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Rafik Abdesselam
COACTIS, Université Lumière Lyon 2, France

Jean Bonnet
Patricia Renou-Maissant
CREM UMR CNRS 6211, Université de Caen Basse-Normandie, France

Mathilde Aubry
EM Normandie, Métis Research Department, Caen, France

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Rafik Abdesselam*, Jean Bonnet**,
Patricia Renou-Maissant** and Mathilde Aubry***

* COACTIS, Université Lumière Lyon 2, EA 4161, Faculté des Sciences Economiques et de Gestion, 16 quai Claude Bernard, 69365 Lyon Cedex 07, France. rafik.Abdesselam@univ-lyon2.fr

** Université de Caen Basse-Normandie, CREM-CAEN, UMR CNRS 6211, Faculté des Sciences Économiques et de Gestion, 19, rue Claude Bloch, 14032 Caen, France. jean.bonnet@unicaen.fr, patricia.renou@unicaen.fr.

*** EM Normandie, Métis Research Department, 9, rue Claude Bloch, 14052 Caen Cedex 4, France. maubry@em-normandie.fr

Abstract :

The aim of this paper is to analyze entrepreneurial activity in OECD countries over the period 1999-2012 in order to make a distinction between economies that are more or less entrepreneurial. A combined use of multidimensional and evolutive data analysis methods is used with variables pertaining to entrepreneurial activity and growth. It allows us to distinguish several types of development. Furthermore, three main periods are found, before, during and after the crisis. The pre-crisis period, from 1999 to 2008, was a period of growth favorable to entrepreneurship while the sub-period 2010-2012 is less favorable. The effects of the financial crisis are noticeable after a delay in 2009. We show that in 2009, the agricultural economies have best withstood the financial crisis. Secondly, during the period 2010-2012 after the crisis, economies widely dependent on the financial sector were most impacted by the financial crisis. Because of the financial crisis, the entrepreneurial dynamics vary greatly across countries over the period 1999-2012, however we were able to establish common trajectories for a number of them.

Keywords :

Entrepreneurship, Data analysis methods, Entrepreneurial/Administrated economies

JEL codes : L26, C38, O1

1. Introduction

Audretsch and Thurik (2000, 2001) and Thurik (2011) distinguish two polar economies according to which economic stylized facts can be reinterpreted and reordered. The managerial model articulates economic growth around mass production, specialization, certainty, predictability and homogeneity, allowing the full play of economies of scale. The model of the entrepreneurial economy articulates economic growth around a variety of needs, novelty, turbulence, innovation and functioning in networks, allowing the full play of entrepreneurial flexibility. The entrepreneur is thus becoming an essential vector of growth. Entrepreneurial firms (young and innovative firms) are an integral part of the transition process from an industrial-based economy to an entrepreneurial-based economy and have been the engine of economic growth for over a decade. Many of the new entrepreneurial firms are the creators and leaders of new industries. Most job-creating firms are new and fast-growing and evidence indicates that the trend toward an entrepreneurial society is accelerating (Bonnet et al., 2010a).

When one wishes to analyze entrepreneurship from a perspective of international comparisons between countries, one must take into account that countries differ in the level of development and regulation of the economy. Acs et al. (2013) demonstrate that the activity of creating new ventures and their outcome are themselves regulated by country-specific institutional characteristics. Relevant variables that take into account differences in the entrepreneurial motives must then be enlarged to include judicial and cultural considerations and are part of institutional characteristics of the labor market specific to each industrialized country. The legislation regulating the labor market relations, the fiscal rules, the labor law, the social security system, bankruptcy laws but also the development and the functioning of the financial system, even the intensity of administrative barriers, will have an effect upon the motivation to create new firms and the presence of entrepreneurial firms (Bonnet et al., 2011). These national specificities may explain the more or less entrepreneurial nature of economies.

The aim of this paper is to analyze entrepreneurial activity in OECD[1] countries over the period 1999-2012 in order to make a distinction between economies that are more or less entrepreneurial. Our intention is to identify factors explaining differences among countries and understand their behaviors and common trajectories over the study period. We use variables representing economic and entrepreneurial activities (the GDP growth, the unemployment rate, the share of entrepreneurial activity and the growth of this share) with the intention of establishing a classification of countries representing different types of development. The approach adopted rests on a combined use of multidimensional and evolutive data analysis methods that take into account the characteristics of the countries in terms of the four retained variables. According to the similarity of these four variables, we can establish a classification of OECD countries. Moreover, in order to better characterize classes and the different kind of development in these countries, we introduce variables representative of national socio-economic development as supplementary variables. As our data period ends

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[1] The Organization for Economic Co-operation and Development (OECD) is an international economic organization of 34 countries founded in 1961 to stimulate economic progress and world trade. It is a forum of countries committed to democracy and the market economy, providing a platform to compare policy experiences, seek answers to common problems, identify good practices and coordinate domestic and international policies of its members.

in 2012, the impact of the financial crisis is fundamental for our study. Indeed, various studies have highlighted a slowdown in business activity since this crisis. Among them we can mention GEM (2009), OECD (2009) and Klapper and Love (2010). So, it seems appropriate to study the impact of the crisis on entrepreneurial activity. On the one hand, from this we may expect fewer start-up activities because of a lower perceived opportunity. On the other hand, some people may actually see new business opportunities following the recession. That is why we consider the effects of the crisis on entrepreneurial behaviors and on different models of development.

Several important outcomes emerge from this study. First, the financial crisis involved a break in entrepreneurial dynamism. The effects of the financial crisis are noticeable after a delay in 2009. The pre-crisis period, from 1999 to 2008, was a period of growth favorable to entrepreneurship while the sub-period 2010-2012 after the crisis is characterized by an unemployment rate significantly higher than the average over the whole period and a significantly lower level of self-employment. We show that in 2009, the agricultural economies have best withstood the financial crisis. Secondly, during the period 2010-2012 after the crisis, economies widely dependent on the financial sector were most impacted by the financial crisis. Latin American economies, less integrated into the international financial system, were preserved from the contagion of the crisis and maintained a highly dynamic entrepreneurial activity in the period after the crisis. Finally, mainly because of the financial crisis, the entrepreneurial dynamics vary greatly across countries over the period 1999-2012, however we were able to establish common trajectories for a number of them.

In the following section, we present a brief review of the literature. In section 3, we describe the data and highlight a break in the dynamics of entrepreneurship since the global financial crisis. Section 4 presents typologies of regional development in OECD countries over three periods: before, during and after the financial crisis. Section 5 concludes.

2. Literature review and conceptual model

Many macroeconomic and institutional causes can explain the differences in entrepreneurial intensity between countries and areas. They include the economic growth, the rate of unemployment, the development and the operation of the financial system, the intensity of the administrative barriers, specificities of the labor market, legal consequences of the failure of the firm, the entrepreneurial spirit and the collective perception of the failure of the firm ... They refer to what W. J. Baumol names in a notable 1990 article "*the rules of the game*", i.e. the structure of reward in the economy. He notes that certain societies historically favored rather unfavorable structures of reward in the development of entrepreneurship. These structures divert the national or local elites from the exercise of the entrepreneurial function and prove indirectly harmful to the diffusion of technical progress (ancient Rome with the valorization of the political office, medieval China with the Mandarin system...).

Yet in recent years, it seems that in most countries the real contribution of entrepreneurship to economic development is characterized by the following statement "Entrepreneurship is considered to be an important mechanism for economic development through employment, innovation and welfare effects" (Acs and Amoros 2008, p. 121). Nevertheless, one may notice that some differences still may be at work regarding the potentiality of growth. Wong et al. (2005), using cross-sectional data on the 37 countries participating in GEM 2002[2], show that, among different types of entrepreneurial activities, only high growth potential entrepreneurship is found to have a significant impact on economic growth. Thus, different reasons can motivate new business creation and there are different types of entrepreneurial activities. The impact of entrepreneurship on economic growth also depends on the nature of the entrepreneurial activities and refers to the difference which exists between an entrepreneurial society which develops private initiative and a wage-based society which increases the opportunity cost to undertake new ventures.

Entrepreneurship is also essential for the structural change (Naudé, 2010). It contributes to the transformation of agricultural economies into knowledge and service economies. The weight of the primary sector and the functioning of the informal economy explain the high rate of entrepreneurial activity in developing countries. With the development and the increase of interesting wage opportunities (the level of actual wages increases), we observe a diminution of the entrepreneurial activity but also, recently, a revival at the extreme with the appearance of *innovation driven* economies (GEM, 2009, p.9). That is the famous U-shaped curve that links the GDP per capita with the rate of entrepreneurial activity (Caree et al., 2007). Wennekers et al. (2010) « argue that the reemergence of independent entrepreneurship is based on at least two 'revolutions' »: the solo self-employment (Bögenhold and Faschinger, 2008, Bögenhold et al., 2015, Faschinger and Frankus, 2015) which is important for societal and flexibility reasons and the ambitious and/or innovative entrepreneurs (Acs et al., 1999, van Stel and Carree, 2004, Audretsch,

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[2] These countries participate in "The Global Entrepreneurship Monitor (GEM) project, an annual assessment of the entrepreneurial activity, aspirations and attitudes of individuals across a wide range of countries. Initiated in 1999 as a partnership between London Business School and Babson College, the first study covered 10 countries; since then nearly 100 'National Teams' from every corner of the globe have participated in the project, which continues to grow annually. The project has an estimated global budget of nearly USD $9 million; the 2013 survey is set to cover 75% of world population and 89% of world GDP": http://www.gemconsortium.org/What-is-GEM.

2007). According to van Stel and al. (2005), the Total Entrepreneurial Activity rate[3] for the 1999-2003 period in 36 countries has a positive and significant impact on economic growth. Nevertheless, this impact is to be differentiated according to the level of development and the development process of the countries. It is less important in transition economies (Hungary, Poland, Slovenia, and China) and it may even have a negative impact on economic growth in some developing countries (Argentina, Brasil, Mexico, Thailand, and South Africa). The absence of large companies in these countries and a low real wage may explain that the choice to become an entrepreneur is in favor as it is sometimes the only possibility to earn a living. Moreover, if the involvement of young people (18-24 years old) in the entrepreneurial activity is important for the growth in developed countries, it is the older entrepreneurs (45-64 years old) that bring the stronger contribution to growth in developing countries (Verheul and van Stel, 2010). The older entrepreneurs may compensate for their low level of education by their experience of life and probably by a successful experience in business.

Relevant variables that take into account differences in the entrepreneurial motives must then be enlarged to include judicial and cultural considerations, and are part of the institutional characteristics of the labor market specific to each industrialized country. The legislation governing the labor market relations, the fiscal rules, the labor law, the social security system, and bankruptcy laws, but also the development and the functioning of the financial system, and even the intensity of administrative barriers will have an effect upon the motivation to create new companies and the presence of entrepreneurial firms. Recent research (Acs et al., 2013) 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".

How can entrepreneurship be related with national development?

Three main variables are retained to build different types of development (fig. 1); the share of self-employed (as a measure of the entrepreneurial activity), the level of unemployment and the rate of growth of GDP (as measures of performance of the different economies). Because the level of development is essential with the U-shaped curve, we take into account the structural effect of the development in considering low, medium and high level of development. Then the combination of the share of the self-employed in the workforce with rates of unemployment and rates of GDP growth allows us to identify six theoretical types of development that correspond rather to the structural aspect of the development.

The last variable, the growth of the self-employed share, does not intervene directly in the typology of the theoretical types of development presented below because it is a cyclical variable. However, it is an important variable in our study. It helps to identify the reactions in terms of entrepreneurial characteristics to macroeconomic fluctuations, especially in times of crisis, and it sheds light on the entrepreneurial environment of different economies to

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[3]GEM defines the Total entrepreneurial activity (TEA) as the share of adults in the total population aged 18 to 64 who are either actively involved in the creation of a new business or who run a business for less than 42 months.

overcome difficulties. Moreover, this variable also promotes the identification of the *refugee/Schumpeter* effects in different classes.

Figure 1: Types of development relatively to the three variables and level of development
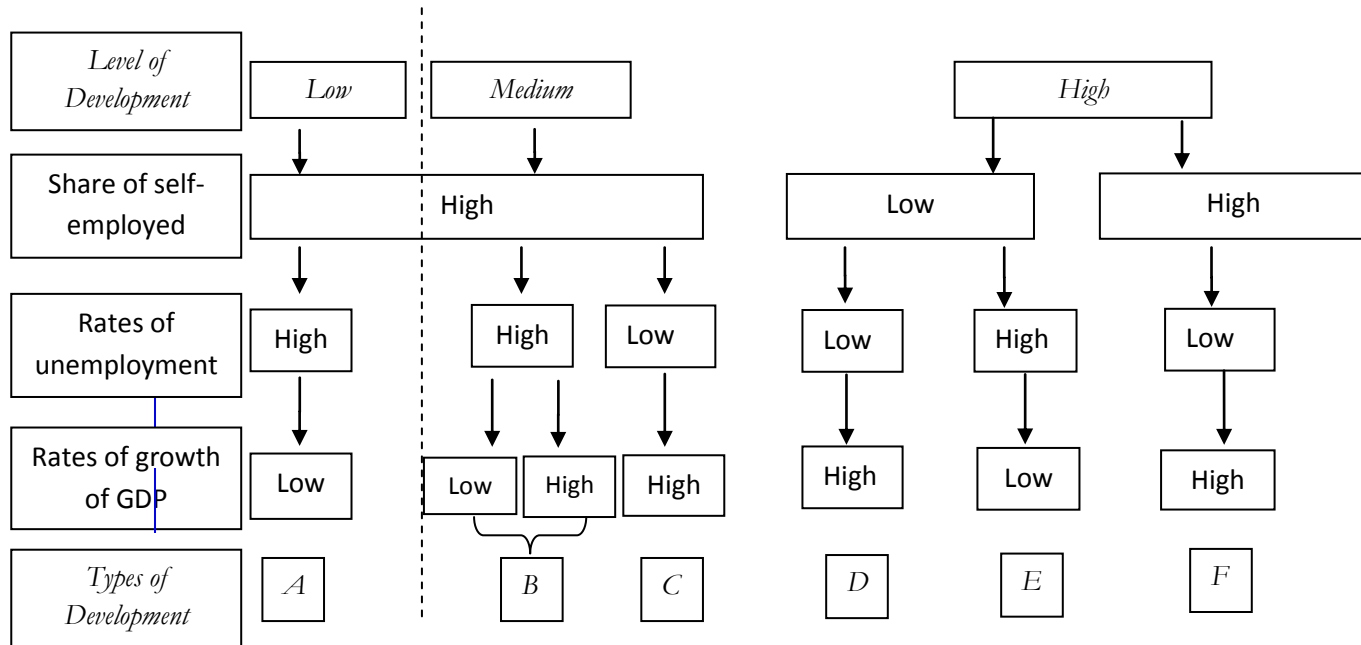
Path *A* corresponds to developing countries that are still waiting for the take off. The high share of self-employed is mainly related to low opportunities of a wage job. A theoretical explanation based on managerial skills and the level of real wage can be found in Lucas (1978). This path has not to be retained because countries belonging to OECD cannot be regarded as low developed countries.

Path *B* sheds a light on developing countries in transition towards becoming developed countries. Naudé (2010) notices that in some developing countries there exists also entrepreneurship for opportunity motives (there is so much to do in these countries in order to catch up with the more developed ones).

Path *C* comprises entrepreneurial economies issued from medium development economies that are at the end of the transition phase towards becoming developed countries.

Path *D* relates to advanced knowledge and service economies where the relatively low level of the share of self-employed is indicative of a mature economy and so the unemployment rate is rather low. "As an economy matures and its wealth increases, the emphasis of industrial activity shifts towards an expanding services sectors… The industrial sector evolves and experiences improvements in variety and sophistication. Such a development would be typically associated with increasing research & development and knowledge intensity, as knowledge-generating institutions in the economy gain momentum. This change opens the way for development of entrepreneurial activity with high aspirations." (Szerb et al., 2012, p. 22). In these countries innovation accounts for 30% of economic activity and very often small and innovative entrepreneurial firms operate as 'agents of creative destruction'. Nevertheless, the growth in the self-employed share of the workforce is rather weak because the more mature economies undergo development that is more based on

qualitative entrepreneurship. In these countries *Schumpeter* effects are more prone to be assessed. The *Schumpeter* effect conveys the fact than new-firm startups launched for opportunity motives may contribute to the reduction of unemployment (Koellinger and Thurik, 2012).

Path *E* corresponds to administrated economies where a low level of entrepreneurship is associated to a high level of unemployment and a low level of growth. It illustrates the reverse version of the *Schumpeter* effect. For example, in the case of France, several explanations may be put forward for the low intensity in entrepreneurship and the factors deterring "pull" motives: inadequate education in creativity and entrepreneurship (Retis, 2007), a slow development of incubators and an under-development of seed money and private financing networks (Aernoudt, 2004), a lack of entrepreneurial spirit (CGPME, 2005), the existence of sunk costs for elites (Bonnet and Cussy, 2010) and a high unemployment rate that mainly induce entrepreneurship for "push" motives (Abdesselam et al., 2014, Aubry et al., 2014). Obviously, one of the conditions for risk-taking is to be able to find a job again quickly in case of failure, and/or to give value to one's experience. This implies that unconstrained entrepreneurship is favored in economies characterized by a low rate of unemployment even if an unemployed position generates a low opportunity cost for new entrepreneurs. Empirically, Wennekers (2006) has established a negative relation between the unemployment rate and the rate of entrepreneurial activity in the European case. This result corroborates the fact that the fluidity of the labor market encourages entrepreneurship for opportunity motives while rigidities in the labor market generate entrepreneurship for necessity motives but globally decrease total entrepreneurship.

Path *F* identifies entrepreneurial economies in high developed countries with more extensive development based on competitiveness and attractiveness of production factors.

3. Data and preliminary analysis

In this section, we describe the data. Next, we show evidence of a break in the dynamics of entrepreneurship following the global financial crisis.

3.1. The data

Our proposal aims to establish a classification of OECD[4] countries relative to variables related to economic and entrepreneurial activity, namely GDP growth (GDP), unemployment rates (UNEMPL), the self-employed share as a percentage of the working age population (SEMPLShare) and the rate of growth in the self-employed share of the workforce (SEMPLGrowth). According to the OECD, "The number of self-employed is the number of individuals who report their status as "self-employed" in population in labor surveys. Self-employment jobs are those jobs where the remuneration is directly dependent upon the profits (or the potential for profits). The incumbents make the operational decisions affecting the enterprise, or delegate such decisions while retaining responsibility for the welfare of the

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[4] Organization for Economic Co-operation and Development. The 34 Member countries of OECD are Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom and United States.

enterprise[5]." There is a comparability issue across OECD countries related to the classification of the incorporated self-employed. While in official statistics for most OECD countries, the self-employed who incorporate their businesses are counted as self-employed, in some countries they are counted as employees (for example, Japan, New Zealand and Norway). We retain two variables on self-employment in the goal to better understand entrepreneurship which represents both structural (SEMPLShare) and situational components (SEMPLGrowth). In addition, the use of the growth rate of the self-employed share of the workforce partially overcomes the problem of comparability of self-employed shares series. We use an annual data basis over the period 1999-2012.

These countries may be considered to be relatively homogeneous, i.e. countries driven by market economies and belonging mostly to *innovation driven* economies[6]. In fact, for the reason of data avaibility we retain 26 countries, we excluded Estonia, Greece, Iceland, Israel, Korea, the Slovak Republic, Switzerland and Turkey. The data are extracted from OECD databases. In figure 2, the average evolution of the variables UNEMPL, GDP, SEMPLShare and SEMPLGrowth is represented for the 26 OECD countries under study.

Figure 2: Average evolution of active variables over the 1999-2012 period
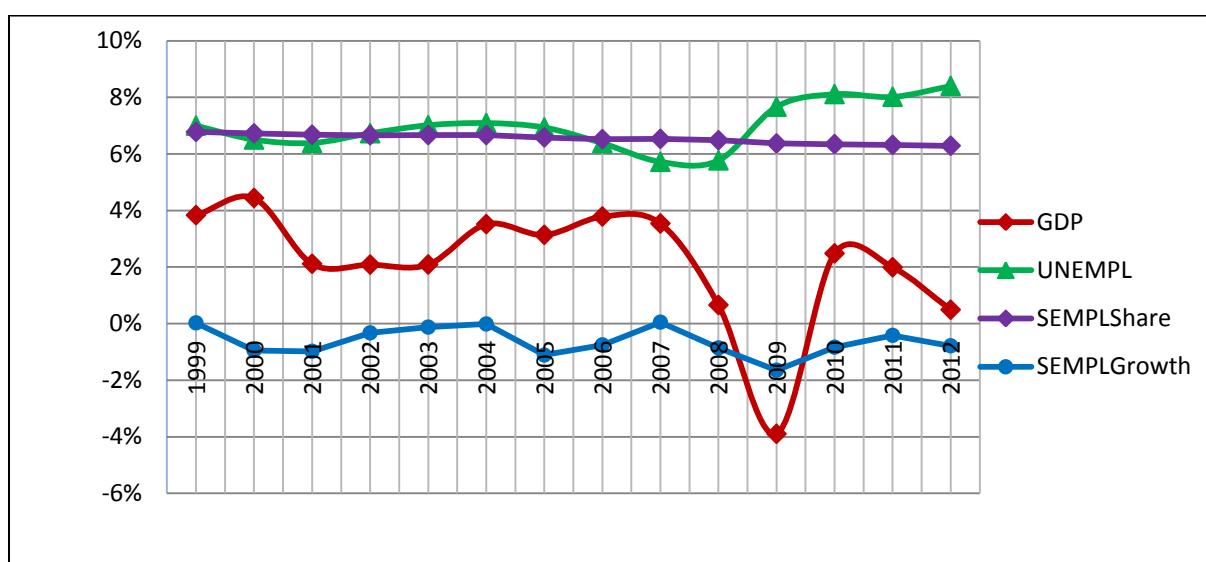
The number of self-employed as a percentage of the population is slightly decreasing during the period with a steady curve while the rate of growth of the self-employed share is of course more volatile -and always negative- with a decrease from 1999 to 2001, followed by an increase during the 2001-2004 period -a less important decrease- and again a decrease in the year 2005, followed by an increase till 2007 and a decrease in 2008 and 2009, with a final increase till 2011 and decrease in the last year of observation. The rate of GDP growth sharply decreases from 2007 with a very negative level in 2009. There is a recovery in 2010 but a

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[5] The definition therefore includes both unincorporated and incorporated businesses and as such differs from the definition used in the System of National Accounts which classifies self-employed owners of incorporated businesses and quasi-corporation as employees. It should be noted that not all self-employed are "entrepreneurs". Self-employment statistics include craft-workers and farmers.

[6] In the 2009 GEM (p. 5) report, Chile and Hungary –belonging to the group *efficiency driven* economies- are considered to be in transition towards the group of *innovation driven* economies.

decrease again in 2011 and 2012. After the crisis of 2008-2009, we can observe a sizeable increase in the unemployment rate.

Moreover, in order to better characterize classes, we use a wide set of variables representative of national socioeconomic development as supplementary variables. We then characterize the groups of countries thanks to these numerous variables pertaining to labor market regulation, general functioning of the market economy, technological development, financial development, administrative burdens, tax system, culture, etc. In addition, for each of these classes, we identify the relative importance of necessity/opportunity motives, the Nascent Entrepreneurial Activity Index (NEAI) and the Young Firm Entrepreneurial Activity Index (YFEAI), ratios obtained through the Global Entrepreneurship Monitor (GEM) and that are supposed to differ according to the different classes of countries obtained. These variables are likely to characterize different types of developments, so they were positioned as supplementary variables in the multidimensional analysis. Although they do not affect the calculations based upon the four variables UNEMPL, GDP, SEMPLShare and SEMPLGrowth, they bring useful information, *a posteriori,* to consolidate and enrich the interpretation of the classes of countries.

These variables and their availability period are described in Table 1.

Table 1: Supplementary variables

Name	Description	Period	Source
Characteristics of the population			
IMM	Inflows of foreign population by nationality (% of pop)	1999-2011	OECD
EDU	Public spending on education, total (% of GDP)	1999-2012	World Bank
HEALTH	Health expenditure, total (% of GDP)	1999-2012	World Bank
URBAN	Urban population (% of total)	1999-2012	World Bank
Variables concerning entrepreneurship			
TIME	Time required to start a business (days)	2003-2012	World Bank
COST	Cost of business start-up procedures (% of GNI per capita)	2003-2012	World Bank
PROC	Procedures required to start a business (number)	2003-2012	World Bank
BTE	Barriers to entrepreneurship	1999-2012	OECD
Variable representative of the openness of a country			
TRADE	Trade (% of GDP)	1999-2012	World Bank
ECH	Net barter terms of trade index (2000 = 100)	1999-2012	World Bank
OutFDI	Foreign Direct Investment (FDI) Outward position at year end as a % of GDP	1999-2012	OECD
InFDI	Foreign Direct Investment (FDI) Inward position at year end as a % of GDP	1999-2012	OECD
Variable representative of the development of the financial sector			
DCR	Domestic credit provided by the financial sector (% of GDP)	1999-2012	World Bank
Variables representative of the functioning of the labor market			
STRICT	Strictness of employment protection	1999-2012	OECD
RMINW	Real minimum wages (Hourly, US$PPP)	1999-2012	OECD
Variables representative of the sectorial specialization			
GDERD	Gross Domestic Expenditure on R&D (GDERD) (% of GDP)	1999-2012	OECD
PATENTS	Patents (Numbers by hab)[7]	1999-2011	OECD
AGRI	Agriculture, value added (% of GDP)	1999-2012	World Bank
INDUS	Industry, value added (% of GDP)	1999-2012	World Bank
SER	Services, etc., value added (% of GDP)	1999-2012	World Bank
AGRIEMPL	Employment in agriculture (% of total employment)	1999-2012	World Bank
INDUSEMPL	Employment in industry (% of total employment)	1999-2012	World Bank
SEREMPL	Employment in services (% of total employment)	1999-2012	World Bank
IPROD	Industrial production, s.a.(Growth previous period)	1999-2012	World Bank
Opportunity Entrepreneurial Activity (OEAI)	% of people of 15-64 years involved in entrepreneurial activity (TEA) out of opportunity	2002-2012	GEM
Nascent Entrepreneurial Activity Index (NEAI)	Nascent Entrepreneurial Activity Index: Measures the number of people who are actively trying to start a new business; relative to the adult population 18-64 years.	2002-2012	GEM
Young Firm Entrepreneurial Activity Index (YFEAI)	Measures the number of people owning/managing a business that has existed for up to 3.5 years; relative to the adult population 18-64 years.	2002-2012	GEM

3.2 A break in the dynamics of entrepreneurship: the global financial crisis

To analyze the dynamic development over the period 1999-2012, we study the annual average evolution of the variables UNEMPL, GDP, SEMPLShare and SEMPLGrowth for the

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[7] Fractional counts are applied for patents with multiple inventors/applicants : When a patent was invented by several inventors from different countries, the respective contributions of each country is taken into account. This is done in order to eliminate multiple counting of such patents.

26 OECD countries. In this analysis, years play the role of "individuals" and average annual rates the role of variables.

A cluster analysis was applied to group the years of the period 1999-2012 into homogeneous classes or sub-periods. More precisely, a Hierarchical Ascendant Classification (HAC) was used on the significant factors of the Principal Component Analysis (PCA) of average annual rates of the four variables of dynamic development. The dendrogram in figure 3 represents the hierarchical tree of the years. Table 2 summarizes the main results characterizating of the chosen partition into three periods, obtained from the cut of the hierarchical tree of the figure 3.

Figure 3: Cluster dendrogram of years over the period 1999 to 2012 according to the means of the economic and entrepreneurial activity variables of the 26 OECD countries[8]
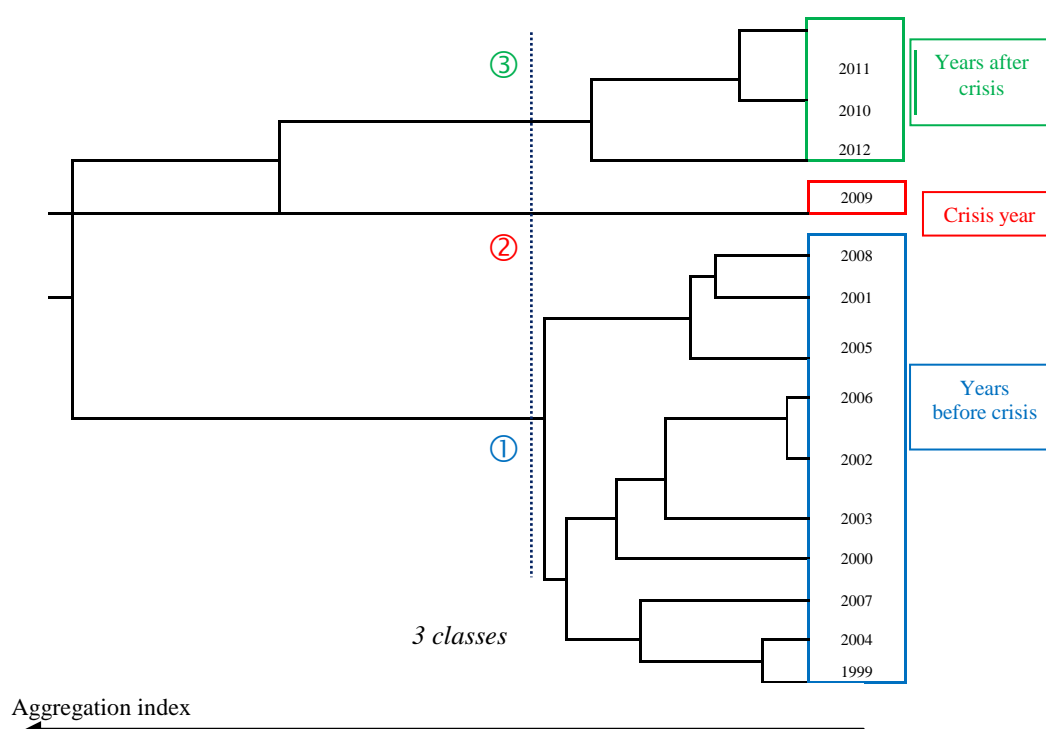

Table 2: Synthesis of the partition into three sub-periods

	Class1 Before Crisis	Class 2 Crisis	Class 3 After Crisis
Duration	10 years	1 year	3 years
Years	1999 to 2008	2009	2010 to 2012
Profile (+)	+ SEMPLShare + GDP		+ UNEMPL
Anti-Profile (-)	- UNEMPL	- GDP - SEMPLGrowth	- SEMPLShare

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[8] The Hierarchical Cluster Analysis (HCA) is employed. An explanatory technical note on this method is proposed in the Appendix.

Figure 4 is a graphical representation of the first main PCA plane of the years, the centers of gravity of the three classes selected and directions of active variables of dynamic development. The three sub-periods are marked out by ellipses. This representation explains 81.51 % of inertia. Clearly the effect of the crisis is noticeable in 2009 with a rate of GDP growth and a rate of growth in the self-employed share of the workforce significantly lower than those registered on the overall period. "The recent crisis, characterized by tighter credit restrictions, has arguably hampered new start-ups and impeded growth in existing start-ups as well as their ability to survive in tough market conditions" (OECD, 2013, P.7). Although the crisis started in 2007, the decline in rates of GDP and self-employed growth are significantly lower than those registered on the overall period only in 2009. Using panel data on the number of new firm registrations in 95 countries to study the impact of the 2008 financial crisis on new firm creation, Klapper and Love (2010) also show that the impact of the crisis was much more pronounced in 2009.

The first period, comprising the years before the crisis, is characterized by high GDP growth; a high level of self-employment and a low unemployment rate. It is a period of growth favorable to entrepreneurship. However, the crisis significantly impacted the dynamics of entrepreneurship: we can observe in the sub-period after the crisis that the unemployment rate is significantly higher than the average on the whole period and the share of the self-employment is significantly lower. The financial crisis seems to have broken the dynamics of entrepreneurship.

Figure 4: Representation of the years according to the average rates in the 26 OECD countries
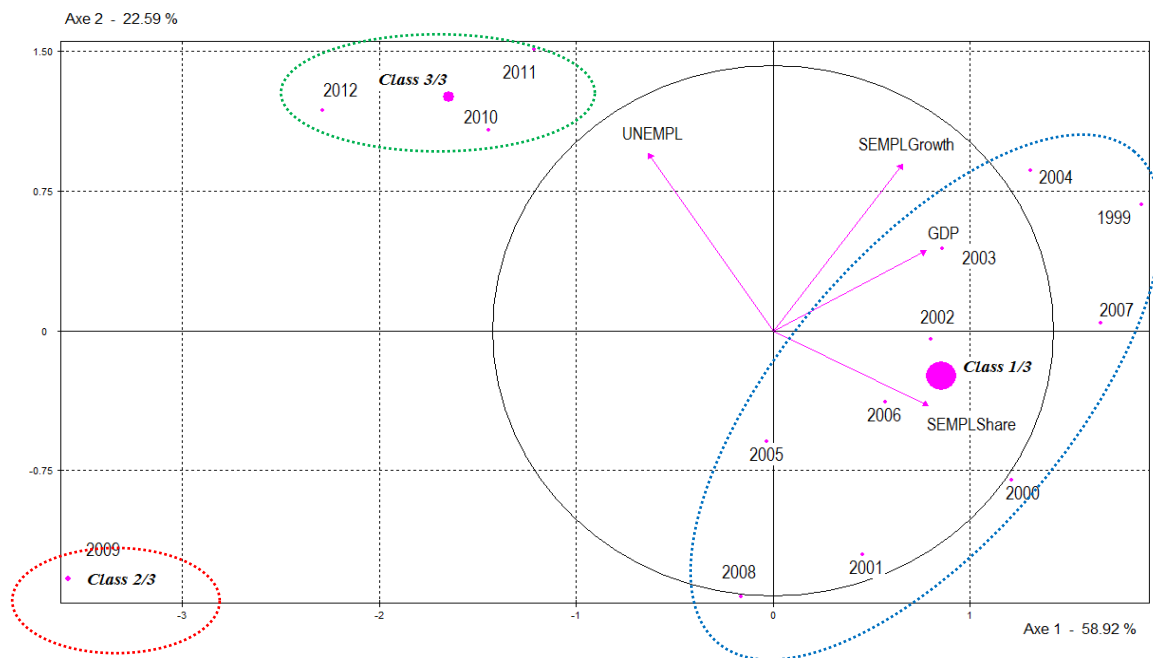
The recent crisis started in 2007-2008 as a financial crisis and led to a great recession (2008-2009), the biggest recession since the Great Depression of the 1930s with widespread consequences on economic performance, labor productivity and employment in all countries around the world. The contagion, which began in 2007 when excessive house prices in the United States finally turned decisively downward, spread quickly, first to the entire United States financial sector and then to financial markets overseas. The crisis was not limited to the financial sector. Companies that normally rely on credit suffered heavily. Small and large companies were affected by the crisis in two ways: due to a tightening of business opportunities and because of stricter lending conditions and, of course, lesser availability of capital. According to the OECD (2009), it is important to note that SMEs and therefore necessarily self-employment are generally more vulnerable in times of crisis for several reasons including the fact that: " it is more difficult for them to downsize as they are already small; they are individually less diversified in their economic activities; they have a weaker financial structure (i.e. lower capitalization); they have a lower or no credit rating; they are heavily dependent on credit and they have fewer financing options". In addition, they are more vulnerable because they often bear the brunt of the difficulties of large companies.

The International Labor Organization (ILO) has described this crisis as a global job crisis. It has resulted in an increase in the unemployment rate as well as the failure of many businesses, leading to a decrease in levels of self-employment over the period 2010-2012.

When unemployment increases, there is a very short lag before we observe an increase in the setting up of new-firms, i.e. the *refugee* effect, (Abdesselam et al., 2014). In fact, unemployment acts as a trigger factor for entrepreneurial involvement for some people. Being

unemployed is one of the displacement factors (breakthroughs in the life of individuals) that can lead to entrepreneurship (Shapero, 1975). The lag in the reduction of the unemployment rate due to new-firm startups (*Schumpeter* effect) is greater because usually new firms do not create a lot of jobs at the beginning of their activity. In effect, jobs can be considered as quasi-fixed costs in countries where labor market regulation is rigid and it is worth waiting until demand becomes sufficiently constant before hiring employees.

4. Dynamic regional development and typologies of OECD countries

To better understand the dynamic of the development of entrepreneurship over the period and to take into account the effects of the financial crisis, we carried out an analysis on the three sub-periods: before, during and after the crisis. The approach adopted relies on a combined use of multidimensional and evolutive data analysis methods that take into account the characteristics of the countries in terms of GDP growth, unemployment rates, the number of self-employed as a percentage of the population and the rate of self-employment growth as well as their evolution over the 1999-2012 period. According to the similarity of these four rates, we can establish a typology of the 26 OECD countries. The usual analyses of annual data do not allow for a global analysis of the countries and their characteristics because these analyses are carried out separately (year by year) and do not take into account the possibility of their having a common structure across time. The total evolution of the countries is thus studied by a multiple factor analysis (MFA) (Escofier and Pagès, 1985, 1998), based on a weighted analysis of the principal components of all the data.

This analysis is especially designed to study individuals -namely the countries-characterized by a certain number of groups of the same variables measured at each different moment in time. The MFA highlights the common structure of a set of groups of variables observed for the same 26 countries. Its originality lies in the weighting of the variables, which balances the influence of the various groups of variables and provides a representation of the countries and variables interpretable according to the usual principal components' analysis. This method makes it possible to consider all the groups on an equal basis. A hierarchical ascendant classification (HAC) was then used on the significant factors of the MFA in order to characterize the classes of countries relative to the evolution of the four chosen variables. The dendrogram in figure 4 represents the hierarchical tree of the countries obtained by using an HAC with the Ward criterion[9].

4.1 The pre-crisis financial period: towards more entrepreneurial economies

The dendrogram in figure 5 represents the hierarchical tree of the countries. Table A1 shown in the appendix summarizes the main results of characterization of the chosen partition into six classes, obtained from the cut of the hierarchical tree in figure 5.

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

Figure 5: Hierarchical tree of countries over the period 1999 to 2008 for the 26 OECD countries
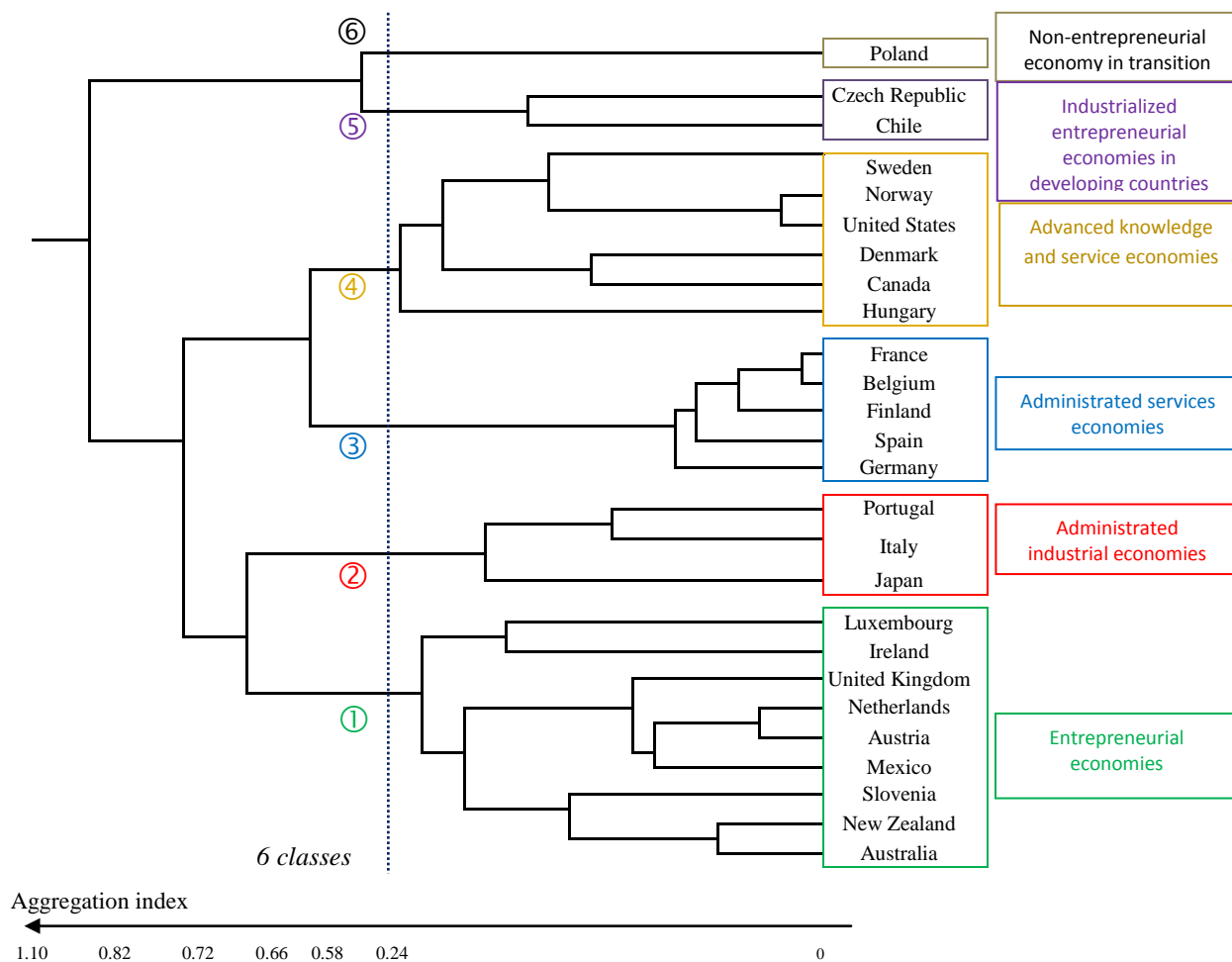
The first class contains 9 countries, including Australia, Austria, Ireland, Luxembourg, Mexico, the Netherlands, New Zealand, Slovenia and the United Kingdom. It is characterized by an unemployment rate significantly lower than the average of the 26 countries considered and shows a high growth in self-employment at the end of the period. Countries grouped in this class can be regarded as **Entrepreneurial economies,** with development based on competitiveness and attractiveness of production factors. These countries seem to be attractive for foreigners. In fact, inflows of foreign population are significantly higher than the average of the population. This class is also attractive for FDI in 2002 and 2003 and displays a high level of trade during the 1999-2002 period. It shows the willingness to be competitive with attractiveness of production factors.

The second class, contains three countries: Italy, Japan and Portugal and can be considered as representing the **Administrated industrial economies** class. These countries have a high level of self-employment relative to all countries of our sample during almost the whole period - 1999 to 2006 - and weak GDP growth for the years 1999 and 2002 to 2006. They are also characterized by a high strictness of employment; they have rather high levels of employment in industry but low performance in industry growth that could denote some problems in maintaining their market share. In these countries, domestic credit provided by the financial sector as a percentage of GDP is significantly higher than the average of the population. These results are in line with those of Klapper and Love (2010), who demonstrated that company creation is higher in countries with greater financial sector development, as measured by bank credit to GDP. The level of expenditure on education is rather low. The Nascent Entrepreneurial Activity Index is also weak in 2004 and 2006, which denotes an insufficient renewal of entrepreneurs.

The third class comprises five countries: Belgium, Finland, France, Germany and Spain. These countries can be regarded as **Administrated service economies.** They present high rates of unemployment and a high level of self-employment growth in 2005 and 2006. We can identify the presence of a refugee effect: unemployment leads to new-firm creation and increased self-employment[10]. These economies are characterized by rather a low proportion of people owning/managing a business that has existed from up to 3.5 years and some restrictions on entrepreneurship. During the whole period they attempt to develop entrepreneurship[11].

The fourth class consists of six countries - Canada, Denmark, Hungary, Norway, Sweden and the United States - and comprises **Advanced knowledge and service economies**. These economies are characterized by weak self-employment growth compared to the average population on the whole period. They recorded a significantly lower GDP growth rate in 2007, suggesting they were affected by the crisis earlier. These countries also present a

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[10] We have clearly identified this effect in the case of France, Aubry et al., (2014), Abdesselam et al., (2014).

[11] In the case of France, entrepreneurship started to be dynamic in the early 2000s, supported by the implementation of public policies aiming to encourage entrepreneurship. In particular the law for the economic initiative -August 2003-, called Dutreil's law, aims at making France one of Europe's most favorable countries for new-firm startups: extension of the possibility to domicile the new firm in one's house for a while (from 2 to 5 years), progressive capitalization of the social capital, simplification of administrative formalities, implementation of community finance institutions etc.

high proportion of service sector jobs, and a high level of education and health expenditure. Jobs in the agricultural sector are significantly lower than the average of all countries.

The fifth class contains 2 countries - Chile and the Czech Republic – which may be described as **Industrialized entrepreneurial economies in developing countries**. These economies are characterized by a high level of self-employment from 2003 to 2008 and high growth in self-employment in 2002 and 2003. They are also characterized by a high level of added value in industry (as a percentage) for all the periods and jobs in this sector from 2006 to 2008. The evolution of industrial production growth and the terms of trade over the period 2004-2008 are rather better than for all the countries considered. The minimum wage and health expenditure are rather low. The share of the service sector in the value added is also significantly lower in this class over the whole period.

The last class contains one country (Poland). This class is characterized by both a high level of unemployment and a high level of self-employment during the whole period, as well as a high level of self-employment growth for the years 2000, 2001 and 2008. We label this class **non-entrepreneurial economy in transition** on account of its characteristics: the procedures for entrepreneurship are fairly numerous during the whole period and the cost of becoming an entrepreneur is high in 2008. These specificities show the occurrence of a refugee effect in Poland for this period but they also indicate entrepreneurial opportunities due to the high growth at the end of the period. Since it joined the EU in May 2004, one may notice that Poland has become one of the most dynamic economies of Europe with an average GDP growth rate of 4.3% over the period 2004-2012 -the proportion of people aged 15-64 involved in entrepreneurial activity (TEA) out of opportunity is quite high in 2004-2005-.

4.2 The financial crisis: 2009

The dendrogram of the figure 6 represents the hierarchical tree of the 26 countries for the year 2009.

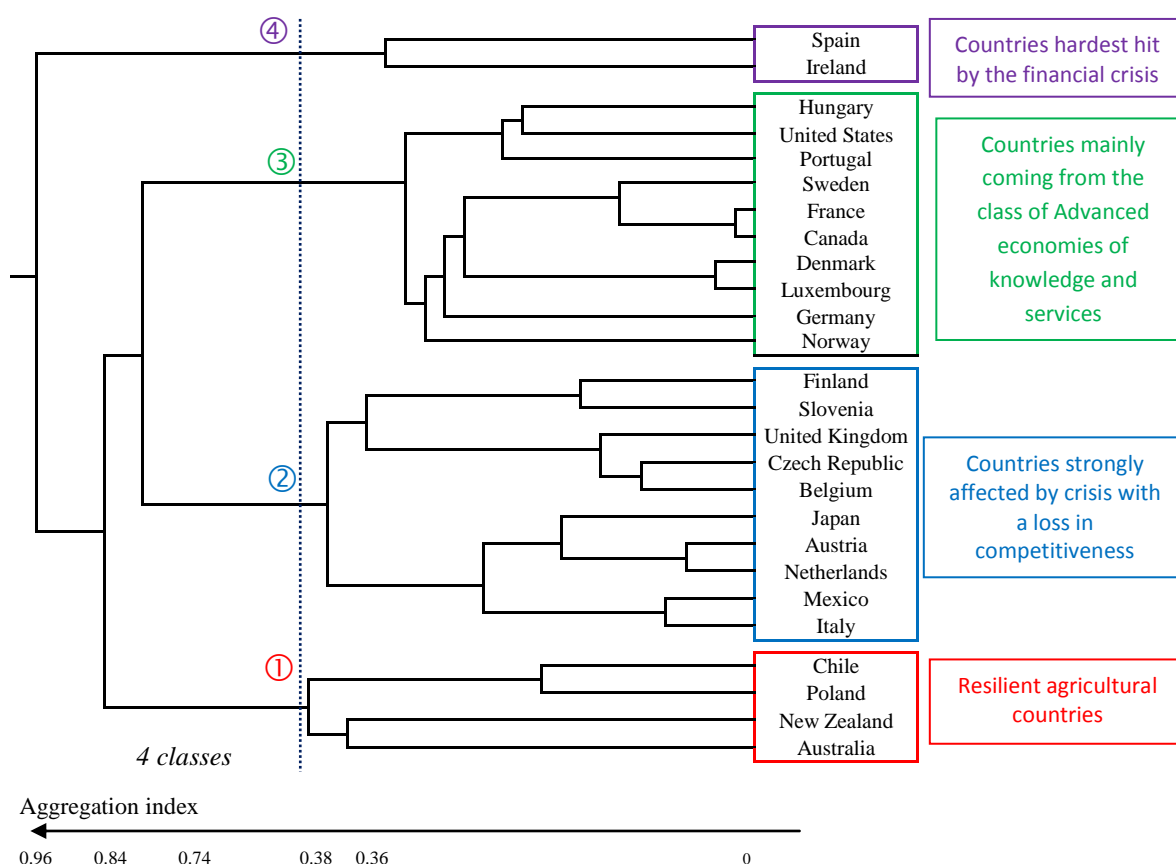**Figure 6: Hierarchical tree in 2009 for the 26 OECD countries**

Table A2 shown in the appendix presents results of characterization of the chosen partition into four classes for the year 2009. Note that the MFA does not allow us to analyze the evolution of variables at an absolute level but it does allow a comparison between countries. For example, a low unemployment rate in a class does not mean that the countries of the class have not been impacted by the crisis in terms of employment, but only means that these countries were less severely affected than the average of the countries under study. Parker (2009) points to the effect of falling wages in recessions, which may lower the opportunity costs for starting a business and encouraging marginal types of new-firm startups (Koellinger and Thurik, 2012).

The first class, contains the more resilient countries to the crisis: Australia, Chile, New Zealand and Poland. These countries recorded high GDP growth and a high proportion of self-employment relative to all countries of our sample in 2009.
These countries are also characterized by a high contribution of agriculture and industry and a low contribution of services in the value added. They also present a high number of jobs in agriculture, favorable net barter terms of trade, a low strictness of employment and low expenditure on R&D. So it is the **agricultural economies** that best withstood the crisis in 2009. The effect of the crisis on Australia was considerably less than in many other countries for several reasons: Australia's economy was buoyed by China's growing demand for resources; the Australian financial system was markedly more resilient. Notably, Australian banks continued to be profitable and did not require any capital injections from the

18

government. Hill (2012) also highlights other factors that could explain the relatively good performance of the Australian economy during the crisis; these factors include monetary and fiscal policy; structures and legal reform; regulation of financial markets; banking history; and corporate governance. The economy of New Zealand is very closely related to that of Australia, most major banks operating in New Zealand are Australian. In addition, Australia is the largest trading partner of New Zealand. In 2009, Chile and Poland appeared to be protected against the financial crisis. These countries were little affected by the crisis due to their limited role in trade and international finance, among other things, (Sholman et al., 2013).

The second class includes countries which fell deeply into recession: Austria, Belgium, Czech Republic, Finland, Italy, Japan, Mexico, Netherlands, Slovenia and the United Kingdom. These countries were more affected by the crisis because we observe that the GDP growth rate is significantly lower than the sample average. However, it seems that the crisis did not stop the dynamics of entrepreneurship, as we find that in 2009 the level of self-employment is above average and the rate of unemployment is significantly lower. Probably a percentage of those people laid off set up their own firms that are characteristic of "push" entrepreneurs. These countries also present unfavorable net barter terms of trade. These are **economies with a loss of competitiveness** in 2009.

The countries of the third class (Canada, Denmark, France, Germany, Hungary, Luxembourg, Norway, Portugal, Sweden and the United States) are rather characterized by a low level of self-employment. This class is mainly composed of countries which were included in the class of **advanced knowledge and service economies.** One possible explanation for the low level of self-employment could be the closure of numerous firms, even if, due to the mix of structural and situational effects, it is difficult to assess whether the low level of self-employment has only a situational component. Furthermore, we showed that countries belonging to the class of advanced knowledge and service economies were affected by the crisis earlier. The weak level of GDP growth in 2007 might have led with some delay to a decline in the level of self-employment.

Class 4 contains Ireland and Spain, **countries hardest hit by the financial crisis** in 2009. These countries combine high unemployment rates and a low level of growth in self-employment. In these countries, unemployment rose significantly from 2008, as a result of a sharp fall in house building leading to major job losses. Construction is among the worst affected sectors in these countries, where there had been a large boom in residential construction in response to sharply rising housing prices. The crisis reversed the trend of increasing new-company creation.

4.3 The period 2010-2012: a sharp slowdown in entrepreneurial activity

The crisis persisted after 2009, with widespread consequences on economic performance, labor productivity and employment in all countries around the world. Hysteresis effects are indeed likely to push up structural unemployment as workers who remain unemployed for a long period become less attractive to employers as a result of declining human capital, or as they reduce the intensity of their job search. In 2012, the OECD identified 48 million unemployed in the OECD, about 15 million more than at the beginning

of the crisis in 2007. As we underlined in 3.2, the sub-period after the crisis (2010-2012) is characterized by an unemployment rate significantly higher than the average over the whole period and the level of self-employment significantly lower.

Figure 7: Hierarchical tree of countries over the period 2010-2012 for the 26 OECD countries
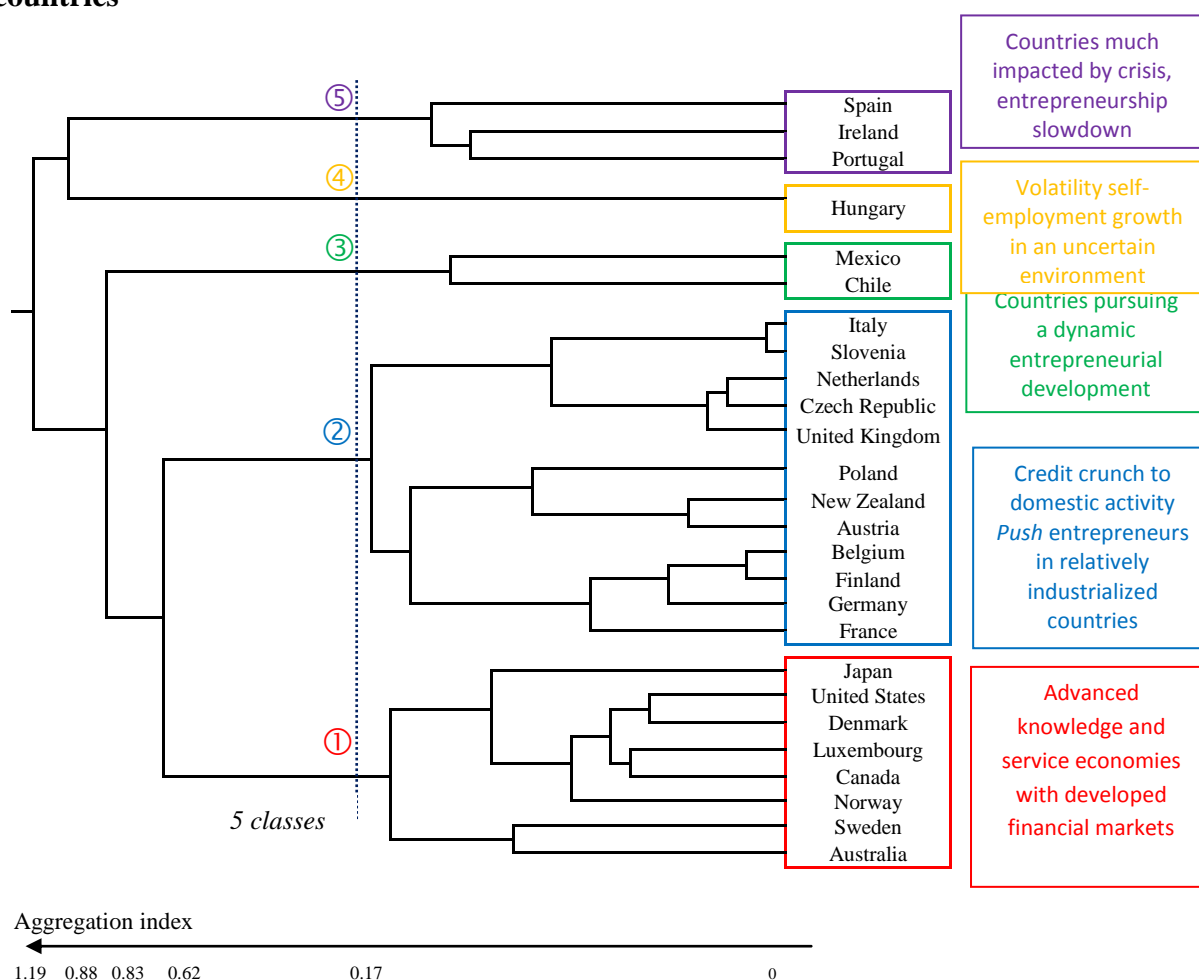
The dendrogram in figure 7 represents the hierarchical tree of the countries.

Table A3 in the appendix presents the results of characterization of the chosen partition into five classes of countries for the post-crisis period. So now let's look at what has happened since the crisis. The aim of the analysis on this period is to study the dynamics of entrepreneurship after the crisis and identify whether recovery processes are underway in some countries which are more or less resilient to the crisis and in which entrepreneurial behaviors remain dynamic.

The countries belonging to the first class (Australia, Canada, Denmark, Japan, Luxembourg, Norway, Sweden and United States) show a significantly low level of self-employment relative to all countries of our sample over the 2010-2012 period. This shows that the dynamics of entrepreneurship were deeply affected by the crisis. However, these countries recorded an unemployment rate lower than the average of the population; which could be a sign of recovery. It is confirmed by recent data on the evolution of growth rates that show for the year 2013 higher-than-average growth rates for high income countries –except for Denmark and Norway- (World Bank, 2014). For Canada and the US, a probable explanation

is their higher sensibility to cycles, with a huge depressed level in the recession phase but also a quick and strong recovery in the growth phase (Aghion, 2014). The countries of this class mainly belong to **advanced knowledge and service economies** and have a level of self-employment that is significantly lower than the average employment level of the population[12].

The OECD (2013) underlines that in Australia, Japan, and the United States, "self-employment levels remain significantly below their pre-crisis level, reflecting in part a shift towards contractual employment, where employment levels were less adversely affected by the crisis".

Moreover, these countries are also characterized by a significantly high level of domestic credit provided by financial sector as a percentage of GDP. As Klapper and Love (2010) point out "One feature of the crisis was its severe impact on the functioning of financial markets, which resulted in a credit crunch and credit rationing. It is not surprising that countries in which financial markets played a larger role in the domestic economy would experience sharper contractions in new firm creation during the crisis".

The second class consists of Austria, Belgium, Czech Republic, Finland, France, Germany, Italy, Netherlands, New Zealand, Poland, Slovenia, and United Kingdom. The characteristics of this class relative to the unemployment rate and the GDP growth rate are similar to those of the sample mean. These countries registered a significantly **high level of self-employment over the period**, and a high rate of growth in this level in 2012. Probably a part of the people laid off set-up their firms and became independent **to earn a living**. In these countries, employment in industry is significantly higher than the average over the period 2010-2012. We also notice that **the share of domestic credit** provided by the financial sector as a percentage of GDP **is lower** than the average in 2010 and 2011.

It is clear that it is the two South American countries (Chile and Mexico) in class 3, which are least affected by the crisis: they show significantly higher levels of GDP growth with higher levels of self-employment over the period. They also feature a high number of people currently setting up a business as well as a significant number of people owning or managing a business that has existed for up to 3.5 years[13]. These characteristics reflect **a dynamic form of entrepreneurship**. Sectors of industry and agriculture contribute significantly to the value added, while the service sector is under-represented. Net barter terms of trade are more favorable to those countries over the period. Globally, this class consists of countries with economic performance superior to that of the average of the entire sample. These countries are developing countries with a significantly lower minimum wage and health spending below the average of OECD countries. The share of domestic credit provided by the financial sector as a percentage of GDP is lower than the average in 2010 and 2011. In these countries, where **financial markets are less developed** and play a limited role in the national economy, the financial crisis did not severely affect the dynamics of entrepreneurship. The global financial crisis had a relatively limited impact on Latin

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[12] Luxembourg which is a financial country was recorded in the grey list of fiscal havens (very low fiscality, non transparent tax system, cooperation with other states on tax information) some years ago. It has evolved and has been removed from this list. Nevertheless some characteristics are still at work.

[13] With this exception, the GEM variables used in this study were generally not significant and therefore do not contribute to the characterization of classes.

American economies. The financial systems of these countries did not suffer contagion because they are not very sophisticated and globally less integrated.

Class 4 consists only of Hungary, which registered variations in the level of self-employment growth with rather high growth in 2011 but low growth in 2012. We could infer a kind of **volatility in self-employment** as a means of adjustment in this country. Hungary was initially considered as the front-runner of market reforms in Central and Eastern Europe, but by the end of the 2000s its economy was facing major structural problems. According to the IMF, "Hungary has been plagued by low growth and high debt for much of the last decade". Real GDP has remained broadly flat over the recent period due to weak domestic demand moderated by net exports which remain the only source of growth. Investment in the country has reached its lowest level in 10 years. Hungary's public sector is highly dependent on foreign financing: almost two-thirds of Hungary's public sector debt, which stands at about 80 percent of GDP, is held by foreigners. Growth prospects are largely unfavorable due to the low real wage growth, rising debt servicing, unemployment, and a credit crunch. Importantly, confidence has suffered in **a policy environment** that is perceived by many investors and consumers **as unpredictable and discriminatory**. "It seems that in Hungary, in spite of its head-start as the most entrepreneurial country amongst the socialist countries in 1970s and 1980s, lags in its cultural attitudes and lack of political recognition of entrepreneurship and entrepreneurs", (Szerb and al., 2012, P. 47).

In class 5, which includes Ireland, Portugal and Spain, the unemployment rate is significantly higher and the rate of growth significantly lower of those of the average of the entire sample over the period. The rate of self-employment growth is also significantly lower than the average in 2010 and 2011. This class includes sparsely urbanized countries with high levels of domestic credit provided by the financial sector as a percentage of GDP. In these countries, new firms are strongly **dependent on bank financing**. The situations of these three countries are somewhat different. In Spain, the ailing banking sector had lent heavily to the construction sector before the housing bubble burst. In Ireland, the property bubble was funded by banks which went bust and were taken over by the state, causing a government debt crisis. Portugal suffers from moderately high indebtedness of the private and public sector, low competitiveness and anemic growth. The **crisis has severely impacted the countries of this class** leading to a lot of bankruptcies and a slowdown in entrepreneurship dynamics in 2010 and 2011.

5. Conclusion

The present paper aims to propose a classification of the development of 26 OECD countries relative to GDP growth, unemployment rates, self-employment levels and the rate of growth in self-employment using a database over the period 1999-2012. In order to characterize classes and the different kinds of development in the countries, we also consider variables representative of regional socio-economic development. A multivariate analysis and evolutionary data analysis has been implemented. The results underline the great impact of the financial crisis on entrepreneurial dynamics and lead us to distinguish three sub-periods to study entrepreneurial behavior: the pre-crisis period (1999-2008), the crisis (2009) and the sub-crisis period (2010-2012). The first period is characterized by high GDP growth, high

levels of self-employment and a low unemployment rate. It is a period of growth favorable to entrepreneurship. The effects of the financial crisis are noticeable after a delay in 2009; this year is characterized by a rate of GDP growth and a rate of self-employment growth significantly lower than those registered on the overall period. The period 2010-2012 shows a sharp slowdown in entrepreneurial activity; the crisis seems to have significantly broken the dynamics of entrepreneurship. We can observe in the sub-period after the crisis that the unemployment rate is significantly higher than the average of the whole period and the level of self-employment is significantly lower.

We have identified thanks to the pre-crisis period six types of development: entrepreneurial economies, administrated industrialized economies, administrated service economies, advanced knowledge and services economies, industrialized entrepreneurial economies in developing countries and a non- entrepreneurial economy in transition. We find that, regardless of the type of development, this period is characterized by strong entrepreneurial activity. This result corroborates those of Klapper and Love (2010) who observed a steady increase in new business registrations prior to the crisis in all groups of countries.

In 2009, it appears that the agricultural economies (Australia, Chile, New Zealand and Poland) best withstood the financial crisis.

The analysis of the post-crisis period (2010-2012) shows that the development of entrepreneurship has been severely impacted by the crisis in countries widely dependent on the financial sector: it is the case of Ireland, Portugal and Spain and to a lesser extent Australia, Canada, Denmark, Japan, Luxembourg, Norway, Sweden and the United States. However, it appears that entrepreneurship is particularly dynamic over the period 2010-2012 in countries where the level of domestic credit provided by the financial sector as a percentage of GDP is lower (classes 2 and 3). Nevertheless in some of these countries "push" entrepreneurship might be important.

If we follow the trajectories of the 26 OECD countries (Table A4 in appendix) we can see that some countries are still group together and regardless of the sub-period. That is the case for Canada, Denmark, Sweden, Norway and the United States. These countries were classified in the class of advanced knowledge and service economies. Aghion (2014) underlines the fact that innovation implies creative destruction and that some countries are more able to surf on the new waves of innovation like ICT, Cloud technology, and renewable energies. According to him, the United States, Sweden and Canada are more likely to benefit from these technologies due to reforms in the labor market to make it more dynamic, the concentration of resources on knowledge economies, support of new innovative firms, accompaniment of salaried people who leave their jobs and increased competition on the market of goods and services[14].

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[14] He also added Germany. We can note that these five countries also share low energy dependence, Norway is widely self-sufficient. It has developed a form of "state capitalism" that is responsible for managing the abundant natural resources -minerals, fjords, forests, waterfalls-, (The Economist, February, 2-2013). The accumulated wealth allows Norway to operate a "fiscal policy rule" which releases oil wealth into the economy in a measured way in cyclical downturns and reduces the release when GDP growth is good.

Slovenia, Australia Netherlands and the United Kingdom follow the same pattern throughout the period, while Belgium and Finland, on the one hand, and France and Germany on the other hand, remain in the same group.

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Appendix

The Hierarchical Cluster Analysis (HCA)

The HCA according to Ward's method consists of gathering classes for which the loss of inertia between classes ΔI_B is the lowest. In this case, the distance between two classes is measured by the loss of inertia that one undergoes in the gathering, called cluster index or index level of the clustering. A high loss of inertia means that the two classes k and k_{-1} that have been grouped are quite distant from each other. Then a "good" partition is a partition that precedes a significant loss of inertia. It is this test that is commonly used to select the number of classes of HCA.

The choice of the number of classes is usually accomplished from the diagram of aggregate indices. This is a crucial aspect of the evaluation of the proposed solutions when analyzing a hierarchical classification; one is faced with the problem of getting too many or too few classes. However, while there is no single index to determine the optimal number of classes, many criteria can be used to facilitate this decision. First, it is possible to take a decision based on the characterization of classes by the active variables with $\alpha = 0.05$, a classic level of significance. If the profiles and/or anti-profiles of the obtained classes differ significantly on these variables for the classification, the proposed solution is probably relevant. Second, the ease of interpretation is also a criterion that tells us the required number of classes. It is important to question the relevance of the theoretical profiles and/or anti-profiles obtained. Finally, the size of the sample must also be taken into consideration, the larger the sample, the higher the number of classes.

Statistical criteria can be also used to decide how many classes to choose, such as the Semi- Partial R-Squared (SPR²) or the R-Squared (R²).

- The $SPR^2 = \Delta I_B / I_T$ measures the loss of inertia between classes or cluster index ΔI_B as a percentage of total inertia I_T caused by grouping two classes. The goal is to have a maximum within-classes inertia, then we look for a low SPR² followed by a strong SPR² at the following aggregation: a hollow for k classes and a peak for k-1 classes, indicates a good classification in k_{-1} classes. This means that we must cut the hierarchical tree before heavy loss of inertia: a low value of SPR² means the fusion of two homogeneous classes.

- The $R^2 = I_B / I_T$ is the proportion of variance explained by classes; it measures the quality of the classification. Its value should be as close as possible to one without too many classes; the ideal is to stop after the last big jump.

To assess the stability of obtained classes of HCA, we have consolidated all the classes, using a non-hierarchical cluster analysis, more robust, with mobile centers (k-means). The interpretation of a class is a qualitative description of their profile and/or anti-profile created from the active variables -those on which we wanted to differentiate the classes; but also with other additional (illustrative) variables selected. A generic name has been assigned to each class of HCA.

Table A1 : Synthesis of the partition into 6 classes of the 26 OECD countries over the period 1999-2008

	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6
Frequency	9	3	5	6	2	1
Countries	Australia Austria Ireland Luxembourg Mexico Netherlands New Zealand Slovenia United Kingdom	Italy Japan Portugal	Belgium Finland France Germany Spain	Canada Denmark Hungary Norway Sweden United States	Chile Czech Republic	Poland
Profile (+)	+ GDP $_{1999, 2002 \text{ and } 2007}$ + SEMPLShare $_{2008}$ + SEMPLGrowth $_{2007, 2008}$	+ SEMPLShare $_{1999 \text{ to } 2006}$	+ UNEMPL $_{1999 \text{ to } 2008 (-2001)}$ + SEMPLGrowth $_{2005, 2006}$		+ SEMPLShare $_{2003 \text{ to } 2008}$ + SEMPLGrowth $_{2002, 2003}$	+ UNEMPL $_{1999 \text{ to } 2008}$ + SEMPLShare $_{1999 \text{ to } 2008}$ + GDP $_{2008}$ + SEMPLGrowth $_{2000, 2001, 2008}$
Anti-Profile (-)	-UNEMPL $_{1999 \text{ to } 2008}$	- GDP $_{1999, 2002 \text{ to } 2006}$		- SEMPLGrowth $_{1999 \text{ to } 2008}$ - GDP $_{2007}$	- GDP $_{1999}$	
Illustrative Variables	+ IMM $_{1999 \text{ to } 2008}$ + TRADE $_{1999 \text{ to } 2002}$ + IPRO $_{2002}$ + InFDI $_{2002, 2003}$ + RMINW $_{2007}$ + YFEAI $_{2004}$ - HEALTH $_{1999}$ - EDU $_{2000}$	+ STRICT $_{1999 \text{ to } 2008}$ + INDUSEMPL $_{1999, 2000, 2003}$ + DCR $_{1999 \text{ to } 2007}$ - EDU $_{2003 \text{ to } 2005, 2007, 2008}$ - IPRO $_{2002, 2004, 2005, 2008}$ - NEAI $_{2004, 2006}$ - InFDI $_{1999}$	+ TIME $_{2003}$ + BTE $_{1999}$ + GERD $_{2000}$ + OutFDI $_{2001}$ - NEAI $_{2002}$ - YFEAI $_{2002, 2003, 2008}$	+ EDU $_{1999 \text{ to } 2008}$ + HEALTH $_{1999 \text{ to } 2008}$ + SEREMPL $_{1999 \text{ to } 2008}$ + PATENTS $_{2007}$ - AGRIEMPL $_{2001 \text{ to } 2008 (-2002)}$	+ INDUS $_{1999 \text{ to } 2008 (-2001)}$ + INDUEMPL $_{2006 \text{ to } 2008}$ + ECH $_{2004 \text{ to } 2008}$ + IPRO $_{2004, 2005, 2007}$ + PROC $_{2006 \text{ to } 2008}$ + BTE $_{2000, 2001}$ + NEAI $_{2006}$ + OEAI $_{2006}$ + AGRI $_{1999}$ - DCR $_{2007}$ - RMINW $_{1999 \text{ to } 2008}$ -SER $_{1999 \text{ to } 2008}$ - HEALTH $_{2004 \text{ to } 2008}$ - ECH $_{2001}$ - SEREMPL $_{2006, 2007}$	+ PROC $_{2003 \text{ to } 2008}$ + COST $_{2008}$ + OEAI $_{2004, 2005}$ + IPRO $_{2003}$

Note: Table A1 summarizes the main results of characterization of the chosen partition into six classes of regions, obtained from the cut of the hierarchical tree of the figure 4. Division is carried out according to the positions of the regions on the factorial axes of the MFA.

Table A2: Synthesis of the partition into 4 classes of the 26 OECD countries in 2009

	Class 1	Class 2	Class 3	Class 4
Frequency	4	10	10	2
Countries	Australia Chile New Zealand Poland	Austria Belgium Czech Republic Finland Italy Japan Mexico Netherlands Slovenia United Kingdom	Canada Denmark France Germany Hungary Luxembourg Norway Portugal Sweden United States	Ireland Spain
Profile (+)	+ GDP + SEMPLShare	+ SEMPLShare		+ UNEMPL
Anti-Profile (-)		- UNEMPL - GDP	- SEMPLShare	- SEMPLGrowth
Illustrative Variables	+ ECH + IPRO + AGRI + AGRIEMPL - SER - STRICT - GDERD	- ECH	+ SER + HEALTH + PATENTS +SEREMPL - COST	

Note: Table A2 summarizes the main results of characterization of the chosen partition into six classes of regions, obtained from the cut of the hierarchical tree of the figure 5. Division is carried out according to the positions of the regions on the factorial axes of the MFA.

Table A3: Synthesis of the partition into 5 classes of the 26 OECD countries over the period 2010-2012

	Class 1	Class 2	Class 3	Class 4	Class 5
Frequency	8	12	2	1	3
Countries	Australia Canada Denmark Japan Luxembourg Norway Sweden United States	Austria Belgium Czech Republic Finland France Germany Italy Netherlands New Zealand Poland Slovenia United Kingdom	Chile Mexico	Hungary	Ireland Portugal Spain
Profile (+)		+ SEMPLShare $_{2010\ to\ 2012}$ + SEMPLGrowth $_{2012}$	+ SEMPLShare $_{2010\ to\ 2012}$ + GDP $_{2010\ to\ 2012}$ + SEMPLGrowth $_{2010}$	+ SEMPLGrowth $_{2011}$	+ UNEMPL $_{2010\ to\ 2012}$
Anti-Profile (-)	- SEMPLShare $_{2010\ to\ 2012}$ - SEMPLGrowth $_{2011}$ - UNEMPL $_{2010\ to\ 2012}$			- SEMPLGrowth $_{2012}$	- GDP $_{2010\ to\ 2012}$ - SEMPLGrowth $_{2010,\ 2011}$
Illustrative Variables	+ PATENTS $_{2010,\ 2011}$ + SEREMPL $_{2010\ to\ 2012}$ + URBAN $_{2010\ to\ 2012}$ + GDERD $_{2010\ to\ 2012}$ + IMM $_{2010,\ 2011}$ + DCR $_{2010\ to\ 2012}$ - INDUSEMPL $_{2010\ to\ 2012}$ - STRICT $_{2010\ to\ 2012}$ - AGRIEMPL $_{2010\ to\ 2012}$ - IPRO $_{2011}$ - AGRI $_{2010}$ - OEAI $_{2011}$	+INDUSEMPL $_{2010\ to\ 2012}$ - SEREMPL $_{2012}$ - OEAI $_{2010}$ - DCR $_{2010,\ 2011}$	+ NEAI $_{2010\ to\ 2012}$ + YFEAI $_{2011,2012}$ + AGRI $_{2010\ to\ 2012}$ + AGRIEMPL $_{2010,\ 2011}$ + ECH $_{2010\ to\ 2012}$ + INDUS $_{2010\ to\ 2012}$ + IPRO $_{2012}$ - RMINW $_{2010\ to\ 2012}$ - SER $_{2010\ to\ 2012}$ - HEALTH $_{2010\ to\ 2012}$ - GDERD $_{2010}$ - DCR $_{2010,\ 2011}$	 - SEREMPL $_{2010}$ - PATENTS $_{2010}$	+ DCR $_{2010\ to\ 2012}$ + OEAI $_{2010}$ - URBAN $_{2010\ to\ 2012}$ - IPRO $_{2012}$ - GDERD $_{2012}$

Note: Table A3 summarizes the main results of characterization of the chosen partition into six classes of countries, obtained from the cut of the hierarchical tree of the figure 6. Division is carried out according to the positions of the countries on the factorial axes of the MFA.

Table A4: Trajectories and resemblances in development for the 26 countries of the OECD

Class	Before Crisis: 1999-2008	Crisis: 2009	After Crisis: 2010-2012
1	*Entrepreneurial economies* Australia Ireland Luxembourg New Zealand Mexico Slovenia United Kingdom Austria Netherlands	*Resilient countries* Australia New Zealand Chile Poland	*Self-employment shares are lower after the crisis* Canada Denmark United States Sweden Norway Australia Luxembourg Japan
2	*Administrated industrialized economies* Italy Japan Portugal	*Countries strongly affected by crisis with a loss in competitiveness* Mexico Slovenia United Kingdom Austria Netherlands Italy Japan Belgium Finland Czech Republic	*Credit crunch to domestic activity* *Push entrepreneurs* Belgium Finland Germany France New Zealand Slovenia United Kingdom Austria Netherlands Poland Czech Republic Italy
3	*Administrated service economies* Belgium Finland Spain Germany France	*Countries mainly coming from the class Advanced knowledge and service economies* Germany France Canada Denmark United States Sweden Norway Hungary Luxembourg Portugal	*Pursuing a dynamic entrepreneurial development* Chile Mexico
4	*Advanced knowledge and service economies* Canada Denmark United States Sweden Norway Hungary	*Countries hardest hit by the financial crisis* Ireland Spain	*Flexible self-employment growth in an uncertain environment* Hungary
5	*Industrialized entrepreneurial economies in developing countries* Chile Czech Republic		*Countries much impacted by crisis, entrepreneurship slowdown* Ireland Portugal Spain
6	*Non-entrepreneurial economy in transition* Poland		