy to improve entrepreneurship we suggest different levels of public policy as national, multi- and single levels depending on the deviation of a particular pillar from the best benchmarking value and on how many regions are affected by the weakness of a particular pillar.

## ***2. The basic characteristics of the Spanish regions***

Before we present in the next section the regional results for the GEDI in the case of Spain, in this section we present a description of the Spanish regions in order to outline the heterogeneity in Spanish regions in terms of growth, population, innovation activity and economic structure.

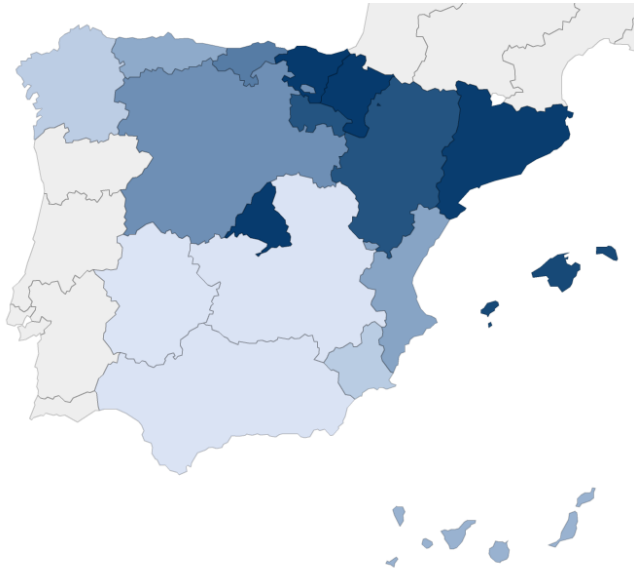
Figure 1 shows the disparities in GDP per capita among the Spanish regions, the darker regions being the ones with a higher GDP per capita.

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<sup>4</sup> More information on the NUTS classification can be found at:  
[http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts\\_nomenclature/introduction](http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction)

<sup>5</sup> The 17 Spanish autonomous regions and the North African enclaves Ceuta and Melilla.

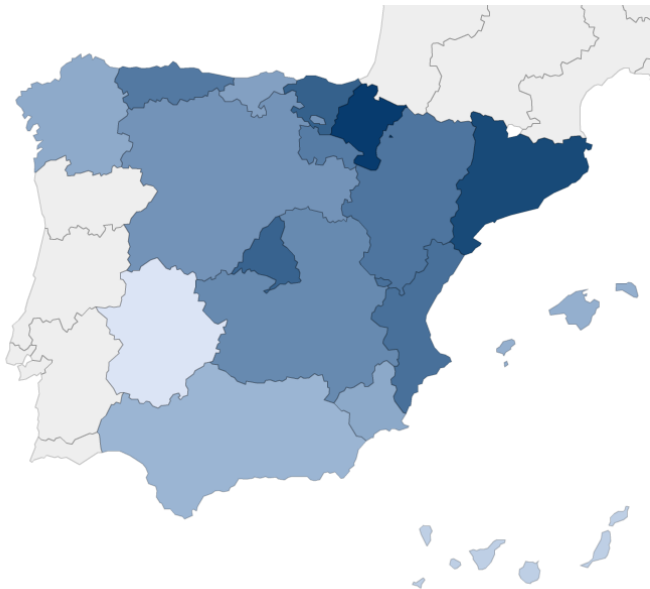
**Figure 1. Spanish regional disparities: GDP per capita**



Source: OECD Regional Database

Two of the causes that explain the high entrepreneurial environment can be found in the innovation activity and the quality of the human capital. Figures 2 and 3, show the high regional disparities in patent applications and higher education attainment in Spain. As can be seen, Cataluña and Navarra accounts for the highest rate of patent applications in Spain.

**Figure 2. Spanish regional disparities: patent applications**

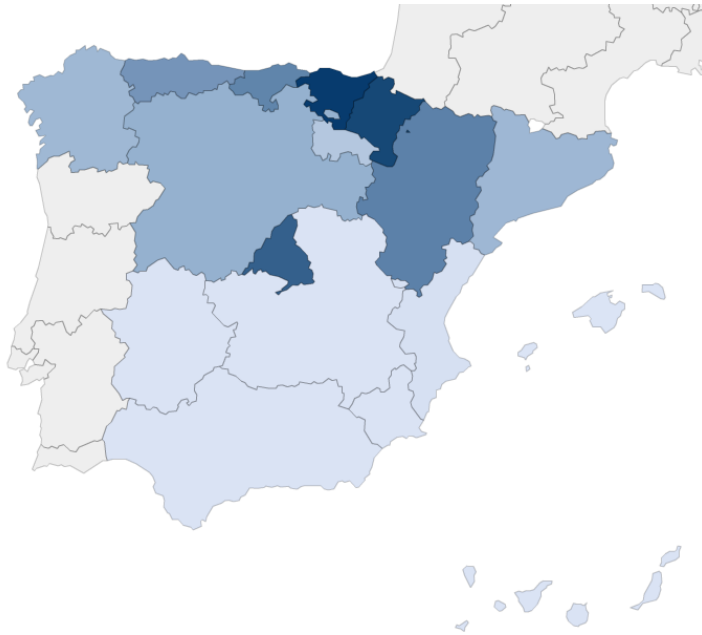


Source: OECD Regional Database

In terms of the proportion of the population with higher education the concentration is even higher when compared with the previous figure. The regions that show higher attainment in terms of the population share with higher education are Madrid and Navarre. Navarre is one of the most interesting cases regarding the quality of its high-skilled labor force. Navarre has a population of 620,337 inhabitants of which 28,000 people are university students. This high

concentration of university graduates means that Navarra's R&D personnel (in full-time equivalent) now represents some 20% of the region's working population. Also employment in high-tech manufacturing and high-tech service sectors represents 11.2% of regional employment. Among other reasons for this high concentration of higher education can be found in the location of The Spanish National Research Centre for renewable energies CENER in Navarra. This boasts more than 200 researchers using the latest technology infrastructures along with 6,000 people working in the renewable energy sector.

**Figure 3. Higher Education Attainment**



Source: OECD Regional Database

Table 1 presents some indicators that summarize the specialisation patterns, the industrial composition, the innovation classification and the human resources of the different Spanish regions. As table 1 shows, the Spanish economy is service-intensive, with the contribution of its industrial sector being heavily concentrated in the regions of Cataluña, Madrid, Comunidad Valenciana, Andalucía and País Vasco. In terms of human capital, the proportion of population with secondary education appears to be more unevenly distributed than the higher education shares presented in figure 3.

Table 1 also presents some characteristics of the employment environment. The Spanish economy has experienced the highest unemployment rates in decades due to the economic downturn. Some regions such as Andalucía or Canarias have experienced unemployment levels of around 30%. Analysing more deeply the rates of unemployment in Spain it is evident that many of the lower-educated unemployed do not have the skills needed to start a business. Moreover, even the higher-skilled unemployed, including university graduates in Spain in the last years, have experienced a lower probability of finding employment compared with other OECD countries (OECD, 2011). In part this may be associated with labor benefits. A Spanish unemployed individual who receives relatively high unemployment benefits appears to have a low incentive to become re-employed (Congregado et al., 2005). Unemployment has a significantly positive influence on individual satisfaction in terms of higher leisure time and health conditions (Ahn et al., 2004). Entrepreneurship could be seen then as a promising route

to combat unemployment in certain lower income Spanish regions (Golpe and van Stel, 2008).

**Table 1. Economic characteristics of Spanish regions**

Region	Regional sectoral specialisation <sup>1</sup>	Industrial Turnover <sup>2</sup>	Active Population Rate <sup>3</sup>	Unemployment Rate <sup>3</sup>	Skills <sup>4</sup>	OECD Innovation category <sup>5</sup>
Andalucía	Agriculture	10.4	58,72	30,93	19.12	Structural inertia or de-industrialising <sup>7</sup>
Aragón	Agriculture and Industry	4.6	58,54	16,16	24.15	Structural inertia or de-industrialising
Asturias	Balanced	2.7	51,72	17,17	24.38	Structural inertia or de-industrialising
Baleares	Balanced	0.8	67,95	17,81	16.97	Structural inertia or de-industrialising
C. León	Agriculture	5.7	55,86	16,08	22.72	Structural inertia or de-industrialising
C. Mancha	Agriculture	4.4	58,70	22,44	16.57	Structural inertia or de-industrialising
C.Valenciana	Industry	10.2	59,90	24,73	21.53	Structural inertia or de-industrialising
Canarias	Non Available	1.5	63,20	29,55	18.95	Structural inertia or de-industrialising
Cantabria	Industry	1.4	57,01	14,10	25.92	Structural inertia or de-industrialising
Cataluña	Industry	23.6	63,27	19,43	23.0	Medium-tech manufacturing and service providers <sup>6</sup>
Extremadura	Agriculture	1.0	53,69	23,60	16.73	Structural inertia or de-industrialising
Galicia	Agriculture	6.6	55,27	17,25	22.1	Structural inertia or de-industrialising
Madrid	Services	10.8	63,83	17,01	31.53	Medium-tech manufacturing and service providers
Murcia	Agriculture	2.5	61,83	24,19	19.58	Structural inertia or de-industrialising
Navarra	Industry	3.2	60,35	11,68	28.84	Medium-tech manufacturing and service providers
País Vasco	Industry	9.7	58,55	12,17	33.74	Medium-tech manufacturing and service providers
Rioja	Industry	0.9	60,90	17,39	23.84	Structural inertia or de-industrialising
Ceuta	Non Available	NA	53,54	33,20	16.23	Non available
Melilla	Non Available	NA	55,75	23,81	16.98	Non available

Notes:

1. Source: Eurostat (2010): *Eurostat Regional Yearbook 2010*, Regional sectoral specialization by NUTS2 regions, 2008
2. Source: INEbase – National Statistical Office. Industrial turnover over the total, 2007.
3. Source: EPA Active Population Survey (INE), III trimester 2011.
4. Education, OECD regional database, % population >16 yrs with secondary education
5. (OECD, 2011a) *Regions and Innovation Policy*. Calculations based on data from the *OECD Regional Database*.
6. Medium-tech manufacturing and service providers: they are generally lesser performing regions in knowledge-intensive countries or leading regions in middle income countries. They have generally well-educated labour force and strengths in manufacturing
7. Structural inertia or de-industrialising regions: these regions present “underdevelopment” traps, are lesser performing regions relative to national averages in Southern and Eastern Europe (the case of Spain). The group has on average the highest rates of unemployment, lower GDP per capita and the values of S&T-related indicators are low.

### ***3. The role of entrepreneurship in country and regional levels***

#### **3.1. Entrepreneurship as an engine of regional growth**

During the last decades entrepreneurship has increased in recognition as an important driver of economic growth, productivity, employment and competitiveness (Scarpetta 2003; Carree and Thurik 2003; Acs and Varga 2005). It is accepted as a key aspect of economic dynamism and clearly influences the innovation landscape of countries and regions (OECD 2009). Entrepreneurship and the formation of new businesses are important elements in regional economic growth because they influence the composition of the regional industrial base which is an important predictor of growth and performance differences between regions (e.g. Feldman and Audretsch 1999, Feldman 2001, Audrestch and Fritsch 2002, Acs and Varga 2005; Fritsch and Mueller 2004 and 2007). Several aspects affect the industrial composition of regions. Aspects which are related with regional industrial concentration and the associated agglomeration externalities, whether based on specialization or diversification, exert an important effect on regional market selection (van der Panne 2004).

Differences in start-ups, entrepreneurial attitudes and the performance of new firms are influenced by the institutional and macroeconomic context, leading to the exit of less productive firms and the success of the more productive firms and the evidence shows a stickiness or persistence in the process of firm creation (Andersson and Koster 2011; Andersson *et al.* 2011). The literature has shown that different regional specificities, related to firms accessibility to financing and innovation needs, together with the quality and quantity of human capital, or the proximity to scientific and technological infrastructures, are all among the most important characteristics that shape regional entrepreneurial and innovative climates (Audretsch and Feldman 1996; Boschma and Lambooy 1999; Shanon 2005; Fritsch and Mueller 2005; Andersson *et al.* 2005; Okamuro and Kobayashi, 2005; among others).

The extent to which creative destruction or *entrepreneurial growth* contributes to regional growth differs across regions, even when taking into account differences in the sectoral composition of economies and these differences persist over time (Audretsch and Fritsch, 2002; Fritsch and Schmude, 2005). Existing evidence highlights large differences in entry rates but also in the post-entry performance of young firms between regions. Such differences are likely to reflect the role of regulatory and institutional frameworks and labour and product market structures, all of which will affect reallocation dynamics in various ways. For example, high barriers to entry, subsidies to incumbents, or policy measures that can delay the exit of failing firms, may stifle competition and slow the reallocation process relative to an economy without barriers. Local regulations, agreements between incumbent market players (suppliers or distributors), limited access to local input resources, bankruptcy laws and labour market regulations also contribute to reducing the rate of entry of new firms. These barriers and institutions affect market opportunities and hence have a strong influence on industrial renewal and innovation (Aghion *et al.*, 2005, Audretsch and Keilbach 2007, 2008).

Finally, young firms and their post-entry performance play a crucial role in these dynamics, which shape aggregate productivity growth. Aspects related with the export attitude (Bernard and Jensen 1999; Bernard and Wagner 1997), and the access to new technologies and their applications, and stimulate the growth and survival of new firms and improve the efficiency and productivity of existing ones. The “up or out” dynamics suggests that entrepreneurship and young firms’ dynamics are important for understanding and quantifying the processes underlying geographical differences in aggregate employment and productivity growth (Bartelsman *et al.* 2009).

Apart from the academic literature, entrepreneurship has also gained importance in the policy agenda as an engine for the competitiveness and growth of regions. Regional policies have



demonstrated their suitability to cover the business needs taking into consideration the peculiarities of the regional economic and business environments. Aspects that should be considered in the definition and implementation of entrepreneurship policies are related to: the identification of business demand for innovation and technology; the modernization and improvement of financial systems (offering available risk funds or seed capital); the flexibility of institutional barriers in the markets of products and labour; and the administrative burdens and bureaucracy generating barriers to entry.

### **3.2. The Global Entrepreneurship and Development Index perspective**

While there is a widely hold consensus amongst scholars that entrepreneurship is a multidimensional and complex phenomenon, the exact meaning and content of entrepreneurship is still lacking. As a consequence, there is no agreement on how to measure entrepreneurship. This is particularly true for country and regional level entrepreneurship where the contextual aspects are vitally important. Over time, output (e.g. self-employment, new firm formation), attitude (e.g. preference for being unemployed) and framework (Ease of Doing Business, OECD Entrepreneurship Indicators Program) measures have been evolved. Whereas these different approaches developed for different purposes have their own distinctive merits, all have some shortcomings. The output measures are generally simple quantity indicators, attitudes just refer to the preference and not the actual act toward entrepreneurship, and framework indicators either focus only on institutions (Ease of doing business) or lack the system perspective (OECD). (Acs et al 2012). Both output and attitude measures are negatively related to economic development measured by the per capita GDP implying false public policy step against mainstream economic theories: In order to develop entrepreneurship should be decreased. The deficient in a consistent systematic approach is relevant in country as well as in regional levels. While there are numerous regional level studies of entrepreneurship, they focus mainly on high-tech clusters (Kenney and von Burg, 1999; Klepper, 2010) or use a simple output or attitude related indicators as demonstrated in the previous part of the paper.

GEDI's three sub-indexes capture these three dimensions of entrepreneurship on a national level. The action and aspiration sub-indexes (outlined below) capture actual entrepreneurship action and aspiration as they relate to nascent and startup business activities, while the entrepreneurial attitude (ATT) sub-index aims to identify the attitudes of a country's population as they relate to entrepreneurship.

For example, the pillar known as opportunity perception potential is essential to recognizing and exploring novel business opportunities. It is also critical to have the proper startup skills and personal networks to exploit these opportunities. Moreover, fear of failure to start a business can have a negative effect on entrepreneurial attitudes, even when opportunity recognition and startup skills exist. Entrepreneurial attitudes are believed to be influenced by the crucial institutional factors of market size, level of education, the riskiness of a country in general, the population's rate of use of the Internet, and culture, all of which enter the indicator as interaction variables.

The entrepreneurial action (ACT) sub-index is principally concerned with measuring startup action with high growth potential. This high growth potential is approached by quality measures, including opportunity motivation for startups that belong to a technology-intensive sector, the entrepreneur's level of education, and the level of competition. The institutional variables include the business freedom, the technology adsorption capability, the extent of staff training, and the dominance of powerful business groups in business.

The entrepreneurial aspiration (ASP) sub-index refers to the distinctive, qualitative, strategy-related nature of entrepreneurial action. Entrepreneurial businesses are different from regularly managed business, thus it is particularly important to be able to identify the most relevant institutional and other quality-related interaction variables. The newness of a product and of technology, internationalization, high growth ambitions, and finance variables are included in this sub-index. The institutional variables measure the R&D potential, the sophistication of a business and of innovation, the level of globalization, and the availability of venture capital.

The Global Entrepreneurship and Development Index (GEDI) approach defines the National System of Entrepreneurship as the dynamic, institutionally embedded interaction between entrepreneurial attitudes, activities, and aspirations, by individuals, which drives the allocation of resources through the creation and operation of new ventures. While composite indicators have becoming popular in many fields over the last two decades GEDI is the first complex index focusing on the multidimensional quality rather than the quantity aspects of entrepreneurship. GEDI is similar to other indices having a complex structure consisting of variables (31), pillars (14), and sub-indices (3). The construction of the pillars combines together the individual and the institutional variables, which is similar to the interaction variable methodology. In this case, the contextual institutional/environmental variables can also be interpreted as country-level weights of the individual variables. The newly developed Penalty for Bottleneck (PFB) methodology serves for incorporating the interdependencies amongst the 14 pillars of entrepreneurship. The central tenet of the PFB is that the performance of the system depends on the weakest link. Higher scoring pillars cannot exhibit their full effect on the performance of the system because of the bottleneck. The uniqueness of this methodology is that the elements of the system are only partially substitutable with each other. According to PFB, entrepreneurship policy can remove barriers to entrepreneurship development most efficiently by focusing on the bottleneck that is the “weakest link” among the indicators.

Technically, the GEDI calculation starts with the multiplication of the individual and the representing institutional variable for all the 14 pillars. The following step is normalizing the pillars to the [0,1] range. The bottleneck is achieved for each pillar by adding one plus the natural logarithm of the difference between that pillar’s country score and the score for the weakest pillar for that country to the score for the weakest pillar for that country. Thus improving the score of the weakest pillar will have a greater effect on the index than improving the score of stronger pillars. For example, assume the normalized score of a particular pillar in a country is 0.60, and the lowest value of the pillars of a certain sub-index is 0.40. The difference is 0.20. The natural logarithm of 1.2 is equal to 0.18. Therefore the final adjusted value of the pillar is  $0.40 + 0.18 = 0.58$ . The three sub-indices are calculated as averaging the proper PFB adjusted pillar values, and the GEDI super-index is the simple average of the three sub-indices.<sup>6</sup>

### **3.3. The regional adaptation of the Global Entrepreneurship and Development Index**

The GEDI approach and the associated PFB methodology have a potentially wide range of further use. The aim of this section is to demonstrate the suitability of the GEDI index at regional level to capture the existent high heterogeneity between the regions in certain

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<sup>6</sup> For the description of the full methodology see Szerb and Acs (2011).

countries. The selected level of investigation refers to the European Union NUTS2 classification<sup>7</sup> (Eurostat 2007). However, the methodology, the data and the variables should be adjusted to fit to the regional analysis. The adjustment of the individual variables is less problematic: the only potential limitation of the regional analysis is the proper size of the data. Since Spain conducts a regional level GEM survey, collecting a large sample of over 30,000 individuals on a yearly basis, the calculation of the individual variables can be done easily. All the 16 individual variables for the 19 Spanish regions in two years, 2007 and 2008 are calculated and averaged the same way as for the country level (See Acs and Szerb 2011, for details). This methodology makes comparison possible between the individual pillars of entrepreneurship at regional level within Spain with the level of the overall Spain as well as with other countries.

The adaption of the institutional variables to regional level is rather more problematic. The optimal solution would be to use the same variables for the regional version as we have done for the country level. However, most of the variables are not available at the regional level. An acceptable solution is possible if we can use some closely correlated proxies with available regional data for a particular variable. Another practical alternative would be to use the same country level institutional variables for all the regions in Spain. In this case differences in entrepreneurship pillars would be purely due to the individual level variables. While the variance of the institutional within countries is probably lower than the variance over countries, they are basically not the same. Considering these alternatives, and the lack of the available variables, we therefore decided to apply a mix of these three approaches as follow:<sup>8</sup>

1. The use of different country and regional level variables where variables have exactly the same meaning. Out of the 15 institutional variables both the country and regional level variables are available in four cases: the rate of urbanization (URBANIZATION) that is a part of the MARKETAGGLOM variable; the tertiary education participation rate (EDUCPOSTSEC); the percentage of the population using internet (INTERNETUSAGE); and the percentage of R&D in GDP (GERD). These variables have exactly the same interpretation at both country and regional levels.
2. We use a close proxy of the country level variable for calculating the regional variables in six cases. Five out of the six cases have the same source, which of the EU regional competitiveness index (Annioni and Kozovska 2010): the size of the market (MARKETSIZE); the availability of the latest technology is used as a proxy for technological absorption (TECHABSORP); the higher education and lifelong learning variable is used as a proxy for a country's level of investment in business training and employment development (STAFFTRAIN); the innovation variable is used as a proxy for TECHTRANSFER; and the business sophistication variable is used for proxying the business strategy (BUSS STRATEGY). The sixth regional variable, the regional corruption variable (CORRUPTION), is extracted from a recent database by Charon et al. (2011). In all of these cases the regional variables had to be rescaled to the same level as the country level variable. The rescaling methodology is described in Appendix. A3.

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<sup>7</sup> More information on the NUTS classification can be found at:  
[http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts\\_nomenclature/introduction](http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction)

<sup>8</sup> The detailed description of all of the variables and sources can be found in A-1 and A-2 appendixes.

3. We use the country level variables at the regional levels in the remaining five cases where we did not have any regional level proxy for it. These variables are: the availability and reliability of corporate financial information (BUSINESS RISK); the overall burden of regulation, as well as the regulatory efficiency of the government in influencing startups and operating businesses (FREEDOM); the extent of market dominance or concentration (MARKDOM); the international openness of the market (GLOB); and the access to institutional venture capital (VENTCAP). Since the regional variations of these five institutional variables are unknown, it obviously limits any interpretations of the results and the validity of policy recommendations.

After calculating the 14 pillar values for the Spanish regions we simply added these regional cases to the original 71 countries. For the calculation of the normalized pillar values, we selected the best, benchmarking scores for each pillar out of 90 cases, 71 countries and 19 Spanish regions. So basically we handled the Spanish regions the same way as they would be independent countries. The recalculated, PFB adjusted values of the pillars for the 71 countries were the same as compared to the case without the Spanish regions. While this approach is useful for getting a benchmark for the Spanish regions it definitely has the disadvantage of neglecting important regional specific agglomeration effects and the potential interconnection of the regions.

## **4. The Global Entrepreneurship and Development Index for the Spanish regions**

In the following sections we are analyzing the entrepreneurial position of the Spanish regions in terms of the GEDI super-index, the three sub-indexes and the fourteen pillars.

### **4.1 The analysis of the Spanish regions in the aggregate GEDI and the three sub-indices**

Table 2 provides a more detailed picture of the entrepreneurial performance and disparities among the Spanish regions based on the three entrepreneurial sub-indexes: attitudes, actions and aspirations and the GEDI. The GEDI at the regional level captures the heterogeneity that can be found in Spanish regions, and reinforces the relevance of performing a regional level analysis. The spread of the GEDI of the 19 Spanish regions is between 0.46 (Madrid) and 0.30 (Extremadura). Despite high levels of government support over recent decades, Extremadura is still the poorest Spanish region, but Cantabria's poor position is rather surprising<sup>9</sup>.

Important differences can be seen when examining the relative position of the Spanish regions in terms of the three sub-indexes. While the difference in GEDI between the first and the last Spanish region is 0.16, the difference in entrepreneurial attitudes (ATT) is 0.19, in entrepreneurial action or activity (ACT) is 0.18, and in the entrepreneurial aspiration difference (ASP) is 0.16.

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<sup>9</sup> The two autonomous Spanish cities, Ceuta and Melilla that are basically small town with less than 100,000 population. The third smallest Spanish region is Rioja with more than 300,000 inhabitants. Therefore, Ceuta and Melilla are very small entities as compared to other Spanish regions, so the conclusions and the ranking of these two regions should be interpreted very carefully.

**Table 2. Spanish regions relative position: sub-index level and GEDI**

Region	Attitudes (ATT)		Actions (ACT)		Aspirations (ASP)		GEDI	
	Rank	ATT	Rank	ACT	Rank	ASP	Rank	GEDI
Andalucía	13	0.41	15	0.42	12	0.25	12	0.36
Aragón	6	0.43	6	0.47	13	0.23	10	0.38
Asturias	5	0.43	5	0.49	5	0.29	5	0.40
Baleares	16	0.36	16	0.42	16	0.23	16	0.33
C. León	12	0.41	10	0.44	10	0.27	11	0.37
C. Mancha	17	0.34	8	0.46	11	0.26	14	0.35
C.Valenciana	4	0.46	7	0.46	8	0.27	6	0.40
Canarias	10	0.42	9	0.45	9	0.27	8	0.38
Cantabria	14	0.37	18	0.37	15	0.23	18	0.33
Cataluña	2	0.49	3	0.49	3	0.31	2	0.43
Ceuta	15	0.37	12	0.44	18	0.22	15	0.34
Extremadura	18	0.34	19	0.35	19	0.22	19	0.30
Galicia	9	0.42	11	0.44	7	0.27	7	0.38
Madrid	1	0.52	2	0.51	1	0.36	1	0.46
Melilla	19	0.33	14	0.43	17	0.23	17	0.33
Murcia	8	0.42	17	0.42	14	0.23	13	0.36
Navarra	11	0.42	1	0.53	2	0.31	3	0.42
País Vasco	3	0.46	4	0.49	4	0.30	4	0.42
Rioja	7	0.42	13	0.43	6	0.28	9	0.38
<b>Spain</b>		<b>0.44</b>		<b>0.40</b>		<b>0.24</b>		<b>0.36</b>

From the performance of the regions over the three sub-indexes we are able to cluster the Spanish regions into three different groups based in their average performance in the three pillars<sup>10</sup>:

- The first group, containing the *leader Spanish regions* that show a relatively better performance in all three pillars, is composed by the regions of: Madrid, Cataluña, País Vasco, Asturias and Navarra. The regions included in this group are mainly urbanized regions with high level incomes, higher innovation ratios (as can be seen in fig.2) and higher shares of their populations with higher education (see fig. 3) in comparison to the regions allocated to the other two groups.
- The second group consists of the regions of Aragón, La Rioja, Comunidad Valenciana, Galicia, Castilla León and Canarias, and these regions present average values reflecting a similar environment to the average of Spain as a whole.
- Finally, the third group contains the Spanish regions that show a less favourable environment for entrepreneurship and these are Andalucía, Baleares, Cantabria, Murcia, Castilla La Mancha and Extremadura. The majority of these regions show low income levels and high unemployment rates. These regions are still based on agriculture with a lower number of companies belonging to innovative sectors, low patenting activity (see figure 3) and a relatively low share of its workforce with higher education (see figure 4).

<sup>10</sup> Ceuta and Melilla have been excluded from the grouping because of their peculiarities.

Table 2 also shows the components of the three sub-indexes analysed by the GEDI (attitudes, action of activity and aspirations) for the case of the whole Spanish economy. Spain ranks better in the entrepreneurial attitudes (ATT) sub-index in comparison with the others.

#### 4.2 The analysis of the individual pillar variables of the Spanish regions

In this section, we focus on the pillar level analysis of the Spanish regions. In Table 3, besides the pillar values of the 19 Spanish regions we also present two benchmarks. One is the average pillar values of the most advanced innovation driven economies, and the other is the average value of the 17 Spanish autonomous regions. From the average calculation we excluded the two autonomous cities, Ceuta and Melilla. We also report the most favorable and the least favorable pillar value of all regions.

As expected, the variance of the pillars exceeds both the variance of the GEDI and that of the three sub-indices. The lowest variances can be seen in those cases where the institutional variables are the same for all of the regions, and the variations are due purely to the individual variables (NONFEAR OF FAILURE, OPPORTUNITY STARTUP, INTERNATIONALIZATION and RISK CAPITAL). The only exception here is the variable capturing the competition in the market (COMPETITION), which varies significantly from a value 0.41 in Aragón to 0.80 in the case of Ceuta. The lowest difference between the best and the worst regional variable value can be found in the case of the pillar capturing the regional entrepreneurial culture (CULTURAL SUPPORT), implying a relatively equal acceptance and recognition of the role of entrepreneurs over all the 19 regions. While the absolute differences in the pillar related with the regional business growth opportunities (HIGH GROWTH) appears not to be too large (0.16), it is high in relative percentages terms since it ranges from 0.05 (in Extremadura) to 0.21 (in Ceuta) (over 400% difference).

The largest differences can be found in the quality of human capital (QUALITY OF HUMAN RESOURCES) (0.62), the presence of high technology intensive sectors (TECH SECTOR) (0.60), OPPORTUNITY PERCEPTION (0.42), the PROCESS INNOVATION (0.39) and the previously mentioned market competition (COMPETITION) (0.39).<sup>11</sup>

Examining the least favorable indicators, we see the difficulties facing Spanish businesses to grow and become market leaders in that (HIGH GROWTH) is the weakest pillar in nine regions. The difficulties facing Spanish businesses in obtaining successful results from their innovative activities (PROCESS INNOVATION) appears as the weakest pillar in eight regions, and the relatively low presence of firms belonging to industries intensive in technology (TECH SECTOR) appears to be the weakest in two regions. Since both HIGH GROWTH and PROCESS INNOVATION are in the ASP sub-index, it explains the generally weak performance of Spain and the Spanish regions in aspirations.

While HIGH GROWTH appears to be the weakest pillar of the innovation driven economies average as well, the difference is substantial. The innovation driven country average is 0.35, and the Spanish regional average is 0.14, two and a half times lower.

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<sup>11</sup> A note, that in the TECH SECTOR, the worst Spanish regions are Cantabria and Extremadura with 0.03 value, while the third worst is Rioja with 0.29.

In general, Spain ranks as successful in the OPORTUNITY STARTUP pillar. The other three components presenting the quality of start-ups (TECH SECTOR, QUALITY OF HUMAN RESOURCES, and COMPETITION) show that improvement is needed. Out of the components related with the Entrepreneurial aspirations (ASP), the HIGH GROWTH pillar has the lowest value, meaning that the percentage of high growth TEA businesses (gazelles) is relatively low in Spain as compared with other countries, situating Spain only in the 33<sup>rd</sup> percentile. Moreover, HIGH GROWTH has the lowest value out of the five entrepreneurial aspiration pillars and this has a negative influence in the computing of the overall Spanish GEDI indicator<sup>12</sup>. The European countries in the last decades have experienced a relatively low average firm growth rate in comparison with other countries such as US, and this has affected directly their economic competition and growth. This relatively low firm growth rate is a European concern that has been raised by the European Commission in the recent communications of European Industrial Policy (European Commission, 2010). Regarding innovation, PROCESS INNOVATION appears to be barely better than HIGH GROWTH, but in this case other countries also perform weakly, which makes sense given the low contribution of industry in the Spanish economy (26.8%, in 2009) in comparison with services industries (70%, in 2009). The low level of RISK CAPITAL represents the relative lack of equity finance in Spain. INTERNATIONALISATION, a combined pillar based on the degree of exporting and the country's openness to international entrepreneurs, is rather low despite the generally high globalization of Spain. PRODUCT INNOVATION, the highest value of the five ASP related indicators is still in the amber zone implying the relative lag of Spain mainly compared to other innovation driven economies.

To sum up, from the analysis done in this section we can conclude that Spanish economy exhibits three main disadvantages: the innovation processes, firm high growth and internationalization aspects. Some of the causes that can help explain the lower levels of process innovation can be found in the economic structure of Spain, which is mainly focused in labour intensive and low-R&D intensive services (see table1). Spain ranks 32nd in the Global Innovation Index 2011, after the main European countries. Among the most problematic aspects that the index shows regarding the innovation situation of Spain is the low ranking in creative intangibles, patent activity or knowledge diffusion (INSEAD, 2011).

The low internationalisation and export activities of Spanish firms are associated with two aspects; a firm characteristic related with the low scale of operations of Spanish firms and an individual characteristic associated with the high fear of failure of Spanish entrepreneurs. Regarding the low internationalization of the Spanish economy, the literature suggests that Spain needs to build and rebuild a solid image of its products, companies and institutions and to implement concerted policies by all Public Administrations, both at national and regional levels, to incentivise Spanish firms to internationalise.

Specifically regarding the perception of products and services *made in Spain*, the image of Spain abroad does not generate a brand associated with competitiveness and there is a clear divergence between Spain's economic reality and its image in the world. Although in many sectors of activity Spain provides one of the best price-quality ratios available in the global market (clothing, banking, telecommunications, machine tools, household goods and construction), Spanish products are not associated with themes of quality and technological innovation. And one of the main causes of the huge difference between the quality of Spain's

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<sup>12</sup> According to the PFB methodology, Spain should improve its performance in GEDI by raising the value of HIGH GROWTH. This would have positive effects on all the other 13 pillars.

exports and their poor image can be found in the delay in the internationalization of Spanish companies and the fact that consumers do not recognize many of our best-known brands as being Spanish (Círculo de Empresarios, 2011). The Enabling Trade Index published by the World Economic Forum for 142 countries leaves Spain amongst the lowest-scoring countries in Western Europe in terms of competitiveness (27<sup>th</sup> in 2009 and 32<sup>th</sup> in 2010), scoring the 119<sup>th</sup> or the 84<sup>th</sup> in labour market efficiency and macroeconomic conditions respectively (World Economic Forum, 2010).

Finally, our results show the growth difficulties faced by Spanish firms, the main causes being rigidities in the labour market and the low capacity of the firms to develop long-term investments that can facilitate the expansion in new markets and the development and adaptations of new innovations. Other causes can be found in the relatively low development of policy measures aimed to support the growth of firms compared to the broad group of policy support measures centered in the creation of firms and the survival of the first years after creation.



**Table 3. Spanish regions relative position: pillar level**

REGIONS	PILLARS														INDICATORS	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Less favourable	Most favourable
<b>Andalucía</b>	0.44	0.45	0.48	0.35	0.60	0.56	0.31	0.53	0.52	0.49	0.15	0.11	0.39	0.21	HIGHGROWTH	CULTURAL SUPPORT
<b>Aragón</b>	0.44	0.51	0.53	0.39	0.57	0.69	0.63	0.47	0.41	0.48	0.09	0.18	0.34	0.17	PROCESS INNOVATION	OPPORTUNITY STARTUP
<b>Asturias</b>	0.48	0.53	0.49	0.38	0.56	0.58	0.49	0.55	0.65	0.59	0.21	0.12	0.42	0.26	HIGH GROWTH	COMPETITION
<b>Baleares</b>	0.37	0.20	0.58	0.38	0.57	0.66	0.57	0.30	0.51	0.47	0.03	0.11	0.37	0.32	PROCESS INNOVATION	OPPORTUNITY STARTUP
<b>Canarias</b>	0.49	0.40	0.55	0.39	0.61	0.63	0.48	0.38	0.63	0.51	0.08	0.17	0.44	0.29	PROCESS INNOVATION	OPPORTUNITY STARTUP
<b>Cantabria</b>	0.34	0.39	0.56	0.37	0.55	0.60	0.03	0.61	0.62	0.53	0.10	0.09	0.34	0.24	TECH SECTOR	COMPETITION
<b>C. León</b>	0.23	0.62	0.53	0.35	0.55	0.56	0.33	0.47	0.61	0.50	0.17	0.16	0.33	0.24	HIGH GROWTH	STARTUP SKILLS
<b>C. Mancha</b>	0.23	0.25	0.49	0.32	0.59	0.62	0.43	0.46	0.61	0.47	0.12	0.18	0.36	0.22	PROCESS INNOVATION	OPPORTUNITY STARTUP
<b>Cataluña</b>	0.65	0.52	0.54	0.49	0.56	0.60	0.48	0.53	0.60	0.53	0.16	0.19	0.48	0.29	PROCESS INNOVATION	OPPORTUNITY PERCEPTION
<b>C.Valenciana</b>	0.61	0.55	0.52	0.39	0.58	0.66	0.40	0.64	0.48	0.58	0.14	0.10	0.38	0.30	HIGH GROWTH	OPPORTUNITY STARTUP
<b>Extremadura</b>	0.24	0.35	0.52	0.29	0.61	0.64	0.03	0.43	0.59	0.48	0.10	0.05	0.36	0.27	TECH SECTOR	OPPORTUNITY STARTUP
<b>Galicia</b>	0.40	0.52	0.52	0.31	0.61	0.63	0.35	0.54	0.47	0.55	0.13	0.15	0.35	0.29	PROCESS INNOVATION	OPPORTUNITY STARTUP
<b>Madrid</b>	0.64	0.71	0.54	0.46	0.60	0.65	0.32	0.75	0.57	0.76	0.41	0.19	0.41	0.22	HIGH GROWTH	PRODUCT INNOVATION
<b>Murcia</b>	0.62	0.39	0.51	0.30	0.60	0.60	0.32	0.47	0.50	0.46	0.13	0.11	0.32	0.22	HIGH GROWTH	OPPORTUNITY PERCEPTION
<b>Navarra</b>	0.28	0.53	0.54	0.39	0.58	0.64	0.46	0.76	0.60	0.71	0.23	0.15	0.34	0.29	HIGH GROWTH	QUALITY OF HUMAN RESOURCE
<b>PaísVasco</b>	0.51	0.58	0.54	0.42	0.57	0.68	0.39	0.71	0.52	0.69	0.23	0.12	0.33	0.26	HIGH GROWTH	QUALITY OF HUMAN RESOURCE
<b>Rioja</b>	0.34	0.43	0.54	0.44	0.59	0.64	0.29	0.48	0.52	0.55	0.15	0.15	0.32	0.31	HIGH GROWTH	OPPORTUNITY STARTUP
<b>Ceuta</b>	0.41	0.28	0.51	0.39	0.60	0.73	0.44	0.24	0.80	0.41	0.02	0.21	0.46	0.18	PROCESS INNOVATION	COMPETITION
<b>Melilla</b>	0.38	0.17	0.51	0.28	0.59	0.67	0.59	0.14	0.74	0.51	0.05	0.13	0.46	0.15	PROCESS INNOVATION	COMPETITION
<b><i>Spain overall</i></b>	0.43	0.47	0.53	0.38	0.58	0.63	0.37	0.53	0.55	0.55	0.16	0.14	0.37	0.26	HIGH GROWTH	OPPORTUNITY STARTUP
<b><i>Innovation-driven country</i></b>	0.42	0.50	0.77	0.47	0.67	0.67	0.53	0.53	0.61	0.62	0.43	0.35	0.63	0.49	HIGH GROWTH	NONFEAR OF FAILURE

Notes: Opportunity Perception (1); Startup Skills (2); Nonfear of Failure (3); Networking (4); Cultural Support (5); Opportunity Startup (6); Tech sector (7); Quality of Human Resources (8); Competition (9); Product Innovation (10); Process Innovation (11); High Growth Firm (12); Internationalisation (13); Risk Capital (14).

*In italics: Spanish regional and Innovation-driven country averages.*

### 4.3. The regional application of the GEDI as a tool for multilevel policy advice

Previous to us a comparative analysis of the GEDI values of the pillars as a policy tool on entrepreneurship at different governmental level. We should introduce the evolution of the Entrepreneurship policy run by the Spanish different governmental levels.

#### The Entrepreneurship policy in Spain

Entrepreneurship policy is a transversal policy that at the national level is under the activities and responsibilities of different ministries. In the last decades, Spain has conducted a clear development and adaptation of what today can be called entrepreneurship policy measures. The first attempts to develop firm creation policy mechanisms and the development of an entrepreneurial culture can be found in the Small and Medium Enterprise's policies conducted by the Ministry of Industry<sup>13</sup> and the Ministry of Economy. Those policies had as the main goals to support industrial development and to overcome unemployment. Other initiatives can be found nowadays by the Ministry of Education, Culture and Sports, centered in the encouragement of entrepreneurship and innovation at the educational level.

Regarding the education and targeted groups seem to need particular attention, but in the case of Spain some of the competences regarding these policy focuses fail under the jurisdiction of the *sub-national policy* levels, as the Spanish constitution of 1978 recognized and guarantees the right to self-government of the nationalities and regions of which Spain is composed and their mutual solidarity (García-Quevedo *et al.*, 2007).

Today, in spite of the fact that many ministries have powers as regards activities affecting the start-up processes, both entrepreneurship policy and SME policy are controlled by the Spanish Ministry of Industry, Tourism and Trade and their agencies.

The Ministry of Industry, Tourism and Trade together with their agencies and under the Directorate of the Small and Medium enterprise (DGPYME)<sup>14</sup> is the institution that applies more policy actions focusing in the creation of new advanced companies, the reduction of the regulatory and administrative procedures, the development of a battery of financial instruments and strengthen the partnership with other policy levels. Amongst others, we can find the following:

- Regarding the reduction of administrative burdens, it has been develop an e-governmental “one stop shop procedure” to merge in one single document all the starting a business procedures.
- In order to develop and improve the entrepreneurial culture, different programs have been set, like “*Emprendemos juntos*”<sup>15</sup>, where different administrations and private institutions collaborate to transmit the important role of entrepreneurship in the society. Enterprises awards like the “*Emprendedor XXI*”<sup>16</sup> that is a public-private joint initiative by the DGPYME and the bank “*La Caixa*”, or the “*European Enterprise*

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<sup>13</sup> Ministerio de Industria, Energía y Turismo nowadays (*Ministry of Industry, Energy and Tourism*)

<sup>14</sup> Dirección General Pequeña y Mediana Empresa. Directorate General of SME Policy

<sup>15</sup> <http://www.emprendemosjuntos.es/es-ES/Paginas/EmprendemosJuntos2011.aspx>

<sup>16</sup> <http://www.emprendedorxxi.es/>

*Awards 2011*<sup>17</sup> by General Directorate of Enterprise and Industry have helped to encourage the entrepreneurial initiatives. The Ministry of Labor and Social Affairs contributes by providing incentives for self-employment and advice, information and training to new entrepreneurs through the INEM<sup>18</sup>.

- One of the pillars of any entrepreneurship policy is the provision of access to finance, the *national policy* in Spain has mainly focused in prioritizing the provision of second-tier national re-guarantee fund to loans to innovative investments and projects, micro enterprises and new or early-stage business ventures. Additionally, non-discriminatory participatory loans and micro-loans for targeting groups, like women entrepreneurs and business owners have been provided. The Ministry of Economy and Finance by the ICO<sup>19</sup> launched the Micro-credit facility in 2002 with the objective to finance investments to individuals or micro-enterprises that had reduced access to other means of finance. The ICO worked in conjunction with the European Investment Fund (EIF).
- Some of the initiatives connected with innovation and internationalization are mainly developed by the CDTI<sup>20</sup> that belongs to the Ministry of Economy and Competitiveness. The CDTI supports the generation and development of new technology-based firms, providing seed capital and risk capital. With regards to the process innovations, the Research and Development Projects is an initiative applied to business projects to create and significantly enhance the production process, product or service by a single company or by a group of firms. The CDTI also disseminates European initiatives and programmes boosting international technological cooperation, like the EUREKA program that encourages joint initiatives on smart and sustainable manufacturing technologies, or the CDTI-EUROSTARS which is destined to support the Spanish firms in starting international cooperation activities.

Regarding the regional policies, many initiatives have been developed by the regional agencies taking into consideration the regional environment. In particular, many initiatives have been developed to facilitate the restructuration of regional economies by encouraging the creation of companies in certain technological intensive sectors with the aim of absorbing unemployment and improving the regional competitiveness. Regions that have their economies based on agriculture or mining have applied important measures to give incentives to the creation of new technology based firms (e.g. Asturias).

### **The GEDI as a multi-level policy tool**

In general, the analyses done with regards the Spanish entrepreneurship policy highlight evidence of the lack of risk capital and entrepreneurial culture. Significant improvements seem to be needed in ICT investment, youth education, lifelong learning. SMEs collaborating in innovation and patenting. Spain seems to lag behind other European countries in achieving

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<sup>17</sup>[http://www.google.nl/search?sourceid=navclient&aq=1&oq=european+enterprise+&ie=UTF-8&rlz=1T4SKPT\\_enNL404NL449&q=european+enterprise+awards&gs\\_upl=0101013103441111111111110&aqi=g4](http://www.google.nl/search?sourceid=navclient&aq=1&oq=european+enterprise+&ie=UTF-8&rlz=1T4SKPT_enNL404NL449&q=european+enterprise+awards&gs_upl=0101013103441111111111110&aqi=g4)

<sup>18</sup> Instituto Nacional de Empleo

<sup>19</sup> Instituto de Crédito Oficial

<sup>20</sup> Centro para el Desarrollo Tecnológico Industrial (<http://www.cdti.es/>)

the requirement of a higher R&D investment as a share of its growth despite its increasing efforts in R&D the results into innovative outputs have not been shown yet.

The GEDI indicator application at regional level is a potential powerful tool to identify areas where the entrepreneurship policy should focus on. In this section we will develop a different investigation where we run comparisons of each of the pillar values for all the Spanish autonomous regions with the Spanish regional average, and the innovation-driven country average, in order to analyse the potential policy focus needed at regional and national level.

As the first step in this comparison analysis, we compare three of the leading regions with three of the less favoured regions..

**Figures 4 and 5. Relative position pillar level: three leading regions vs. three less favoured regions**

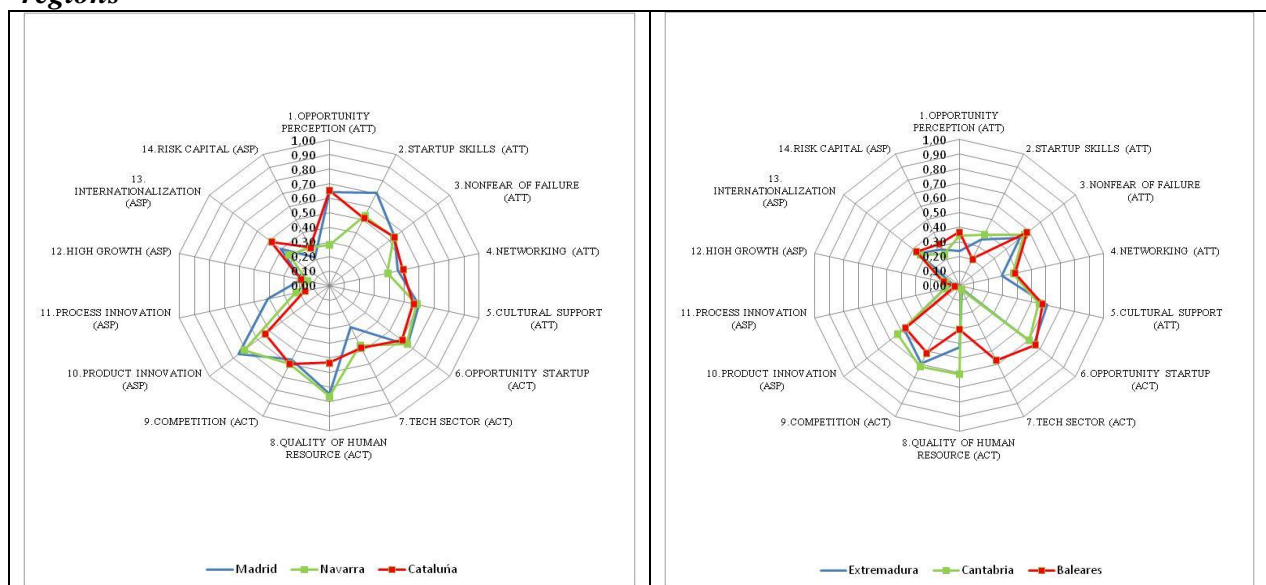


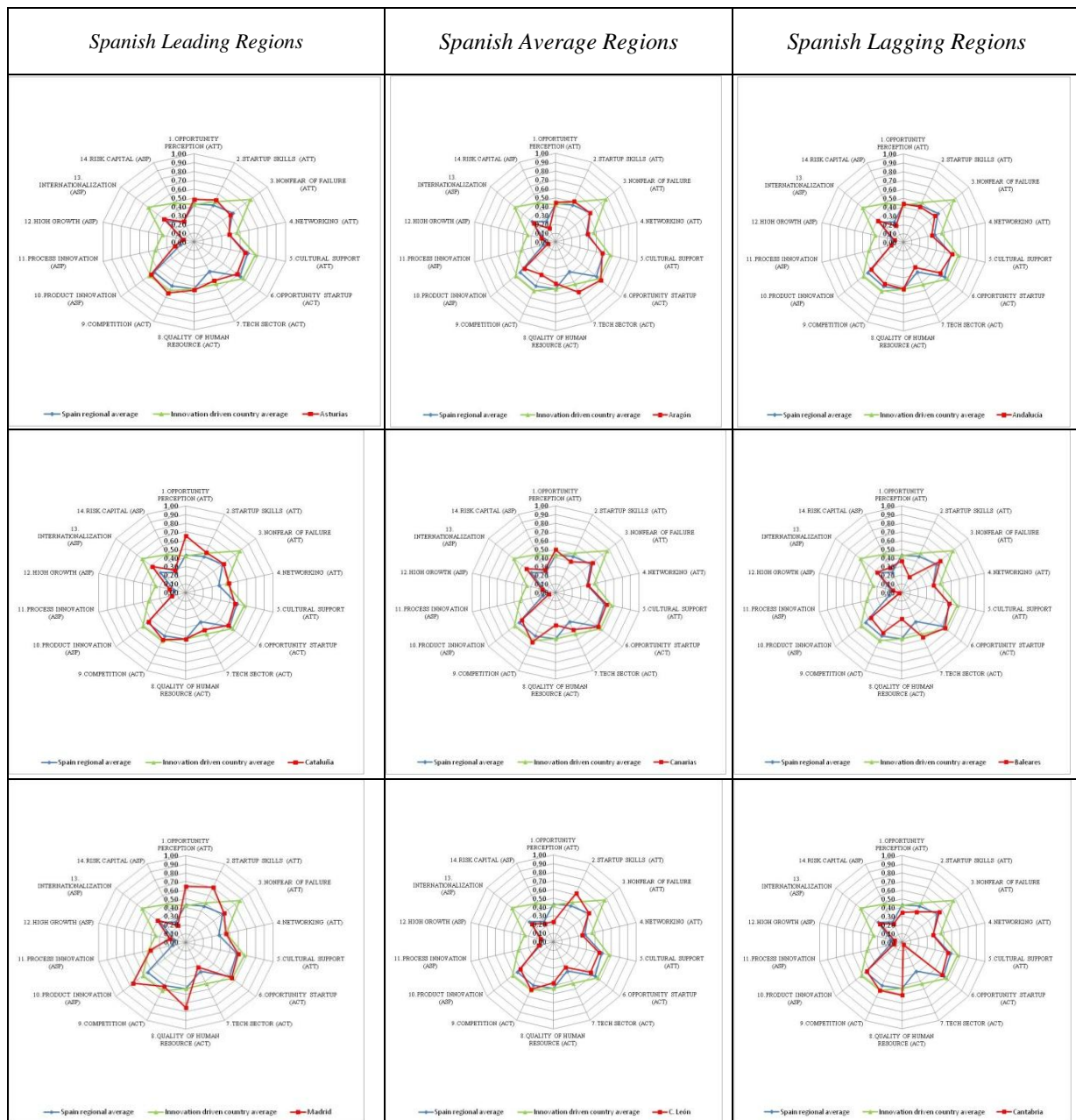
Figure 4 presents the comparative analysis of three of the leading regions: Madrid, Navarra and Cataluña. The results show as the most common favorable pillar the OPPORTUNITY PERCEPTION, while the less common favorable pillar is HIGH GROWTH. The pillars that show more heterogeneous results are QUALITY OF HUMAN CAPITAL and PRODUCT AND PROCESS INNOVATIONS, showing the weaknesses of Catalanian region. Figure 5 introduces the comparative analysis of three of the less favoured regions: Extremadura, Cantabria and Baleares. The results also show HIGH GROWTH and PROCESS INNOVATIONS are the pillar that present lower values as we found in figure 4. Regarding the disparities found, HIGH TECH, QUALITY OF HUMAN CAPITAL and STARTUP SKILLS are the less homogeneous values.

The comparison of pillars of the three Spanish regions shows both similarities and also considerable differences in the strengths and weaknesses of the different regions. However, we can use the GEDI to develop this policy analysis even further in order to help with policy tailoring. Taking into account the other regions and regional differences, three types of public policy interventions are suggested. *National level policy* serves to deal with the general, country level, problems. National entrepreneurship policy should focus on enhancing

entrepreneurship, i.e. improving the GEDI value by increasing the weakest pillar value(s). Besides the national issues, regional policy is required to reduce the differences amongst the regions and to boost entrepreneurship. *Multi-level policy* is suitable if many, but not all regions face the same problem(s), whereas *single-level policy* aims at improving a pillar that is problematic for just one or only a few regions. Regional policy should therefore combine and fit together the national, the multi-level and the single-level policy steps together so as to achieve the desired aims (OECD, 2011a).

Table 4 presents the different comparative analysis of all the regions in Spanish with the average regional values and the values for innovation-driven countries. In column 1 the spider graphs for the *leading* regions are presented, in column 2 for the *average* entrepreneurial regions and for the lagging in column 3 respectively.

**Table 4. Comparative analysis of the relative position of Spanish regions**



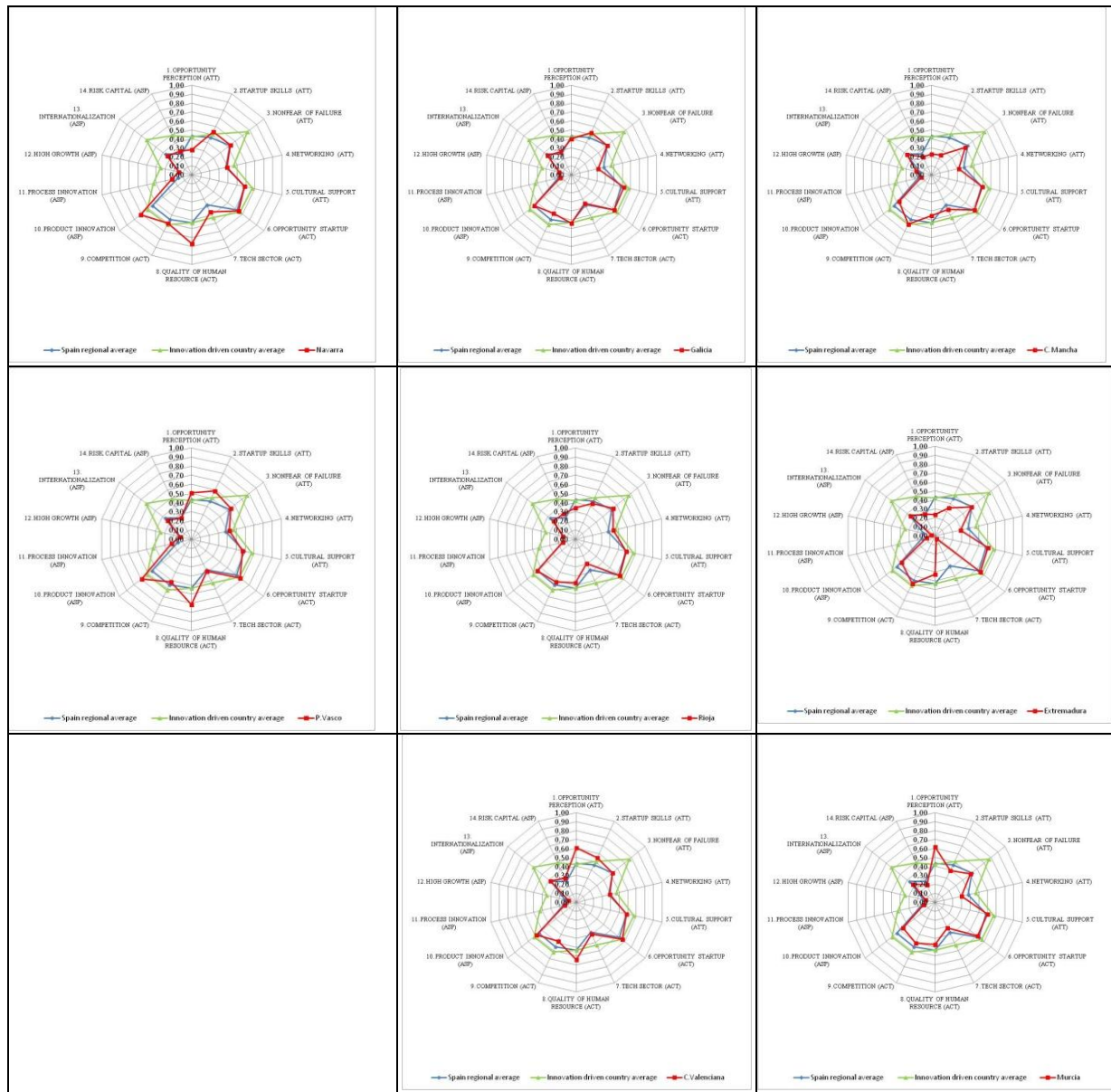


Table 5 serves to identify the less favorable aspects of the entrepreneurial regional environment in each of the Spanish regions. Besides ranking the most problematic points, Table 5 also shows the order of the most effective policy steps. In the sense of the PFB (Penalty for Bottlenecks) methodology, the largest improvement can be achieved if the worst pillar is increased (for details see Szerb and Acs 2011). However, after improving the bottleneck it is highly probable that there will be another bottleneck emerging negatively influencing the other variables. Therefore, it is suggested to investigate not only the worst but at least 3-5 out of the worst pillars. Here, we consider five pillars.

**Table 4: Spanish regions: 5 less favorable pillars Table 10. Spanish regions: 5 less favorable pillars**

<b>Region</b>	<b>First</b>	<b>Second</b>	<b>Third</b>	<b>Fourth</b>	<b>Fifth</b>
Andalucía	HIGH GROWTH	PROCESS INNOVATION	RISK CAPITAL	TECH SECTOR	NETWORKING
Aragón	PROCESS INNOVATION	RISK CAPITAL	HIGH GROWTH	INTERNATIONALIZATION	NETWORKING
Asturias	HIGH GROWTH	PROCESS INNOVATION	RISK CAPITAL	NETWORKING	INTERNATIONALIZATION
Baleares	PROCESS INNOVATION	HIGH GROWTH	STARTUP SKILLS	QUALITY OF HUMAN RESOURCE	RISK CAPITAL
Canarias	PROCESS INNOVATION	HIGH GROWTH	RISK CAPITAL	QUALITY OF HUMAN RESOURCE	NETWORKING
Cantabria	TECH SECTOR	HIGH GROWTH	PROCESS INNOVATION	RISK CAPITAL	TECH SECTOR
C. León	HIGH GROWTH	PROCESS INNOVATION	OPPORTUNITY PERCEPTION	RISK CAPITAL	INTERNATIONALIZATION
C. Mancha	PROCESS INNOVATION	HIGH GROWTH	RISK CAPITAL	OPPORTUNITY PERCEPTION	STARTUP SKILLS
Cataluña	PROCESS INNOVATION	HIGH GROWTH	RISK CAPITAL	TECH SECTOR	INTERNATIONALIZATION
C.Valenciana	HIGH GROWTH	PROCESS INNOVATION	RISK CAPITAL	INTERNATIONALIZATION	NETWORKING
Extremadura	TECH SECTOR	HIGH GROWTH	PROCESS INNOVATION	OPPORTUNITY PERCEPTION	RISK CAPITAL
Galicia	PROCESS INNOVATION	HIGH GROWTH	RISK CAPITAL	NETWORKING	INTERNATIONALIZATION
Madrid	HIGH GROWTH	RISK CAPITAL	TECH SECTOR	PROCESS INNOVATION	INTERNATIONALIZATION
Murcia	HIGH GROWTH	PROCESS INNOVATION	RISK CAPITAL	NETWORKING	INTERNATIONALIZATION
Navarra	HIGH GROWTH	PROCESS INNOVATION	OPPORTUNITY PERCEPTION	RISK CAPITAL	INTERNATIONALIZATION
P.Vasco	HIGH GROWTH	PROCESS INNOVATION	RISK CAPITAL	INTERNATIONALIZATION	TECH SECTOR
Rioja	HIGH GROWTH	PROCESS INNOVATION	TECH SECTOR	RISK CAPITAL	INTERNATIONALIZATION
<b>Spanish regional average</b>	<b>HIGH GROWTH</b>	<b>PROCESS INNOVATION</b>	<b>RISK CAPITAL</b>	<b>INTERNATIONALIZATION</b>	<b>TECH SECTOR</b>

Based on Tables 4 and 5, we can develop a framework of the suggested entrepreneurship policy in terms of policy levels and pillars.

*National level policy* is required for: HIGH GROWTH and PROCESS INNOVATION. In both cases all the 17 Spanish autonomous regions rank these pillars amongst the top three problematic fields. Country wide steps are also necessary to improve RISK CAPITAL, that is the third lowest pillar for Spain, and amongst the top five problematic fields in all the 17 autonomous regions. We have seen in the previous section that efforts have been applied for increasing the financial conditions and reducing the administrative procedures to start a business in Spain. However, more effort is needed in increasing the growth support after the start-up stage of firm development.

National policy and regional policy should work in tandem to support the region specific indicators influencing the national policy agenda. *Multi-level policy* is required in the cases of INTERNATIONALIZATION and TECH SECTOR. Eleven regions list



INTERNATIONALIZATION as a problematic point, typically in the fifth place. While there are only eight regions which are affected by the low level of TECH SECTOR, in two regions this ranks as first (Extremadura and Cantabria) and in other two as the third (Madrid and Rioja) most problematic field. We have already shown how concentrated high-tech industry is in the Spanish economy, and we explained that the lower level of ICT incorporation in Spanish companies together with the adverse attitude towards exporting and internationalization is closely link to the smaller size of Spanish companies.

*Single-level policy* is required in the cases of NETWORKING (seven regions are affected), OPPORTUNITY PERCEPTION, STARTUP SKILLS, and QUALITY OF HUMAN RESOURCES (four regions are affected in each cases). Educational and labour policies at regional level should focus on changing perceptions and also improving the skills needed for both new firm formation and also viability.

## **5. Summary, conclusion and policy implications**

Over recent years, increasing attention has been paid to the role that regional level factors play in driving entrepreneurship and thereby regional and national development. Within the EU an important aim is to decrease regional inequalities, and although regional funding is significant, some of the results are disappointing. Despite enormous efforts, regional disparities in many countries have been increasing. The examination of the drivers of entrepreneurship at the regional level may explain some of the reasons for these continuing regional inequalities.

While the Spanish regional GEDI values are calculated in the same way as would be those of independent countries, our analysis focuses on comparing the Spanish regions to each other. The Spanish regions are investigated in terms of the GEDi, the sub-index as well as in the pillar level. The Spanish regions are found to be particularly weak in the aspiration related pillars. We have also developed a system for assisting in the design of an appropriate public policy framework for improving entrepreneurship in the Spanish regions. Three levels of policies are classified as national, multi- and single-levels, and based on the identification of the five worst pillars of each of the Spanish regions, we provided a useful system for helping develop good entrepreneurship policy for Spain taking into account national and regional priorities.

The results presented in this study go a long way towards explaining the marked variations in entrepreneurial activity in the Spanish regions. Regarding the least favorable aspects of the entrepreneurial climate of Spain, issues which policy needs to focus on these can be classified according to the Spanish economic structure, the business activity and the attitudes of Spanish potential entrepreneurs.

Regarding to the Spanish economic structure, the results presented here show that the high rigidity found in the financial, product and labor markets has caused a negative effect both in terms of the entrepreneurial climate and also the potential post entry firm performance of firms (characterized by a low firm growth rates).

The results show that Spanish firms exhibit reduced levels of internationalization, innovation and export activity. Some of the causes can be found in the economic structure of Spanish firms which are focused mainly in services, the relatively smaller size of Spanish firms and



also the lags in their incorporation of new technologies. Taken together these all have a negative effect on the productivity and growth of firms.

Finally, the analysis based on the individual characteristics of Spanish entrepreneurs (potential entrepreneurs) shows that Spanish entrepreneurs lack start-up skills and also exhibit a negative attitude towards the potential economic or business opportunities due to a high fear of failure. These individual aspects of Spanish potential entrepreneurs may be exacerbated in the current macroeconomic conditions.

In terms of the policy suggestions that can be derived from our analysis, we can conclude that Spanish industrial policy should be aimed in improving the macroeconomic conditions that will have a direct effect in the business environment and entrepreneurial climate. Policy measures should not be only centered on the creation of firms, but also they have to complement with policy measures aimed at supporting the growth of firms beyond their first stages of development. Despite the development of national initiatives like the innovation strategy E2I, which is meant to become the framework for defining all the necessary instruments for supporting the transformation to an innovation-based economy, the analysis presented here points to a clear need to improve the business environment and opportunity attitudes of Spanish entrepreneurs. Policy measures are needed to facilitate access to risk finance that will necessarily support both the creation of the firms and also the activities related with expansion of Spanish firms in international markets. Policy measures are also required to foster firm diversification strategies into the types of more sophisticated technological driven activities which will have a direct effect in the productivity of Spanish firms and their ability to compete in national and international markets. Measures must be connected with the individual characteristics of potential entrepreneurs in Spain and aimed at improving and increasing the rates of education, the level of skills, and the flexibility of the labour market.

Regarding the regional level policies, they should be focused on increasing the innovation capacity of regions by working on both the demand and supply sides of the system to increase both private and public sector investments in innovation activities of a type which builds on existing and emerging regional capabilities.

Reducing red tape is necessary for fostering new firm creation and the growth of new firms and this entails reducing start-up regulations and administrative burdens so as to reduce barriers to entry. Policy should then address the administrative, social and tax requirements that in part tend to rise with the size of the company, because these increase the costs of firm growth.

Policies design to ease the access to finance for new and innovative small firms both with respect to debt and equity finance that would appear to be important, and particularly so in the current crisis. Support for early-stage financing for innovation as well as the fostering of networks for venture capital and business angels should be prioritized. This is because seed capital and start-up financing play a key role in enabling entrepreneurial individuals to turn new ideas into new products. Access to such sources and networks can provide more than funding in that they also help start-ups to develop as businesses by providing advice and managerial expertise.

It would be necessary to review the tax systems so as to ensure that they do not impede entrepreneurship. Personal income tax, corporate income tax and social security contributions

all play an important role in decisions to move from wage employment to establishing a business, and also in influencing the growth structure of such businesses.

Finally, demand led innovation policies should be used to leverage public procurement in order to foster innovation. Government procurement policies should strengthen their capacity to deliver innovative solutions which are responsive to public needs and are in line with good governance, transparency and accountability (OECD, 2011b).

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## A-1 APPENDIX: The description of the applied individual variables

Individual variable	Description
OPPORTUNITY	The percentage of the 18-64 aged population recognizing good conditions to start business next 6 months in area he/she lives,
SKILL	The percentage of the 18-64 aged population claiming to possess the required knowledge/skills to start business
NONFAIRFAIL	The percentage of the 18-64 aged population stating that the fear of failure would not prevent starting a business
KNOWENT	The percentage of the 18-64 aged population knowing someone who started a business in the past 2 years
NBGOODAV	The percentage of the 18-64 aged population saying that people consider starting business as good career choice
NBSTATAV	The percentage of the 18-64 aged population thinking that people attach high status to successful entrepreneurs
CARSTAT	The status and respect of entrepreneurs calculated as the average of NBGOODAV and NBSTATAV
TEAOPPORT	Percentage of the TEA businesses initiated because of opportunity start-up motive
TECHSECT	Percentage of the TEA businesses that are active in technology sectors (high or medium)
HIGHEDUC	Percentage of the TEA businesses owner/managers having participated over secondary education
COMPET	Percentage of the TEA businesses started in those markets where not many businesses offer the same product
NEWP	Percentage of the TEA businesses offering products that are new to at least some of the customers
NEWT	Percentage of the TEA businesses using new technology that is less than 5 years old average (including 1 year)
GAZELLE	Percentage of the TEA businesses having high job expectation average (over 10 more employees and 50% in 5 years)
EXPORT	Percentage of the TEA businesses where at least some customers are outside country (over 1%)
INFINVMEAN	The mean amount of 3 year informal investment
BUSANG	The percentage of the 18-64 aged population who provided funds for new business in past 3 years excluding stocks & funds, average
INFINV	The amount of informal investment calculated as INFINVMEAN* BUSANG

## A-2 APPENDIX: The description of the applied institutional variables

Institutional variable	Description	Source of data	Data availability
MARKETDOM	Country level: Domestic market size that is the sum of gross domestic product plus value of imports of goods and services, minus value of exports of goods and services, normalized on a 1–7 (best) scale data are from the World Economic Forum Competitiveness.	World Economic Forum	The Global Competitiveness Report 2008-2009, p. 470 The Global Competitiveness Report 2009-2010 p. 450
	Spanish regional data: calculation based on the EU regional competitiveness market size calculation, rescaling the variable to a 7 point Likert scale (calculation method in Appendix A-3).	EU Regional competitiveness 2010	Based on: EU Regional competitiveness 2010, p. 154
URBANIZATION	Country level: Urbanization that is the percentage of the population living in urban areas, data are from the Population Division of the United Nations, 2010 estimate	United Nations	<a href="http://esa.un.org/unup/index.asp?panel=1">http://esa.un.org/unup/index.asp?panel=1</a>
	Spanish regional: same as above. Data are from 2008	OECD applied	<a href="http://www.oecd.org/dataoecd/35/48/43245602.pdf">http://www.oecd.org/dataoecd/35/48/43245602.pdf</a>
MARKETAGGLOM	The size of the market: A combined measure of the domestic market size and the urbanization that later measures the potential agglomeration effect. Calculated as MARKETDOM*URBANIZATION	Own calculation	-
EDUCPOSTSEC	Country level: Gross enrolment ratio in tertiary education, 2008 or latest available data.	UNESCO	<a href="http://stats.uis.unesco.org/unesco/TableViewer/tableView.aspx?ReportId=167">http://stats.uis.unesco.org/unesco/TableViewer/tableView.aspx?ReportId=167</a>
	Spanish regional data: same as above. Data are from 2008	EUStat	<a href="http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&amp;init=1&amp;language=en&amp;pcode=tgs00094&amp;plugin=1">http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&amp;init=1&amp;language=en&amp;pcode=tgs00094&amp;plugin=1</a>
BUSINESS RISK	Country and regional levels are the same: The business climate rate “assesses the overall business environment quality in a country... It reflects whether corporate financial information is available and reliable, whether the legal system provides fair and efficient creditor protection, and whether a country's institutional framework is favorable to intercompany transactions” ( <a href="http://www.trading-safely.com/">http://www.trading-safely.com/</a> ). It is a part of the Country Risk Rate. The alphabetical rating is turned to a seven point Likert scale from 1 (“D” rating) to 7 (A1 rating). 30. Data are from 2008 except 2009 countries that are from 2009.	Coface	<a href="http://www.trading-safely.com/">http://www.trading-safely.com/</a>
INTERNETUSAGE	Country level: The number Internet users in a particular country per 100 inhabitants, 2008, except 2009 countries that are from 2009	International Telecommunication Union	<a href="http://www.itu.int/ITU-D/ict/statistics/">http://www.itu.int/ITU-D/ict/statistics/</a>
	Spanish regional data: same as above. Data are from 2008	EUStat	<a href="http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&amp;init=1&amp;language=en&amp;pcode=tgs00094&amp;plugin=1">http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&amp;init=1&amp;language=en&amp;pcode=tgs00094&amp;plugin=1</a>



			<a href="#">=en&amp;pcode=tgs00050&amp;plugin=1</a>
CORRUPTION	Country level: The Corruption Perceptions Index (CPI) measures the perceived level of public-sector corruption in a country. "The CPI is a "survey of surveys", based on 13 different expert and business surveys." ( <a href="http://www.transparency.org/policy_research/surveys_indices/cpi/2009">http://www.transparency.org/policy_research/surveys_indices/cpi/2009</a> ) Overall performance is measured on a ten point Likert scale. Data are from 2008 except 2009 countries that are from 2009.	Transparency International	<a href="http://www.transparency.org/policy_research/surveys_indices/cpi/2010/results">http://www.transparency.org/policy_research/surveys_indices/cpi/2010/results</a>
	Spanish regional data: based on a standardized variable combining education, health, and general public corruption in addition to law enforcements and bribe payment. Calculation is based on Charron et al (2011) , rescaling it to a 10 point scale (see A-3 Appendix for details).	Charron et al (2011)	<a href="http://www.qog.pol.gu.se/eu_project_2010/eu_project.htm">http://www.qog.pol.gu.se/eu_project_2010/eu_project.htm</a>
FREEDOM	Country and regional levels are the same: "Business freedom is a quantitative measure of the ability to start, operate, and close a business that represents the overall burden of regulation, as well as the efficiency of government in the regulatory process. The business freedom score for each country is a number between 0 and 100, with 100 equaling the freest business environment. The score is based on 10 factors, all weighted equally, using data from the World Bank's <i>Doing Business</i> study". ( <a href="http://www.heritage.org/Index/pdf/Index09_Methodology.pdf">http://www.heritage.org/Index/pdf/Index09_Methodology.pdf</a> ). . Data are from 2008 except 2009 countries that are from 2009.	Heritage Foundation/ World Bank	<a href="http://www.heritage.org/index/explorer?view=by-region-country-year">http://www.heritage.org/index/explorer?view=by-region-country-year</a>
TECHABSORP	Country level: Firm level technology absorption capability: "Companies in your country are (1 = not able to absorb new technology, 7 = aggressive in absorbing new technology)". Data are from 2007-2008 except 2009 countries that are from 2008-2009	World Economic Forum	The Global Competitiveness Report 2008-2009, p. 461 The Global Competitiveness Report 2009-2010 p. 441
	Spanish regional: proxied by the technological readiness data from the EU regional competitiveness index and rescaling it to the original 7 point scale (see A-3 Appendix for details).	EU Regional competitiveness 2010	Based on: EU Regional competitiveness 2010, p. 176
STAFFTRAIN	Country level: The extent of staff training: "To what extent do companies in your country invest in training and employee development? (1 = hardly at all; 7 = to a great extent)". Data are from 2007-2008 except 2009 countries that are from 2008-2009	World Economic Forum	The Global Competitiveness Report 2008-2009, p. 419 The Global Competitiveness Report 2009-2010 p. 401
	Spanish regional: proxied by the Higher education and life long learning sub-index data from the EU regional competitiveness index and rescaling it to the original 7 point scale (see A-3 Appendix for details).	EU Regional competitiveness 2010	Based on: EU Regional competitiveness 2010, p. 126
MARKDOM	Country and regional levels are the same: Extent of market dominance: "Corporate activity in your country is (1 = dominated by a few business groups, 7 = spread among many firms)". Data are from 2007-2008 except 2009 countries that are from 2008-2009	World Economic Forum	The Global Competitiveness Report 2008-2009, p. 423 The Global Competitiveness Report 2009-2010 p. 405

TECHTRANSFER	Country level: These are the innovation index points from GCI: a complex measure of innovation including investment in research and development (R&D) by the private sector, the presence of high-quality scientific research institutions, the collaboration in research between universities and industry, and the protection of intellectual property. Data are from 2007-2008 except 2009 countries that are from 2008-2009	World Forum	Economic	The Global Competitiveness Report 2008-2009, p. 18 The Global Competitiveness Report 2009-2010 p. 20
	Spanish regional: proxied by the Innovation sub-index data from the EU regional competitiveness index and rescaling it to the original 7 point scale (see A-3 Appendix for details).	EU	Regional competitiveness 2010	Based on: EU Regional competitiveness 2010, p. 204
GERD	Country level: Gross domestic expenditure on Research & Development (GERD) as a percentage of GDP, year 2009 or latest available data Puerto Rico, Dominican Republic, and United Arab Emirates are estimated	UNESCO		<a href="http://stats.uis.unesco.org/unesco/TableViewer/tableView.aspx?ReportId=2656">http://stats.uis.unesco.org/unesco/TableViewer/tableView.aspx?ReportId=2656</a>
	Spanish regional data: same content, regional level application	EUStat		<a href="http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&amp;init=1&amp;language=en&amp;pcode=tgs00042&amp;plugin=1">http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&amp;init=1&amp;language=en&amp;pcode=tgs00042&amp;plugin=1</a>
BUSS STRATEGY	Country level: Refers to the ability of companies to pursue distinctive strategies, which involves differentiated positioning and innovative means of production and service delivery. Data are from 2007-2008 except 2009 countries that are from 2008-2009	World Forum	Economic	The Global Competitiveness Report 2008-2009, p. 18 The Global Competitiveness Report 2009-2010 p. 20
	Spanish regional: proxied by the Business strategy sophistication sub-index data from the EU regional competitiveness index and rescaling it to the original 7 point scale (see A-3 Appendix for details).	EU	Regional competitiveness 2010	Based on: EU Regional competitiveness 2010, p. 188
GLOB	Country and regional levels are the same: A part of the Globalization Index measuring the economic dimension of globalization. The variable involves the actual flows of trade, Foreign Direct Investment, portfolio investment and income payments to foreign nationals as well as restrictions of hidden import barriers, mean tariff rate, taxes on international trade and capital account restrictions. ( <a href="http://globalization.kof.ethz.ch/static/pdf/variables_2009.pdf">http://globalization.kof.ethz.ch/static/pdf/variables_2009.pdf</a> ) . Data are from the 2010 report and based on the 2007 survey.	KOF	Swiss Economic Institute	Dreher, Axel (2006): Does Globalization Affect Growth? Evidence from a new Index of Globalization, <i>Applied Economics</i> 38, 10: 1091-1110.
VENTCAP	Country and regional levels are the same: A measure of the venture capital availability on a 7-point Likert scale generating from a statement: Entrepreneurs with innovative but risky projects can generally find venture capital in your country (1 = not true, 7 = true)". . Data are from 2007-2008 except 2009 countries that are from 2008-2009	World Forum	Economic	The Global Competitiveness Report 2008-2009, p. 453 The Global Competitiveness Report 2009-2010 p. 433

### **A-3 APPENDIX: The rescaling of the regional variables for the level and range of the country level variable**

Example: MARKETSIZE

MARKETSIZE = Spain's average marketsize from WEF = 5.34

Maximum MARKETSIZE = 7 Country maximum marketsize from WEF

MARKETSIZE<sub>j</sub> = the applied marketsize variable for the j<sup>th</sup> Spanish region

REGMARKETSIZE<sub>j</sub> = jth region marketsize from Regional Competitiveness score j= 1,.....k, k is the number of region in Spain

Maximum REGMARKETSIZE<sub>j</sub> = 100

AVREGAMARKETSIZE = regional average marketsize as the average of a country regional marketsize values

MARKETSIZE<sub>j</sub> = AVMARKETSIZE +  
 (REGMARKETSIZE<sub>j</sub> – AVREGAMARKETSIZE)(7 – 5.34)/(100 – AVREGAMARKETSIZE)