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What are the drivers of business demography and employment in the countries of the European Union?

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ABSTRACT

The aim of this contribution is to establish a typology of European entrepreneurship countries with respect to variables related to entrepreneurial activity and economic development. Using a combination of multidimensional data analyses allows us to extend the concept of 'entrepreneurial regimes' and leads to the distinction of five such entrepreneurial regimes. Moreover, in order to better characterize these classes, a wide set of illustrative variables representative of national economic development, labour market functioning, and formal and informal institutional environments, as well as variables specific to the entrepreneurial population, are considered. Finally, discriminant analyses show that the five explanatory themes considered (Innovation, Employment, Formal Institutions, Entrepreneurship and Governance) differentiate the classes, and significantly explain the diversity of entrepreneurial regimes. These findings have important implications for the implementation of public policy, in order to promote entrepreneurial activity and reduce unemployment.

KEYWORDS

Entrepreneurship;
Data analysis methods;
Entrepreneurial regimes;
Employment

JEL CLASSIFICATION

L26; C38; O10; O52

I. Introduction

After an increase in the size of enterprises, managerial economies from the late 1970s have been jolted by the emergence of new businesses in new industries, developing new business models. The current period, then, is one of a re-emergence of entrepreneurship in Europe and North America (Audretsch and Thurik 2000, 2001; Thurik 2011). While Europe today is certainly more entrepreneurial than it was in the 1960s and '70s, it remains insufficiently so when compared to the global entrepreneurial economy (Audretsch 2007; GEM 2000, 2006, 2009).¹ According to Schramm (2009), many young American companies are the creators and leaders of new industries and most of these companies are high growth. Five years later, firms are still being described as young (Coad et al. 2014) and as generating a disproportionate amount of jobs, innovations, patents and new technologies. Aghion (2014) emphasizes that innovation involves

creation/destruction, just like the Schumpeterian entrepreneur, and that some countries are better able to 'surf' on new waves of innovation, such as information technology and communication, 'cloud computing' and renewable energy. Like the USA, Sweden and Canada have benefited from these technologies due to reforms already undertaken in the labour market to make it more dynamic.² A comparison with the USA, where the increased growth of recent years is partly due to the creation of companies in new sectors, may shed light on the need to further develop entrepreneurial activity in Europe, particularly in the advanced technology sectors. New collaborative, social and environmental business models should also be developed. Nissan, Martin, and Picazo (2011) find that 'institutions affect economic growth, specifically formal institutions, such as procedures or time needed to create a new business, indicating that regulation can influence the context in which

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¹Erkki Liikanen, Member of the European Commission responsible for enterprise and the information society, wrote in 2003: 'Europe suffers from an entrepreneurship deficit in comparison to the USA'. According to the Sapir report (An Agenda for a Growing Europe, 2004), entrepreneurship and especially innovative company creation appeared as an important means of implementing the Lisbon Strategy (2000), to strengthen innovation and growth in Europe and to build 'the most competitive and dynamic knowledge-driven economy by 2010'.

²Aghion also highlights the concentration of resources in the economy of knowledge, support for innovative firms, support for employees who leave their jobs and increasing competition in the market for goods and services.

entrepreneurship affects economic growth'. The institutional system is then decisive because it guides the trajectory of countries, being more or less entrepreneurial (Audretsch and Thurik 2001). In a recent study, Abdesselam et al. (2018) show that advanced knowledge-based OECD countries with developed financial markets, and with few institutional legal constraints on the labour market, on the openness of the country, and on the creation of enterprises, have a high level of opportunity entrepreneurship and the lowest unemployment rates.

The aim of this contribution is to establish a typology of European entrepreneurship with respect to variables related to entrepreneurial activity, namely, birth, death and survival rates, high-growth enterprises in proportion and the motives behind setting up a firm (opportunity, necessity, self-employment); variables related to economic development (the rates of gross domestic product (GDP) and GDP per capita); and variables relative to the labour market (unemployment, long-term unemployment). This typology has been inspired by those proposed by Audretsch and Fritsch (2002). The approach adopted is more general as it relies on a combination of multidimensional data analyses that take into account the characteristics of the countries, relative to the 12 active variables mentioned above. According to these variables, we can distinguish five different entrepreneurial regimes. Moreover, in order to better characterize them, we have also considered a wide set of illustrative variables representative of national economic development, labour market functioning, and formal and informal institutional environments, as well as variables specific to the entrepreneurial population. Finally, a discriminant model has been applied, with the aim of highlighting the possible links between the five classes of countries with a set of continuous explanatory variables relating to a homogeneous theme. In other words, we want to know if the classes differ regarding the set of predictive variables, which classes differ, and which variables differentiate them. Five explanatory themes were considered: Innovation, Employment, Formal Institutions, Entrepreneurship and Governance.

In the following section, we present a brief review of the literature and a conceptual model. In Section III, we describe the data. Section IV

analyses the typology of the 28 European Union member countries, based on business demography variables and economic environment. A discriminant analysis is applied to distinguish the relevant illustrated variables of numerous sub-themes. Section V concludes the study and presents implications for economic policies.

II. Literature review and conceptual model

The European Union is composed of 28 distinct nation states that are different in terms of economic variables (level of development and labour market functioning) and entrepreneurial characteristics (motives behind setting up a company and business demography). Different national entrepreneurial regimes may be found using a combination of these two groups of active variables, and their integration within the institutional environment.

This section provides a brief overview of the relevant literature in order to explain the differences in entrepreneurial activity across all 28 countries. First, we refer to the literature that highlights, on the one hand, the link between entrepreneurial activity and economic development, and on the other, the functioning of the labour market. Second, we present the national entrepreneurial characteristics, in particular, the motives behind setting up a company and the business demography. Third, we briefly discuss the literature regarding the role of institutions on entrepreneurial activity. Finally, depending on the different levels of development, entrepreneurial activity and business demography, we propose a conceptual model presenting five different entrepreneurial regimes.

Economic variables

The level of development

GEM reports (2000, 2006, 2009, 2014) highlight a high rate of entrepreneurship in countries whose economic development is relatively low. The importance of the primary sector and the functioning of an informal economy explain this high level of entrepreneurial activity in developing countries. Nevertheless, the nature of entrepreneurial activities, and especially the motives behind setting up a firm (opportunity-versus necessity-driven), also affect the impact of

entrepreneurship on economic growth. According to Szerb, Aidis, and Acs (2013, 22),

[A]s an economy matures and its wealth increases, the emphasis of industrial activity shifts towards an expanding services sector [...]. The industrial sector evolves and experiences improvements in variety and sophistication [...]. This change opens the way for development of entrepreneurial activity with high aspirations.

According to Wennekers et al. (2010), two ‘revolutions’ explain the re-emergence of independent entrepreneurship, namely, solo self-employment (Bögenhold and Fachinger 2008; Bögenhold, Heinonen, and Akola 2017; Fachinger and Frankus 2017) – which is important for societal and flexibility reasons and which is more necessity driven – and the ambitious and/or innovative entrepreneurs (Acs, Carlson, and Karlsson 1999; Van Stel and Carree 2004; Audretsch 2007). Simón-Moya, Revuelto-Taboada, and Guerrero (2014) argue that necessity-driven entrepreneurship plays a more relevant role in countries whose economic development is relatively low, and where inequality prevails. Conversely, in more developed countries with relatively low-income inequality and a low level of unemployment, rates of entrepreneurial activity are significantly lower, necessity-driven entrepreneurship is less prevalent and opportunity-driven entrepreneurship is dominant. According to Sambharya and Musteen (2014), ‘the opportunity-driven entrepreneurship often involves more intensive creative processes while necessity entrepreneurship often relies on imitation of well-known business models’. Both are necessary when considering emerging and developing countries. Notwithstanding, in the case of advanced economies, a high ratio of opportunity-driven entrepreneurship is recorded, reflecting a flexible economy more prone to enhancing growth. According to Van Stel, Carree, and Thurik (2005), the total entrepreneurial activity rate for the 1999–2003 period in 36 countries has a positive and significant impact on economic growth. Nevertheless, this impact needs to be differentiated according to the level of development and

the development process of the countries. It is less important in transition economies (for example, in Hungary, Poland and Slovenia) and it may even have a negative impact on economic growth in some developing countries (for example, in Mexico). The absence of large companies and a low actual wage in these countries may explain the high rate of entrepreneurship, as becoming an entrepreneur is sometimes the only way to earn a living. Abdessalam et al. (2018) studied the entrepreneurial behaviours of OECD countries over the period 1999–2012 and show that the level of development and sectoral specialization are crucial for understanding differences in entrepreneurial activity between countries, and to establish a distinction between managerial and entrepreneurial economies.

It is well established that economic development and entrepreneurial activities are closely linked and that less developed countries show higher entrepreneurial activity. Economic development modifies both the extent and nature of self-employment, contributes to the growth of wage employment at the expense of self-employment, and leads to sectoral specialization towards a knowledge and service economy. The economy moves towards qualitative entrepreneurship and fosters opportunity-driven entrepreneurship. Therefore, in order to understand the differences in the intensity and nature of entrepreneurial activity between countries, it is necessary to consider the variables relating to both the level of development and the sectoral specialization of countries.

Labour market functioning

From a microeconomic perspective, the decision to become an entrepreneur is an allocation decision of one’s human capital, the balancing of an opportunity cost to undertake with a reward expectancy (monetary, symbolic – social recognition – or psychological). In an entrepreneurial society, being an employee does not guarantee a stable situation because of the greater flexibility for employers to fire workers. Yet, the flexibility of the labour

market can more easily encourage individuals to engage in entrepreneurship, insofar as this action is a positive signal to future employers. In a salaried society, like France, employees have important historical advantages, with social security, relatively stable jobs and the opportunity to avail of many public benefits.³ Rigidity of the labour market and the stigma of entrepreneurial failure prevent many students and experienced employees (including researchers) from increasing their human capital through the entrepreneurial option. In the case of France, there is also a low commitment level of elites in innovative entrepreneurial activity due to the existence of sunk costs, related to network effects, and the stigma of entrepreneurial failure should the startup be less successful than expected (Bonnet and Cussy 2010).⁴

An employee may not engage in an entrepreneurial adventure unless the overall environment is favourable, that is to say, that the rate of unemployment is rather low and the labour market is fluid and he/she perceives that his/her possible entrepreneurial failure⁵ will not penalize him/her. The same reasoning can be applied to students in universities or engineering schools. Greater labour market flexibility, associated with securing a career path, enables the setting-up of new firms for good reasons. On the other hand, creation costs are more elevated in economies where unemployment is high; for an individual forced out of entrepreneurship due to lower than expected levels of activity, finding a way back into employment can become harder. Thus, an economy that creates insufficient jobs (low growth rate) leading to a dysfunctional labour market (an average duration of unemployment being high) reinforces entrepreneurship but through negative reasons, and discourages entrepreneurs who are motivated by positive ones.

Entrepreneurial characteristics

Motives to set up a firm

The usual way to describe an entrepreneurial economy is to consider that new entrepreneurs are pulled ('pull' effect) into entrepreneurship by the perception of profit opportunities (Kirzner 2009). In this sense, they respond to positive motivation to start a business (clearing markets or developing new ideas). Yet, new entrepreneurs can also be motivated by a 'push' effect, such as being unemployed and trying to avoid the depreciation of one's human capital (Bhattacharjee et al. 2010). Thurik and Dejardin (2011) give other examples of push factors, such as 'uncompetitive compensation schemes, weak social insurance benefits, but also limited autonomy associated with employee status, or the lack of attractive alternative occupational choice'. In a study of self-employment, Congregado and Millan (2013) distinguish the 'true self-employed' from the 'self-employed of the last resort' and the 'dependent self-employed'. The 'true self-employed' are distinguished by the fact that employers are creating jobs, the 'self-employed of the last resort' create their own jobs primarily for reasons of the low opportunity cost attached to the entrepreneurial undertaking (a way out of unemployment), and the 'dependent self-employed' are forced to use this status for labour market flexibility reasons (or cost of employment) – the trade relationship being less restrictive than the wage relationship. The first type is obviously the most desirable.

The Global Entrepreneurship Monitor Program (GEM) measures the levels of entrepreneurial activity between countries by setting the Total Entrepreneurial Activity (TEA) as the proportion of 18 to 64-year-olds who are actively involved in creating a business or running a business for less than 42 months. When comparing the USA and the European Union, the results show that the main difference is that opportunity entrepreneurship (as distinguished from an entrepreneurship of

³GEM studies also point out the importance of tax and social benefits attached to employment status in comparison with independent status. In the case of France, this type of regime was not very favourable to entrepreneurship until new legislation on 'auto-entrepreneurs' appeared at the beginning of 2009. Success was instant: over 600,000 auto-entrepreneurs were registered in 2009 and 2010. The self-creation of an activity has become an important intention of work for youth. It also, unfortunately, often stems from the lack of employment opportunities in existing businesses. More than 900,000 people registered in August 2013, although for a large part of these new entrepreneurs it was more to complement income related to paid employment or a pension supplement (less than 50% were economically active and declaring a positive turnover).

⁴The sunk cost is a notion of industrial organization that expresses the fact that certain investments, once they are made, lose any residual value if the object of investment is not used for what it was designed. By extending this concept to human capital, we show that certain types of education (labelled 'Grandes écoles', see below) do not encourage risk-taking on the part of graduates because of the sunk cost if graduates deviate from their classical trajectory of career.

⁵An entrepreneurial failure does not necessarily lead to bankruptcy – such an outcome is, rather, the exception. It is more the idea that if a company does not give the expected returns then the entrepreneur has to return to a waged position.

necessity) is lower in Europe, and especially in France, but also in Germany (GEM, 2009). It is, therefore, necessary to examine the conditions that enable an economy to foster opportunity entrepreneurship. The proportion of new entrepreneurs driven by reasons of necessity is all the more important given that the unemployment rate is high. Yet, in Europe, Wennekers (2006) has shown that there is a negative relationship between the unemployment rate and the total level of entrepreneurial activities ('push' and 'pull' effects). The two motives are thus not independent. The French economy, unfortunately, is in a situation where the 'push' effects (characterized by constrained motives) dominate, resulting in a global entrepreneurial intensity that is rather low.⁶

Business demography

Audretsch and Fritsch (2002), by extending the concept of technological regimes for innovative activities, drawn from the literature of industrial organization, have built a typology of four classes of regional development in Germany. They distinguish between the entrepreneurial regime – with a high level of new business creation and significant job growth; the routinized regime – where job growth is mainly driven by existing firms, where new firms have a relatively low survival rate and growth prospects compared to the entrepreneurial regime; the 'revolving door' regime – where there is a high rate of entry and exit of new firms and ultimately little impact on employment; and, finally, the regime of decline – where heavy job cuts in existing firms combine with low entrepreneurial activity. This classification is carried out on a regional database using the values of the rates of enterprise creation and growth of employment.

Birth and death rates of a new company's formation may be different between countries, as, indeed, are the survival rates. In a favourable period to entrepreneurship, the proportion of high-growth firms will give us information about the relative prevalence of entrepreneurial dynamics in the creation of jobs.

Institutional environment

For institutionalists in economy, and following North (1990), 'the relevant framework is a set of political, social, and legal ground rules that fixes a basis for production, exchange, and distribution in a system or society' (Bruton and Ahlstrom 2003). Scott (1995) distinguishes between three institutional categories: regulatory, normative and cognitive. North (1990) proposes to split institutions into formal and informal ones. The most formal institutions are the regulatory ones representing standards provided by laws and other sanctions (Bruton and Ahlstrom 2003). Normative institutions are less formal or codified and define the roles or actions that are expected of individuals. Cognitive institutions relate more to the cultural, behavioural and role models shared in society. Recent research (Acs, Autio, and Szerb 2014) proposes a systemic approach to entrepreneurship with the definition of different national systems of entrepreneurship: 'A National System of Entrepreneurship is the dynamic, institutionally embedded interaction between entrepreneurial attitudes, ability, and aspirations, by individuals, which drives the allocation of resources through the creation and operation of new ventures'. Regarding entrepreneurship, the 'rules of the game' include the development and operation of the financial system, the intensity of the administrative barriers, the legislation regulating labour market relations, the fiscal rules, the social security system, legal consequences of the failure of the firm, the entrepreneurial spirit and the collective perception of the failure of the firm, as well as the perception of success as an entrepreneur (Bonnet, Brau, and Cussy 2011). Figure 1 summarizes the main institutional determinants of entrepreneurial activities.

A number of recent studies have explored the impact of the institutional environment on entrepreneurship activity but they differ, not only in the choice of institutions they focus on but also regarding which institutional variables seem to be the most salient ones. Bosma and Schutjens (2011) point out the importance of institutional factors in explaining variations in regional entrepreneurial attitude and activity. Considering different components of entrepreneurial attitudes, i.e. fear of failure

⁶Things are changing, however, with a recent effort by the government for the creation of innovative companies and the research tax credit ('crédit d'impôt recherche') that makes 'France one of the countries that supports the most their innovative companies', S. Distinguin, *La Croix*, 6 January 2016.

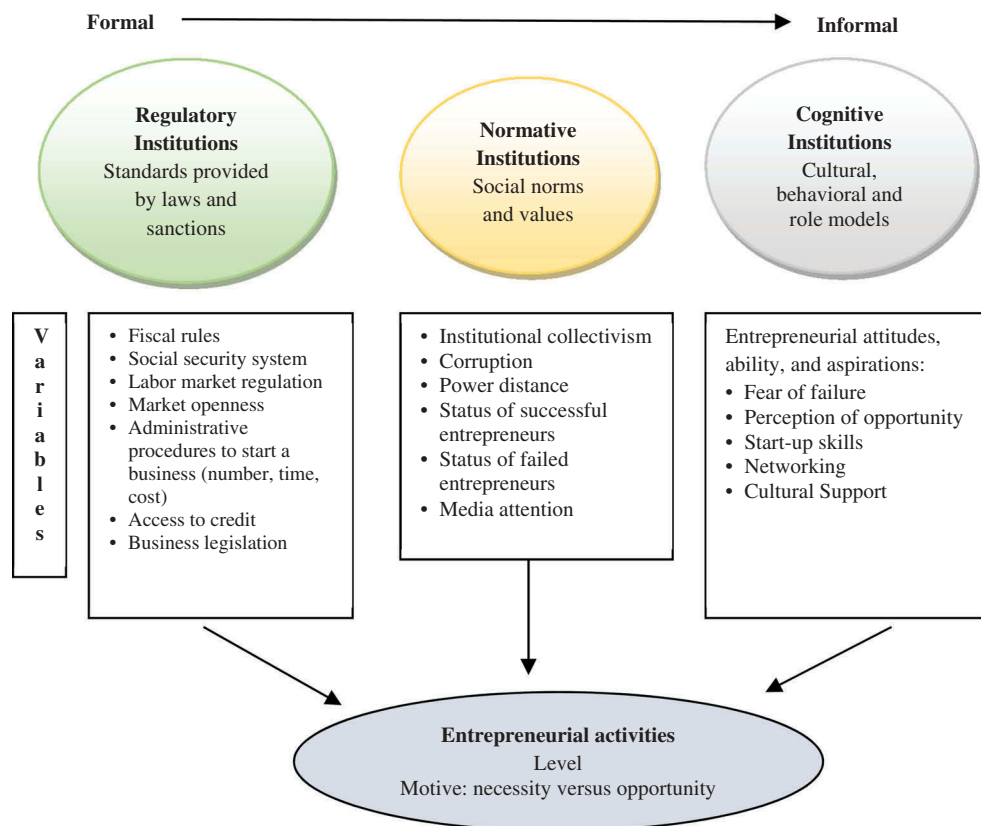


Figure 1. Institutional drivers of entrepreneurial activities.

in starting a business, perceptions on start-up opportunities and self-assessment of personal capabilities to start a firm, they argue that institutional conditions influence entrepreneurial behaviour not directly, but indirectly, by affecting entrepreneurial attitudes. Nissan, Martin, and Picazo (2011) find that ‘institutions affect economic growth, specifically formal institutions, such as procedures or time needed to create a new business, indicating that regulation can influence the context in which entrepreneurship affects economic growth’. Van Stel, Storey, and Thurik (2007) examine the relationship between regulation and entrepreneurship in 39 countries and show that the minimum capital requirement for starting a business does seem to lower entrepreneurship rates across countries, while administrative protocol, such as time, the cost, or the number of procedures needed to start a business, do not. Valdez and Richardson (2013), using GEM aggregated survey data of individuals at national level, show that normative and cultural cognitive institutions are the main drivers of entrepreneurship. Simón-Moya, Revuelto-Taboada, and

Guerrero (2014) suggest that both formal and informal institutions matter – countries with high levels of economic freedom and education tend to have more opportunity entrepreneurship. Sambharya and Musteen (2014), using cross-sectional data on 42 countries over the period 2000–2005, show that market openness, regulatory quality (for example, the time and funds consumed by complying with complex regulatory requirements to set up a firm), and some elements of entrepreneurial culture (uncertainty avoidance, institutional collectivism and power distance) explain the level of opportunity- versus necessity-driven entrepreneurial activity. Their findings suggest that the impact of institutional factors varies depending on the type of entrepreneurship activity. Aparicio, Urbano, and Audrestch (2016) state that informal institutions, namely control of corruption and confidence in one’s skills, have a higher impact on opportunity-driven entrepreneurship than formal institutions, such as the number of procedures required to start a new business, and private coverage needed to get credit. Abdesselam et al. (2018)

establish a typology of entrepreneurship for OECD countries and point out that an institutional regulation environment is able to stimulate or inhibit not only entrepreneurial activity but also explain the type of entrepreneurial activity.

The empirical literature strongly supports the notion that the three institutional pillars (regulatory, normative, cognitive) can be viewed as important drivers of entrepreneurial activity and contribute to explaining both the intensity (level and rate) and motives (necessity or opportunity) of entrepreneurship, as well as the differences between countries. If an institutional convergence exists in Europe, participating towards growth and cohesion, especially among Central and Eastern European countries (Gruševaja and Pusch 2015), strong differences are still at work and will influence the two groups of active variables.⁷

The conceptual model

We would like to extend these Regional Entrepreneurial regimes to National Entrepreneurial regimes, based on the previous discussion. Two groups of active variables are chosen to establish a cluster analysis of the European Union countries in order to identify different 'National Entrepreneurial regimes'. These variables are related to the economic environment and entrepreneurial activities. First, we enrich the typology proposed by Audretsch and Fritsch (2002) using a multidimensional analysis, taking into account several variables representative of the demography of companies and the motives behind setting up a firm. We also take into account different variables representative of labour market functioning and level of development. We can then present a figure that summarizes the discussion.

The variables that are used to define and characterize the different entrepreneurial regimes come from the economic environment and entrepreneurial activities, as discussed above. There is also retroaction between these fields; for example, a poor functioning of the labour market or a weak level of development may induce a high level of necessity motives in the setting-up process. Conversely, for

different reasons linked to a favourable institutional environment, a high level of opportunity motives may lead to a low level of unemployment, thanks to the creation of many jobs (*Schumpeter effect*).

Different national entrepreneurial regimes can be found within the combination of the four groups of active variables (see Figure 2), and their integration within the institutional environment. 'A System of Entrepreneurship is the dynamic, institutionally embedded interaction between entrepreneurial attitudes, ability, and aspirations, by individuals, which drives the allocation of resources through the creation and operation of new ventures.' (Szerb, Acs, Autio, Ortega-Argiles and Komlosi (2013), REDI report, p.12). Indeed, for the promoters of Global Entrepreneurship Index (GEI), an entrepreneur is a person who has the Kirznerian capacity of 'alertness', in the sense that they see an opportunity for innovation and seize it. It can, therefore, be said that the GEI indicator and its components are meant to measure the conditions for the highest quality of entrepreneurial activity.

III. Data and preliminary analyses

In this section, we describe the data and present the summary statistics.

Our proposal aims to establish a cluster analysis, more precisely, a hierarchical ascendant classification (HAC) of the European Union countries according to variables related to entrepreneurial activity, namely: BIRTH, DEATH, SURVIVAL, high-growth enterprises proportions (HighGrowthEnt, HighGrowthEmpl) and motives for setting up a firm, OPPORTUNITY and NECESSITY; and variables related to economic development: GDP (rate of growth of GDP), GDPPC (GDP per inhabitant) and SELFEMPL (self-employment rate), and to the labour market, UNEMPL (rate of unemployment) and LTUNEMPL (rate of long-term unemployment).

These variables are described in Table 1. We consider the 28 European Union member countries and data refer mainly to the year 2014, except for the variable DEATH which is only available for 2013.

⁷Reducing need-based entrepreneurship in favour of opportunistic entrepreneurship requires profound institutional and socio-economic changes, especially in the CEECs. Rodríguez-Pose (2017) shows that in addition to the traditional factors of growth (human capital, physical capital, innovation (i.e. opportunity entrepreneurship) and infrastructure levels, among others), the quality of institutions is crucial. Since the 2009s crisis, institutions are changing, they are improving, and improvements concerning the quality of institutions explain growth at the regional level.

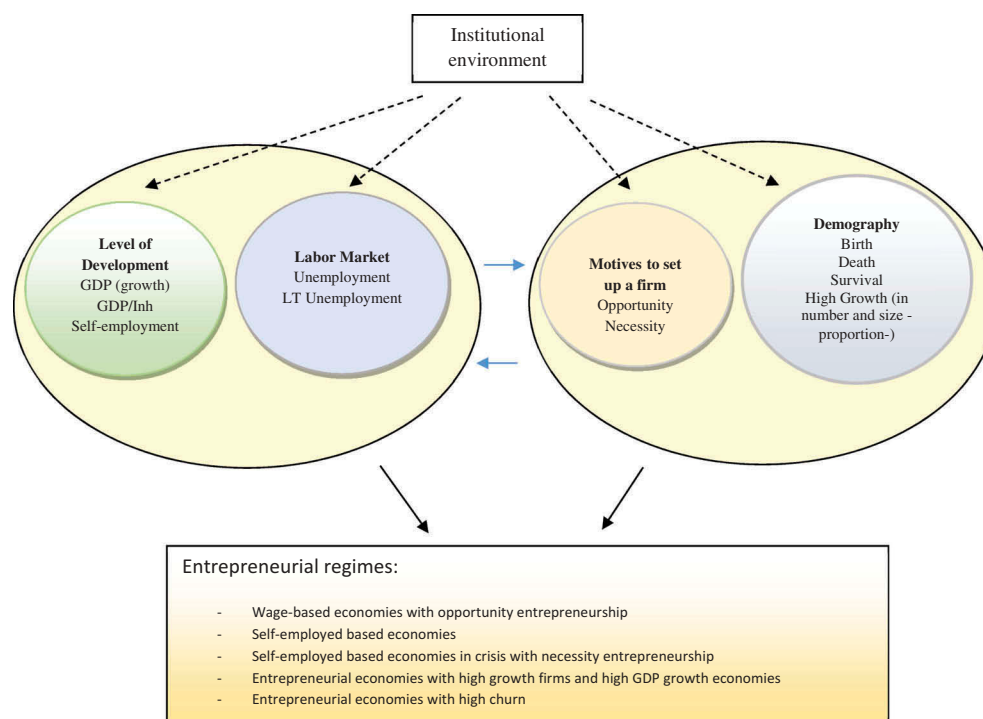


Figure 2. National entrepreneurial regimes.

Table 1. Active variables.

Name	Description	Period	Source
BIRTH	Birth rate: number of enterprise births in the reference period (t)/the number of enterprises active in t.	2014	EUROSTAT
DEATH	Death rate: number of enterprise deaths in the reference period (t)/the number of enterprises active in t.	2013	EUROSTAT
SURVIVAL	Survival rate: number of enterprises in the reference period (t) newly born in t-5, having survived to t divided by the number of enterprise births in t-5	2014	EUROSTAT
HighGrowthEnt	Percentage of high-growth enterprises measured in employment: number of high-growth enterprises divided by the number of active enterprises with at least 10 employees	2014	EUROSTAT
HighGrowthEmpl	Employment share of high-growth enterprises measured in employment: number of employees among high-growth enterprises divided by the number of employees among the stock of active enterprises with at least 10 employees	2014	EUROSTAT
OPPORTUNITY	Percentage of the population aged 18–64 who experience good opportunities to start a firm in the area where they live	2014	GEM
NECESSITY	Percentage of those involved in TEA ⁸ who are involved in entrepreneurship because they had no other option for work	2014	GEM
SELFEMPL	Percentage of self-employed workers from the category of all employed people (salaried and self-employed)	2014	ILO
GDP	Rate of growth of the GDP	2014	World Bank
GDPPC	GDP per capita (constant 2010 US\$)	2014	World Bank
UNEMPL	Unemployment rate	2014	ILO
LTUNEMPL	Long-term unemployment refers to the number of people with continuous periods of unemployment extending for a year or longer, expressed as a percentage of the total number of unemployed	2014	ILO

GEM, Global Entrepreneurship Monitor; ILO, International Labour Organization.

The data is extracted from OECD, Eurostat, GEM and ILO databases.

Table 2 illustrates some summary descriptive statistics relative to these 12 active variables used to create a European Union member countries typology, according to entrepreneurship and employment.

The coefficient of variation is an appropriate statistic to compare the dispersion level of several series; it ranges from 17.8% for the variable SURVIVAL to 95.48% for the GDP.

We observe a strong variability of variables related to economic development, namely, GDP, GDPPC

⁸The Total early-stage Entrepreneurial Activity (TEA) rate is defined as the percentage of individuals aged 18–64 who are either actively involved in creating a business or running a business for less than 42 months.

Table 2. Descriptive statistics.

Variables	Frequency	Mean	Minimum	Maximum	Standard deviation	Coefficient of variation (%)
BIRTH (%)	27	10.68	4.37	24.5	4.16	38.95
DEATH (%)	27	9.69	3.48	18.10	3.11	32.09
SURVIVAL (%)	25	44.71	30.23	60.66	7.96	17.80
HighGrowthEnt (%)	27	9.41	2.16	13.67	2.76	29.33
HighGrowthEmpl (%)	27	12.81	3.55	19.73	4.33	33.80
OPPORTUNITY (%)	26	33.51	15.84	70.07	12.97	38.70
NECESSITY(%)	26	23.11	5.42	46.57	10.05	43.49
SELF (%)	27	16.10	8.70	36.00	6.42	39.88
GDP (%)	27	1.99	-1.53	8.46	1.90	95.48
GDPPC (ME)	27	32.67	7.30	103.92	20.67	63.28
UNEMPL (%)	27	10.60	5.00	26.3	5.21	49.15
LTUNEMPL (%)	27	45.38	15.00	73.5	13.83	30.48

and UNEMPL, revealing a high heterogeneity between the 28 countries studied, in terms of economic performance. The GDP growth rate ranges from 1.53% in Cyprus to 8.46% in Ireland, while GDP per capita ranges from 7,299 euros in Bulgaria to 103,924 euros in Luxembourg. The rate of unemployment is 26.3% in Greece against only 5% in Germany. Several variables linked to entrepreneurial activity (NECESSITY, SELF, BIRTH and OPPORTUNITY) also exhibit relatively high coefficients of variation showing heterogeneity in entrepreneurial behaviours between European Union member countries.

The motives behind setting up a firm differ greatly from one country to another: creation through necessity ranges from 5.4% in Denmark to 46.6% in Croatia, while creation through opportunity ranges from 15.8% in Bulgaria to 70% in Sweden. Self-employment is 36% in Greece compared with only 8.7% in Luxembourg. Furthermore, the birth rate of firms is also very different between the 28 countries, as it reaches 24.5% in Lithuania against only 4.4% in Belgium.

Finally, we find that both the variables related to economic development and those related to entrepreneurial demography differ greatly between the countries of the European Union. This suggests the existence of diverse economic and entrepreneurial development processes in Europe.

Moreover, in order to better characterize classes, we also use a wide set of illustrative variables relevant for illustrating the context of entrepreneurship in different countries. These variables are likely to provide additional information to consolidate and enrich the interpretation of the different regimes of countries, so they were positioned as supplementary variables in the multidimensional analysis. They do not

affect the calculations based upon the 12 active variables: they are not used to determine the principal component factors but are, *a posteriori*, positioned in order to assess their degree of similarity with the active variables. We consider three categories of variables: those representative of national economic development, of institutional environment and of those specific to the entrepreneurial population. In the category of national economic development, sectoral variables, as well as variables representative of the level of development, such as the importance of innovation, health, finance, education, connectivity, the complexity of the economy and employment characteristics, are found. Formal and informal institutional variables are also recorded, as well as entrepreneurial variables like the characteristics of entrepreneurs, firms and newly founded companies.

These variables, extracted from various data sources, are described in Table A1 in the appendix. We use data mostly related to the year 2014. When data is not available for this year, we complete the database using data from accompanying years, specifically 2013 or 2015.

IV. Empirical results

To exploit this massive amount of data, two techniques of data analysis are proposed: the first, an hierarchical ascendant classification (HAC), with descriptive purpose (Lebart, Morineau, and Piron 2000; Saporta 2006), and the second, a discriminant analysis (DA), with an explanatory purpose (Celeux 1990; Huberty 1994).

In the first analysis (HAC), the characteristic variables of the theme, entrepreneurial activity, employment and economic development of the 28 EU countries, as presented in Table 1, whose status

is said to be active, are used to build and characterize the most homogeneous and distinct country classes of the 28 EU countries. According to the similarity of the 12 active variables, we establish a typology of the 28 EU member countries. As for the variables in Table A1 in the appendix, which relate to several economic themes and whose status in the HAC is illustrative, they are used *a posteriori* to describe the EU country classes previously characterized by the active variables.

In the second analysis (DA), we study the effect of a theme of continuous explanatory variables on the target qualitative variable with five class modalities, synthesized by the first analysis, in other words, the HAC of the 28 EU countries according to the theme of entrepreneurial activity, employment and economic development.

Five explanatory themes are considered: Innovation, Employment, Formal Institutions, Entrepreneurship and Governance (see Table A1 in the appendix). In other words, for each explanatory theme, we try to determine the

characteristics which discriminate and divide the classes of the 28 EU countries characterized by the HAC.

Typology of the demography of business and employment in the 28 EU countries

The approach adopted relies on a combined use of multidimensional data analyses that take into account the characteristics of the countries, relative to the 12 active variables described above. According to the similarity of these variables, we can establish a typology of the 28 European Union member countries. An HAC, according to the Ward criterion,⁹ is applied to group the 28 countries into homogeneous classes on the significant factors of the principal component analysis (PCA) of the theme, entrepreneurial activity, employment and economic development. This methodological linking of factorial analysis and clustering methods constitutes an instrument for statistical observation and the

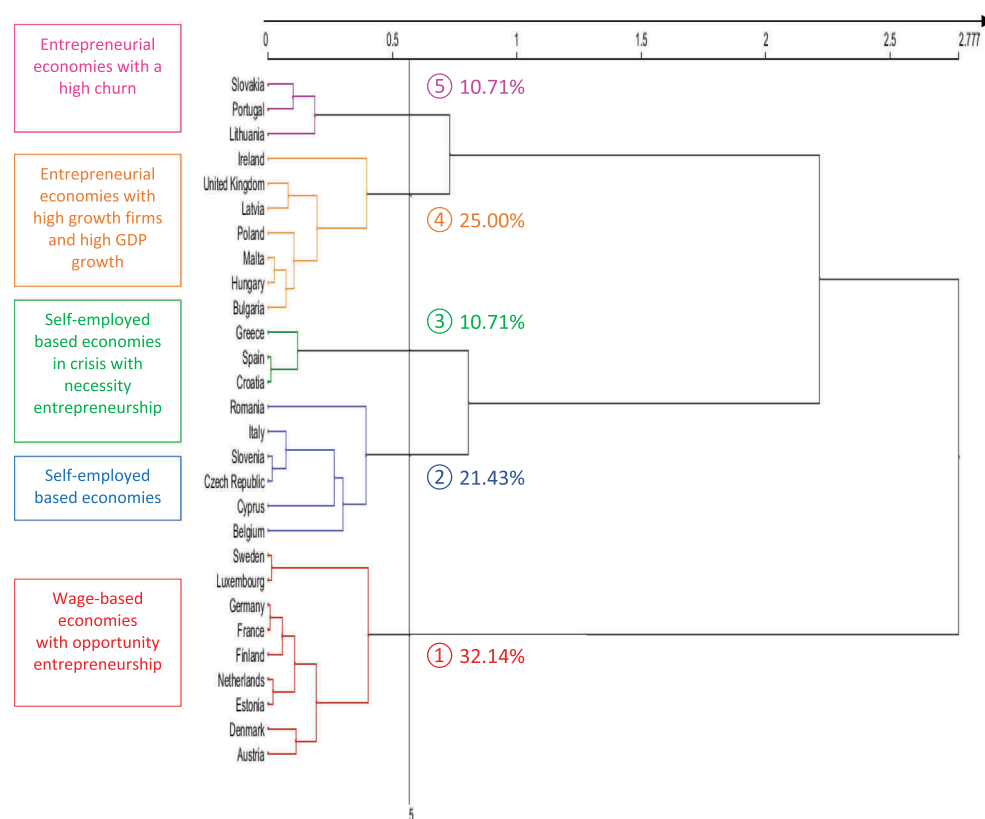


Figure 3. Hierarchical tree for the 28 European Union member countries.

⁹Generalised Ward's Criteria, i.e. aggregation based on the criterion of the loss of minimal inertia.

structural analysis of data. The dendrogram, in [Figure 3](#), represents the hierarchical tree of the 28 EU countries according to the theme, entrepreneurial activity, employment and economic development.

The HAC identifies five distinct entrepreneurial activity and employment types in the Union European. [Table A2](#), shown in the appendix, summarizes the main results of the characterization of the five classes of EU countries, obtained after cutting the hierarchical tree according to a judicious choice of the aggregation index.

Class 1 wage-based economies with opportunity entrepreneurship

The first class is composed of nine countries, namely, Austria, Denmark, Estonia, Finland, France, Germany, Luxembourg, the Netherlands and Sweden. In these countries, business creation is driven by opportunity motives. The countries are the most developed in terms of GDP/inhabitant, and business survival at 5 years is good. There are fewer creations per necessity, unemployment, as well as long-term unemployment, is lower, the level of self-employment is low, and, finally, the mortality rate is low.

These countries have rather high levels of employment in the services sector and benefit from an economic context favourable to innovation. They display a high level of research and development (R&D) expenditure, including high-quality scientific research, revealed by the importance of patents and scientific and technical journal articles. Expenditure on education and healthcare is important, and economic complexity and the economy of finance is well developed. The proportion of young people in employment is high, as is the employment rate for those over 15 years of age. Employees are a high proportion of the population, part-time work is developed, and the unemployed are educated. Employment in industry and in agriculture (% of total employment), as well as added value in agriculture (% of total added value), are rather weak. Vulnerable employment is low, as is the unemployment rate of 15- to 24-year-olds.

Many variables related to the institutional environment are significant, especially those regarding informal institutions. Indeed, most of the GEM/GEDI variables linked to entrepreneurship attitudes,

abilities and aspirations, as well as governance, are positively significant. If we look more closely at the results, we observe that concerning formal institutions, countries from this class present some attractive production factors, including labour inflows of foreign populations that are significantly higher than average, and high real minimum wages. These countries also present unfavourable net barter terms of trade. Although entrepreneurial activities are valued, the intention to start a business is not highly rated and the assessment of entrepreneurial skills is weak. Eight governance variables out of 10 are significant: corruption is low, there are high levels of economic freedom, taxation is effective, the quality of tertiary education is high, and company-level technology absorption capability and venture capital business strategy are also high. It seems that in this class, governance is favourable to opportunity entrepreneurship and business survival. These results are in line with those of Simón-Moya, Revuelto-Taboada, and Guerrero (2014) and Abdeslam et al. (2018), which show that business freedom, trade freedom and labour market freedom are all favourable to opportunity entrepreneurship.

The proportion of people who know business creation, the percentage of TEA businesses that are highly active in the technology sectors (high or medium), and the amount of TEA companies started in those markets where not many other firms offer the same product, are high. Entrepreneurial activity is not that important; moreover, not that many males are engaged in nascent entrepreneurship. There is relatively little ambition for growth, new company startups are still small in size when they cease trading, and few jobs are created at the startup. The number of jobs in startups that reach their 5-year-old mark is rather low. Finally, the percentage of TEA businesses using new technology is low.

Class 1 comprises countries that have wage-based economies where much of the development is also carried out by existing companies. Opportunity entrepreneurship and a good survival rate are the main entrepreneurial characteristics of this class.

Class 2: Self-employed-based economies

The second class contains six countries: Belgium, Cyprus, the Czech Republic, Italy, Romania and Slovenia. These countries have a high level of self-employment relative to all the countries in our

sample, as well as a high business survival rate at 5 years. They are also characterized by low rates of birth and low percentages of high-growth firms in terms of the number of firms and the number of jobs created.

The countries of this class present high rates of vulnerable employment and low levels of salaried workers. They have strong institutional environment constraints relative to entrepreneurship, namely, the cost of becoming an entrepreneur is high. Furthermore, variables relative to governance reveal a high level of corruption and the non-effectiveness of using taxes.

Class 2 shows fewer established firms and less new company startups initiated by females. People know fewer creative entrepreneurs; less companies with high-growth expectation are reported in the information and communications technology (ICT) sector and in real estate, and there are less jobs in ICT.

Class 3: self-employed-based economies in crisis with necessity entrepreneurship

The third class comprises three countries: Croatia, Greece and Spain. Unemployment rates, as well as the long-term unemployment rate, are high. This class is also characterized by a high self-employment rate and by necessity-driven entrepreneurship. Unemployed people set up their own firms, which is a characteristic of 'push' entrepreneurs. Opportunity entrepreneurship is low.

The labour force participation rate is rather lower than the average for the countries under study. The percentage of wage and salaried workers is low, with respect to total employment, and the youth unemployment rate is high. Moreover, these economies are not innovative; businesses of less than 42 months are generally not involved in the launching of new products or services. Economic complexity is rather low, as is technology transfer.

The barriers to entrepreneurship are high. Many GEM/GEDI indicators related to informal institutions are negatively significant: the environment and governance are unfavourable to entrepreneurship.¹⁰ Attitudes and aspirations indexes to entrepreneurship are low. Although there is no fear associated with setting up his/her firm, successful entrepreneurs do not receive recognition. This may be linked

to the bias towards entrepreneurship of necessity in these countries; such status does not lead to being socially valued. Governance variables reveal a high level of corruption, the low absorption of new techniques, limited economic freedom (property rights, labour market), and venture capital business strategy are poorly developed. These results corroborate those of Aparicio, Urbano, and Audrestch (2016), Pinho (2016) and Simón-Moya, Revuelto-Taboada, and Guerrero (2014), which show the relevance of informal institutions, such as the control of corruption, confidence in one's skills, business freedom, property rights, etc., as determinants of opportunity entrepreneurship at a macro-level.

The size of surviving 5-year-old enterprises is rather large; the number of jobs in high-growth new firms is low in the ICT sector.

Class 4: entrepreneurial economies with high-growth firms and high GDP growth

The fourth class consists of seven countries: Bulgaria, Hungary, Ireland, Latvia, Malta, Poland and the United Kingdom. These countries registered a significantly high rate of growth in 2014. They are also characterized by numerous high-growth firms and the percentage of these enterprises in employment is high.

There exist numerous high-growth firms in the ICT and real estate branches of activity. The percentage of these enterprises in terms of jobs is high for both sectors and they are created with a large average size. The average size of new entrants is high. Companies up to 5-year-old represent a large share of jobs.

Health expenditure, and especially public health expenditure, is significantly below the average of other European Union countries. These economies are not innovation oriented: scientific institutions and the availability of scientists are little developed, and scientific and technical journal articles are fairly scarce.

Only three institutional regulatory variables are significant. The countries of this class present favourable net barter terms of trade with low employment regulation. They also suffer from some restrictions to entrepreneurship, such as the time required in starting a business.

¹⁰See appendix.

Class 5: entrepreneurial economies with a high churn

The countries of the fifth class, Lithuania, Portugal and Slovakia, are only characterized by business demography variables. They present a dynamic style of entrepreneurship with both high start-up and exit rates; the survival rate at 5 years is low. The characteristics of this class relative to the other variables are similar to those of the sample's mean.

Class 5 includes rather sparsely urbanized countries, which are rather unattractive and present few barriers to entrepreneurship. The real minimum wage is low and there is no market of pure and perfect competition according to the variable CERUG from GEDI Index.¹¹

There is a real entrepreneurial dynamic of emerging firms, with a higher average for nascent companies than in the other classes, as are all averages for new enterprises less than 42 months old. The amount of jobs created by new firms up to 5 years old is high; the size of new-firm startups is also high, as is the size of exiting new-firm startups. Churn is high, but we cannot qualify these countries as equivalent of the 'revolving door' effect of Audretsch and Fritsch (2002), because net growth in the number of firms remains high and unemployment is not significantly higher than the mean of classes.

Discriminating effects of themes on the entrepreneurial activity of the 28 EU countries

The discriminant analysis (DA) is a multidimensional method; it allows one to highlight the links existing between a target qualitative variable which can help explain, in this case, the variable: synthesis of entrepreneurial activity into five modalities corresponding to the previously discussed five classes of the 28 EU countries, and a set of continuous explanatory variables relating to a homogeneous theme. Five explanatory themes were considered: Innovation, Employment, Formal Institutions, Entrepreneurship and Governance.

The DA method is a special PCA; it produces discriminant factors which are linear combinations of the explanatory variables and establishes graphical representations on discriminant factorial planes making it possible to distinguish the classes, and then explain their respective positions.

It has two main objectives: the first is descriptive and consists in determining which of the explanatory variables are discriminating. The second objective is predictive or decision-making and is concerned with classifying new anonymous explanatory data in these known classes using the discriminant linear functions established previously. Our goal is a search to identify themes – homogeneous sets of explanatory variables – which discriminate between the five classes presented in the 'Typology of the demography of business and employment in the 28 EU countries' section.

Table 3 and Table A3 given in appendix summarizes the main results of the five DA.¹² For each theme, the explanatory variables that discriminate between and separate each of the entrepreneurial classes characterized by the HAC are mentioned. In general, all five discrimination models considered are significant overall; the p-value of the Fischer F-statistic of the Wilks' lambda¹³ is less than, or equal to, the error risk $\alpha = 5\%$. So, we reject the null hypothesis that classes are confused. In the same way, an explanatory variable is significantly discriminating if the corresponding p-value is less than, or equal to, the error risk $\alpha = 5\%$.

With regard to the Innovation DA, the model as a whole is very significant (p-value = 0.09% < 5%) with a good predictive performance; more than 85% of the 28 countries are correctly classified by the model (see Table A3 in Annex). Only two variables, NSERPRO and ARTI13, are not discriminating. The significant discriminant factor opposes and separates the countries of Class 1, with high levels of expenses in R&D in %age of the GDP, a high number of researchers (per million inhabitants), a high level of patent applications made by residents

¹¹This variable is a product of two variables; *Regulation*: Effectiveness of anti-monopoly policy, answering to the question: 'In your country, how effective are anti-monopoly policies at ensuring fair competition?' [1 = not effective at all; 7 = extremely effective] and *Market Dominance*: 'Corporate activity in your country is (1 = dominated by a few business groups, 7 = spread among many firms)'.

¹²The DA is based on the normality of populations. The discriminant functions are linear if the matrices of variances and covariances of these populations are equal; otherwise, they are quadratic. All these conditions of application have been checked.

¹³Note that, the Wilks' lambda is an indicator that allows one to statistically evaluate whether the model as a whole is significantly discriminating. Its value ranges from 0 to 1. The closer it is to 0, the more the model is discriminant and the more the classes are distinct. The closer it tends to 1, the more the classes are confused and not separable, i.e. there is no discrimination. The Wilks statistic can be approximated by a Fisher law.

Table 3. DA – synthesis results of each explanatory theme.

Multivariate Statistics and F Approximation											Innovation
Statistics		Value		F Value		Pr > F					
Wilks' Lambda		0.0623		2.60		0.0009**					
Variable	GDERD	ARTI13	RD	PATENTS	NSERPRO	TECHTR	SCIENCE	The overall error rate is 14.29% for the theme Innovation			
R-Square	0.4910	0.2981	0.5217	0.4249	0.1882	0.5826	0.5010				
F Value	5.55	2.44	6.27	4.25	1.33	8.03	5.77				
Pr > F	0.0028*	0.0756	0.0014*	0.0102**	0.2878	0.0003**	0.0023*				

Multivariate Statistics and F Approximation											Employment
Statistics		Value		F Value		Pr > F					
Wilks' Lambda		0.0442		2.52		0.0010**					
Variable	TUNEMP	PUNEMP	VUNEMP	EMPT15	E1524	LFP15	U1524	WORKS	The overall error rate ² is 28,57% for the theme Employment		
R-Square	0.1973	0.2432	0.4100	0.6272	0.5349	0.3216	0.7259	0.4382			
F Value	1.41	1.85	4.00	9.67	6.61	2.73	15.23	4.49			
Pr > F	0.2610	0.1540	0.0132*	<.0001**	0.0011**	0.0542	<.0001**	0.0080**			

Multivariate Statistics and F Approximation											Governance	
Statistics		Value		F Value		Pr > F						
Wilks' Lambda		0.0402		1.83		0.0187*						
Variable	NOCOR	BRISK	FPROP	TGOV	CREGU	EDUC	TABSO	LMARK	FSTRA	INFIN		The overall error rate is 14.29% for the theme Governance
R-Square	0.5732	0.1479	0.4977	0.3942	0.4960	0.1295	0.5041	0.3027	0.5460	0.1228		
F Value	7.72	1.00	5.70	3.74	5.66	0.86	5.84	2.50	6.91	0.80		
Pr > F	0.0004**	0.4288	0.0024**	0.0174*	0.0025**	0.5050	0.0021**	0.0709	0.0008**	0.5348		

Multivariate Statistics and F Approximation											Entrepreneurship	
Statistics		Value		F Value		Pr > F						
Wilks' Lambda		0.0184		1.83		0.0190*						
Variable	ISTAR	DESIR	FAIL	NFFAI	EGROW	HSTAT	MSUCC	SKILLS	CARST	ATT		The overall error rate is 14.29% for the theme Entrepreneurship
R-Square	0.2221	0.1342	0.0427	0.2059	0.0998	0.3801	0.1755	0.1958	0.0844	0.5250		
F Value	1.64	0.89	0.26	1.49	0.64	3.53	1.22	1.40	0.53	6.36		
Pr > F	0.1979	0.4848	0.9029	0.2377	0.6408	0.0220*	0.3281	0.2653	0.7149	0.0013**		

Formal characteristics Complete model: 15	Multivariate Statistics and F Approximation										Formal Characteristics
	Statistics		Value		F Value		Pr > F				
	Wilks' Lambda		0.0071		1.59		0.0651				
	Entered Variable		BARR	ECH	NMIG	TRADE	COST	STRIC	TIME	FDIIn	
	Removed Variable										
	Partial R-Square		0.3648	0.4295	0.4554	0.3098	0.2563	0.2826	0.3521	0.2751	
	F Value		3.30	4.14	4.39	2.24	1.64	1.77	2.31	1.52	
	Pr > F		0.0281	0.0119	0.0098	0.1005	0.2061	0.1784	0.0998	0.2440	

Formal characteristics Reduced	Statistics		Value		F Value		Pr > F		The overall error rate is 17.86% for the theme Formal Characteristics
	Wilks' Lambda		0.0459		3.03		0.0001**		
	Variable	ECH	NMIG	COST	STRIC	BARR	FDIIn	TIME	
	R-Square	0.3515	0.3533	0.2156	0.2112	0.3648	0.1231	0.2169	
	F Value	3.12	3.14	1.58	1.54	3.30	0.81	1.59	
	Pr > F	0.0346*	0.0337*	0.2132	0.2241	0.0281*	0.5334	0.2100	

Significance level α : ** $\alpha \leq 1\%$; * $\alpha \in [1\%; 5\%]$

(%age of the labour force), an elevated level of technology transfer and a high level of the variable science (product of GDERD), including quality of scientific institutions and availability of scientists, from the countries of Classes 2 and 3.¹⁴

According to the theme of Employment, the model is also significant with five discriminant variables with a risk of error of 5%; note that the variable LFP15 is significant with a risk of error of 5.4%. We observe a difference between countries of Class 1, with high rates of employment, especially among the young (aged 15–24) – in %age of the population aged 15 and more – and a high level of wage and salaried workers (% of the total employment), and countries of Classes 3 and 5, with high rates of vulnerable employment and unemployed youth (aged 15–24).

As for the significant model on the Entrepreneurship theme, it discriminates between the countries in Class 1, with high rates of GEI, ATT, ABT, ASP and HSTAT, and those of Classes 3, 4 and 5. Our results validate the relevance of the GEDI indicators related to attitudes, abilities and aspirations for entrepreneurship that discriminate between the five entrepreneurial regimes.

The first significant discriminant factor of the Governance model differentiates between the countries of Class 5, which are characterized by relative no corruption, good assimilation of technology by companies,¹⁵ high rates of business freedom and property rights, and venture capital availability, comparatively to the countries of Classes 3 and 4. The second factor distinguishes

¹⁴The overall rate of misclassification is given to judge the predictive quality of the model.

¹⁵The Corruption Perceptions Index (CPI) – NOCOR – 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'. Firm-level technology absorption capability (TABSO): 'Companies in your country are (1 = not able to absorb new technology, 7 = aggressive in absorbing new technology)'.

between the countries of Classes 3 and 5, and those of Class 1. Class 1 (wage-based economies with opportunity entrepreneurship) is ahead of Classes 3 and 5 regarding the absence of corruption, property security leading to high levels of activity, the effectiveness of public expenditure, the functioning of competitive markets, the availability of venture capital, the ability of companies to pursue different strategies, and an optionally competitive qualitative labour market, with an error risk of 7.09%.

From the above, it is clear that a hierarchy exists among these variables and three of them appear to be important to differentiate between the fourth class (high level of GDP growth) and the fifth class (high churn). These three variables are the effectiveness of government taxation – the idea that public expenses are well spent, i.e. they provide qualitative services – the competitive functioning of the markets and freedom of the labour market, and staff training.

As for the final theme, Formal Characteristics, the complete model with 15 explanatory variables is not significant; the p-value = 6.51% of the F-statistic of Wilks' lambda is greater than the error risk $\alpha = 5\%$. So, we apply a variable selection procedure, the Stepwise method, which allows us to identify the most powerful combination of explanatory variables. The seven variables selected for the reduced model are presented in the last table shown in [Table 3](#). Thus, the first discriminant factor separates the countries in Class 4, from those in Class 5, with high rates of trade and also barriers to entrepreneurship. The second factor distinguishes countries from Class 2, which have a high rate of net migration (positive), from those of Class 5.

V. Conclusion and policy implications

This study contributes to the existing literature in several ways. First, it proposes a better understanding of the complex relationships between level of development, functioning of the labour market, motives behind setting up a firm and entrepreneurial dynamics at a country level. Second, it determines different 'entrepreneurial regimes' (Audretsch and Frisch 2002) and characterizes these regimes based on numerous illustrative variables at the economic, institutional and entrepreneurial levels. Third, thanks to the availability of

such a large amount of data, we can emphasize that informal institutional variables, especially governance variables, can strongly condition the 'entrepreneurial regimes'.

Using a combination of multidimensional data analyses, we propose a classification of European countries relative to variables pertaining to entrepreneurial activity and growth, and the labour market situation. Based on the similarity of the 12 active variables, we have established a typology of the 28 EU member countries and have identified five different 'entrepreneurial regimes'. Thanks to supplementary variables representative of economic development, institutional environment and entrepreneurial characteristics, the classification has been improved and the different kinds of development highlighted.

Our results suggest that opportunity entrepreneurship is linked to the most developed countries, those that exhibit a high level of innovation, and a high standard of living with an elevated level of healthcare, and, of course, that exert a strong degree of attractivity (positive net migration). These countries are wage-based economies and the opportunity cost to set up a firm is high. But thanks to their development and their wealth, they are able to promote efficient policies to support opportunity entrepreneurship.

Differentiating the class of entrepreneurial economies with high-growth firms and high GDP growth (Class 4), from the class of entrepreneurial economies with a high churn (Class 5), leads to the realization that the former class of countries benefits from qualitative public services and a competitive functioning of markets. Even if some barriers to entrepreneurship still exist, labour market freedom in freely accessible countries with a low level of employment regulations, and investment in the training of employees, ensure that these countries benefit from their 'entrepreneurial regime'. Conversely, too few barriers to entrepreneurship combined with a low minimum wage, and a low level of qualitative public services, may lead to a high churn.

Finally, discriminant analyses (DA) show that the five explanatory themes which have been considered (Innovation, Employment, Formal Institutions, Entrepreneurship and Governance) differentiate the classes and significantly explain the diversity of entrepreneurial regimes.

In a previous research (Abdesselam et al. 2018), we have shown that advanced knowledge economies, with developed financial markets, fewer regulatory institutional constraints and scope for qualitative entrepreneurship, have lower unemployment rates. We now emphasize, with this complementary research, that informal institutional variables play a significant role in creating effective 'entrepreneurial regimes' favourable to growth. From a conceptual point of view, this study provides a better understanding of the components of the national environment (level of development, entrepreneurial characteristics and institutional environment) that can promote or deter opportunity entrepreneurship, and contributes to explaining the different 'entrepreneurial regimes'.

It appears that policymakers should alleviate some constraints on entrepreneurship and the functioning of the labour market, but only within the context of good governance. Most particularly, a certain degree of efficiency within public services, competitive markets (products and labour) and free accessibility to a country for trade are needed. Only at a certain level of development can opportunity entrepreneurship happen, and it is in the wage-based economies that we find the best conditions to facilitate such entrepreneurship.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

- Abdesselam, R., J. Bonnet, and P. Renou-Maissant. 2018. "Entrepreneurship, Economic Development and Institutional Environment: Evidence from OECD Countries." *Journal of International Entrepreneurship* 16 (4): 504–546.
- Acs, Z. J., B. Carlson, and C. H. Karlsson. 1999. "The Linkages among Entrepreneurship, SMEs and the Macroeconomy." In *Entrepreneurship, Small and Medium-sized Enterprises and the Macroeconomy*, edited by Z. J. Acs, B. Carlson, and C. Karlsson, 3–42. Cambridge: Cambridge University Press.
- Acs, Z. J., E. Autio, and L. Szerb. 2014. "National Systems of Entrepreneurship: Measurement Issues and Policy Implications." *Research Policy* 43: 476–494.
- Acs, Z. J., and L. Szerb. 2016. "A Review Paper on the Extension of the GEDI-indicator with Additional Indicators on Financial, Labour and Knowledge Institutions." FIRES report.
- Aghion, P. 2014. "Attraper sans problème un point de croissance supplémentaire". La Croix. September 8.
- Aparicio, S., D. Urbano, and D. Audrestch. 2016. "Institutional Factors, Opportunity Entrepreneurship and Economic Growth; Panel Data Evidence." *Technology Forecasting and Social Change* 102: 45–61.
- Audrestch, D. B. 2007. "Entrepreneurship Capital and Economic Growth." *Oxford Review of Economic Policy* 23: 63–78.
- Audrestch, D. B., and A. R. Thurik. 2000. "Capitalism and Democracy in the 21st Century: From the Managed to the Entrepreneurial Economy." *Journal of the Evolutionary Economy* 10: 17–34.
- Audrestch, D. B., and A. R. Thurik. 2001. "What's New about the New Economy? Sources of Growth in the Managed and Entrepreneurial Economies." *Industrial Corporate and Change* 10: 267–315.
- Audrestch, D. B., and M. Fritsch. 2002. "Growth Regimes over Time and Space." *Regional Studies* 36: 113–124.
- Bhattacharjee, A., J. Bonnet, N. Le Pape, and R. Renault. 2010. "Entrepreneurial Motives and Performance: Why Might Better Educated Entrepreneurs Be Less Successful?," *Working Paper TEPP*. 9.
- Bögenhold, D., J. Heinonen, and E. Akola. 2017. "Self-employment and Independent Professionals: Labour Market Transitions and Myths of Entrepreneurship." In *Exploring the Entrepreneurial Society: Institutions, Behaviors and Outcomes*, edited by J. Bonnet, M. Dejardin, and D. García-Pérez-de-Lema, 263. Cheltenham, UK: Edward Elgar Publishing.
- Bögenhold, D., and U. Fachinger. 2008. "Do Service Sector Trends Stimulate Entrepreneurship? A Socio-economic Labour Market Perspective." *International Journal of Service Economy and Management* 1: 117–134.
- Bonnet, J., and P. Cussy. 2010. "High Education, Sunk Costs and Entrepreneurship." In *The Entrepreneurial Society: How to Fill the Gap between Knowledge and Innovation*, edited by J. Bonnet, D. Garcia Perez De Lema, and H. Van Auken, 37–53, 260. Cheltenham: E.E. Publishing.
- Bonnet, J., T. Brau, and P. Cussy. 2011. "Entrepreneurial Decision-making." In *World Encyclopedia Of Entrepreneurship*, edited by L. P. Dana, 65–79. Cheltenham: E.E. Publishing.
- Bosma, N., and V. Schutjens. 2011. "Understanding Regional Variation in Entrepreneurial Activity and Entrepreneurial Attitude in Europe." *Annals of Regional Science* 47: 711–742.
- Bruton, G., and D. Ahlstrom. 2003. "An Institutional View of China's Venture Capital Industry: Explaining the Differences between China and the West." *Journal of Business Venturing* 18: 233–260.
- Celeux, G. 1990. Analyse discriminante sur variables continues. Vol. 7, Collection didactique INRIA (Institut National de Recherche en Informatique et en Automatique), 188 p., Sophia-Antipolis.
- CGPME. 2005. "Jeunes et seniors: Regards croisés sur l'entreprise. Enquête Ipsos/Planète PME." Accessed May 2005. <http://www.ipsos.fr/ipsos-public-affairs/actualites/2005-05-18-jeunes-et-seniors-regards-croises-sur-l-entreprise>

- Coad, A., S. O. Daunfeldt, W. Hözl, D. Johansson, and P. Nightingale. February 2014. "High-growth Firms: Introduction to the Special Section." *Industrial and Corporate Change* Oxford University Press 23 (1): 91–112.
- Congregado, M., and J. M. Millan. 2013. "Start-up Incentives: Entrepreneurship Policy or Active Labour Market Programme?" *Journal of Business Venturing* 28: 151–175.
- Fachinger, U., and A. Frankus. 2017. "Self-employment and Pensions – Is Old Age Poverty the Inevitable Dark Side of an Entrepreneurial Society?" In *Exploring the Entrepreneurial Society: Institutions, Behaviors and Outcomes*, edited by J. Bonnet, M. Dejardin, and D. Garcia Perez De Lema, 263. Cheltenham, UK: Edward Elgar Publishing.
- GEM (Global Entrepreneurship Monitor). 2000. Executive report. Reynolds, P. D., Hay, M., Bygrave, W. D., Camp, S. M., & Autio, E.
- GEM (Global Entrepreneurship Monitor). 2006. Summary Results. Bosma N and Harding R. Founding and Sponsoring Institution: Babson College and London Business School
- GEM (Global Entrepreneurship Monitor). 2009. Executive Report. Bosma N and Levie J, with contributions from Bygrave WD, Justo R, Lepoutre J and Terjesen S. Founding and Sponsoring Institutions. Babson Park, MA, USA: Babson College.
- GEM (Global Entrepreneurship Monitor). 2014. Global Report. Slavica Singer, José Ernesto Amorós, Daniel Moska Arreola. Founding and Sponsoring Institution: Babson College, Babson Park, MA, United States, Universidad del Desarrollo, Santiago, Chile, Universiti Tun Abdul Razak, Kuala Lumpur, Malaysia, Tecnológico de Monterrey, Monterrey, Mexico, London Business School, London, United Kingdom.
- Gruševaja, M., and T. Pusch. 2015. "Institutional Convergence of CEECs and Its Connection to Growth and Cohesion." 2/15/2020GRINCOH Working Paper Series, Paper No. 7.01.
- Huberty, C. J. 1994. *Applied Discriminant Analysis*. New York: Wiley Series in Probability and Mathematical Statistics.
- Kirzner, I. M. February 2009. "The Alert and Creative Entrepreneur: A Clarification." *Small Business Economics* 32 (2): 145–152.
- Lebart, L., A. Morineau, and M. Piron. 2000. *Statistique exploratoire multidimensionnelle*, 3ème édition, 439. Paris: Dunod.
- Nissan, E., M. A. G. Martin, and M. T. M. Picazo. 2011. "Relationship between Organizations, Institutions, Entrepreneurship and Economic Growth Process." *International Entrepreneurship and Management Journal* 7: 311–324.
- North, D. 1990. *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press.
- Pinho, J. C. 2016. "Institutional Theory and Global Entrepreneurship: Exploring Differences between Factor- versus Innovation- Driven Countries." *Journal of International Entrepreneurship*. doi:10.1007/s10843-016-0193-9.
- Rodríguez-Pose. 2017. "Keynote Speaker of the 54th Workshop of ASRDLF." In *Les défis de développement pour les villes et les régions dans une Europe en mutation*, 5-7 juillet 2017. Athènes, Grèce: Université Panteion.
- Sambharya, R., and M. Musteen. 2014. "Institutional Environment and Entrepreneurship: An Empirical Study across Countries." *Journal of International Entrepreneurship* 12: 314–330.
- Saporta, G. 2006. *Probabilités, analyse des données et statistique*. 2ème édition Technip. Paris.
- Schramm, C. 2009. *Our Role in the Evolution of Capitalism*, 8–14. Kansas City: Kauffman Thoughtbook, Kaufman Foundation.
- Scott, W. R. 1995. *Institutions and Organizations*. London: Sage Publications.
- Simón-Moya, V., L. Revuelto-Taboada, and R. F. Guerrero. 2014. "Institutional and Economic Drivers of Entrepreneurship: An International Perspective." *Journal of Business Resources* 67: 715–772.
- Szerb, L., R. Aidis, and Z. J. Acs. 2013. "A Comparative Analysis of Hungary's entrepreneurial Performance in the 2006–2010 Time Period Based on the Global Entrepreneurship Monitor and the Global Index Methodologies." *Foundation and Trends in Entrepreneurship* 9: 1–142.
- Szerb, L., Z. Acs, E. Autio, R. Ortega-Argiles, and E. Komlosi. 2013. REDI: The regional entrepreneurship and development index—measuring regional entrepreneurship, final report. Brussels: European Commission, Directorate-General for Regional and Urban policy. doi:10/79241
- Thurik, A. R.. 2011. "From the Managed to the Entrepreneurial Economy : Considerations for Developing and Emerging Countries." In *Entrepreneurship and Economic Development*, edited by W. Naudé, 147–165. England: Palgrave Macmillan.
- Thurik, R., and M. Dejardin. 2011. "The Impact of Culture on Entrepreneurship." January-February. www.europeanbusinessreview.com
- Valdez, M., and J. Richardson. 2013. "Institutional Determinants of Macro-level Entrepreneurship." *Entrepreneurship Theory and Practice* 37: 1149–1175.
- Van Stel, A., D. J. Storey, and A. R. Thurik. 2007. "The Effect of Business Regulations on Nascent and Young Business Entrepreneurship." *Small Business Economics* 28: 171–186.
- Van Stel, A., and M. A. Carree. 2004. "Business Ownership and Sectoral Growth; an Empirical Analysis of 21 OECD Countries." *International Small Business Journal* 22: 389–419.
- Van Stel, A., M. A. Carree, and A. R. Thurik. 2005. "The Effect of Entrepreneurial Activity on National Economic Growth." *Small Business Economics* 24: 311–321.
- Wennekers, S. 2006. "Entrepreneurship at Country Level: Economic and Non-economic Determinants." Doctoral Thesis. Erasmus Research Institute of Management (ERIM).
- Wennekers, S., A. Van Stel, M. Carree, and A. R. Thurik. 2010. "The Relationship between Entrepreneurship and Economic Development: Is It U-Shaped?" *Foundation and Trends in Entrepreneurship* 6: 167–237.

Appendices

Table A1. Supplementary variables.

Name	Description	Period	Source
Economic development			
AVA	- Sectoral specialization Agriculture, value added (% of GDP)	2014	World Bank/OECD ^a
I/A	Industry, value added (% of GDP)	2014	World Bank/OECD
SVA	Services, etc., value added (% of GDP)	2014	World Bank/OECD
AEMP	Employment in agriculture (% of total employment)	2014	ILO ^b
IEMP	Employment in industry (% of total employment)	2014	ILO
SEMP	Employment in services (% of total employment)	2014	ILO
	- Relative to the level		
	<i>Innovation</i>		
GDERD	Research and development expenditure (% of GDP)	2014	UNESCO ^c
ART113	Scientific and technical journal articles/Labour force (%)	2013	NSF ^d
RD	Researchers in R&D (per million people)	2014	UNESCO
PATENTS	Patent applications, residents/Labour force (%)	2014	WIPO ^e
NSERPRO	Percentage of TEA who indicate that their product or service is new to at least some customers	2014	GEM ^f
TECHTR	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, collaborative research between universities and industry and the protection of intellectual property	2014	GEDI ^{16 g}
SCIENCE	GERD * Average of scientific institutions and availability of scientists	2014	GEDI
	<i>Health</i>		
HEALTHPR	Health expenditure, private (% of GDP)	2014	WHO ^h
HEALTHPU	Health expenditure, public (% of GDP)	2014	WHO
HEALTHT	Health expenditure, total (% of GDP)	2014	WHO
	<i>Finance</i>		
DCR	Domestic credit provided by the financial sector (% of GDP)	2014	IMF ⁱ
DCRPS	Domestic credit to private sector (% of GDP)	2014	IMF
PERSFUNDS	%age 18–64 pop who have personally provided funds for a new business (3y)	2014	GEM
DCM	Depth of capital market	2014	GEDI
	<i>Connectivity</i>		
(Continued)			

¹⁶Global Entrepreneurship Development Index. Thanks to Laslo Szerb for providing us with the variables of the new Global Entrepreneurship Index (GEI) which is based on the review paper by Acs and Szerb (2016). It is an improvement of the GEDI-Global Entrepreneurship and Development Index. This global index reflects a country's ability to promote quality entrepreneurship, which is a factor of growth and employment.

Table A1. (Continued).

Name	Description	Period	Source
URBAN AGGLOMERATION	Urban population (% of total) (URBANIZATION * INFRASTRUCTURE)	2014	UN ^j
EDU13 LBTE13	<i>Education</i> Government expenditure on education, total (% of GDP) Labour force with tertiary education (% of total)	2014	GEDI
ECONOMIC COMPLEXITY	<i>Economic complexity</i> Complexity of the economy is assessed	2013-11-12 2013	UNESCO ILO
TUNEMP PUNEMP VUNEMP EMPT15 E1524	- Relative to unemployment/employment characteristics Unemployment with tertiary education (% of total unemployment) Part-time employment, total (% of total employment) Vulnerable employment, total (% of total employment) Employment to population ratio, 15+, total (%) (national estimate) Employment to population ratio, ages 15-24, total (%) (national estimate)	2014	GEDI
LFPT15	Labour force participation rate, total (% of total population ages 15+) (nationalestimate)	2014	ILO
U1524	Unemployment to population ratio, ages 15-24, total (%) (national estimate)	2014	ILO
WORKS	Wage and salaried workers, total (% of total employment)	2014	ILO
Institutional environment			
TAXES%REV13 TAXES%TAXES13 PROFIT.TAX	- Formal <i>Fiscality</i> Taxes on income, profits and capital gains (% of revenue) Taxes on income, profits and capital gains (% of total taxes) Profit tax (% of commercial profits)	2013 2013 2014	IMF IMF World Bank
TRADE ECH FDI_In FDI_Out IMS15 NMIG	<i>Openness</i> Trade (% of GDP) Net barter terms of trade index (2000 = 100) Foreign direct investment, net inflows (% of GDP) Foreign direct investment, net outflows (% of GDP) International migrant stock (% of population), data 2015 Net migration/total population (%), data 2012	2014 2014 2014 2014 2015 2012	World Bank/OECD UN IMF IMF UN UN
TIME COST PROC BARR ^a	<i>Entrepreneurship</i> Time required to start a business (days) Cost of business start-up procedures (% of GNI per capita) Procedures required to start a business (number) Barriers to entrepreneurship	2014 2014 2014 2013	World Bank World Bank World Bank OECD ^a
STRICT RMINW	<i>Labour market</i> Strictness of employment protection Real minimum wages (hourly, US\$PPP)	2013 2014	OECD OECD

(Continued)

Table A1. (Continued).

Name	Description	Period	Source
- Informal Entrepreneurship			
ISTAR	Percentage of population aged 18–64 (individuals involved in any stage of entrepreneurial activity excluded) who intend to start a business within 3 years	2014	GEM
DESIR	Percentage of population aged 18–64 who agree with the statement that in their country, most people consider starting a business as a desirable career choice	2014	GEM
FAIL	Percentage of population aged 18–64 with positive perceived opportunities who indicate that fear of failure would prevent them from setting up a business	2014	GEM
NFFAI	Percentage of population aged 18–64 stating that the fear of failure would not prevent them from starting a business	2014	GEM
EGROW	Percentage of TEA who expect to employ at least five employees 5 years from now	2014	GEMI
HSTAT	Percentage of population aged 18–64 who agree with the statement that in their country, successful entrepreneurs receive high status	2014	GEMI
MSUCC	Percentage of population aged 18–64 who agree with the statement that in their country, one can often see stories in the public media about successful new businesses	2014	GEM
SKILLS	Percentage of population aged 18–64 who believe themselves to have the required skills and knowledge to start a business	2014	GEM
CARST	Status and respect of entrepreneurs calculated as the average of carrier and status	2014	GEM
ATT	Attitudes sub-index (opportunity perception, startup skills, risk perception, networking, cultural support)	2014	GEDI
ABT	Abilities sub-index (opportunity startup, technology absorption, human capital, competition)	2014	GEDI
ASP	Aspiration sub-index (production innovation, process innovation, high growth, internationalization, risk capital)	2014	GEDI
GEI	Global Entrepreneurship index	2014	GEDI
Governance			
NOCOR	Corruption Perceptions Index (CPI) is assessed	2014	GEDI
BRISK	(RISK ACCEPTANCE * COUNTRY RISK)	2014	GEDI
FPROP	Economic Freedom * Property Rights	2014	GEDI
TGOV	Measures the effectiveness of using taxes	2014	GEDI
CREGU	Regulation * Market Dominance	2014	GEDI
EDUC	Tertiary Education * Quality of Education	2014	GEDI
TABSO	Firm level technology absorption capability	2014	GEDI
LMARK	Labour Freedom * Staff Training	2014	GEDI
FINANCE AND STRATEGY	Venture capital business strategy	2014	GEDI
INFIN	Amount of informal investment INFINVMEAN * BUSANG	2014	GEDI
Entrepreneurial variables			

(Continued)

Table A1. (Continued).

Name	Description	Period	Source
- Characteristics of entrepreneurs			
<i>Establish</i>			
ESTABLISH	Percentage of population aged 18–64 who are currently owner-manager of an established business, i.e. owning and managing a running business that has paid salaries, wages, or any other payments to the owners for more than 42 months	2014	GEM
<i>Nascent</i>			
NASCENT	Percentage of population aged 18–64 who are currently a nascent entrepreneur, i.e. actively involved in setting up a business they will own or co-own; this business has not paid salaries, wages, or any other payments to the owners for more than 3 months	2014	GEM
NASCNEWENT	Percentage of population aged 18–64 who are either a nascent entrepreneur or owner-manager of a new business	2014	GEM
NASCNEWENTF	Percentage of female population aged 18–64 who are either a nascent entrepreneur or owner-manager of a new business	2014	GEM
NASCNEWENTM	Percentage of male population aged 18–64 who are either a nascent entrepreneur or owner-manager of a new business	2014	GEM
<i>Culture</i>			
KNOWENT	Percentage of population aged 18–64 knowing someone who started a business in the past 2 years	2014	GEDI/GEM
<i>Education</i>			
HIGHEDUC	Percentage of TEA business owners/managers having participated in secondary education	2014	GEDI/GEM
<i>Expectancy</i>			
GAZELLE	Percentage of TEA businesses having high job expectation average (over 10 more employees and 50% in 5 years)	2014	GEDI/GEM
- Characteristics of the firms			
<i>Business growth</i>			
NetBG	Net growth of the number of businesses	2014	EUROSTAT
<i>Size new</i>			
SIZENEW	Average size of new enterprises: number of persons employed in the reference period (t) among new enterprises in t divided by the number of new enterprises in t	2014	EUROSTAT
<i>Size death</i>			
SIZEDATH	Average number of employees in enterprise deaths: number of persons employed in the reference period (t) among enterprise deaths in t divided by the number of enterprise deaths in t	2014	EUROSTAT
<i>Size survival</i>			
SIZESURV5	Average size of 5-year-old enterprises: number of persons employed in the reference period (t) among new enterprises in t-5 having survived to t divided by the number of new enterprises in t in t-5 having survived to t	2014	EUROSTAT
<i>Employment shares</i>			

(Continued)

Table A1. (Continued).

Name	Description	Period	Source
EMPLNEW	Employment share of enterprise births: number of persons employed in the reference period (t) among new enterprises in t divided by the number of persons employed in t among the stock of enterprises active in t	2014	EUROSTAT
EMPLDEATH	Employment share of enterprise deaths: number of persons employed in the reference period (t) among enterprise deaths divided by the number of persons employed in t among the stock of active enterprises	2013	EUROSTAT
EMPLENTO-5	Number of persons employed in firms aged 0–5 years old		
Churn	<i>Churn</i> Business churn: birth rate + death rate	2014	EUROSTAT
SIZEHG	- Sectorial <i>High expectancy growth</i> Average size of high-growth enterprises measured in employment: number of employees in the reference period (t) among high-growth enterprises measured in employment in t divided by the number of high-growth enterprises measured in employment in t	2014	EUROSTAT
HGENTIC	Share of high-growth enterprises measured in employment: number of high-growth enterprises divided by the number of active enterprises with at least 10 employees in sector: Information and communication	2014	EUROSTAT
HGENTREA	Share of high-growth enterprises measured in employment: number of high-growth enterprises divided by the number of active enterprises with at least 10 employees in sector: Real estate activities	2014	EUROSTAT
HGEMPLIC	Employment share of high-growth enterprises measured in employment: number of employees among high-growth enterprises divided by the number of employees among the stock of active enterprises with at least 10 employees in sector: Information and communication	2014	EUROSTAT
HGEMPREA	Employment share of high-growth enterprises measured in employment: number of employees among high-growth enterprises divided by the number of employees among the stock of active enterprises with at least 10 employees in sector: Real estate activities	2014	EUROSTAT
SIZEHGIC	Average size of high-growth enterprises measured in employment: number of employees in the reference period (t) among high-growth enterprises measured in employment in t divided by the number of high-growth enterprises measured in employment in t sector: Information and communication	2014	EUROSTAT
SIZEHGREA	Average size of high-growth enterprises measured in employment: number of employees in the reference period (t) among high-growth enterprises measured in employment in t divided by the number of high-growth enterprises measured in employment in sector: Real estate	2014	EUROSTAT
COMPET	<i>New</i> Percentage of TEA businesses started in those markets where not many businesses offer the same product <i>Export</i>	2014	GEDI/GEM

(Continued)

Table A1. (Continued).

Name	Description	Period	Source
EXPORT	Percentage of TEA businesses where at least some customers are outside the country (over 1%)	2014	GEDI/GEM
CUSTOUT	Percentage of TEA who indicate that at least 25% of their customers come from other countries	2014	GEM
TECHSECT	<i>Innovative</i> Percentage of TEA businesses that are active in technology sectors (high or medium)	2014	GEDI/GEM
NEWT	Percentage of TEA businesses using new technology that is less than 5 years old on average (including 1 year old)	2014	GEDI/GEM

^aOECD (Organisation for Economic Co-operation and Development): <http://www.oecd.org/>

^bInternational Labour Organization: <http://www.ilo.org>

^cThe United Nations Educational, Scientific and Cultural Organization: <http://en.unesco.org/>

^dNational Science Foundation: <https://www.nsf.gov/>

^eThe World Intellectual Property Organization: <http://www.wipo.int/>

^fThe Global Entrepreneurship Monitor: <http://www.gemconsortium.org/>

^gThe Global Entrepreneurship Development Institute: <https://thegedi.org/>

^hThe World Health Organization: <http://www.who.int/en/>

ⁱThe International Monetary Fund: <http://www.imf.org/>

^jThe United Nations Foundation: <http://www.un.org/en/index.html>

Table A2. Synthesis of the partition into five classes of the 28 EU countries.

Frequency (%)	Class 1 9 (32.14%)	Class 2 6 (21.43%)	Class 3 3 (10.71%)	Class 4 7 (25.00%)	Class 5 3 (10.71%)
Countries	Austria Denmark Estonia Finland France Germany Luxembourg Netherlands Sweden	Belgium Cyprus Czech Republic Italy Romania Slovenia	Croatia Greece Spain	Bulgaria Hungary Ireland Latvia Malta Poland United Kingdom	Lithuania Portugal Slovakia
Profile (+)	+ OPPORTUNITY + GDPPC +SURVIVAL	+ SELF +SURVIVAL	+ UNEMPL + NECESSITY + LT.UNEMPL + SELF	+ HighGrowthEmpl + HighGrowthEnt + GDP	+ BIRTH + DEATH
Anti-profile(-)	- NECESSITY - LT.UNEMPL - SELF - UNEMPL - DEATH - SEMP + TECHTR + RD + GDERD + PATENTS + ART113 + HEALTHPU + HEALTHT + DCM + URBAN + AGGLOMERATION + EDU13 + LBTE13 + ECONOMIC COMPLEXITY + E1524 +EMPT15 + WORKS + LFP15 + PUNEMP + TUNEMP - IEMP - AEMP - AVA - VUNEMP - U1524	- HighGrowthEnt - HighGrowthEmpl - BIRTH	- OPPORTUNITY		- SURVIVAL
Illustrative variables	Economic development		+ U1524 - TECHTR - NSERPRO - ECONOMIC COMPLEXITY - E1524 - EMPT15 - LFP15 - WORKS	- SCIENCE - ART113 - HEALTHPU - HEALTHT	- URBAN

(Continued)

Table A2. (Continued).

Frequency (%)	Class 1 9 (32.14%)	Class 2 6 (21.43%)	Class 3 3 (10.71%)	Class 4 7 (25.00%)	Class 5 3 (10.71%)
Institutional environment	+ NMIG + IMS15 + RWMIN + HSTAT + ATT + ABT + ASP + GEI + FINANCE AND STRATEGY + FREEDOM PROPERTY + TABSO + CREGU + TGOV + NOCOR + BRISK + EDUC - ECH - ISTAR - SKILLS	+ COST - TGOV - NOCOR	+ BARR - NFFAI - HSTAT - ATT - ASP - GEI - TABSO - NOCOR - FREEDOM PROPERTY - FINANCE AND STRATEGY - LMARK	+ ECH + TIME - STRIC	- Net Migration12 - BARR - RWMIN - CREGU
Entrepreneurial variables	+ KNOWENT + TECHSECT + COMPET - NASCENTM - GAZELLE - SIZEDEATH - EMPMNEW - EMPLDEATH - EMPLT0-5 - NEWT	- ESTABLISH - NASCNEWENTF - KNOWENT - HGENTREA - HGEMPLIC - HGENTIC	+ SIZESURV5 - HGEMPLIC	+ SIZEDEATH + EMPLT0-5 + SIZENEW + HGEMPLIC + HGEMPREA + HGENTIC + HGENTREA + SIZEHGRE + SIZEHGIC	+ NASCENT + NASCNEWENT + NASCNEWENTF + NASCNEWENTM + EMPLNEW + EMPLDEATH + EMPLT0-5 + CHURN + NETBG

This table summarizes the main results of the HAC (Hierarchical Ascending Clustering) characterization into five classes of countries, obtained from the cut of the hierarchical tree of Figure 7. Division has been carried out according to the positions of the countries, on the factorial axes of the PCA. All the active and illustrative variables mentioned in this table are significant at the level of 5%.

Table A3. Synthesis of the thematic discriminant analysis.

Explain variable: economic and entrepreneurial characteristics				
Explanatory variables	Description	Class 1:	Class 2:	Class 3:
		Wage-based economies with opportunity entrepreneurship	Self-employed-based economies in crisis with necessity entrepreneurship	Self-employed-based economies in crisis with necessity entrepreneurship
	Frequency (%)	9 (32.14%)	6 (21.43%)	3 (10.71%)
	EU countries	Austria, Denmark, Estonia, Finland, France, Germany, Luxembourg, Netherlands, Sweden	Belgium, Cyprus, Italy, Czech Republic, Romania, Slovenia	Croatia, Greece, Spain
Innovation	RD, ART13, GDERD, PATENTS, TECHTR, NEWERPROD, SCIENCE 85.71% of EU countries are correctly classified by the model	+ RD, + GDERD, + PATENTS, + TECHTR + SCIENCE	- RD, - GDERD, - PATENTS, - TECHTR, - SCIENCE	- RD, - GDERD, - PATENTS, - TECHTR, - SCIENCE + VUNEMP, + U1524
Employment	TUNEMP, PUNEMP, VUNEMP, EMPT15, E1524, LFP15, U1524, WORKS 71.43% of EU countries are correctly classified by the model	+ EMPT15, + E1524, + LFP15, + WORKS - VUNEMP, - U1524	- RD, - GDERD, - PATENTS, - TECHTR, - SCIENCE	- RD, - GDERD, - PATENTS, - TECHTR, - SCIENCE + VUNEMP, + U1524
Entrepreneurship	ISTAR, DESIR, FAIL, NFFAI, EGROW, HSTAT, MSUCC, SKILLS, CARST, ATT, ABT, ASP, GEI 85.71% of EU countries are correctly classified by the model	+ HSTAT, + ATT, + ABT, + ASP, + GEI	- RD, - GDERD, - PATENTS, - TECHTR, - SCIENCE	- RD, - GDERD, - PATENTS, - TECHTR, - SCIENCE + VUNEMP, + U1524
Governance	NOCOR, BRISK, FPROP, TGOV, CREGU, EDUC, TABSO, LMARK, FSTRA, INFIN 85.71% of EU countries are correctly classified by the model	+ NOCOR, + FPROP, + TGOV, + CREGU, + LMARK, + FSTRA, + LMARK	- RD, - GDERD, - PATENTS, - TECHTR, - SCIENCE	- RD, - GDERD, - PATENTS, - TECHTR, - SCIENCE + VUNEMP, + U1524
Formal	ECH, NMIG, COST, STRIC, BARR, FDIIn, TIME 82.14% of EU countries are correctly classified by the model	+ NOCOR, + FPROP, + TGOV, + CREGU, + LMARK, + FSTRA, + LMARK	- RD, - GDERD, - PATENTS, - TECHTR, - SCIENCE	- RD, - GDERD, - PATENTS, - TECHTR, - SCIENCE + VUNEMP, + U1524

Class 4:
Entrepreneurial economies with high-growth firms and high GDP growthClass 5:
Entrepreneurial economies with high GDP growthClass 6:
Entrepreneurial economies with high GDP growthClass 7:
Entrepreneurial economies with high GDP growthClass 8:
Entrepreneurial economies with high GDP growthClass 9:
Entrepreneurial economies with high GDP growthClass 10:
Entrepreneurial economies with high GDP growthClass 11:
Entrepreneurial economies with high GDP growthClass 12:
Entrepreneurial economies with high GDP growthClass 13:
Entrepreneurial economies with high GDP growthClass 14:
Entrepreneurial economies with high GDP growthClass 15:
Entrepreneurial economies with high GDP growthClass 16:
Entrepreneurial economies with high GDP growth