The influence of creativity on entrepreneurship: the Portuguese case

by

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Abstract

The literature has shown that a high level of new firm formation contributes to a region's economic performance and is a signal of a thriving economy built on innovation. Amongst the many factors promoting new firm formation, such as market size, industrial structure or human capital, creativity has been neglected for some time. Richard Florida's *The Rise of the Creative Class* (2002) was a seminal contribution for the recognition of the importance of creative people, creative industries, creative economies and, consequently, creativity. Many authors, inspired by this contribution, have been undertaking theoretical and empirical studies to analyse the role of creativity in economics. The purpose of this thesis is to follow such contributions, discussing the relationship between entrepreneurship and creativity in a particular, relatively peripheral country: Portugal. A multivariate linear regression analysis is applied, explaining new firm formation across Portuguese regions with explanatory variables that include both creativity and diversity indexes, innovation indicators and the human capital dimension, along with control variables. Our results show little evidence of the influence of creativity on the birth of new firms in Portugal, while pointing to the relevance of agglomeration effects for new firm formation. Additionally, they suggest that immigrants might be facing difficulties in establishing a firm in Portugal, which may be explained by language barriers, financing difficulties and excessive bureaucracy.

Keywords: Entrepreneurship, Creativity, Multivariate linear regression
JEL-Codes: L26; R30; O30

Resumo

A literatura mostra que a criação de novas empresas contribui para o desempenho económico de uma região e é um sinal de uma economia próspera assente na inovação. Entre os vários fatores que promovem a criação de novas empresas, tais como a dimensão do mercado, a estrutura industrial ou o capital humano, encontra-se a criatividade, que tem sido negligenciada na literatura. *The Rise of the Creative Class* (2002) de Richard Florida é um trabalho seminal para o reconhecimento da importância de pessoas criativas, de indústrias criativas, de economias criativas e, consequentemente, da criatividade. Vários autores, inspirados por esta contribuição, têm levado a cabo estudos teóricos e empíricos para analisar o papel da criatividade na economia. O propósito desta tese é seguir estas contribuições, discutindo a relação entre a criatividade e empreendedorismo num país relativamente periférico: Portugal. Em termos metodológicos, recorre-se a uma regressão linear múltipla, explicando a criação de novas empresas nas regiões portuguesas com recurso a variáveis explicativas que englobam índices de criatividade e de diversidade e indicadores de inovação e de capital humano, para além de variáveis de controlo. Os nossos resultados mostram pouca evidência da influência da criatividade no nascimento de novas empresas em Portugal, ao mesmo tempo que apontam para a relevância das economias de aglomeração. Adicionalmente, os nossos resultados sugerem que os imigrantes podem estar a atravessar dificuldades no estabelecimento de empresas em Portugal, o que pode ser explicado por barreiras linguísticas, dificuldades financeiras e burocracia excessiva.

Palavras-chave: Empreendedorismo, Criatividade, Regressão linear múltipla

Códigos JEL: L26; R30; O30

Table of Contents

List of Tables

1. Introduction

A high level of new firm creation significantly contributes to regional economic performance and is a clear sign of a thriving economy; therefore, understanding the factors promoting new firm formation is crucial for economic development (Lee *et al.*, 2004). While the traditional literature has shown the influence of several variables such as the unemployment rate, population density, industrial structure, human capital, availability of funding and entrepreneurial characteristics on new firm formation, a more recent approach by authors such as Florida (2002, 2003) has been suggesting that creativity is one of the main factors promoting new firm formation and, thus, innovation and economic growth.

On the subject of creativity, some authors stress the key aspects of creative cities (Hospers, 2003), creative industries (Pratt, 2008) and creative economies (Howkins, 2001) that promote regional growth and prosperity. Hospers (2003) says creative cities have been a phenomenon belonging to every era, while Pratt (2008) says the term "creative industries" came into existence in the late 1990s – on this aspect, Hartley (2005) claims that creative industries are a consequence of local history, varying geographically, depending on heritage and circumstance. Creative economies are, according to Howkins (2001), an economy where a person's ideas, not land or capital, are the most important input and output. For Peters and Besley (2008), a creative economy links the primacy of ideas in both arts and sciences in a more embedded and social framework of entrepreneurship.

Peters and Besley (2008) note that Schumpeter provided an account of entrepreneurship and the role and significance of the entrepreneur who, through innovation, led the gales of "creative destruction". Additionally, Armington and Acs (2002) point out that variations in entrepreneurship rates are substantially explained by regional differences (in terms of industry intensity, population growth and income growth).

Hence, it seems that some characteristics boost an entrepreneurial-favourable climate and promote the innovative abilities of the human capital, i.e., creativity. But is it true that creative and diverse regions attract a more innovative and entrepreneurial

human capital, thus encouraging new firm formation? In a nutshell, is there a direct and positive relationship between entrepreneurship and creative and diverse regions?

Lee *et al.* (2004) explore whether connections exist among regional social characteristics, human capital and new firm formation in several urban areas of the United States of America. Arguing that social diversity and creativity have a positive relationship with new firm formation, they find that new firm formation is strongly associated with cultural creativity when controlled for the traditional variables suggested in the literature. Analysing the regional distribution and the economic effect of the creative class in more than 500 regions in 7 European countries (Denmark, England and Wales, Finland, Germany, the Netherlands, Norway and Sweden), Boschma and Fritch (2009), noting that the creative class is unevenly geographically distributed across Europe, find that a regional climate of tolerance and openness has a strong and positive effect on a region's share of these people, leading to a positive relationship among creative class occupation, employment growth and entrepreneurship at the regional level. However, they note that it is not clear whether human capital, measured by creative occupation, outperforms traditional indicators, such as those based on formal education.

The main goal of this study is to understand the relation between creativity and entrepreneurship in the Portuguese context, taking into account the effect of creativity in new firm formation, after controlling for other determinants of firms' birth. This study will undertake a multivariate linear regression analysis where the dependent variable will be new firm formation by NUTS 3 (measured by data obtained from *Instituto Nacional de Estatística - Sistema de Contas Integradas das Empresas*). The explanatory variables will be both creativity and diversity indexes, innovation indicators and human capital dimension, controlling for other variables (such as cost variables, agglomeration economies or market size).

This study will begin with a literature review on the main concepts on creativity and entrepreneurship, followed by a chapter on empirical studies on these topics. Chapter 3 will assess creativity and entrepreneurship in Portugal, encompassing methodological considerations and the presentation and discussion of the results. The main conclusions of this study and some suggestions for subsequent research will be presented in the final section.

Chapter 1: On Creativity and Entrepreneurship

1.1 Main concepts on the economics of creativity

Florida (2003) points out that economists and geographers accept economic growth as a regional mechanism driven by, and spreading from, specific regions, cities, or even neighbourhoods, either because they are located on transportation routes or because they have natural resources that encourage firms to locate there. The economic importance of a place is tied to the efficiency with which one can make things and do business, supported by government tax breaks and highway constructions.

Florida (2003) also points out that a more powerful theory of city and regional growth has been emerging since the early 1990s, postulating that people are the driving force behind regional growth, a perspective known as the "human capital" theory of regional development. The ground-breaking work by Jacobs (1969, 1984) made theorists note the ability of cities to attract creative people and thus spur economic growth. While previous economic growth theories and models were developed upon nations and huge economic blocks, now emerges a more regional sense and dimension of economic growth. Theories and models such as Solow's growth model (Solow, 1957) or the endogenous growth theories take into account labour, human capital, innovation and knowledge as significant contributors to economic growth at the nationwide level (e.g., Romer, 1986, 1990; Lucas, 1988; Aghion and Howitt, 1992), but fail to recognize the small and all-important contributions made at the regional level. Mainly, those fail to account for the contribution of entrepreneurship brought about by creativity. Authors like Richard Florida aim directly to this purpose (i.e., entrepreneurship and creativity); in his book *The Rise of the Creative Class*, Florida (2002) points to a correlation between a region's economic development and its share of creativity (measured by the tolerance towards diversity, the capacity to invent or improve technology and the richness of public amenities).

Florida develops his theories on regional development and the creative class on the previous works of both Jacobs and Lucas. Jacobs (1969) first stressed the role of

cities and regions in the transfer and diffusion of knowledge, noting that as the scale and diversity of the cities increases, so does the connections between economic actors, leading to the generation of new ideas and innovations. Lucas (1988) further developed these notions, identifying the role of human capital externalities in economic development. He also highlighted the clustering effect of human capital, embodied with the knowledge factor. Finally, he recognized the role of great cities, which localize human capital and information, creating knowledge spillovers and becoming engines of economic growth. Because cities reduce the cost of knowledge transfer, ideas move more quickly, leading to a faster rise of new knowledge. Florida (2003) argues that places with a greater number of talented people thrive and are better suited to attract more talent. But his perspective differs from the usual human capital theories. While those theories establish that human capital is indeed the driving force in regional economic growth, as a whole they do not aim to find out what makes people cluster in certain places, why they choose some cities over others. Florida's perspective differs from those in respect to two things: first, it identifies a type of human capital – creative people – as being key to economic growth; and, second, it identifies the underlying factors that shape the location decisions of those people – in relation to innovation, diversity and tolerance. Thus, Florida (2003) introduces the notion of a "creative class" composed by those that engage in tasks whose function is to create meaningful new forms. He divides this creative class into two groups: first, the core of the creative class – scientist and engineers, university professors, poets and novelists, artists, entertainers, actors, designers and architects, as well as the thought leadership of modern society (nonfiction writers, editors, cultural figures, think-tank researchers, analysts and other opinion-makers) –, and, second, the "creative professionals" who work in a wide range of knowledge-based occupations in high-tech sectors, financial services, the legal and health-care professions and business management. Additionally, Florida *et al.* (2008a) find that human capital and the creative class have complementary roles in regional development.

Florida stresses creativity as a fundamental and intrinsic human characteristic, since all human beings are creative and all are potential members of the creative class. Moreover, Florida introduces his 3Ts of economic development as the key to understanding the new economic geography of creativity and its effects on economic

outlines: technology, talent and tolerance. Technology is defined as a function of both innovation and high-technology concentrations in a region; talent as those people with a bachelor's degree and above; and tolerance as openness, inclusiveness and diversity to all ethnicities, races and life patterns. Only places possessing all three critical and intertwined factors will score high in creativity and quantity of members belonging to the creative class. Lee *et al.* (2010) have the same opinion, arguing that innovation is a joint product of human capital and the diversity and openness of a place to difference.

But not all agree with Florida's 3Ts. For instance, Pratt (2008) outlines the fact that technology, talent and tolerance are mere proxies and whilst the numbers of Florida's analysis might look convincing, the underlying concepts are woolly. He goes on to point out that the 3Ts depend on one's definition, on which variables one uses and on their relationship with the target variables. However, he is not against the definition of a creative class itself as a means to explain regional economic growth; he just criticizes the conceptualization process. Unlike Pratt, though, some detractors do not accept Florida's creative class theory at all (Vorley *et al*., 2008). Peck (2005) is one of such derogatory works. For starters, Peck calls Florida's argument in *The Rise of the Creative Class* both straightforward and rather elusive. He goes on to say that the production of authentic neighbourhood cultures through deliberate public-policy interventions (following Florida's approaches) is a daunting, if not infeasible, task, even though Florida has voiced about how some cities have oversimplified his ideas. Malanga (2004) says that the best-performing cities on measures like employment and population growth, or the rate of formation of high-growth companies, are not creative capitals (such as San Francisco or New York), but low-tax, business-friendly cities defined as creative losers (like Las Vegas and Memphis), while Glaeser and Saiz (2004) find that skilled cities are growing because they are becoming more economically productive when compared to less skilled cities, and not because these cities are becoming more attractive places to live.

Despite these criticisms, Cohedent *et al.* (2010) believe that the work initiated by Florida has set the background for an emerging field of research, opening a large agenda for studies on creativity. Nonetheless, these authors find a limitation in Florida's work: he often considers who the creative people are, rather than what they really do; his suggestions are more a necessary condition for having a creative city through the

accumulation of talents belonging to the creative mass, rather than a comprehensive vision of the actual processes that lead an urban milieu to be more creative-oriented. Hence, instead of the anatomy of the creative class proposed by Florida, Cohedent *et al.* (2010) propose an anatomy of the creative city and an understanding of the emergence and formation of creative processes in those particular local ecologies of knowledge[1]. The result is a division of the creative city in three different layers: the upperground, the middleground and the underground. The upperground is characterized by formal institutions such as cultural firms or institutions whose specific role is to bring creative ideas to the market. The middleground is the level where the work of communities is decisive in designing the grammars of use and other common platforms of knowledge necessary for a knowledge transmission and learning that precedes innovation in those geographically bounded innovative environments. Finally, the underground is constituted by creative individuals such as artists or other knowledge works, individuals not immediately linked to the commercial and industrial world. Hospers (2003) has little doubt that cities are the locations where knowledge, creativity and innovation thrive. He finds that cities that develop clever and original strategies on a local scale have the opportunity to grow to become competitive, creative cities. For Hospers, creative cities have been a phenomenon belonging to every era; throughout history there have been various types: technological-innovative, cultural-intellectual, cultural-technological and technological-organizational. Technological-innovative cities are places that work as the birthplace for new technological developments or, sometimes, real technological revolutions, for which America's Silicon Valley is an example. Cultural-intellectual cities are those where culture (e.g. figurative and performing arts) and science bloom in a period of tension between the established conservative order and a small group of innovative-minded radicals – this generation gap produces creativity reactions on the part of artists, philosophers and intellectuals. Such an example, of "creative revolution", is Florence during the Renaissance. Cultural-technological cities are a merger of the major characteristics of the previous two types of creative cites: technology and culture go hand in hand, for which the film industry of Hollywood is an example. Lastly, technological-organizational cities are those where local actors find original solutions to problems stemming from large-scale urban life, like the supply of

[1] On the topic of creative cities, Oliveira (2011) offers an extensive literature review.

water for the population, the need of infrastructure, transport and housing – an example is Rome under Caesar (aqueducts) or London in the 1980s (re-structure of the Docklands). Even though Hospers says it is impossible to predict when and where a creative city will come into existence, he identifies the factors that can increase the chances of developing urban creativity and thus contributing to an urban knowledge economy: concentration (of population), diversity (extending Florida's notion further: not just variation between citizens, but also in the image of the city projects in terms of buildings) and instability (as an extra condition for urban creativity: a city can find itself in a vulnerable situation and invite creativity). Notwithstanding, he stresses that creative cities cannot be constructed from the scratch: the roots of creativity must be already there, lying in the existing, historically developed urban environment. In a nutshell, policy-makers can only foster the chances for the emergence of urban creativity (Hospers and Dalm, 2005). Pratt (2008) extends the concept of creativity, applied before to creative cities, to creative industries. According to him, it was not until the late 1990s that the term 'creative industries' was put to use, after the UK Creative Industries Task Force produced the first mapping document, (DCMS, 1998), which defined creative industries as including several activities such as advertising, antiques, architecture, crafts, design, fashion, film, leisure, software, music, performing arts, publishing, software, TV and radio. Pratt goes on to point out that the term cultural industries had been previously used to refer to a similar domain of policy and activity by authors like O'Connor (2004) and Garnham (2005), but it was a rather amorphous one that sometimes was indicative of commercial activities, sometimes not. Just like Hospers (2003) said, creative cities derive from roots of creativity already there (historically). Hartley (2005) claims that creative industries are a consequence of local history, and so they vary geographically, depending on heritage and circumstance.

But none of the above, i.e. creative cities and creative industries, can come into existence without the observance of a creative economy. Peters and Besley (2008) state that the notion of a 'creative economy' has been around since the early 1990s, first introduced by John Howkins. Howkins (2001) defines creative economy not merely in terms of the concepts of creativity, culture, heritage, knowledge, information, innovation, or in terms of the performing arts, publishing, etc., but rather more broadly as an economy where a person's ideas, not land or capital, are the most important input

and output. As it stands, everyone can be creative: there is no need for land, or capital. Peters and Besley (2008) also signalize that Howkins' account of the creative economy follows a long line of development that emerges from different literatures, mainly the Schumpeter's "creative destruction" and his account of entrepreneurship. Thus, this study points out that the creative economy, broadly conceptualized, links the primacy of ideas in both arts and sciences in a more embedded and social framework of entrepreneurship. In a nutshell, the UNCTAD (2008)'s report on *The challenge of assessing the Creative Economy* defines creative economy as the interface between creativity, culture, economics and technology, expressed in the ability to create and circulate intellectual capital, with the potential to generate income, jobs and export earnings, while at the same time promoting social inclusion, cultural diversity and human development.

2.2 Creativity and entrepreneurship: an overview

Through creative cities, creative industries and creative economies, a surge is expected in entrepreneurship and thriving of new innovative firms. As mentioned above, Schumpeter's "creative destruction" theory is perhaps the first and most prominent and coherent account of entrepreneurship[2]. Schumpeter, as noted by Peters and Besley (2008), provided an account of entrepreneurship and the role and significance of the entrepreneur who, through innovation, led the gales of "creative destruction", making old ideas, technologies and skills obsolete, serving as the source of progress and improvement in the standard of living. For Schumpeter, the entrepreneur is the individual carrying out new combinations, introducing new products or processes, identifying new export markets or sources of supply, even creating new types of organization. His vision is somewhat of the entrepreneur as a hero, as someone motivated by the dream and the will to found a private kingdom, the will to conquer, to

[2] The concept of entrepreneurship first came into light centuries ago, but with different meanings. Kyrö (1996) points that in the XVII century the French verb "entrependre", meaning being able to bring off some project or activity, began to be applied. Richard Cantillon (1755) was one of the first authors linking the broad concept of entrepreneurship with economics. Additionally, the timeless Adam Smith (1776), in his *Wealth of Nations*, designates entrepreneurs as those reacting to variations in the economy, while John Stuart-Mill (1848) stresses entrepreneurship as the point of origin of a private firm.

prove oneself superior to others, and ultimately by the joy of creating (Peters and Besley, 2008).

McClelland (1961) establishes three levels encouraging individual entrepreneurship: the need for achievement, the need for affiliation and the need for power. The need for achievement refers to an individual's desire of some significant accomplishment, his/her need of competitive success. Second, the need for affiliation is stated as an individual's need of belonging and sense of involvement within a social group. Lastly, the need for power is viewed as the necessity of control and influence, the prevailing of one's ideas and the augmenting of one's status. Combined, these three psychological human needs and motivational processes are crucial to the individual's financial growth and, consequently, to the entrepreneurial activity. Nonetheless, Peters and Besley (2008) stress the importance of shifting away from the figure of the lone and heroic individual who is willing to take risks towards entrepreneurship as the model for a society or as a set of infrastructural conditions enabling creativity. Drucker (1985) argues that entrepreneurship is not an economic end in itself and that the entrepreneur does not need to show any particular trait of personality; rather he needs only a self-commitment on innovation. Leadbeater and Oakley (2001) call the knowledge entrepreneurship a structured activity, instead of merely a flash of individual genius, built in six stages: creation, sensing, packaging, mobilizing, acting and exiting. Thus, the basic unit of entrepreneurship is not the individual *per se* but teams or partnerships providing tight networks in distinctive industry clusters. Also, Leadbeater and Oakley suggest that the most powerful forces driving entrepreneurship are technological change and knowledge creation, cultural change, economic changes and the willingness of financial markets and investors to sanction risk taking. To this regard, Johannisson (1984) says that entrepreneurial culture is defined as a social context where entrepreneurial behaviour is encouraged. Armington and Acs (2002) point out the existence of an entrepreneurial culture promoting start-up activity as one of the major hypotheses concerning the regional variation in firm birth rates (i.e. entrepreneurship). They conclude that the variations in firm birth rates are substantially explained by regional differences (in terms of industry intensity, population growth and income growth), as predicted before by authors like Hospers (2003).

Sternberg (1988) defines entrepreneurship as a form of creativity – labelled as business or entrepreneurial creativity – because new businesses are often original. Lee *et al*. (2004) divide academic approaches on entrepreneurship into two major categories: the first one on entrepreneurs (and the reasons why an individual decides to become one and start a new firm) and the second one on regional variations in firm formation (looking at structural variations in geographical areas).

As noted above, the approaches on entrepreneurs take into account the psychological characteristics of the individual. But there are also other types of characteristics that can turn an individual into an entrepreneur: Yoon (1997) suggests that immigrants are more likely to become entrepreneurs because they are systematically excluded from employment that offers suitable wages, job security and career opportunities, while Evans and Leighton (1989) find that men with more financial resources and more confidence in their own ability are more likely to be self-employed. Regarding regional variations in new firm formation, the leading studies focus on tax rates, transportation costs, and scale economies at the plant level (Kieschnick, 1981; Bartik, 1989). Armington and Acs (2002) point out factors such as industrial intensity, income growth, population growth and human capital, while Kirchhoff *et al*. (2002) find academic research and development expenditure to be significantly associated with firms birth.

What can be highlighted now is the role of entrepreneurship in the context of cities. As Jacobs (1969) notes, open and diverse cities attract more talented people, spurring creativity and innovation (the underlying forces of entrepreneurship). Lucas (1988) argues that cities function as collectors of human capital, generating new ideas and economic growth. This goes back to Florida's initial claim that there is a correlation between a region's economic development and its share of creativity. Therefore, entrepreneurship will thrive in places that are innovative, diverse and tolerant (Florida, 2003). This goes hand in hand with Hospers' (2003) notion of creative cities as places where talented people invite creativity in a vulnerable situation. The question that now arises is if creativity powers entrepreneurship, i.e., new firm formation.

Chapter 2: Empirical studies on creativity and entrepreneurship

In the previous chapter, several theories of entrepreneurship and creativity were highlighted. Through creative cities, creative industries and creative economies, one the most prominent effects stressed by authors is that of creativity in spurring new firm formation (after controlling for traditional determinants of entrepreneurship). But when the results of empirical studies are taken into account, does creativity and, to some extent, creative cities, creative industries and creative economies, still matter as a determinant of new firm formation?

Several studies can be highlighted as an evidence of creativity's effect and importance (see Table 1[3]). Lee *et al.*'s (2004) study shows that, in general, new firm formation is indeed associated with creativity and that the most open and creative regions (regarding diversity and talent), by attracting more human capital, achieve a more dynamic entrepreneurship. The main goal of this study was to determine whether connections exist between regional social characteristics, human capital and new firm formation in several urban areas of the United States of America (through the use of data provided by Metropolitan Statistical Areas [SMAs], Primary MSAs [PMSAs] and Labour Market Areas [LMAs]). Using bivariate correlation analysis and multivariate ordinary least square (OLS) analysis, new firm formation (data from Longitudinal Establishment and Enterprise Microdata [LEEM] on firm births per one million people) was explained by a measure of creativity (Bohemian Index – the proportion of bohemians and other artistically creative people), a measure of diversity (Melting Pot Index – the percentage of the population that is foreign born – and Diversity (or Gay) Index – the concentration of same-sex male unmarried partners in the population), a measure of human capital (the percentage of adults in the population with a bachelor's degree and above), a patent variable, the income growth rate and the population growth rate. Mainly, the authors found that new firm formation is strongly associated with creativity when controlling for the traditional variables suggested in the literature. Firm formation is most closely associated with the Bohemian Index and positively and

[3] The studies mentioned in Table 1 and Table 2 were extracted from Scopus Database during the first two weeks of December 2012. First, we use a combination of keywords: "creativity" and "entrepreneurship"; "creativity" and "regional entrepreneurship"; and "creative class" and "entrepreneurship". After that, and by inspection of each abstract, we selected the articles that adopted an empirical approach to the topic under study: creativity and entrepreneurship.

significantly associated with the Diversity Index, but insignificantly with the Melting Pot Index. It is also strongly associated with human capital, but only moderately associated with patents and reasonably with income change. Finally, it is highly correlated with population growth.

Donegan *et al.* (2008) undertake a similar study, exploring the relationships between the presence of the creative class (individuals reflecting some degree of creativity) and regional economic performance. Again, the sample of multivariate regression models was drawn from SMAs, where metropolitan economic performance (measured as the percentage change in jobs, percentage change in per capita personal income and the instability of jobs) was explained by a measure of talent (Creative Class Index – the percentage of MSA workforce in super-creative core[4] and creative professional occupations – and Bohemian Index – the location quotient for artistically creative people in MSA), a measure of tolerance (Melting Pot Index – the percentage of foreign-born people in MSA – and Gay Index – the location quotient for males who identify themselves as gay), a measure of technology (the Tech-pole – the multiplicative combination of the MSA's high-tech industrial output as a percentage of total US high-tech industrial output and the MSA's location quotient of high-tech industrial output), a measure of human capital (the percentage of adults with bachelor's degrees) and, finally, a measure of the industry mix (the relative fraction of a region's total earnings from manufacturing, from business services and from sole proprietorships). The parallels between the two studies are interesting, with the second one showing that indicators of human capital and industry composition perform as well as, or better than, talent, tolerance and technology in explaining metropolitan job and income growth and job instability.

[4] According to Florida (2002), the super-creative core is defined as: computer and mathematical occupations; architecture and engineering occupations; life, physical, and social science occupations; education, training, and library occupations; and arts, design, entertainment, sports, and media occupations.

Table 1. Main empirical studies on creativity and entrepreneurship – I

Author(s)	Main Goal	Sample	Methodology	Dependent Variables	Explanatory Variables		Main Findings
Lee *et al.* (2004)	Determine whether connections exist among regional social characteristics, human capital and new firm formation.	Sample 1: Metropolitan Statistical Areas (SMAs)/Primary MSAs (PMSAs) Period: 1994-1996 Sample 2: Labour Market Areas (LMAs) Period:1997-1998 United States of America	Bivariate correlation analysis Multivariate Ordinary Least Squares (OLS) analysis	New firm formation (Firm births per 1 million people)	*Creativity*	- Bohemian Index: % of bohemians and other artistically creative people	Regions that are open, creative and attract human capital enjoy a more dynamic entrepreneurship
					Diversity	- Melting Pot Index: % of the population that is foreign born - Gay Index: concentration of same-sex male unmarried partners in the population	
					Human Capital	- % of adults in the population with a bachelor's degree and above	
					Income Growth rate		
					Population Growth rate		
Florida *et al.* (2008b)	Examine the relationships between talent, technology and regional development	Sample: 31 Chinese provincial-level regions in mainland China Period: 2004	Structural equation models (SEM), estimated with maximum likelihood (LM)	Regional Development (GDP per capita)	*Talent*	- Human Capital: individuals with a college or higher-level degree - Creative Class: % of professional and technical workers within the local population	- The relationship between the distribution of talent and technology and between the distribution of talent and regional economic performance is weak in China - The presence of universities and the actual stock of talent are strongly related - Tolerance plays an important role in the distribution of talent and technology in China
					Technology	- High technology: location quotient of the value added for high-tech industries - Patents: officially approved patents per capita	
					Regional institutions and cultural factors	- University: number of university students standardized by local population - Tolerance : Hukou index	
Rutten and Gelissen (2008)	Investigate whether differences in creativity and diversity are a good predictor of differences in regional wealth	Sample: 94 European regions Period: 1998-2001 NUTS-2 level	Ordinary least squares (OLS) regression	Level of regional economic development (GDP per capita)	*Technology*	- Innovation: number of patents per million inhabitants for each region - High-tech: investments in R&D of a region's private firms as a % of that region's GDP	- Regional differences in diversity are directly related to differences in regional wealth - The synergetic effect of technology and talent on the level of regional wealth depends on the degree of diversity that resides within regions - Creativity and diversity deserve a more prominent place in economic geography
					Talent	- Human capital: % of the workforce with a bachelor's degree or higher - Share of knowledge-intensive services (KISs) occupations in the total workforce	

					Diversity	- Melting Pot: the % of non-nationals in the population (Eurostat data) - Tolerance index: average score across regions of the number of times each respondent agreed to having a member of gays, gypsies, Jews, or Muslims as their neighbour (by the European Values Survey (EVS), 1999) - Bohemian values: composite index (EVS, 1999)	
Donegan *et al.* (2008)	Explore the relationships between the presence of the creative class and regional economic performance	Sample: U.S. metropolitan areas (SMAs) Period: 1994 - 2003	Multivariate regression models	Metropolitan economic performance: - % change in jobs - % change in per capita personal income	*Talent*	- Creative class index: % of MSA workforce in super-creative core and creative professional occupations - Bohemian index: location quotient for artistically creative people in MSA	- Indicators of human capital and industry composition perform as well or better than talent, tolerance and technology in explaining both job and income growth and job instability at the metropolitan level
					Tolerance	- Melting pot index: % of foreign-born people in MSA - Gay index: location quotient for males who identify as gay	
					Technology	- Tech-pole: multiplicative combination of: the MSA's high-tech industrial output as a percentage of total US high-tech industrial output; and the MSA's location quotient of high-tech industrial output	
					Human Capital	- % of adults with bachelor's degrees	
					Industry Mix	- Share of a region's total earnings from manufacturing - Share of earnings from business services - Share of earnings from sole proprietorships	
Boschma and Fritsch (2009)	Analyse the regional distribution of the creative class and its impact at the economic regional level	Sample: 500 regions of 7 European countries (Denmark, England and Wales, Finland, Germany, the Netherlands, Norway, and Sweden) Period: 2002	Descriptive statistics Multivariate estimation models (Spatial Error Models)	Regional population share of employees in creative occupations	*Regional culture*	- Bohemian Index: share of regional population in bohemian occupations - Openness Index: share of foreign-born people	- Strong empirical evidence that the creative class is unevenly distributed across Europe - Evidence of a positive relationship among creative class occupation, employment growth and entrepreneurship at the regional level
					Regional facilities	- Public provision index: share of the labour force working in public health care and public education - Cultural opportunity index: share of the workforce that is active in cultural and	

		NUTS 3 level				recreational activities	
					Region's economic performance	- Annual employment growth rate	
					Population density		
Qian (2010)	Investigate the geographic distribution of talent and its association with innovation, entrepreneur-ship and regional economic performance in China	Sample: China's provincial-level data (31 provinces of mainland China) Period: 1997 - 2004	Descriptive analysis Correlation analysis Regression analysis (OLS)	Talent: - Human capital index: number of people with a college or higher-level degree divided by the local population of 15 years old and older Creativity index: proportion of professional and technical personnel among the local population	*Market factors*	- Average wage - Wage change - Employment Change	- The single most important contributor to the talent distribution in China is the presence of universities - Wage levels, service amenities and openness also contribute to talent attraction but to different extents - Human capital, outweighing the creative class, exhibits positive effects on innovation, entrepreneurship and regional economic performance - Openness may play an important role in regional innovative activity, consistent with Florida's theory on diversity
					Amenities	- Service amenities	
					Openness	- Hukou index: proportion of population without local Hukou or registration	
					University	- University students divided by local population	
					City index	- Proportion of urban population in total population	
					Innovation	- Innovation index: officially granted patents per capita - High-tech index: location quotient of the value added in high-tech industries	
					Entrepreneurship	- Number of new established firms divided by the employed population	
					Regional economic performance	- GDP per capita	
Audretsch *et al.* (2010)	Investigate the determinants of entrepreneuri-al activity in German regions	Sample: 97 German regions Period: 1998–2005 NUTS 3 level	Regression analysis (OLS)	Regional entrepreneur-ship (start-ups per 10.000 inhabitants)	*Control variables*	- Regional unemployment rate: number of unemployed as a % of regional labour force - Population density: inhabitants per square kilometre in the German planning regions	- Regions with a high level of knowledge provide more opportunities for entrepreneurship than other regions - Diversity has a positive impact on technology oriented start-ups - Diversity of people is more conducive to entrepreneurship than the diversity of firms - Regions characterized by a high level of knowledge and cultural diversity form an ideal breeding ground for technology oriented start-ups
					Knowledge variables	- RD: share of R&D workers in total employment - HQ: share of highly qualified employees in total employment	
					Diversity measures	- Index of fractionalization: probability that two randomly selected individuals in a community belong to the same group - Theil index	

						- Modified Herfindahl index	
Kerimoglu and Karahasan (2011)	Determine if regions specializing in creative strategic sectors have rapid productivity growth will experience faster growth and concentration of talent with positive and significant impact on regional economic performance	Sample: 17 Autonomous Communities of Spain Period: 1996 – 2004 (INE, SABI, IVIE)	Static non-spatial panel data model GLS estimator	Regional economic performance: - Volume of regional employment - Value added in industrial and service oriented production - GDP of Autonomous Communities	*Occupational attainment*	- Employment in talent-based occupations (% of employment)	- Talent is unevenly dispersed among the regions of Spain and this has severe impact on the differences between the economic activity levels, measured by employment volume, industry and service value added and finally regional GDP - Talent is a vital element of the regional differences
					Educational attainment	- Employment with bachelor's degree and above (% of employment)	
Kerimoglu and Karahasan (2012)	Investigate the spatial distribution of creative capital and its connection with regional disparities	Sample: Spanish provinces Period: 1996 – 2004 SABI database	Exploratory spatial data tools Moran's I LISA	Spatial dispersion of creative capital	Creative capital: high-tech, knowledge intensive services, real estate, architecture and engineering, research and development, advertising and market research, professional, scientific and technical activities, financial and insurance activities, other creative activities such as publishing, software publishing, telecommunications, and computer programming occupations		- There is an unequal structure for creative capital - Creative employment is spatially dependent across the territory of Spain - Provinces with high creative capital have relatively high per capita income in Spain - There is strong and significant impact of the creative capital endowments on the regional differences in Spain
Piergiovanni *et al.* (2012)	Examine the importance of creativity, new business formation, Intellectual Property Rights (IPR) activities and other factors in determining regional growth	Sample: 103 Italian provinces Period: 2001 – 2006 (NUTS 3)	Regression analysis (OLS)	Relative growth rate of value added (*per province*) Relative growth rate of employment (*per province*)	*Creativity*	- Growth rate of the number of firms in creative industries - Share of creative firms in the population of all non-agriculture firms active in the region - Number of university faculties per resident population	- Positive effect of the increase in the number of firms operating in creative industries, of the net entry, and of a greater provision of leisure amenities on regional economic growth The share of legal immigrants is found to have a positive impact on employment growth
					New business formation	- Net entry rate of firms	
					IPR activities	- Incremental growth of the stock of trademarks and registered designs & models by province - Number of trademarks and registered	

						designs & models in the respective province - Incremental growth of the stock of patents and utility patents - Number of patents and utility patents in the respective province	
					Provision of amenities	- Number of restaurants per capita - Number of movie theatre tickets per capita	
					Migration	- Share of legal immigrants per 1000 resident population	
					Educational attainment	- Employment with bachelor's degree and above (% of employment)	
Berggren and Elinder (2012)	Investigate how tolerance, as measured by attitudes toward different types of neighbours, affects economic growth	Sample: 54 countries from Asia, Latin America, the EU, North America and transition countries Period: 1998-2007	Fixed-effects panel-data analysis	Average annual growth in real GDP per capita	*Tolerance homosexuals*	- Share of the population that does not pick "homosexuals" in answer to the question: "On this list are various groups of people. Could you please mention any that you would not like to have as neighbours?" - World Values Survey (WVS)	- Tolerance toward homosexuals is negatively related to growth - Robust results are not found for tolerance toward people of a different race, but the sign of the estimated coefficients is positive, suggesting that the inclusion of people irrespective of race makes good use of productive capacity
					Tolerance race	- Share of the population that does not pick "people of a different race" in answer to the same question (WVS).	
					Alternative education measures	- Enrol: gross enrolment rate in secondary education - Cognitive skills: average test scores in math and science in primary and secondary school	

Hence, it seems that Lee *et al.* (2004) and Donegan *et al.* (2008) differ, with the latter considering that Richard Florida's 3Ts are poor predictors of metropolitan job and income growth and that attracting the creative class is no substitute for traditional strategies. However, Donegan *et al.* (2008) stress that the presence of the creative class in a region is not a disadvantage; rather, along with Florida's indices, it provides regions with a starting point for analysing and harnessing their existing occupational strengths.

Boschma and Fritsch (2009) also analyse the creative class (in addition, its regional distribution) and its impact at the economic regional level by studying 500 regions of 7 European countries (Denmark, England and Wales, Finland, Germany, the Netherlands, Norway and Sweden) at NUTS 3 level. Through descriptive statistics and multivariate estimation models, they test the regional population share of employees in creative occupations in regard to regional culture (measured by the Bohemian Index – the share of regional population in bohemian occupations – and the Openness Index – the share of foreign-born people), regional facilities (measured by the Public provision index – the share of the labour force working in public health care and public education – and the Cultural opportunity index – the share of the workforce that is active in cultural and recreational activities), the region's economic performance (measured by the annual employment growth rate) and population density. Their findings, in line with Lee *et al.*'s (2004) study for the United States, indicate a positive relationship between creative class occupation, employment growth and entrepreneurship at the regional level in those 7 European countries. Moreover, they stress strong empirical evidence that the creative class is unevenly distributed across Europe.

Before Boschma and Fritsch (2009), Rutten and Gelissen (2008) analyse 94 European regions to investigate if differences in creativity and diversity were a good predictor of differences in regional wealth. Adapting much of Florida's explanatory variables to the European context, they estimate an OLS regression to determine the level of regional economic development (measured by GDP per capita) with technology measures (one of innovation – the number of patents per million inhabitants for each region – and one of high-tech – the investments in R&D of a region's private firms as a percentage of that region's GDP), talent measures (the percentage of the workforce with a bachelor's degree or higher – human capital – and the share of knowledge-intensive services (KISs) occupations in the total workforce) and diversity measures (the Melting

Pot index – percentage of non-nationals in the population –, the tolerance index – by the 1999 European Values Survey[5] (EVS) – and bohemian values – composite index (EVS, 1999)). Their findings prove that regional differences in diversity are directly related to differences in regional wealth and that the synergetic effect of technology and talent on the level of regional wealth depends on the degree of diversity that resides within regions. Lastly, they stress that creativity and diversity deserve a more prominent place in economic geography.

Some countries in Europe are studied separately. For instance, Audretsch *et al.* (2010) take data from 97 German regions at the NUTS 3 level to investigate the determinants of entrepreneurial activity. Trough regression analysis (OLS) they attempt to explain regional entrepreneurship (measured as the number of start-ups per 10 000 inhabitants) with some knowledge variables (the share of R&D workers in total employment and the share of highly qualified employees in total employment) and some diversity measures (the index of fractionalization, the Theil index and the modified Herfindahl index), controlling for the regional unemployment rate (the number of unemployed as a percentage of the regional labour force) and the population density (number of inhabitants per square kilometre in the German planning regions). The results show that regions with a high level of knowledge provide more opportunities for entrepreneurship than other regions. Furthermore, diversity is shown to have a positive impact on technology-oriented start-ups, while diversity of people is proven to be more conducive to entrepreneurship than the diversity of firms. Finally, regions characterized by a high level of knowledge and cultural diversity are found to form an ideal breeding ground for technology-oriented start-ups.

Piergiovanni *et al*. (2012), on the other hand, examine the importance of creativity, new business formation, Intellectual Property Rights (IPR) activities and other factors in determining regional growth in 103 Italian provinces at the NUTS 3 level. They relate the relative rate of growth of value added per province and the relative rate of growth of employment per province – as dependent variables – with creativity (measured by the growth rate of the number of firms in creative industries, the share of creative firms in the population of all active non-agriculture firms in the region

[5] The European Values Study is a large-scale, cross-national, and longitudinal survey research program on basic human values, providing insights into the ideas, beliefs, preferences, attitudes, values and opinions of citizens all over Europe since 1981.

and the number of university faculties per resident population), new business formation (measured by the net entry rate of firms), IPR activities (measured by the growth of the number of trademarks and registered designs & models by province, the incremental growth of the stock of patents and utility patents and the number of patents and utility patents in the respective province), provision of amenities (measured by the number of restaurants per capita and the number of movie theatre tickets per capita) and, finally, migration (measured by the share of legal immigrants per 1000 resident population) as explanatory variables. The results show the positive effect on regional economic growth of the increase in the number of firms working at the level of creative industries, the positive effect on regional economic growth of the net entry of firms and the positive effect on regional economic growth of a greater provision of leisure amenities. Furthermore, the share of legal immigrants is found to have a positive impact on employment growth. Again, creativity, spurring creative industries, is proven a valuable determinant not only in terms of new firm formation but also in terms of regional economic growth.

Kerimoglu and Karahasan (2011) looked at Spain to determine if regions specializing in strategic sectors that are creative and have rapid productivity growth would experience faster growth and concentration of talent with positive and significant impact on regional economic performance. With a sample of 17 Autonomous Communities of Spain (INE, SABI, IVIE), they carry out a static non-spatial panel data model and a Generalized Least Squares (GLS) estimation. The dependent variable, regional economic performance, is measured by the volume of regional employment, the value added in industrial and service oriented production and the GDP of the Autonomous Communities. One of the explanatory variables, occupational attainment, is measured by employment in talent-based occupations (percentage of overall employment); another explanatory variable – educational attainment – is measured by employment associated with a bachelor's degree and above (percentage of total employment). Additionally, two control variables are included: the percentage of employment in manufacturing industries and the percentage in service industries. The main findings are that talent is a vital element of regional differences. As in Boschma and Fritsch's (2009) work, talent, and thus the creative class, is found to be unevenly dispersed among the regions of Spain. This has a strong impact on the differences

between economic activity levels, measured by employment volume, industry and service value added, and regional GDP.

A second study by Kerimoglu and Karahasan (2012) investigates the spatial distribution of creative capital in Spain (using the SABI database for Spanish provinces), while adding its connection with regional disparities. The uneven structure of creative capital is stressed once again. Moreover, creative employment is revealed to be spatially dependent across the territory, as provinces with high creative capital have relatively high per capita income; also, a strong and a significant impact of creative capital endowments on regional differences is found. These findings come from exploratory spatial data tools, Moran's I and local indicators of spatial association (LISA); the spatial dispersion of creative capital is documented by analysing the creative capital consisting of high-tech, knowledge intensive services, real estate, architecture and engineering, research and development, advertising and market research, professional, scientific and technical activities, financial and insurance activities, other creative activities such as publishing, software publishing, telecommunications, and computer programming occupations.

Outside of Europe and the United States, regions are outgrowing rankings of new firm formation. Such a region is the People's Republic of China. Hence, Florida *et al.* (2008b) examine the relationships between talent, technology and regional development in 31 Chinese provincial-level regions in mainland China. By means of Structural Equation Models (SEM) with Maximum Likelihood (LM) estimation, the authors try to explain regional development (measured by GDP per capita) through talent (measured by human capital – individuals graduating with a college or higher-level degree – and the creative class – the proportion of professional and technical workers within the local population), technology (measured by high technology – the location quotient of the value added for high-tech industries – and patents – officially approved patents per capita) and regional institutions and cultural factors (measured by the number of university students standardized by local population and the Hukou index[6] for tolerance – as an alternative to the Gay index, since statistical data on gays

[6] The Hukou index of openness is defined as the proportion of the population without a locally registered Hukou. Those with a locally registered Hukou are always permanent residents and receive local economic, social and political benefits, such as social welfare, education and voting rights. Those who live in a jurisdictional area without a local Hukou, however, are always "marginal" workers or visitors. If

are not available in China). What they find is that the presence of universities and the actual stock of talent are strongly related and that tolerance plays an important role in the distribution of talent and technology. However, they find a weak relationship between the distribution of talent and technology and the distribution of regional economic performance.

Similarly, Qian (2010) looks at China to investigate the geographic distribution of talent and its association with innovation, entrepreneurship and regional economic performance for the same 31 provinces of mainland China. Employing descriptive analysis, correlation analysis and regression analysis (OLS), Qian attempts to describe talent (measured by the human capital index – those holding a college or higher-level degree divided by the local population of 15 year olds and older – and the creativity index – the proportion of professional and technical personnel among the local population) in relation to market factors (average wage, wage change and employment change), service amenities, the level of openness (measured by the Hukou index – the proportion of population without local Hukou or registration), universities (measured by the number of university students as a proportion of local population), the city index (the proportion of the urban population in the total population), innovation (measured by the innovation index – the officially granted patents per capita – and the high-tech index – location quotient of the value added in high-tech industries), entrepreneurship (measured by the number of new firms established divided by the employed population) and the regional economic performance (given by GDP per capita). Qian finds that the single most important contributor to talent distribution in China is the presence of universities. Wage levels, service amenities and openness also contribute to talent attraction, but to different extents. The author further finds that human capital, outweighing the creative class, exhibits positive effects on innovation, entrepreneurship and regional economic performance. Consistently with Florida's theory of diversity, openness may play an important role in regional innovative activity.

In another line of work (see Table 2), Baron and Tang (2011) find that creativity has a positive and significant effect on founding entrepreneurs when investigating the joint effect, on firm-level innovation, of two variables pertaining to entrepreneurs: their

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a large proportion of the population of a region does not have a locally registered Hukou, this indicates that a large proportion of the population is from outside the region.

positive affect[7] and creativity. Thus, creativity is related to firm-level innovation. Their inferences come from surveys mailed to and answered by 99 entrepreneurs in several south-eastern states of the United States (Alabama, Georgia Louisiana, Mississippi and Tennessee). Some other data comes from archival industry data and statistical tests are also applied. Berggren and Elinder (2012), on the other hand, find that tolerance toward homosexuals is negatively related to growth. They investigate how tolerance, measured by attitudes toward different types of neighbours, affect economic growth in 54 countries from Asia, Latin America, the EU, North America and transition countries through a fixed-effects panel-data analysis.

Other empirical works examine creativity and its impact on entrepreneurship, but in a different scope of this thesis' purpose. However, even if briefly, their contribution must be noted. For instance, Hackler and Tech (2008) explore whether the proposition of the creative class theories that there is crucial link between new firm formation and a region's creative milieu also explains the level and intensity of women, Hispanic, and Black business ownership. With a sample of women, Black, and Hispanic business ownership for the 50 largest MSAs in the United States, the authors undertake regression models (OLS), testing the industry intensity of women, Black, or Hispanic-owned firms by means of explanatory variables of creativity, diversity, human capital, innovation, population change, financial resources, market access, entrepreneurial skills, integration and institutional support. Their findings stress that opportunity structures, which may be positive and negative structural factors that influence the entry of minority groups into entrepreneurship, explain better the dynamics for these entrepreneurs, who in turn benefit from a regional environment that builds human capital and skill base, enabling access to a variety of financial resources, and facilitates market access.

[7] Positive affect has been found to influence many aspects of cognition and behavior, including those directly relevant to activities that entrepreneurs perform in launching new ventures. Positive affect was measured using the 10-item scale from the Positive and Negative Affect Schedule (PANAS) developed and validated by Watson *et al*. (1988). The PANAS scale has been used to assess respondents' general feelings and emotions (i.e., how they feel on average).

Table 2. Main empirical studies on creativity and entrepreneurship – II

Author(s)	Main Goal	Sample	Methodology	Dependent Variables	Explanatory Variables		Main Findings
Stolarick and Florida (2006)	Determine the connections among individuals of the creative class that may create innovation and spillovers	Sample 1: 9 Focus Groups Sample 2: 34 Interviews Period: 2004 Montréal region	Focus Groups Structured interviews	n.a.	n.a.		- Connections that may create innovation and spillovers are possible and can have a positive impact on the innovative and total business activity across the region
Hackler and Tech (2008)	Explore whether the proposition that a crucial link exists between new firm formation and a region's creative milieu also explains the level and intensity of women, Hispanic, and Black business ownership	Sample: Women, Black, and Hispanic business ownership for the 50 largest MSAs in the United States Period: 2002	Regression models (OLS)	Industry intensity of women, Black, or Hispanic-owned firms	*Creativity*	- % of workforce creative class	- Opportunity structures, whether opportunity or barrier, explain better the dynamics for these entrepreneurs - These entrepreneurs benefit from a regional environment that builds human capital and skill base, enabling access to a variety of financial resources, and facilitates market access
					Diversity	- % of workforce supercreative core - % of non-white population - Integration index - Melting pot index	
					Human capital	- College educational attainment	
					Innovation	- Tech pole index	
					Income	- Aggregate earnings per person in metro	
					Population change	- % of population change	
					Financial resources	- % of Black or Hispanic household aggregate income as a % of white household aggregate income - Women's earnings as a % of men's earnings	

					Market access	- Average business sales and receipts - Industry intensity - Average firm size	
					Entrepreneurial skills	- % in management positions	
					Integration	- Integration index	
					Institutional support	- Presence of entrepreneurial networking or social capital building opportunities	
Acs and Megyesi (2009)	Assess the potential of transforming a traditionally industrial region into a creative economy	Sample: Baltimore Metropolitan Statistical Area (Baltimore MSA) Period: 1999 - 2000	Independent and comparative study with 7 similar industrial regions (Chicago, IL; Cleveland, OH; Detroit, MI; Milwaukee, WI; Philadelphia, PA; Pittsburgh, PA; and St. Louis, MO – MSAs and PMAs)		4T dimensions of the Baltimore MSA: - Talent: creative share of the workforce - Tolerance: Gay and Bohemian Index - Technology: patents granted by the US Patent and Trademark Office - Territory: Wage Inequality Index and Housing Inaffordability Index		Baltimore owns resources and can develop further capabilities to pull creative talent from its surrounding area
Williams and McGuire (2010)	Examine the effect of culture on national innovation and prosperity	Sample: 63 countries (industrialized, developing, and in transition) Period: 1996 - 2004	Structural equation modelling (SEM), estimated with maximum likelihood (LM)	Output per Worker Capital Stock per Worker Market Capitaliza-tion as percentage of GDP	*National culture*	- Power distance: degree to which a society adheres to formal power and status differences among group members - Uncertainty avoidance: propensity or willingness to assume risk - Individualism versus collectivism: individualism is the extent to which members of a culture seek personal,	- Culture influences economic creativity at the nationwide level - Innovation implementation explains some of the variation in prosperity across countries

						rather than group goals; in a collective culture, a person's identity is tightly based on his or her place within the group and social system; maximum value present within the system: 91 = more individualistic; standardized	
					Economic creativity	- Patents: number of successful patent applications made in a given year - Scientific publications: total number of scientific and engineering publications - R&D spending by all sectors	
					Innovation implementation	- Self-employment: number of persons operating their own ventures that employ more than one person - Royalty and License Fees: legal protections offered to owners of economically valuable assets - Trademark: proxy for the goods and services that result from creative endeavours	
Baron and Tang (2011)	Investigate the joint effects, on firm-level innovation, of two variables characterising entrepreneurs (their positive affect and creativity)	Sample 1: 99 entrepreneurs in several south-eastern states of the United States (Alabama, Georgia Louisiana, Mississippi and Tennessee) Period: 2007 Sample 2: Archival industry data	Surveys Descriptive statistics	Innovation: - Number of innovations - Radicalness of innovations	*Positive affect*	- 10-item scale from the Positive and Negative Affect Schedule PANAS that has been used to assess respondents' general feelings and emotions in prior research	- Creativity has a positive and significant effect on founding entrepreneurs - Creativity, in turn, is related to firm-level innovation
					Creativity	- Respondents were asked to rate the extent to which their work in their companies involved (1) new ideas and approaches to customer problems; (2) new applications for existing technology; (3) risk-taking; (4) radical new ideas; and (5) novel long-term vision or applications	
Heinonen *et al.* (2011)	Investigate the relationships	Sample: Surveys to 117 students		Perceived viability of	Creative strategies		- Creativity has no statistic significant influence on the

between student's creativity, various opportunity search strategies, and the viability of business ideas developed during an entrepreneurship education module	Period: 2009 (Finland)	Exploratory factor Analysis (EFA) Structural equation modelling	business idea (The respondents were asked to assess the viability and growth potential of the business idea on a Likert Scale)	Strategies based on knowledge acquisition Creativity	perceived viability of a business idea - Creativity has a positive effect on the use of creative strategies in searching for business opportunities - The influence of creativity on the viability of a business idea is strongly mediated by creative opportunity search strategies and knowledge acquisition

n.a. not applicable

Stolarick and Florida (2006) aim at determining the connections between individuals of the creative class that may create innovation and spillovers. The authors undertake 24 interviews and 9 focus groups with individuals from the business, education, arts, and government sectors in the Montréal region, Canada, in 2004, to determine that these connections are possible and can have a positive impact on innovative and total business activity across the region. Acs and Megyesi (2009) assess the potential of transforming a traditionally industrial region into a creative economy in Baltimore, USA, through an independent and comparable study of 7 similar industrial regions (Chicago, IL; Cleveland, OH; Detroit, MI; Milwaukee, WI; Philadelphia, PA; Pittsburgh, PA; and St. Louis). Their findings show that Baltimore owns resources and can develop further capabilities to pull creative talent from its surrounding area.

Also, the growth of industrialized urban regions is highly dependent on a region's ability to transform into creative knowledge economies. Williams and McGuire (2010) examine the effect of culture on national innovation and prosperity in 63 countries (industrialized, in development and in transition), from 1996 to 2004. Their findings suggest that culture influences economic creativity at the nationwide level and that innovation implementation explains some of the variation in prosperity across countries. Finally, Heinonen *et al.* (2011), based on 117 surveys applied to students in 2009, investigate the relationships between students' creativity, opportunity search strategies and the viability of business ideas developed during an entrepreneurship education module to find that creativity has no statistically significant influence on the perceived viability of the business idea. Nevertheless, creativity has a positive effect on the use of creative strategies in searching for business opportunities; also, the influence of creativity on the viability of the business idea is strongly mediated by creative opportunity search strategies and knowledge acquisition.

Chapter 3: Creativity and Entrepreneurship in Portugal: an assessment

3.1 Methodology

As pointed out before, the main goal of this study is to understand the influence of creativity on entrepreneurship in the Portuguese economy. We will take into account the effect of creativity in new firm formation by undertaking an empirical assessment. Our econometric model can be described as follows:

$$NF_{it} = \beta_1 + \beta X_{it} + u_{it} \tag{3.1}$$

where i represents the ith cross-section unit (NUTS 3 regions) (i = 1, …, 26), t represents time (t = 1, …, 7) and

NF_{it} is the dependent variable and describes the number of new firms per 1000 inhabitants for region i at time t;

β_1 is the common intercept;

β is the vector of coefficients associated with the explanatory variables;

X_{it} is the vector of independent/explanatory variables for region i at time t;

u_{it} is the random term for region i at time t.

The dependent variable (NF_{it}) corresponds to the number of annual new firms per 1000 inhabitants (NUTS 3), gathered from *Instituto Nacional de Estatística (INE) - Sistema de Contas Integradas das Empresas (SCIE)*.

The explanatory variables, X_{it}, annually registered at the NUTS 3 level, encompass creativity, diversity and innovation variables, as well as control variables:

- Creativity:
  - EBA_{it} - Employees in bohemian activities by total population. This variable captures the openness of a region to talent and creativity; it measures a region's artistic creativity and intellectual

dynamism. It is expected to be positively associated with new firm formation (*e.g.* Lee *et al.*, 2004; Boschma and Fritsch, 2009).

- Diversity
  - FPV_{it} – Foreign people who requested a Portuguese visa per 100 inhabitants. Because immigrants usually lack skills, resources and networks, they tend to be more self-employed than non-immigrants (Lee *et al.*, 2004). Notwithstanding, authors like Clark and Drinkwater (2000) point to a potential negative association between these variables since language barriers lower self-employment probabilities. Bulla and Hormiga (2011) stress out financing difficulties, barriers and excessive bureaucracy as factors preventing immigrant entrepreneurship. Therefore, the expected sign for this variable is not clear.
  - $SMFP_{it}$ – Share of marriages between foreign and Portuguese people by total marriages. This measure intends to capture some level of openness and tolerance, which is supposed to have a positive effect on entrepreneurship at the regional level (Boschma and Fritch, 2009).

- Innovation:
  - RD_{it} – Share of annual R&D expenditure on GDP. R&D expenditure is often used as a proxy for innovation and we expect to observe a positive association with the birth of new firms (*e.g.* Rutten and Gelissen, 2008; Audretsch *et al.*, 2010).

- Human Capital:
  - HC_{it} - Number of adults with a bachelor's degree per 1000 inhabitants. People with higher educational attainment tend to found new business more often than those with less educational

attainment (Lee *et al*., 2004). Education is expected to have a positive influence on entrepreneurship (Donegan *et al*., 2008).

- Control variables:
  - Market size: $GDPpc_{it}$ – GDP per inhabitant, which is expected to have a positive effect on firms' birth rate (Cheng and Kwan, 2000);
  - Agglomeration economies: $FIRMS_{it}$ – Number of firms per 1000 inhabitants, with an expected positive effect on new firm formation (Becker *et al.*, 2011);
  - Land cost: PD_{it} – Population Density (inhabitants/km^2), with a predictable negative effect on firm's birth rate (Figueiredo *et al.*, 2002);
  - Labour cost: LC_{it} – Total expenditure with employees over total employees, expected to have a negative effect on entrepreneurship (Kittiprapas and McCann, 1999).

This study will undertake the estimation of a balanced panel data, where the same cross-section data is surveyed over time.

When estimating panel data we must choose between a fixed effects model (FEM) or a random effects model (REM). FEM assumes that the independent variables are fixed across observation units and that the fixed effects are computed from the differences within each unit across time. The REM produces more efficient estimates since it includes information not only across individual units but also across time periods. However, the estimates of the random effects are consistent only if unit-specific effects are not correlated with the other explanatory variables. Since this is not usually true, FEM tends to be a reasonable choice (Greene, 2011). Specific tests for this choice are implemented in section 3.3.

Considering that the common intercept changes across regions, but that the slope coefficients do not, FEM can be implemented by applying dummy variables to the common intercept. Hence, equation (3.1) is rewritten as:

$$NF_{it} = \beta_1 + \propto D_{i-1} + \beta X_{it} + u_{it} \quad , i=1,\ldots,26;\ t=1,\ldots,7 \qquad (3.2)$$

where

β_1 is the fixed effect for one of the regions;

D_{i-1} is a vector of dummy variables, each one corresponding to the remainder i-1 regions;

$\propto$ is the constant associated to each dummy variable that should be added (+) or subtracted (–) to β_1.

The dependent and the explanatory variables will be further described and explained in the following section. We then proceed to present and discuss the results of our study.

3.2 Data

3.2.1 New firms

Following Lee *et al.* (2004) and Audretsch *et al.* (2010), we define new firms (NF_{it}) as the number of new firms per 1000 inhabitants. The number of new firms from 2004 to 2010 is obtained from INE – SCIE (2004-2010). We consider the Nomenclature of Territorial Units for Statistics at level 3 (NUTS 3) as our geographic unit[8] and focus on Portugal (mainland)[9].

In Table 3 we present the geographic distribution of the number of new firms per 1000 inhabitants. As we can observe, the region of *Algarve* presents the highest annual average of new firms, immediately followed by *Grande Lisboa*. *Grande Porto* comes in third place. This is no surprise since these geographic units are also the

[8] Portugal has 30 NUTS 3: *Alto Trás-os-Montes*, *Ave*, *Cávado*, *Douro*, *Entre Douro e Vouga*, *Grande Porto*, *Minho-Lima*, *Tâmega*, *Baixo Mondego*, *Baixo Vouga*, *Beira Interior Norte*, *Beira Interior Sul*, *Cova da Beira*, *Dão-Lafões*, *Médio Tejo*, *Oeste*, *Pinhal Interior Norte*, *Pinhal Litoral*, *Pinhal Interior Sul*, *Serra da Estrela*, *Grande Lisboa*, *Península de Setúbal*, *Alentejo Central*, *Alentejo Litoral*, *Alto Alentejo*, *Baixo Alentejo*, *Lezíria do Tejo*, *Algarve*, *Açores* and *Madeira* (INE, 2002).

[9] We exclude *Pinhal Interior Sul*, *Serra da Estrela*, the Island of *Açores* and the Island of *Madeira* since the number of new firms during the period 2004-2010 was quite small.

country's most important metropolitan areas, equipped with international airports, ports and railway stations, and characterized by the presence of Portugal's major national and foreign companies. The standard deviation between regions is not very preeminent and even regions located in Portugal's inland, characterized by relatively slow economic and demographic growth, are fairly close to the annual averages of other regions.

Table 3. Geographic distribution of new firms from 2004 to 2010

NUTS 3	Designation	New firms per 1000 inhabitants (2004-2010) (annual average)
1	**Portugal Mainland**	**14,99**
111	*Minho-Lima*	11,12
112	*Cávado*	13,02
113	*Ave*	11,38
114	*Grande Porto*	16,11
115	*Tâmega*	9,63
116	*Entre Douro e Vouga*	12,33
117	*Douro*	10,83
118	*Alto Trás-os-Montes*	10,97
161	*Baixo Vouga*	13,89
162	*Baixo Mondego*	14,91
163	*Pinhal Litoral*	14,29
164	*Pinhal Interior Norte*	10,35
165	*Dão-Lafões*	11,11
168	*Beira Interior Norte*	9,91
169	*Beira Interior Sul*	11,26
16A	*Cova da Beira*	10,93
16B	*Oeste*	14,54
16C	*Médio Tejo*	11,21
171	*Grande Lisboa*	20,21
172	*Península de Setúbal*	16,32
181	*Alentejo Litoral*	15,91
182	*Alto Alentejo*	11,93
183	*Alentejo Central*	14,06
184	*Baixo Alentejo*	12,87
185	*Lezíria do Tejo*	13,18
150	*Algarve*	21,03

Source: INE, *Sistema de Contas Integradas das Empresas* (2004-2010)

In addition, we show in Table 4 the sectorial distribution of these new firms according to the Portuguese Classification of Economic Activities (CAE) at two digit level (INE, 2008), considering the annual average of new firms per total firms. *Administrative and support services activities* present the highest level of new firms in our period of analysis, followed by the sectors of *Education* and *Artistic*, *entertainment, sports and recreational activities*, way above the average of the economy. The sectors of *Manufacturing* and *Extractive industries* are the least significant sectors, below the average of the economy. This pattern reflects the tertiarization of the Portuguese economy. The relatively high level of the sector of *Artistic, entertainment, sports and recreational activities* must be pointed out for its importance to our study, seeming to suggest an important dynamic of new firms in economic activities related to bohemian and creative occupations.

Table 4. Sectorial distribution of new firms from 2004 to 2010

CAE	Designation	New firms (2004-2010) per total firms (annual average)
A	Agriculture, livestock, hunting, forestry and fishing	2,22
B	Extractive industries	1,65
C	Manufacturing	1,75
D	Electricity, gas, steam, hot and cold water and cold air	3,02
E	Collection, purification and distribution of water, sanitation, waste management and activities to discontinue pollution	3,32
F	Construction	2,40
G	Wholesale and retail trade, repair of motor vehicles and motorcycles	2,39
H	Transportation and storage	1,83
I	Accommodation and food services	3,11
J	Information and communication activities	4,53
L	Real estate activities	3,02
M	Consulting, scientific and technical activities	3,03
N	Administrative and support services activities	8,29
P	Education	5,79
Q	Human health and social support activities	3,81
R	Artistic, entertainment, sports and recreational activities	4,93
S	Other service activities	2,93
	All economic activities	**2,27**

Source: INE, *Sistema de Contas Integradas das Empresas* (2004-2010)

3.2.2 Explanatory variables

Next, we describe main statistical information about explanatory variables considered in our model (as well as for the dependent variable), which were collected for the period 2004-2010[10]. The geographic unit for all variables is NUTS 3.

Table 5. Descriptive statistics

Variable	Description	Expected sign	Min.	Max.	Average	Standard deviation	Source
NF_{it}	New firms per 1 000 inhabitants		8.5467	26.7387	13.2030	3.2302	INE – SCIE (2004-2010)
EBA_{it}	Employees in bohemian activities over total population	(+)	0.3514	5.2260	1.3879	0.9014	INE – SCIE (2004-2010)
FPV_{it}	Foreign people who requested a Portuguese visa per 100 inhabitants	(n.c.)	0.0100	3.4000	0.1747	0.3114	INE – SCIE (2000-2006)
SCM_{it}	Share of annual catholic marriages in total marriages	(+)	0.2050	0.7990	0.5169	0.1216	INE – SCIE (1995-2011)
$SMFP_{it}$	Share of annual marriages between foreign and Portuguese people in total marriages	(+)	0.017000	0.223000	0.076104	0.0436	INE – SCIE (2000-2011)
RD_{it}	Share of annual R&D expenditure on GDP	(+)	0.0004	0.0332	0.0083	0.0072	INE – SCIE (2003-2010)
HC_{it}	Number of adults with a bachelor's degree per 1000 inhabitants	(+)	0.1000	25.600	6.5665	5.0366	INE – SCIE (2004-2011)
$GDPpc_{it}$	GDP per inhabitant (Portugal = 100)	(+)	50.9743	169.1405	85.4745	24.2634	INE – SCIE (2004-2010)
$FIRMS_{it}$	Number of firms per 1000 inhabitants	(+)	73.1584	157.3344	104.6545	16.1928	INE – SCIE (2004-2010)
PD_{it}	Population density (inhabitants/km^2)	(-)	14.5000	1578.8000	241.9945	392.2015	INE – SCIE (2000-2011)
LC_{it}	Total expenditure with employees by total employees	(-)	441702	3881907	1239302	543522	INE – SCIE (2004-2009)

n.c. not clear

[10] With exception for the variable "Foreign people per 100 inhabitants", which was collected for the period of 2000-2006 due to data limitations.

Using the software *EViews*, we analysed the correlation between all proposed explanatory variables. We signal in Table 6 some situations for which the correlation is high. In order to exclude potential multicolinearity, we propose distinct specifications for the estimation of the econometric model, avoiding the combination of explanatory variables that are significantly correlated.

Table 6. Correlation matrix between explanatory variables

	EBA	FIRMS	FPV	GDP	HC	LC	PD	RD	SMFP
EBA	1.000								
FIRMS	0.6757	1.0000							
FPV	0.3890	0.4120	1.0000						
GDP	0.7352	0.7880	0.2968	1.000					
HC	0.3205	0.2167	0.0730	0.2146	1.0000				
LC	-0.3038	-0.2682	-0.2491	-0.0865	-0.3117	1.0000			
PD	0.6787	0.2820	0.0725	0.5095	0.2489	0.0977	1.0000		
RD	0.48318	0.3085	0.1392	0.3334	0.5438	0.0557	0.4337	1.0000	
SMFP	0.7188	0.7288	0.4098	0.6084	0.0916	-0.4209	0.3319	0.1704	1.000

3.3 Estimation results

We now present the estimation results with a panel least squares with cross-section and period fixed effects (see Table 7). As mentioned above, we considered different specifications for our model by allowing different combinations of control and explanatory variables.

Table 7. Estimation results for alternative specifications: panel least squares with cross-section and period fixed effects (2004-2010)

Explanatory variables	Model I	Model II	Model III
C	13.29340 (0.0000)***	-21.76753 (0.0008)***	0.906319 (0.9095)
EBA_{it}	0.105657 (0.7734)		
FPV_{it}	-1.097741 (0.0036)***	-0.426795 (0.1596)	-0.801694 (0.0305)**
$SMFP_{it}$			11.96930 (0.0283)**
RD_{it}	-11.23201 (0.6324)	-1.438049 (0.9409)	-18.41952 (0.4349)

HC_{it}	-0.062148 (0.0885)*	-0.033985 (0.1721)	-0.030629 (0.3628)
$GDPpc_{it}$			0.059670 (0.0086)***
$FIRMS_{it}$		0.298344 (0.0000)***	
PD_{it}		0.022472 (0.2957)	0.028526 (0.3589)
LC_{it}	3.68E-07 (0.4189)	-1.11E-06 (0.0019)***	-9.95E-08 (0.7945)
Summary of statistics/specifications			
R-squared	0.950917	0.970977	0.955951
Adjusted R-squared	0.938731	0.963520	0.944246
S.E. of regression	0.799560	0.616964	0.762730
Sum squared residual	92.69790	54.81289	83.19122
Log likelihood	-196.8527	-149.0394	-187.0061
F-statistic	78.03357	130.2057	81.66834
Prob (F-statistic)	0.000000	0.000000	0.000000
Mean dependent variable	13.20296	13.20296	13.20296
S.D. dependent variable	3.230221	3.230221	3.230221
Akaike info criterion	2.569810	2.055378	2.483584
Schwarz criterion	3.221174	2.724347	3.170156
Hannan-Quinn criterion	2.833863	2.326568	2.761910
Durbin-Watson stat	1.667285	1.584556	1.625787

Notes: (1) significance level at 1% (***), 5% (**) and 10% (*); p-value in (). (2) Estimations made under White-diagonal standard error correction for valid statistic inference with an autoregressive component.

From Table 7 it is possible to verify that all three model specifications have a very good global fit, with an adjusted R-squared around 95%. However, only few explanatory variables have significant estimated coefficients in explaining NF_{it} within distinct combinations for the assumed specifications.

The estimated results for Model I suggest little evidence of the influence of creativity on the birth of new firms. A one percentage point increase in FPV_{it} decreases NF_{it} by 1.09 percentage points, *ceteris paribus*. As pointed out before, only locations with technology, talent and tolerance will score high in terms of creativity and quantity

of members belonging to the creative class (*e.g.*, Florida, 2004 and Lee *et al.* 2010). Since FPV_{it} may capture the tolerance of Portuguese people in relation to foreign-born, Model I might be suggesting that tolerance has little impact on the creation of new firms. Nevertheless, the results of Model I for FPV_{it} can also be pointing that immigrants face some constraints with regards to new firm formation, either language barriers, bureaucracy restraints or other kind of impediments, as Clark and Drinkwater (2000) and Bulla and Hormiga (2011) predicted.

In Model II, the variable $FIRMS_{it}$ has a significant and positive impact on the birth of new firms, suggesting the importance of agglomeration economies for the emergence of new firms, while LC_{it} has a negative significant effect with an estimated impact near zero.

The variable $GDPpc_{it}$ has a significant and positive impact on the birth of new firms in Model III, once more sustaining the relevance of agglomeration effects and market size for new firms' formation. As in Model I, there is a negative and significant effect of FPV_{it}. Despite the negative significant effect of FPV_{it}, $SMFP_{it}$, which is a proxy for openness and tolerance expected to have a positive effect on entrepreneurship at the regional level (Boschma and Fritch, 2009), has a very significant impact on NF_{it}: an increase in this variable by one percentage point increases NF_{it} by 11.9 percentage points, *ceteris paribus*. Therefore, with regards to tolerance, the results of this model seem to be in line with the literature.

For any of our model specifications, all other explanatory variables are not statistically significant and/or in line with the expected sign proposed by the literature. Estimations for variables aiming at capturing, respectively, talent and technology, EBA_{it} and RD_{it}, are not statistically significant. This means that our results do not sustain evidence that a region's artistic creativity and intellectual dynamism is important for the emergence of new firms, as the contributions from the literature previously revised sustained (*e.g.*, Lee *et al.*, 2004 and Boschma and Fritsch, 2009). The same occurs for the proxy on human capital. Although commonly recognized in the literature as having a positive influence on entrepreneurship (Donegan *et al.*, 2008) since people with higher educational attainment are more business-oriented than those with less education attainment (Lee *et al.*, 2004), HC_{it} emerges with a negative impact. Finally, population density is also statistically not significant.

We present in Table 8 the results of the tests implemented in order to sustain our choice for cross-section and period fixed effects. Running our regression using NF_{it} as the dependent variable over the selected explanatory variables and a constant term, we tested for the nature of fixed effects under FEM for both cross-section and period effects. The results confirm the choice for FEM with both cross-section and period fixed effects. For all model specifications, and for a confidence level of 95%, the two statistic values for cross-section *F* and cross-section *Chi-square* ratios, as well as the associated *p-values*, allow us to strongly reject the null hypothesis that the cross-section effects are redundant. Relatively to the period effects, the two corresponding statistic values and the associated *p-values* also allows to strongly reject the null hypothesis that the period effects are redundant. Finally, cross-section/period *F* and *Chi-square* ratios conduct to a clear rejection of the null hypothesis that all effects are redundant.

Table 8. FEM tests – alternative specifications

Cross-section and period fixed-effects tests/Specifications	**Model 1**	**Model II**	**Model III**
Cross-section F ***stat*** ***(p-value)***	24.520323 *(0.000)*	15.718201 *(0.000)*	12.328742 *(0.000)*
Cross-section χ^2 ***stat*** ***(p-value)***	301.020771 *(0.000)*	239.530390 *(0.000)*	209.137507 *(0.000)*
Period F *stat* ***(p-value)***	55.637887 *(0.000)*	44.692661 *(0.000)*	38.269640 *(0.000)*
Period χ^2 *stat* ***(p-value)***	217.418345 *(0.000)*	191.389113 *(0.000)*	174.302984 *(0.000)*
Cross-Section/Period F ***stat*** ***(p-value)***	41.790607 *(0.000)*	30.117932 *(0.000)*	22.460228 *(0.000)*
Cross-Section/Period χ^2 ***stat*** ***(p-value)***	417.875265 *(0.000)*	366.316892 *(0.000)*	322.082549 *(0.000)*

Looking now at Table 9, we can compare the cross-section fixed effects for each region (NUTS 3) for Model II (which we choose because it has the best global significance evaluated through the adjusted R-squared, the log likelihood and the F-statistic). The most interesting effect seems to occur in both *Grande Porto* and *Grande Lisboa*. In Table 3 we saw that these two regions were those with the highest annual average of new firms. However, the cross-section fixed effect for the common intercept is negative for these regions, suggesting that region-specific characteristics negatively affecting the birth of new firms are omitted. The region of *Algarve*, which topped that list, is likewise shown to be negatively affected by region-specific characteristics unknown to our model, although in a lesser degree. Interestingly enough, smaller regions of Portugal, which had a fairly low annual average of new firms, are shown to be positively affected by omitted region-specific characteristics in regard to new firm formation (e.g. *Tâmega* and *Beira Interior Norte*).

Table 9. Cross-section fixed effects

NUTS 3	Designation	Model II
111	*Minho-Lima*	3.796666
112	*Cávado*	-0.231815
113	*Ave*	0.374127
114	*Grande Porto*	-30.03764
115	*Tâmega*	5.711971
116	*Entre Douro e Vouga*	-0.515108
117	*Douro*	6.301745
118	*Alto Trás-os-Montes*	6.001430
161	*Baixo Vouga*	0.654962
162	*Baixo Mondego*	-0.824467
163	*Pinhal Litoral*	-2.078256
164	*Pinhal Interior Norte*	4.135285
165	*Dão-Lafões*	5.643041
168	*Beira Interior Norte*	5.075266
169	*Beira Interior Sul*	4.229923
16A	*Cova da Beira*	5.699998
16B	*Oeste*	-1.736333
16C	*Médio Tejo*	3.660798
171	*Grande Lisboa*	-29.01264
172	*Península de Setúbal*	-1.507450

181	*Alentejo Litoral*	2.723552
182	*Alto Alentejo*	4.733606
183	*Alentejo Central*	1.345033
184	*Baixo Alentejo*	2.660926
185	*Lezíria do Tejo*	4.459335
150	*Algarve*	-1.263950

In a nutshell, our results contradict to some degree the expectations about the signs of the explanatory variables. We present in the next chapter the main conclusions of our work.

Conclusions

Firm formation is undeniably essential to sustain a high regional economic performance. Each region must consider and make available the necessary conditions to promote the birth of new firms. At the nation level, more than considering and making available the necessary conditions, policies must be taken to promote new firm formation and regional economic development. Traditional literature has put in evidence the effect of variables such as the unemployment rate, population density, industrial structure, human capital, availability of funding, and entrepreneurial characteristics on new firm formation. A new line of study has been proposing a new variable to capture such effect: creativity. Authors like Florida (2002, 2003) go as further as to say that creativity is one of the main factors promoting the birth of new firms. Florida argues that places with a greater number of talented people thrive and are better suited to attract more talent. He even presents the notion of a "creative class" composed by those that engage in tasks whose function is to create meaningful new forms, while also introducing his 3Ts of economic development – technology, talent and tolerance – as significant keys to identify an economic geography of creativity.

The main goal of this study was to understand the relation between creativity and entrepreneurship in the Portuguese context. Previous studies have shown that a positive relation between creativity and entrepreneurship is possible. Lee *et al.* (2004), for several urban areas of the United States of America, found that new firm formation was strongly associated with social diversity and creativity when controlled for the traditional variables suggested in the literature, while Boschma and Fritch (2009), for 500 regions in 7 European countries (Denmark, England and Wales, Finland, Germany, the Netherlands, Norway and Sweden), found that a regional climate of tolerance and openness had a strong and positive effect on a region's share of members belonging to the creative class, leading to a positive relation among creative class occupation, employment growth and entrepreneurship at the regional level. Audretsch *et al.* (2010) and Piergiovanni *et al*. (2012), for German and Italy, respectively, came to analogous conclusions in regards to the relation between creativity and entrepreneurship.

By means of a multivariate linear regression analysis, we estimated three different model specifications that aimed at capturing the influence of creativity on

entrepreneurship in the Portuguese context. We obtained data from *Instituto Nacional de Estatística - Sistema de Contas Integradas das Empresas* to create one dependent variable (NF_{it}), five explanatory variables (EBA_{it}, FPV_{it}, $SMFP_{it}$, RD_{it} and HC_{it}) and four control variables ($GDPpc_{it}$, $FIRMS_{it}$, PD_{it}, and LC_{it}).

A deeper analysis of the dependent variable allowed us to perceive that the region of *Algarve* presents the highest annual average of new firms, immediately followed by *Grande Lisboa* and *Grande Porto*, which was hand in hand with the fact that these geographic units are also Portugal's most significant metropolitan areas, equipped with international airports, ports and railway stations, and characterized by the presence of Portugal's major national and foreign companies. It additionally allowed us to understand that, according to the sectorial distribution proposed by the CAE, the sector of *Administrative and support services activities* presents the highest level of new firms, followed by the sectors of *Education* and *Artistic*, *entertainment, sports and recreational activities*, both way above the average of the Portuguese economy. Below the average of the Portuguese economy, the average of new firms in the sectors of *Manufacturing* and *Extractive industries* point to a pattern reflecting the tertiarization of the Portuguese economy.

The explanatory variables aimed at capturing the effects of Florida's 3Ts as well as other keys to identify an economic geography of creativity suggest in the revised literature. The results suggest that the influence of creativity on entrepreneurship is not clear in the Portuguese context. Our three model specifications show little evidence of the influence of creativity on the birth of new firms, while pointing to the relevance of agglomeration effects for new firms' formation.

The most interesting result is that of the explanatory variable FPV_{it}. Composed by foreign people who requested a Portuguese visa per 100 inhabitants, it intended to capture immigrants' impact on entrepreneurship. Lee *et al.* (2004) suggested that immigrants tend to be more self-employed than non-immigrants because they usually lack skills, resources and networks, while Clark and Drinkwater (2000) and Bulla and Hormiga (2011) stressed that they might face difficulties in establishing a firm in the receiving country because of language barriers, financing difficulties and excessive bureaucracy. Our results point that the troubles anticipated by Clark and Drinkwater (2000) and Bulla and Hormiga (2011) might be happening in the Portuguese context,

preventing immigrants from establishing new firms in Portugal. Therefore, we believe that policies intending to reduce bureaucracy and financing difficulties should be considered. Additionally, the variable $SMFP_{it}$, which intends to measure the openness and tolerance of a region, is shown to have a positive and significant impact on firm formation, along with the proxy for the human capital.

All into account, our results cannot allow us to either support the theories that creative and diverse regions attract more innovative and entrepreneurial human capital, thus encouraging new firm formation, as some authors propose (e.g. Florida, 2002; Florida, 2003; Hospers, 2003; Lee *et al.*, 2004; Boschma and Fritsch, 2009; Lee *et al.* 2010; Cohedent *et al.*, 2010; and Piergiovanni *et al.*, 2012), or refute them, as other authors do (e.g. Malanga, 2004; Glaeser and Saiz, 2004; Peck, 2005; Pratt, 2008; Vorley *et al.*, 2008; and Donegan *et al.*, 2008). Rather, it suggests that other factors also promote the birth of new firms. Such factors could either be creativity-related (e.g. human capital, tolerance) or not (e.g. agglomeration variables).

As future research, we intend to (i) explore other proxies for creativity and innovation that may explain the formation of new firms, (ii) investigate the causes for regional differences on the relation between creativity and entrepreneurship, and, finally, (iii) search for the potential association between creativity-related policies and entrepreneurship policies.

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