

**Universidad Pública de Navarra**  
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**Doctoral Dissertation**

**Understanding agricultural entrepreneurship:  
its characteristics, drivers and context**

**Author:**

**Emilio Pindado Tapia**

**Supervisors:**

**Dr. Mercedes Sánchez García**

**Dr. Ramo Barrena Figueroa**

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# Understanding agricultural entrepreneurship: its characteristics, drivers and context



## ABSTRACT

It is often stated that farmers need to become more entrepreneurial to compete in modern agriculture and that their entrepreneurship generates positive spillovers. Much of the literature on agricultural entrepreneurship, however, has been focused on established farmers and little is known about new entrants. Furthermore, there is a need for a more in-depth understanding of the contextual factors that shape entrepreneurship among farmers. Therefore, the objective of this thesis is to investigate the individual and contextual determinants of entrepreneurial behaviours among farmers, with a special focus on new entrants. In order to do so, agricultural entrepreneurship was studied in its multidimensional facets, including behaviour, opportunity identification, growth and innovation. A comprehensive approach was developed through five empirical studies addressing factors that influence these entrepreneurial dimensions.

The first study describes the entrepreneurship of the sector, analyzing the differences existing between new and established agri-entrepreneurs in relation to their counterparts in non-agricultural ventures. Results show that agri-entrepreneurs have weaker entrepreneurial capabilities than other sectors. However, new entrants into the agricultural sector are not less entrepreneurial in relation to other sectors, and show greater entrepreneurialism than established farmers. The second study examines the drivers of entrepreneurialism among new entrants. Results suggest that new farmers with confidence in their entrepreneurial competencies and entrepreneurial experience tend to be more entrepreneurial. Likewise, farmers' social ties with other entrepreneurs increase this behaviour. The third study focuses on growth-oriented new agricultural ventures and their context. Results reinforce the importance of the above capabilities and networks, as well as the capabilities to effectively offer new products. Institutional and industry contexts also influence them as they need social legitimation, and those operating in less agriculturally competitive countries have a greater probability of becoming growth-oriented. The fourth study focuses on entrepreneurial innovation providing evidence that different entrepreneurial innovations arise from different entrepreneurial assets and context configurations. Finally, the fifth study presents an innovative approach using Twitter data to analyse attitudes towards food innovations. We found a complex set of factors that may underlie positive attitudes such as cultural diversity and intensity of information flows.

This thesis contributes to the entrepreneurship field by contextualizing the entrepreneurial process and providing valuable insights for policy-makers to enhance farmers' entrepreneurship. Our findings highlight the importance of entrepreneurial competencies as well as professional networks, which have consequences for tailoring education and training programs. This research enhances our understanding of how entrepreneurship is enabled and constrained by several overlapping dimensions of context, which has implications for policies aimed at improving entrepreneurial ecosystems.

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# Chapter 1

## INTRODUCTION

### 1.1 Background

Entrepreneurship is a crucial process for energizing the agricultural sector and rural areas. That is, entrepreneurial ventures create economic benefits such as job creation, innovation, economic growth and renewal that have positive spillovers on their environment (Acs et al., 2008). Consequently, agricultural entrepreneurship has received increased attention from researchers and politicians over the last decade (Alsos et al., 2011).

Agriculture has traditionally been considered a low-tech sector with low entrepreneurial rewards (i.e. farmers have been mostly focused on cost advantage rather than doing new things). However, this situation has changed due to reforms to agricultural policies, market liberalization, changing consumers' preferences, value chain integration, new information channels and Big Data, as well as society's requirements such as sustainability (Lans et al., 2017; Roucan-Kane et al., 2011). Therefore, it is argued that these changes have increased the entrepreneurial behaviour of existing firms and have opened up the sector for entrepreneurially inclined new entrants (Knudson et al., 2004; Morris et al., 2017; Vesala and Vesala, 2010).

However, despite the growing quantity of research dealing with entrepreneurship within agriculture, there is no generally accepted definition of agricultural entrepreneurship and this has resulted in a fragmented literature (Morgan et al., 2010; Vik and McElwee, 2011). Much of the extant literature has mainly considered agricultural entrepreneurs to be those established farmers that developed non-agricultural businesses. Nevertheless, research also indicates that agriculture provides entrepreneurial opportunities –for established farmers and newcomers— such as development of new products (e.g. functional foods) and innovations in business models and processes (EIP-AGRI, 2016; Hulsink, 2005; Seuneke et al., 2013, Vik and McElwee, 2011).

Both views are correct if we consider that entrepreneurship is not about being but rather about doing (Gartner, 1988). Shane and Venkataraman (2000) offer a vision of the entrepreneurial act as a process based on the discovering and exploitation of opportunities to create future goods and services. Scholars have also argued that entrepreneurship is a process based not only on discovering but also on the creation of opportunities and strategic action (Alvarez and Barney, 2007; Edelman and Yli-Renko, 2010; Hitt et al., 2001). Accordingly, agricultural entrepreneurship can be defined as *the process through which individuals create, discover and exploit positive market*

*opportunities through the creation and expansion of new agricultural ventures or farm-based new ventures* (Aldrich and Cliff, 2003; Gries and Naudé, 2011).

This definition covers the entrepreneurial behaviours traditionally identified in the sector and includes the occupational dimension as agricultural business owners (Wennekers, 2005). It additionally reflects the notion that agricultural entrepreneurship is a process which takes place and has effects in multiple contexts (Cuervo et al., 2007). This means that it is the individual who sets up and expands the new venture based on his own resources and capabilities, and it is embedded in spatially and temporally bounded organizational, sociocultural, institutional and industrial contexts (Autio et al., 2014).

## **1.2 Research Gap, Objectives, and Research Questions**

Given the above discussion, there are important questions that must be addressed in the field of agricultural entrepreneurship. First, due to the lack of a generally accepted definition of agricultural entrepreneurship and the limited number of cross-cultural studies, the impact of diverse resources and capabilities on agricultural entrepreneurship remains unclear from a general point of view (Methorst et al., 2017; Seuneke et al., 2013). This knowledge gap is especially relevant for those individuals creating new ventures in the sector (Lans et al., 2017). Second, despite the increasing attention paid to contextual influences on this process in the entrepreneurship literature, agricultural scholars have tended to ignore these external influences (Grande et al., 2011; Lans et al., 2014). The neglect of contextual influences on agricultural entrepreneurship leaves a major gap in the field (Zahra and Wright, 2011).

Accordingly, the overall objective of this thesis is to obtain a deep understanding of the internal and external drivers of entrepreneurship within the agricultural sector, focusing mainly on the early stages of new agricultural ventures. This general objective is met by addressing the following research questions that cover different facets of entrepreneurship including behaviour, opportunity identification, growth and innovation:

*RQ1. Does farmers' entrepreneurial behaviour differ from that of other businesses?*

A classical question within the agricultural entrepreneurship domain has concerned whether or not the entrepreneurship in agriculture differs from that in non-agricultural sectors (Lans et al., 2017). The extant research is inconclusive with respect to the entrepreneurialism of the sector. While several authors have stressed the entrepreneurial capacity of the sector to survive (Alsos et al., 2011), others have claimed that their low entrepreneurship is a consequence of past market intervention policies (McElwee, 2008). Most empirical studies of agri-entrepreneurship are based on small samples of established farmers —thereby missing the entrepreneurialism of new

entrants in agriculture— and different theoretical frameworks providing different results which, in short, causes confusion.

Therefore, Chapter 2 takes an international perspective on differences between agricultural and non-agricultural entrepreneurs in Europe. In this chapter we focus on identifying the internal and external factors affecting entry into agricultural business and the features of these business owners/managers once they are established in the activity and compare them to non-agricultural ventures. In particular, we examine the resources and capabilities, entrepreneurial orientation (risk-taking, proactiveness and innovativeness) and legitimation affecting the entrepreneurial process. We have also been able to observe the differences across these agri-entrepreneurs based on their stage of development.

*RQ2. What are the personal attributes of farmers that provide them with the capability to identify opportunities within the sector?*

It is often stated that farmers need to become more entrepreneurial to compete in modern agriculture (Vesala and Vesala, 2010). However, little is known about what determines this behaviour among new entrants, despite their being the group that is responding to this requirement for entrepreneurialism (Seuneke et al., 2013; Zagata and Sutherland, 2015). Regarding this, opportunity identification is considered by many to be a core pillar of entrepreneurial behaviour (Gaglio and Katz, 2001; Hayton et al., 2011; Shane, 2003a). Opportunity identification is a process by which entrepreneurs utilize their knowledge and capabilities to acquire and evaluate new information that arises in their environment identifying market asymmetries that can be exploited (Shane, 2003). These cognitive processes and subsequent behaviours are strongly influenced by the context in which the entrepreneur is embedded (Zahra et al., 2005).

In Chapter 3, having assessed the antecedents and entrepreneurial capacity of agriculture, we examined the drivers for entrepreneurialism among new entrants in Europe. More specifically, we investigated the impact of general and entrepreneurship-specific human capital together with structural and cognitive social capital on the identification of new business opportunities by new entrants in agriculture once they start their activities. In doing so, we are focusing on those new entrants that really act as a “reactive dynamic business operators” that uninterruptedly search for and identify market disequilibria (Ucbasaran et al., 2009).

*RQ3. How do industry characteristics influence growth-oriented agri-entrepreneurs?*

From existing research, it has become clear that not all forms of entrepreneurship have the same capacity to significantly transform their environment and contribute to its economic development (Vivarelli, 2013). Growth-oriented entrepreneurs have been identified as those that have the potential to generate higher positive spillovers (Autio and Rannikko, 2016). For these entrepreneurs, the interaction between their resources

and capabilities is especially relevant as well as the institutional set-up and the structure of the industry where they operate (Bamiatzi et al., 2016). It means that –for specific economic activities – the characteristics of external contexts, together with entrepreneurs’ competencies, shape the rewards of entrepreneurial behaviours (Grande et al., 2011; Lumpkin and Dess, 1996; Zilberman et al., 2017).

Within the agricultural entrepreneurship domain, there is practically no cross-national research that encompasses these internal and external factors triggering growth-oriented new agricultural ventures (Lans et al., 2014; Pindado and Sánchez, 2017; Zagata and Sutherland, 2015). Consequently, in Chapter 4 we examined –in a worldwide sample – the strategic assets and capabilities of agri-entrepreneurs that determine orientation towards growth as well as the influences of institutional and industry conditions.

*RQ4. How do contextual variables influence different innovation behaviours among entrepreneurs?*

Given that innovation is an inherent characteristic of entrepreneurship due to entrepreneurs exploiting positive market opportunities by innovating (i.e. by creatively recombining resources to create and introduce new products, processes and services), and the entrepreneurial processes are context dependent, it is likely that different entrepreneurial innovative behaviours unfold in different contextual conditions (de Jong, 2013; Sahut and Peris-Ortiz, 2014; Shane, 2012; Spigel, 2015). The literature further indicates that different types of entrepreneurial innovation arise from the interplay between entrepreneurs’ attributes and different contextual configurations (Wright, 2014). However, much of the research dealing with entrepreneurs’ innovative behaviours has been focused on individual level factors and pays insufficient attention to the different overlapping contexts shaping entrepreneurial innovations (Zahra et al., 2014).

In Chapter 5, we address how different bundles of entrepreneurial resources and capabilities coupled with specific configurations of external context influence different innovative behaviours of early-stage entrepreneurs in Europe. To date, studies on innovative entrepreneurship and its contextual influences have taken into account single dimensions of the national ecosystem where entrepreneurs operate, such as the institutional set-up. Likewise, these studies have been mainly focused on technological innovations. Thus, we consider the technological, institutional, social and spatial dimensions of entrepreneurs’ national context proposed by Autio et al. (2014), in order to understand the overlaid contextual influences on different dimensions of entrepreneurial innovations, namely product, market and process innovations. Likewise, to capture the effect that industry affiliations may exert on innovation behaviours we consider a sample that includes both high- and low/medium-tech industries like agriculture.

*RQ5. How do consumers perceive the innovative food trends pushing entrepreneurial agriculture across different regions?*

Agricultural entrepreneurship literature has established that changing consumers' preferences and eating habits is one of the drivers behind the entrepreneurship of agriculture (De Wolf et al., 2007). This implies that consumers' preferences exert an important force on the entrepreneurial behaviour of farmers (Wu, 2000). However, these new food trends and consumers' concerns are short-lived and disappear rapidly (Aqueveque, 2016). Understanding food consumers' mind-set towards food innovations is of critical importance to ensure the acceptance of innovations and the subsequent entrepreneurial success of farmers (Beckeman et al., 2013; Barrena and Sánchez, 2013; Hills and LaForge, 1992; Onwezen and Bartels, 2013). Previous literature has highlighted the fact that consumers' acceptance of food innovations varies across countries and regions (De Barcellos et al., 2010; Barrena et al., 2015). Nevertheless, there is still little research examining how these perceptions vary around the world, due to the limited samples employed (Mäkinemi et al., 2014).

To address this issue we have explored in Chapter 6 the use of the Twitter social platform as a source of information to study the general understanding and attitudes of individuals toward innovative food trends. This chapter concentrates on identifying geolocated communities of users across the globe that share information about different food trends. Once these communities were identified, we characterized the sentiment content of the pieces of information shared within them to shed light on the cross-cultural differences in attitudes toward food innovation.

### **1.3 Analytical Framework and Methodologies**

This thesis applies different theoretical frameworks and methodologies to address the research questions posed. The main source of data for the analyses conducted was the Adult Population Surveys of the Global Entrepreneurship Monitor (GEM), which is one of the richest sources of information on entrepreneurial activity worldwide. Furthermore, this dataset was complemented with country-level information collected from a variety of sources (Eurostat, World Bank and Heritage Foundation) in order to respond to the research questions addressing external influences. For the analysis of attitudes toward innovative food trends across different communities we harvested data from Twitter. In what follows we detail the theoretical basis and methodologies employed to meet the objectives of this thesis.

Research in Chapter 2 sets up a theoretical model based on the resource-based view, the entrepreneurial orientation perspective, and institutional economics to analyse the internal factors, strategic behaviour, and external influences affecting agricultural entrepreneurship with respect to other economic activities (RQ1). To address the objective of the chapter we used the above mentioned GEM data – in 20 EU countries

for the years 2003-2010 – which contains data on the entrepreneurial attitudes, activity and aspirations of 47,111 entrepreneurs from all business sectors. To control for the unobserved heterogeneity of the cross-sectional dataset, we applied random effects logit models.

In Chapter 3, the analysis of the determinants of opportunity identification by new entrants (RQ2) draws on human capital theory and social capital theory. We used random effects logit models to estimate the likelihood that new entrants into agriculture will identify new business opportunities once they have started. Furthermore, we controlled for country wealth conditions to improve the accuracy of the model, merging GEM data of 843 new agricultural entrants (i.e. individuals involved in the start-up process or owner/managers of agricultural businesses that were created in the past 42 months) in 20 EU countries for the years 2004-2010 with data from the World Bank.

The framework proposed in Chapter 4 to evaluate the internal and external factors affecting growth-oriented new agricultural ventures (RQ3) is rooted in the strategic management literature, which suggests that the growth of these ventures can be explained by combining the resource-based view and institutional theory, as well as the industry-based view. This approach involves the combination of individual and contextual analyses, which requires multilevel regression techniques. We applied these methods to a merged dataset from the GEM and World Bank for a sample of 71 countries for the years 2004-2010 that includes a total of 1,619 new agricultural entrants.

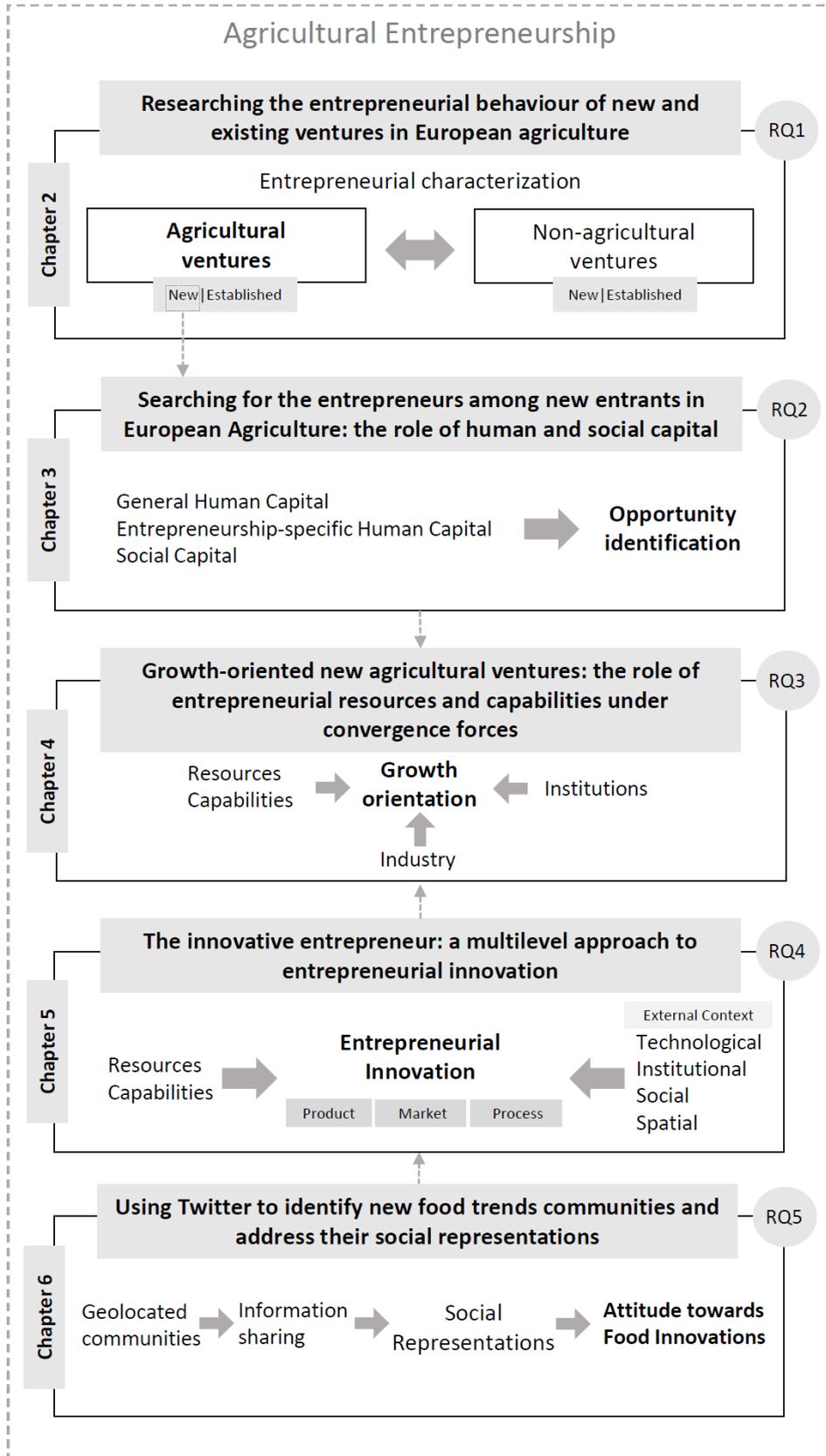
To investigate the innovative entrepreneurship in terms of different types of innovative new ventures and its operating contexts (RQ4), Chapter 5 draws on the resource-based view, National Systems of Entrepreneurship and the geography of innovation literature. This allowed us to develop a theoretical lens that assesses entrepreneurial innovations determined by different internal and contextual factors. To analyse the effect of different contextual dimensions, the data for the empirical analysis were gathered from the GEM, Eurostat, the World Bank and the Heritage Foundation. Due to the nature of the dataset and research objective, we used multilevel analysis on a sample of 18,171 early-stage entrepreneurs (i.e. manage/own a business created in the past 42 months), from all business sectors, in 20 EU countries for the period 2005-2010.

Finally, Chapter 6 draws on social representations theory as a conceptual framework for exploring the attitudes toward innovative food trends of social communities (RQ5). Social representations reflect the socially constructed and shared common sense towards a specific topic by group of individuals, which involves a structural dimension and a socio-psychological dimension. To address both dimensions, we applied density based clustering algorithms using a sample of 7,014 tweets to identify geolocated communities of Twitter users sharing information about food novelties and sentiment analysis to evaluate the attitude of the social representations built by them.

## 1.4 Structure of the Thesis

This thesis is structured in seven chapters. The first chapter offers a general introduction and outlines the background of the agricultural entrepreneurship, the aim and research questions of this thesis, and the theoretical frameworks and methodologies used throughout this research. Chapter 2 deals with agricultural entrepreneurs at different stages of business development and their differences with respect to non-agricultural ventures. Chapters 3 to 4 are primarily empirical studies dealing with the internal and external factors shaping different entrepreneurial behaviours (i.e. new business opportunity identification and growth orientation) in new agricultural ventures. Chapter 5 presents empirical research of how different dimensions of entrepreneurs' context together with entrepreneurs' intangible assets determine different typologies of innovative new ventures. Chapter 6 presents a preliminary analysis of Twitter data to address the attitudes toward food innovations across different cultures and regions pushing innovative new ventures. Finally, Chapter 7 presents the overall conclusions, implications and future lines of research. The structure of this thesis is presented in Figure 1.1.

Figure 1.1. Structure of the thesis.



## Chapter 2

# RESEARCHING THE ENTREPRENEURIAL BEHAVIOUR OF NEW AND EXISTING VENTURES IN EUROPEAN AGRICULTURE<sup>1</sup>

### 2.1 Introduction

The agricultural sector in Europe has suffered economic and productive restructuring in recent years, primarily as a result of the liberalization of agricultural trade and the reforms in the Common Agricultural Policy (CAP) which have led to a more market-oriented agriculture (Giannakis and Bruggeman, 2015a; Lobley and Potter, 2004). These changes together with greater market volatility and expensive external inputs have increased competitive pressures on farmers (the so-called squeeze on agriculture), forcing them to increase their entrepreneurial orientation and entrepreneurial skills in order to remain competitive, or otherwise leave the sector (Knudson et al., 2004; Phillipson et al., 2004; Van der Ploeg and Roep, 2003; Vesala and Vesala, 2010). The impact of these pressures is reflected in the declining number of farms, the change in their average size and the increasing age of farmers in the EU over the last decade (European Commission, 2013). However, despite these structural changes and problems of generational renovation, the sector has survived and this survival is a result of the role that CAP policies have played as well as its entrepreneurship and entrepreneurial capacity (Alsos et al., 2011; Breustedt and Glauben, 2007).

The definition of agricultural entrepreneurship has been a subject of debate among scholars (Lans et al., 2013; McElwee, 2005, 2008; Vik and McElwee, 2011). Several authors have related the concept of agricultural entrepreneurship to the development of non-agricultural business by established farmers (Seuneke et al., 2013). Other authors have pointed out that agricultural activity also provides entrepreneurial opportunities such as development of new products (e.g. organic farming and functional foods) and innovations in business processes, distribution, and marketing (EIP-AGRI, 2016; Hulsink, 2005; Vik and McElwee, 2011).

Both views deal with the concept of entrepreneurship, which can be defined as a process through which individuals take advantage of positive market opportunities to create and expand new business firms (Gries and Naudé, 2011). This process includes at least two notions, an occupational one and a behavioural one, the former corresponding to

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*“owning and managing a business on one’s own account and risk”*, while the latter corresponds to *“entrepreneurial behaviour in the sense of seizing an economic opportunity”* (Sternberg and Wennekers, 2005).

In line with this, this study is focused on agricultural economic activity and sees the occupational view as an output of the behavioural one (Wennekers and Thurik, 1999). This allows us to analyse the entrepreneurial behaviour of those individuals who have decided to start a new agricultural firm (new agri-entrepreneurs) as well as the entrepreneurial behaviour of those who are active as owner-managers of agricultural businesses older than 42 months (established agri-entrepreneurs). This view is consistent with previous studies indicating that farmers can be characterized as entrepreneurs and profit-maximizing decision makers and, therefore their entrepreneurship can be analysed by methods used in non-agricultural sectors (Boussard, 1991; Carter and Rosa, 1998; McElwee, 2006; Phillipson et al., 2004).

Regarding the characteristics of these agricultural business owners, it is important to highlight that new entrants into agriculture are supported by the CAP policies designed to help young farmers set up their activities, since the CAP reform of 1992 (Zagata and Sutherland, 2015). On the other hand, the entrepreneurial behaviour of established agricultural ventures is encouraged by European policies fostering diversification through the creation of non-agricultural businesses since the reform of structural funds in 1988 (Fuller, 1990; Morgan et al., 2010). These policies are related to rural development and a need for young people to settle in rural areas (Marsden and Sonnino, 2008). Thus, researchers and policy-makers believe that acquiring better knowledge of entrepreneurship in the agricultural sector could be a fundamental tool for contributing to the vitality and competitiveness of the sector and of rural areas (EIP-AGRI, 2016).

Additionally, the European agricultural sector is characterized by small-family enterprises where management and control are not separated; the need for independence and succession drive economic objectives and are inscribed within the powerful ideology of tradition which may determine their entrepreneurial behaviour (Alsos et al., 2014; Gasson and Errington, 1993; Jervell, 2011). Likewise, agri-entrepreneurship involves specific engagement with the rural-natural environment, which makes agri-entrepreneurs face particular challenges such as lower levels of human and financial capital, relatively small markets and weak communications, in addition to the universal liability of newness and smallness (Korsgaard et al., 2015). Consequently, the agricultural sector provides an interesting context to examine central issues in entrepreneurship research such as how rural and family embeddedness determine new venture creation and survival (Jervell, 2011; Korsgaard et al., 2015). Moreover, specific characteristics of this sector such as the inherent uncertainty of biological processes, structural change, a heavily regulatory environment, mature markets, and start-up subsidies make it an interesting sector to study the resource configuration of new entrants into the sector as well as the resource restructuring of

established farmers in order to survive in turbulent environments (Alsos et al., 2011; Deakins et al., 2016; Grande et al., 2011).

Therefore, the objective of this paper is to describe agri-entrepreneurs (defined here as individuals owning and managing an agricultural business) within two lines of analysis. The first focus is on identifying the internal and external factors affecting entry into agricultural business and the characteristics of these business owners/managers once they are established in the activity, compared to non-agricultural ventures. The second line of analysis focuses on the differences across these agri-entrepreneurs from the moment they begin their activities until they manage to survive in the market. Our research uses the resource-based view (RBV) to address internal factors, the entrepreneurial orientation (EO) perspective to address strategic behaviour, and institutional economics (IE) to address external factors as theoretical frameworks. The data used is a sample of 47,111 active entrepreneurs in 20 EU countries obtained from the Global Entrepreneurship Monitor (GEM) for the years 2003-2010.

Our study contributes to the entrepreneurship literature in different ways. First, we highlight the importance of studying an industry-specific context to analyze the entrepreneurship process, and how it is strengthened or constrained by the entrepreneur's internal and external contexts. Thus, this study attempts to answer calls for the need to contextualize the entrepreneurial process to better understand new venture creation and survival (Autio et al., 2014; Welter, 2011). Furthermore, this study aims to assess how RBV and IE can inform the entrepreneurial process for micro-sized family firms within rural and heavily regulated environments. Furthermore, it contributes to the emerging agricultural entrepreneurship literature using an integrative framework adapted from the entrepreneurship literature. Our results contribute to the debate on how the latest institutional changes have increased the EO of European farmers. Finally, our findings can provide useful insights for policy-makers to develop policies aimed at encouraging agricultural entrepreneurship.

This article is organized as follows: It starts by examining the literature on agricultural entrepreneurship. The next section describes the theoretical framework and conceptual model for the current work. The Database and Methodology section details the variables employed and the econometric model used. The empirical results obtained are subsequently discussed. The final section draws conclusions and suggests future research.

## **2.2 Background and Theoretical Framework**

### **2.2.1 Agricultural Entrepreneurship**

Entrepreneurship is regarded as one of the main mechanisms of economic development through employment, innovation and welfare effects (Acs et al., 2008). Further,

entrepreneurship is associated with adaption to changes in the economic system through the following mechanisms: the creation of new businesses, the refocusing of existing ones and the reorientation of national institutions (Reynolds et al., 2004). In this regard, the existing literature has already pointed out the influence of entrepreneurs' characteristics as well as the external context on "entry" behaviours (start-up and exploitation of entrepreneurial opportunities, and "post-entry" behaviours) and the goals and objectives of those behaviours (Autio et al., 2014). Consequently, understanding the influence of entrepreneurs' internal and external contexts on entrepreneurial processes has become a core issue for entrepreneurship research (Stenholm et al., 2013; Welter, 2011). Thus, bearing in mind the importance of contextualizing the entrepreneurial process, we will attempt to summarize some relevant features of agricultural entrepreneurship.

A review of the existing literature reveals that the agricultural sector has been somewhat overlooked in general entrepreneurship research (Alsos et al., 2011). However, as previously pointed out here, the latest CAP reforms have promoted a more market-oriented agriculture and farmers have to enhance their entrepreneurial behaviour (Van der Ploeg and Roep, 2003; Vesala and Vesala, 2010). Nonetheless, the agricultural sector has specific environmental and economic features that cannot be ignored as they distinguish its entrepreneurship from that of other economic activities.

Agricultural activity is dependent of land as a production factor, and consequently this activity has more impact on the environment than other sectors (Britz et al., 2012). Likewise, agriculture is based on biological processes with high spatial and temporal variability (Trnka et al., 2011). As a result of that, unexpected changes in weather conditions cause high variability in producer and consumer prices and decrease their economic welfare, making it necessary to implement hedging policies to mitigate this effect (Apergis and Rezitis, 2003). Moreover, the function of agriculture is not only the production of food, it has also shaped landscapes, preserved biodiversity and created a cultural heritage over centuries (Daugstad et al., 2006). Thus, the recognition of the multiple crucial functions of agriculture has translated into a high level of policy involvement (Darnhofer et al., 2015; Potter and Tilzey, 2005). In this regard, European agricultural policies have changed since their implementation in 1962, shifting from a policy focused on commodity production to one more focused on environmental and social sustainability (Darnhofer et al., 2015). These different policies have led European agriculture to be characterized by a fragmented structure in which small-scale farms – generally supported by the public goods that they offer– coexist with export oriented large farms encouraged by past policies such as price support, border tariffs and export subsidies (Bailey et al., 2016, Potter and Tilzey, 2005; Shucksmith and Rønningen, 2011). Furthermore, there is a wide heterogeneity in farms across countries and regions due to differences in natural and infrastructural location factors as well as different management models (Britz et al., 2012).

Regarding the entrepreneurial behaviour of this sector, one of the characteristics of agri-entrepreneurship is family embeddedness: the identification of new business opportunities and the development of new ventures are “inextricably linked” to family roles and relationships (Aldrich and Cliff, 2003). Consequently, part of the literature has been devoted to family succession. Indeed, succession represents a critical point in agricultural firms when new entrants decide to adopt new approaches (e.g. organic production or new production processes), or, conversely, they decide to abandon this economic activity (Sutherland et al., 2012). The success of these new entrants is directly related to farm profitability, and the literature has shown that non-economic values influence this succession (Calus et al., 2008; Inwood et al., 2013; Inwood and Sharp, 2012). These new entrants or successors perceive themselves as entrepreneurs and are more entrepreneurship-oriented than their predecessors given that they have experienced multifunctional agricultural policies as opposed to productivist policies (Vesala and Vesala, 2010; Zagata and Sutherland, 2015). Nevertheless, a successor can also choose to continue the existing farming business without making any changes, especially if they have been trained by their predecessors and this production style satisfies their economic and social aspirations (Perks and Medway, 2012; Sutherland et al., 2012).

However, it is important to stress that entering into business is not necessarily synonymous with family succession (Blanc and Perrier-Cornet, 1993). The literature proposes that a series of factors influence entry into agriculture. In general, studies have found that the factors that contribute to starting an entrepreneurial activity are profit expectation, risk-related aspects, human and social capital, and psychological and demographic characteristics (Santarelli and Vivarelli, 2007). The characteristics and perceptions of agri-entrepreneurs are distinct due to the context in which their activities take place. There are differences between rural and urban entrepreneurship as a result of different access to resources, local culture, proximity to markets and types of customers and services (Korsgaard et al., 2015). Moreover, new entrants into agriculture can pursue specific values such as a farm lifestyle or sustainable agriculture (EIP-AGRI, 2016). Even so, the motivations to start a new agricultural venture can be to maximize returns and exploit an opportunity (Alsos et al., 2003). Finally, the institutional framework and macroeconomic environment can determine individual motivations and preference for entrepreneurial activity (Stuetzer et al., 2014). In this regard, agriculture in the EU is supported through the CAP, which assists farming financially in return for its social and environmental utility and fosters agri-entrepreneurship through various measures such as support for the initial costs of setting up a business (Zagata and Sutherland, 2015).

Much of the literature has focused on diversification and corporate entrepreneurship aimed at generating more income, motivated by fluctuations in market prices and the desire to take advantage of new opportunities (Alsos et al., 2003; Barbieri and Mahoney,

2009; Grande, 2011; Hansson et al., 2013). For established agri-ventures, starting new ventures can be relatively easy as a result of the physical assets i.e. machinery, land and facilities available to them, which can also improve the profitability of these new ventures when they carry out farming activity. However, when the new ventures have no connection with farming activity, lack of entrepreneurial resources (i.e. knowledge of marketing, distribution and sales) can hinder the success of this diversification (Alsos and Carter, 2006). Consequently, part of the literature has been concerned with the entrepreneurial skills necessary to start these new activities (De Wolf et al., 2007; Morgan et al., 2010; Seuneke et al., 2013). In this regard, previous research shows that established agri-entrepreneurs may not have enough entrepreneurial skills, network capabilities or market knowledge to support the new venture creation and development (Alsos and Carter, 2006; McElwee, 2008). This fact is related to the characteristics of the rural workforce, which has lower levels of skill and education (North and Smallbone, 2006).

Nevertheless, they are likely to learn and integrate external knowledge and resources (Grande, 2011). Previous studies highlight the importance of the learning process underlying the development of these skills, especially the need to develop an entrepreneurial identity in farmers to operate beyond the agricultural domain, and the need to open-up family farms through external labour and social networks (Seuneke et al., 2013).

Therefore, in the light of the evidence above, this study recognizes that the industry context determines previous resources and the “entry” behaviour of new agri-entrepreneurs as well as the “post-entry” behaviour of established agri-entrepreneurs in order to respond to the changing environment and survive into the market. In this sense, understanding how agri-entrepreneurs respond to the latest industry and institutional shift from production-oriented to market-oriented agriculture can provide considerable insights into entrepreneurial processes in agricultural firms, and on the extent to which they differ from other business.

### **2.2.2 Theoretical framework**

Entrepreneurship is a process which takes place and has effects at different social levels simultaneously. It is the individual who takes the initiative to engage in entrepreneurship and this takes place within an organizational and external context (Cuervo et al., 2007). Furthermore, one of the differences across entrepreneurs is the fact that not all of them succeed and continue over time (Aldrich and Martinez, 2001). Hence, the entrepreneurial process is selective and encounters different challenges and barriers depending on the stage it goes through (Brixy et al., 2012). Each stage of the entrepreneurial process is characterized by different challenges, opportunities, resources and needs, and organizational approaches (Robichaud et al., 2007).

Therefore, research into the entrepreneurial process needs to analyze its different stages and levels in order to contextualize it and integrate existing frameworks and theories (Welter, 2011; Zahra et al., 2014). In recent years research on the entrepreneurial process has increased based on the resource-based view (RBV) and institutional economics (IE) combined in the analysis of the internal and external factors which influence entrepreneurial activity (Urbano and Turro, 2013).

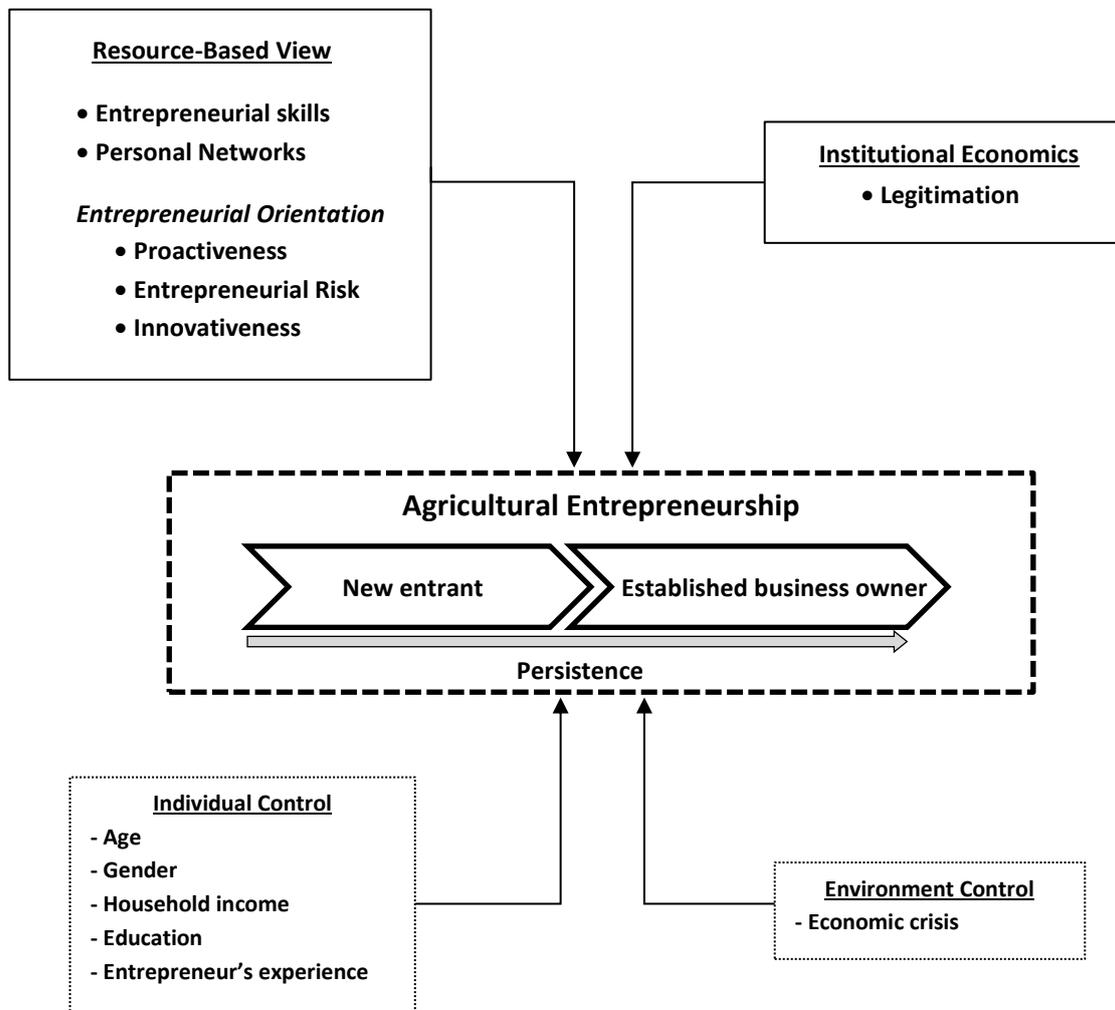
The RBV defines a business as a bundle of resources and capabilities. These tangible and intangible assets which are valuable, rare and unique, together with an appropriate firm's organization (VRIO framework) are a source of sustainable competitive advantage and of the success or survival of entrepreneurial activity (Barney et al., 2001; Wiklund and Sheperd, 2003). Organizational and strategic processes allow for the restructuring and manipulation of resources into value-added strategies (Eisenhardt and Martin, 2000). Indeed, organizational orientations have been identified as key drivers of competitive advantage as these orientations are deeply integrated within firms and are difficult for competitors to emulate (Zhou et al., 2008). In terms of the different orientations which firms can adopt, Entrepreneurial Orientation (EO) has emerged as a core concept of entrepreneurship research and refers to firms' efforts to discover and exploit new opportunities (Wiklund and Shepherd, 2005). Lumpkin and Dess (1996) defined the Entrepreneurial Orientation as *"the processes, practices, and decision-making activities that lead to new entry"*. Despite the variety of ways to measure the EO, research consensus backs the view that EO comprises risk-taking, proactiveness and innovativeness (Wiklund and Shepherd, 2005). Furthermore, this EO can be seen as a proxy of entrepreneurial quality and, hence, as an important element for firm growth and success (Davidsson, 1991). The literature on the study of entrepreneurship has used RBV to understand the process of starting a business and the EO of those entrepreneurs (Cassia and Minola, 2012; Urbano et al., 2013). Likewise, researchers have proposed integrative frameworks encompassing the RBV and the EO perspective to explain firm success and the growth of new ventures (Grande et. al, 2011; Wiklund et al., 2009).

However, despite the fact that RBV has been widely used to address internal factors, the literature highlights the importance of context on the form and patterns of entrepreneurial processes within a specific nation (Stenholm et al., 2013). Therefore, Institutional Theory (North, 1990), creates a more robust conceptual framework for understanding the effects of the environment on entrepreneurship. It allows for differentiating formal factors (political, legal and economic and contractual rules) from informal ones (norms of behaviour and conduct in daily relations). From the point of view of entrepreneurship, institutions represent the set of rules that articulate and organize the economy and have consequences for new venture creation and success (Bruton et al., 2010).

Therefore, based on the aforementioned theoretical frameworks (RBV and IE), this study analyzes the resources and capabilities and entrepreneurship (risk-taking, proactiveness

and innovativeness) of new and established agricultural entrepreneurs in relation to other sectors (see Figure 2.1) and the effects of institutions on them. Furthermore, we analyze differences across agricultural entrepreneurs. The rationale for the inclusion of each explanatory variable in the model will now be laid out.

**Figure 2.1. Research model.**



### 2.2.2.1 Resource-Based View and Entrepreneurial Orientation

#### Entrepreneurial skills as capabilities

Confidence in entrepreneurial skills is related to entrepreneurial behaviour and hence to the decision to start a new business (Arenius and Minniti, 2005). Furthermore, the literature claims that individuals who possess the skills necessary for the management and setting up of a company have a greater chance of success (Terjesen and Szerb, 2008). As pointed out above, the literature on agricultural ventures highlights the diverse profiles and entrepreneurship skills within the farming sector (Deakins et al.,

2016; McElwee, 2006). On the one hand, farmers may lack the necessary entrepreneurship skills as a result of a marked strategic orientation to compete in terms of cost, which is in turn a result of previous production-oriented policies and the heavy regulation of this sector (McElwee and Bosworth, 2010; Pyysiäinen et al., 2006; Seunke et al., 2013). On the other hand, other studies reflect that agri-entrepreneurs actually do possess entrepreneurial skills, especially those involved in diversification activities (Morgan et al., 2010; Vesala et al., 2007). Furthermore, family farms can have a positive effect on entrepreneurial skills as a farm's resources can be used in innovative activities motivated by pull factors like the need of economic freedom (McElwee, 2008). Thus, we propose the following hypotheses:

Hypothesis 1a: Agri-entrepreneurs (new entrants and established) are likely to have less entrepreneurial skills than other sectors.

Hypothesis 1b: New agri-entrepreneurs are likely to have greater entrepreneurial skills than established agri-entrepreneurs.

### **Personal networks as capabilities**

Personal networks are informal or formal means used by entrepreneurs to access resources, information and social support for the creation, survival and growth of a new company (Baron and Markman, 2003; Liao and Welsch, 2005). The rural context can restrict entrepreneurs' access to established networks due to strict social norms and the necessity to adhere to strong local values (Jack and Anderson, 2002). In particular, new entrants into agriculture may find it difficult to integrate themselves in traditional agricultural knowledge systems and established supply channels (EIP-AGRI, 2016). However, the family business literature has emphasized how these established businesses amass social capital based on long-term social relationships as a result of their long-time horizons (Le Breton-Miller et al., 2015). Therefore, the hypotheses to be tested are the following:

Hypothesis 2a: Agri-entrepreneurs (new entrants and established) are more likely to have less social capital (personal networks) than other sectors.

Hypothesis 2b: New agri-entrepreneurs are more likely to have less social capital (personal networks) than established agri-entrepreneurs.

### **Proactiveness as a sub-dimension of entrepreneurial orientation**

Proactiveness reflects an entrepreneur's ability to discover and exploit market opportunities (Stevenson and Jarillo, 1990). This proactive behaviour is related to obtaining competitive advantages and firms' success in turbulent environments as it involves adopting a position of a continuing search of business opportunities and getting ahead of environment changes (Wang, 2008). However, a regulated industry context can result in a less proactive attitude given that farmers are less exposed to market

changes and less used to handling changes in business concept when compared to other sectors (Green et al., 2008). Nevertheless, although farms operate within a heavily regulated environment, the latest institutional changes encourage the development of new ventures both for new entrants and established agricultural firms (Grande et al., 2011). Still, the literature points out that previous productivist policies still carry weight and established farmers remain less productive (Vesala and Vesala, 2010). The foregoing arguments lead to the following hypotheses:

Hypothesis 3a: Agri-entrepreneurs (new entrants and established) are more likely to be less proactive than other sectors.

Hypothesis 3b: New agri-entrepreneurs are more likely to be more proactive than established agri-entrepreneurs.

### **Entrepreneurial Risk as a sub-dimension of entrepreneurial orientation**

Risk-taking is defined as entrepreneurs' willingness to make risky resource commitments to achieve specific objectives (Miller, 1983). Entrepreneurs have been described as "risk takers" and fear of failure has a negative influence on the decision to start a business (Arenius and Minniti, 2005). However, firms operate in complex and unpredictable contexts and thus it is necessary to explore, assess and manage risks in order to reduce potential losses (Brustbauer, 2014). In this regard, studies examining risk-taking and business success show a curvilinear relationship; it enhances performance at the early stages of entrepreneurship and damages it in subsequent phases (Tang et al., 2008). The literature also shows how the specific industry context determines this relationship; risk assumption can be a key factor to survive in dynamic environments where costumers' preferences and technology change rapidly, whereas in static environments firms may benefit from more conservative, risk-averse strategies (Rauch et al., 2009; Wiklund and Shepherd, 2005). Furthermore, agri-entrepreneurs face considerable uncertainty due to unstable agricultural markets and unpredictable weather conditions which directly affect their incomes and, therefore they have been described as "risk-averse" (Chavas and Holt, 1996). Likewise, agri-entrepreneurs' family roots can turn them more risk-averse than other type of entrepreneurs as a consequence of their change resistance and their fear of losing their family wealth (Naldi et al., 2007). We suggest the following hypotheses to sum up the foregoing arguments:

Hypothesis 4a: Agri-entrepreneurs (new entrants and established) are more likely to be more risk-averse than other sectors.

Hypothesis 4b: New agri-entrepreneurs are likely to be more prone to taking risks than established agri-entrepreneurs.

### **Innovativeness as a sub-dimension of entrepreneurial orientation**

Innovativeness refers to an entrepreneur's propensity to develop new ideas, find new market opportunities and engage in creative processes that generate product, market, or technological innovations (Lumpkin and Dess, 1996). As is widely recognized, the ability to innovate increases the growth prospects of a company and its chances of survival (Audretsch, 1991; Terjesen and Szerb, 2008), this increase being more likely in new and small businesses (Cefis and Marsili, 2006). As we have noted before, industry characteristics determine the propensity of entrepreneurs to engage in innovative activities (Covin and Slevin, 1989; Wiklund and Shepherd, 2005). In this sense, within the agricultural sector, a heavily regulated environment can discourage innovation based entrepreneurial efforts (Grande et al., 2011). Likewise, subsidy policies can lead to misreading the level of innovativeness of new entrants (Shane, 2009). Furthermore, the family embeddedness of agri-entrepreneurship can affect innovativeness, although the literature is not conclusive in this regard (Le Breton-Miller et al., 2015). Some studies have shown that family firms are less innovative than their counterparts (Bock, 2012), while other studies point out that the family can foster intergenerational innovative entrepreneurship (Discua Cruz et al., 2013). Accordingly, we propose the following hypotheses:

Hypothesis 5a: Agri-entrepreneurs (new entrants and established) are more likely to be less innovative than other sectors.

Hypothesis 5b: New agri-entrepreneurs are likely to be more prone to innovate than established agri-entrepreneurs.

### **2.2.2.2 Institutional economics**

#### **Perception of social legitimacy**

Socio-political and cognitive legitimacy corresponds to the regulations, standards, and expectations created by governments and organizations, an acknowledgment that the new company is a good citizen, and norms and values of a society (Zimmerman and Zeitz, 2002). Indeed, the survival capacity of enterprises depends on their ability to establish cognitive and socio-political legitimacy (Bruton et al., 2010; Zimmerman and Zeitz, 2002). The latest CAP reforms have attempted to legitimize the idea of entrepreneurship amongst farmers, but, as previous studies have shown, most farmers still see their activity as product-oriented and are far from considering themselves entrepreneurs. Hence, they lack the identity that would legitimate entrepreneurial activity (Burton and Wilson, 2006). However, it is also true that there is an emerging entrepreneurial identity amongst farmers (Vesala et al., 2007; Vesala and Vesala, 2010). Thus, the hypotheses to be tested are the following:

Hypothesis 6a: Agri-entrepreneurs (new entrants and established) are likely to perceive less entrepreneurial legitimacy than other sectors.

Hypothesis 6b: New agri-entrepreneurs are likely to perceive higher entrepreneurial legitimacy than established agri-entrepreneurs.

## 2.3 Database and Methodology

This study uses the database created by the Global Entrepreneurship Monitor (GEM), which is a relevant source of information for studying entrepreneurial behaviour and activity at the international level (Álvarez et al., 2014). To test our hypotheses, we employ a subsample of the GEM adult population surveys from 2003 to 2010, which contains data on the entrepreneurial attitudes, activity and aspirations of 47,111 individuals in 20 European countries from the total GEM sample<sup>2</sup>. GEM data are based on interviews conducted with adults (18-64 years old) from representative samples of at least 2,000 individuals per country.

The main objective of these surveys is to create a representative sample of population in each country and to identify the percentage of individuals who own and manage a business or are in the process of starting one. If either or both of these conditions are met, respondents are asked follow-up questions that allow for the creation of a profile of these individuals and their business (Koellinger et al., 2007). Follow-up questions are related to the age of their business and whether the venture has paid salaries or wages in the last 42 months. The responses to these questions are used to identify the people involved in entrepreneurial activity within each country, and classify them as follows (see Reynolds et al., 2005): (a) new (or early-stage) entrepreneurs are those who are owner-managers of new business less than 42 months old; and (b) established entrepreneurs, those who are currently an owner–manager of an established business and have paid salaries or wages for more than 42 months.

Therefore, GEM adopts the occupational view of entrepreneurship (Sternberg and Wennekers, 2005). However, it captures specific variables that allow for the analysis of the entrepreneurial behaviour of new and established business owners (Bosma and Schutjens, 2011; Koellinger et al., 2007; Muñoz-Bullón et al., 2015). Furthermore, GEM classifies entrepreneurs by industry according to the International Standard Industry Classification (ISIC), which allows for the identification of those entrepreneurs who own an agricultural business. From the total sample, we have identified a subsample of 800 new (early-stage) agri-entrepreneurs and 2,045 established agri-entrepreneurs.

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<sup>2</sup> Belgium, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, The Netherlands, Portugal, Spain, Sweden, United Kingdom, Croatia, Slovenia, Greece, Austria, Latvia, Czech Republic and Romania.

## Description of variables

*Dependent variables.* “New agri-entrepreneur” is a binary variable indicating whether individuals are currently owning-managing a young agricultural business less than 42 months old. “Established agri-entrepreneur” is a binary variable indicating whether individuals have survived more than 42 months in the market owning-managing an agricultural business. For more details on the variables used, see Table 2.1.

*Independent variables.* As noted previously, this study integrates two levels of analysis (internal and external), and pays special attention to the entrepreneurial orientation of agri-entrepreneurs. Therefore, to test our hypotheses related to an entrepreneur’s capabilities we use entrepreneurial skills and the entrepreneur’s networking capability. We use the individual’s self-assessed entrepreneurial skills as an indicator of the level of their entrepreneurial skills (Gist, 1987; Urbano et al., 2013). These variables have been used to explain entry into entrepreneurship and the success of these ventures (Arenius and Minniti, 2005; Brixy et al., 2012; Estrin et al., 2013). To test our hypotheses related to the EO, we use a series of variables which capture three different components of EO and can explain more than the aggregate index within a specific context (Miller, 2011). Then, regarding entrepreneurs’ proactiveness, we use opportunity scanning and export behaviour, which reflect their proactive attitude towards searching for opportunities inside and outside their environment (Muñoz-Bullón et al., 2015). Next, we use perceived fear of failure to measure entrepreneurial risk-willingness (Arenius and Minniti, 2005). We use product and process innovations to test entrepreneurs’ innovativeness (Muñoz-Bullón et al., 2015). In order to test the effect of the institutional context, we use legitimacy of the entrepreneurial activity (Liñán et al., 2011).

*Individual control variables.* Previous research suggests that socio-demographic factors influence the decision to start entrepreneurial activity and the survival of the new venture (Arenius and Minniti, 2005; Davidsson and Honig, 2003). Thus, we have included control variables for age, gender, household income, education and previous entrepreneurial experience. Age is negatively related to the probability of becoming an entrepreneur, and it is expected to be positively related to survival (Brixy and Hessels, 2010). In general, authors believe that women continue to be disadvantaged in terms of starting entrepreneurial activity. However, the analysis of firm success shows that activities run by women have no greater probability of failure (Kalleberg and Leicht, 1991). In terms of household income, low income levels enhance the probability of becoming an entrepreneur and high levels reduce financial barriers and increase the probability of becoming an entrepreneur (Arenius and Minniti, 2005). Individuals with higher education are better able to perceive opportunities for profitable business and also have greater ability to successfully exploit it (Hormiga et al., 2011). Likewise, knowledge acquired in previous entrepreneurial experience enhances the probability of becoming an entrepreneur and furthermore allows entrepreneurs to avoid costly

mistakes, thus giving them an advantage and the opportunity to better exploit business opportunities (Davidsson and Honig, 2003; McKelvie and Wiklund, 2010).

*Country control variables.* In part of the literature the recent economic crisis is negatively correlated with the decision to start an entrepreneurial activity (Nabi and Liñán, 2013). However, the agricultural sector is seen as acting as a support network in times of economic difficulty (European Commission, 2013). Therefore, this study will analyze potential effects of the crisis and so has taken the year 2008 as a benchmark (Peris-Ortiz et al., 2014).

**Table 2.1. Definition and descriptive statics of the variables.**

Variable	Description	Values	Entrepreneurial Process			
			Early Stg. (All Sectors)		Established Stg. (All Sectors)	
			Mean	S.D.	Mean	S.D.
<b>Independent variables</b>						
<i>Resource-Based view</i>						
Entrepreneurial Skills	Variable indicating whether the respondent believes he or she "Has the knowledge, skills and experience required to start a business."	1. Yes 0. No	0.883	0.322	0.865	0.341
Personal Networks	Variable indicating whether the respondent knows someone who has started a business in the last two years.	1. Yes 0. No	0.615	0.487	0.505	0.500
<i>Entrepreneurial Orientation</i>						
Proactiveness: Opportunity scanning	Variable indicating whether the respondent believes, "In the next six months there will be good opportunities for starting a business in the area in which I live."	1. Yes 0. No	0.448	0.497	0.315	0.464
Proactiveness: Export behaviour	Variable indicating whether the respondent believes that over 25% of his/her customers will be from abroad.	1. Yes 0. No	0.457	0.498	0.030	0.171
Entrepreneurial Risk	Variable indicating whether the respondent believes that fear of failure prevents him/her from starting a new business.	1. Yes 0. No	0.255	0.436	0.281	0.449
Product Innovativeness	Variable indicating whether the respondent believes that his/her clients (some or all) believe his/her product to be new.	1. Yes 0. No	0.436	0.496	0.296	0.457
Process Innovativeness	Variable indicating whether the respondent believes that the technologies used to obtain his/her products became available in the last 12 months.	1. Yes 0. No	0.090	0.286	0.058	0.235
<i>Institutional Economics</i>						
Legitimation	Variable indicating whether the respondent believes that in his/her country most people believe that entrepreneurship is a good career option.	1. Yes 0. No	0.550	0.497	0.548	0.498
<i>Control Variables</i>						
Age	Age of respondents measured in years		31.851	13.212	36.802	12.785
Gender	Gender of respondents	0. Female 1. Male	0.621	0.485	0.648	0.478
Household income	Household income	1. Lowest 33% 2. Middle 33% 3. Upper 33%	2.202	0.784	2.312	0.767
Education	Variable indicating whether individual has Graduate experience	1. Yes 0. No	0.224	0.417	0.181	0.385

Variable	Description	Values	Entrepreneurial Process			
			Early Stg. (All Sectors)		Established Stg. (All Sectors)	
			Mean	S.D.	Mean	S.D.
Entrepreneurial Experience	Variable indicating whether individual has experienced a business failure in the last 12 months.	1. Yes 0. No	0.056	0.231	0.035	0.183
Crisis	Variable indicating whether the survey falls within the crisis period starting in 2008	1. Yes 0. No	0.455	0.498	0.540	0.498
Dependent Variables						
Early Stage Agro-entrepreneur	Variable equal to 1 if individual is at an early stage of agricultural activity (belonging to group A, agriculture, forestry and fishing according to ISIC. Rev. 4) and 0 if the entrepreneurial activity is different to agriculture.	1. Yes 0. No	0.051	0.219		
Established Agro-entrepreneur	Variable equal to 1 if individual is at an established business owner stage of agricultural activity (belonging to group A, agriculture, forestry and fishing according to ISIC. Rev. 4) and 0 if the entrepreneurial activity is different to agriculture.	1. Yes 0. No			0.110	0.312
Number observations used in estimations			16180		18654	

Source: GEM 2003-2010; statistics are based on observations used in random intercept models.

## Econometric Model

Since our dataset has a nested structure (individuals are nested within years, which in turn are nested within countries), observations within each group are often more similar (correlated) than observations between groups (Faraway, 2004). Thus, analyses that assume independence of observations may lead to biased results due to an underestimation of standard errors given their non-normal distribution (Hofmann et al., 2000).

Therefore, we apply random effects logit models to address the issue of the unobserved heterogeneity of our pooled cross-sectional dataset (Rabe-Hesketh et al., 2005). Specifically, we use random intercept logit models with random intercept terms for country and country-year, which represents the extent to which the outcome varies between each group due to specific country context and specific country-year characteristics.

A three-step testing strategy was used. First, a precondition for running a random intercept model is that there is significant variance across groups for the dependent variable (Bliese, 2000). Hence, we performed an LR test (likelihood ratio approach) for each dependent variable with a significant effect being found with country and country-year effects. Second, we performed regression analyses to study the resources, capabilities, entrepreneurial orientation and legitimation affecting new agricultural entrants and established agri-business owners as compared to non-agricultural ones. Third, we selected only the subsample of agricultural ventures (both new entrants and established) and performed the regression analysis with the intention of analysing the differences among them. The correlation matrix can be found in the Appendix (Table A2.1). The correlations between the explanatory variables do not show high values, thus

initially ruling out multicollinearity problems. A multicollinearity test (VIF) was carried out and the results rule out any problems in this regard in the database.

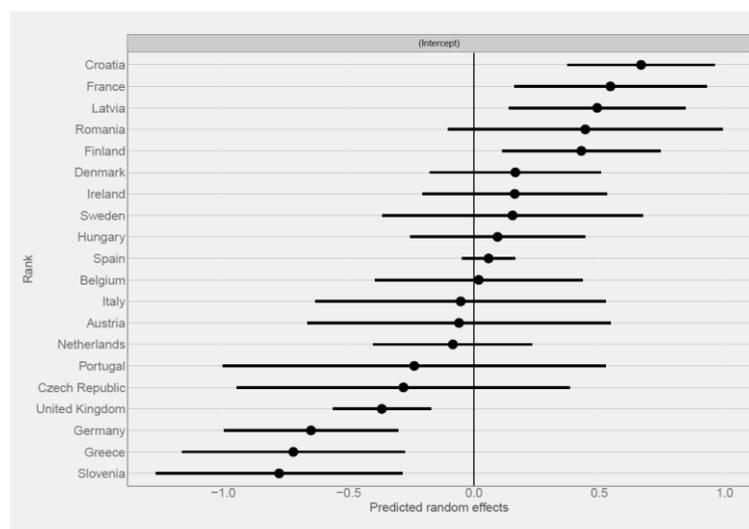
## 2.4 Results

We used R software to develop a Random Intercept Models to analyze agricultural entrepreneurs and the differences between them (Table 2.2). A series of variables related to resources and capabilities, EO, and institutions were used as fixed effects. Intercepts for the country and country-year were used as random effects to take account of differences in samples collected in different countries across different years (Estrin et al., 2013).

In Table 2.2, Model 1 analyzes the differences between new agri-entrepreneurs and their counterparts (non-agricultural new ventures) and Model 2 presents the differences between agri-entrepreneurs and their counterparts for the established stage. Finally, Model 3 shows the results for the agri-entrepreneurs in the sample. The models are statistically significant and the pseudo  $R^2$  shows that the models have an acceptable fit.

The econometric model used allows for an analysis of the heterogeneity of the entrepreneurial process across different countries and years, which is a result of the cultural, institutional and economic environment in each case (Bergmann and Stephan, 2013). To reflect this heterogeneity across countries, Figure 2.2 shows the differences between countries in terms of probability of becoming a new agri-entrepreneur compared to non-agricultural new ventures with 95% confidence intervals. There is no consistent pattern across countries, which shows the complex and multidimensional nature of the entrepreneurial process (Gartner, 1985).

**Figure 2.2. Country effects for new agri-entrepreneurs (compared to non-agricultural new entrepreneurs).**



Source: Country effects (residuals) ranked, estimated from a random-intercept model that includes only country effects. GEM database 2003-2010.

**Table 2.2. Random Intercept Models for agricultural entrepreneurs.**

	Model 1			Model 2			Model 3		
	Estimate	(S.E.)	<i>p</i>	Estimate	(S.E.)	<i>p</i>	Estimate	(S.E.)	<i>p</i>
Fixed Parts									
(Intercept)	-1.861	(0.201)	<0.001 ***	-1.237	(0.223)	<0.001 ***	1.142	(0.266)	<0.001 ***
<i>Resource-Based View</i>									
<i>Capabilities</i>									
Entrepreneurial Skills	-0.295	(0.104)	0.004 ***	-0.566	(0.063)	<0.001 ***	-0.154	(0.138)	0.264
Personal Networks	-0.315	(0.077)	<0.001 ***	-0.192	(0.052)	<0.001 ***	-0.098	(0.108)	0.361
<i>Entrepreneurial Orientation</i>									
Proactiveness: Opportunity scanning	-0.110	(0.078)	0.162	-0.112	(0.058)	0.055 *	-0.263	(0.115)	0.022 **
Proactiveness: Export Behaviour	-0.082	(0.078)	0.291	0.145	(0.177)	0.414	-3.348	(0.186)	<0.001 ***
Entrepreneurial Risk: Fear to Failure	0.074	(0.083)	0.374	0.069	(0.055)	0.215	-0.082	(0.115)	0.477
Product Innovativeness	-0.618	(0.081)	<0.001 ***	-0.700	(0.065)	<0.001 ***	-0.225	(0.127)	0.076 *
Process Innovativeness	-0.138	(0.141)	0.328	-0.156	(0.118)	0.189	0.001	(0.233)	0.998
<i>Institutional Theory</i>									
Legitimation	-0.060	(0.075)	0.421	0.092	(0.051)	0.069 *	0.064	(0.105)	0.542
<i>Control at individual level</i>									
Age	0.332	(0.049)	<0.001 ***	0.228	(0.036)	<0.001 ***	0.503	(0.074)	<0.001 ***
Gender (Male)	0.279	(0.078)	<0.001 ***	0.120	(0.052)	0.022 **	0.051	(0.110)	0.644
Household income									
Middle 33 percentile	-0.364	(0.091)	<0.001 ***	-0.240	(0.065)	<0.001 ***	0.161	(0.126)	0.200
Upper 33 percentile	-0.729	(0.096)	<0.001 ***	-0.704	(0.066)	<0.001 ***	0.418	(0.135)	0.002 ***
Education	-0.363	(0.103)	<0.001 ***	-0.737	(0.087)	<0.001 ***	-0.345	(0.161)	0.033 **
Entrepreneurial experience	-0.688	(0.214)	<0.001 ***	-0.331	(0.159)	0.037 **	0.317	(0.333)	0.340
<i>Control Environment</i>									
Crisis	0.233	(0.154)	0.132	0.257	(0.134)	0.055 *	0.544	(0.175)	0.002 ***
<i>Random Parts</i>									
$N_{\text{yrsurv:country}}$	88			88			87		
$N_{\text{country}}$	20			20			20		
$ICC_{\text{yrsurv:country}}$	0.061			0.048			0.037		
$ICC_{\text{country}}$	0.067			0.159			0.132		
Observations	16,180			18,654			2,845		
-2 Log-Likelihood	6,061.302			11,580.411			2,505.760		
Pseudo R <sup>2</sup> <sup>1</sup>	0.2128			0.2676			0.4055		

Note: Level of significance: \*\*\*\* 1% \*\*\* 5% \*\* 10%. Continuous variables are standardised. (1) R-squared values according to Nakagawa and Schielzeth (2013).

The intra-class correlation (ICC) indicated that 6.7% of the total variance in the agri-entrepreneurship in the early stage (with respect to non-agricultural new ventures) can be attributed to countries' characteristics, and 6.1% to specific country-year conditions. The ICC values for established agricultural ventures (with respect to non-agricultural established ones) indicate that 15.9% and 4.8% of the total variance can be attributed to country and country-year conditions respectively. Finally, the ICC values for the subset of agricultural entrepreneurs indicate that specific country attributes account for the 13.2% of the explained variance, whereas specific country-year conditions account for the 3.7%. These values are close to the normal range (5–20%) indicated by Bliese (2000) for grouped data of this nature. These findings seem to suggest that European countries were relatively similar at the early stage of agri-entrepreneurship with respect to non-agricultural entrepreneurs, whereas there were more differences across countries in terms of established entrepreneurs.

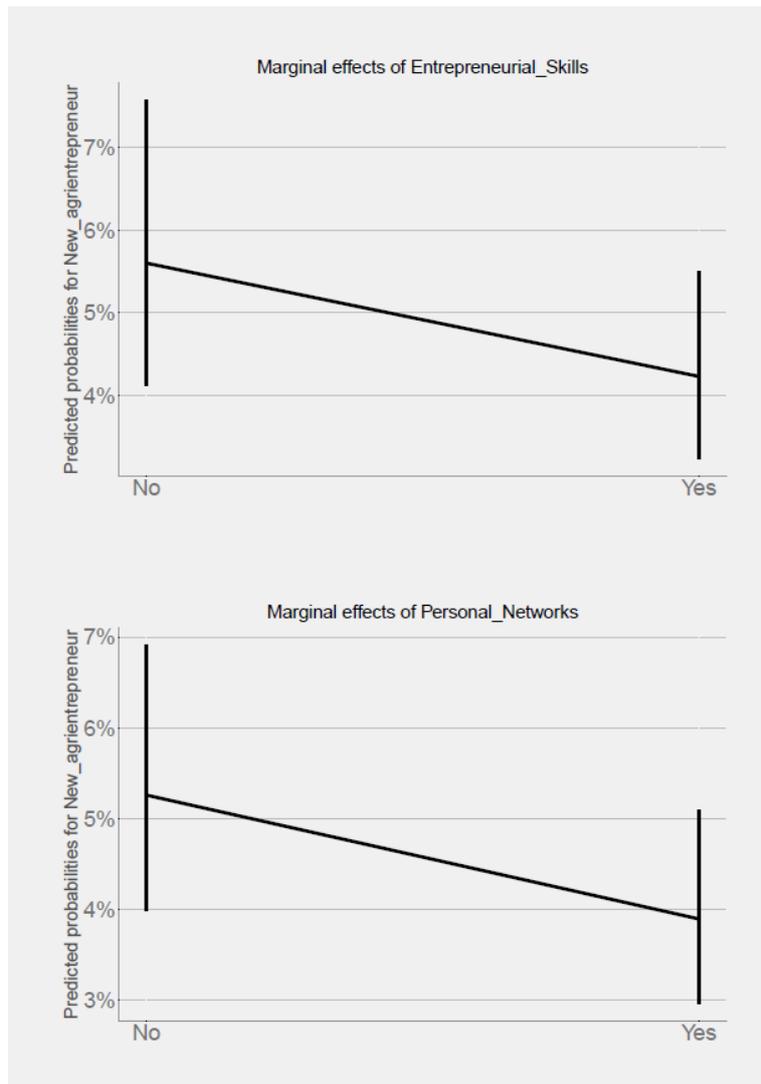
According to Model 1, estimations show that seeing oneself as having the entrepreneurial skills necessary to start a business has a significant and negative effect on agricultural entry, which supports H1a. These results support previous research and show that new agri-entrepreneurs lack the necessary skills to start entrepreneurial activity when compared to other sectors as a consequence of previous strong productivist policies (McElwee and Bosworth, 2010; Pyysiäinen et al., 2006; Seuneke et al., 2013). Regarding social capabilities (knowing other entrepreneurs), they have a negative effect, thus providing support for H2a. Agricultural entrepreneurs do not seem to create networks at their initial stage as do entrepreneurs in other sectors. This result is in line with other studies which have shown that new entrants have difficulties in establishing relationships with other economic actors (EIP-AGRI, 2016).

With regard to the variables measuring the EO of these agri-entrepreneurs in the early stage, we find that they do not show a significant decrease in EO in relation to other sectors. Specifically, the two variables measuring the proactivity of individuals who start agricultural activity, –opportunity scanning and export behaviour– are not significant, therefore H3a, which proposes that agri-entrepreneurs are less proactive when compared to other sectors, is not supported. This result is not consistent with previous studies which indicate that agri-entrepreneurs keep themselves apart from the market as a consequence of it being heavily regulated and of initial subsidies (Green et al., 2008). Hypothesis H4a proposed that agri-entrepreneurs are more risk-averse than other sectors. This hypothesis is not supported in Model 1 as the variable capturing agri-entrepreneurs' risk-taking behaviour is not significant in this early stage. This contrasts with other studies which have defined these new agricultural entrepreneurs as risk-averse (Ferguson and Olofsson, 2011).

Regarding the innovativeness of new agri-entrepreneurs, we found conflicting results. Product innovativeness has a negative and significant effect, thus H5a is partially supported. On the other hand, adoption of the latest technology is not significant, so

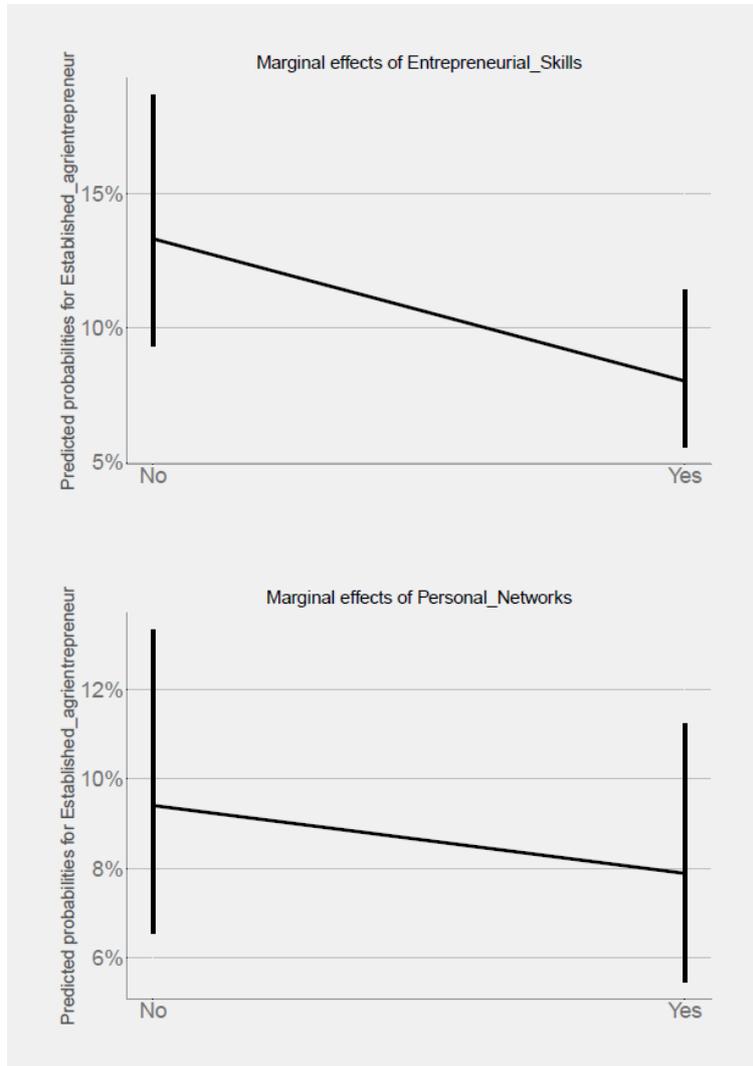
the results do not support the view that new agri-entrepreneurs have less innovation capabilities in process innovation than other sectors. These results probably indicate the weight of former production-oriented policies, which favour the adoption of technological innovation to compete in costs (McElwee and Bosworth, 2010). Finally, the legitimacy perceived by agri-entrepreneurs (H6a) is not significant at the initial stage of the entrepreneurial process.

**Figure 2.3. Marginal effects of entrepreneurial capabilities on new agri-entrepreneurs.**



Source: The figure is based on Model 1 in Table 2.2, and presents the values of for entrepreneurial skills and personal networks variables, indicating the change in the average expected probability that the new entrepreneur is within the agricultural sector.

**Figure 2.4. Marginal effects of entrepreneurial capabilities on established agri-entrepreneurs.**



Source: The figure is based on Model 2 in Table 2.2, and presents the values of for entrepreneurial skills and personal networks variables, indicating the change in the average expected probability that the established entrepreneur is within the agricultural sector.

Model 2 analyses established agri-entrepreneurs in relation to non-agricultural established entrepreneurs. Model 2 presents the same characteristics as those found for the new agri-entrepreneurs: poor entrepreneurial skills and social capabilities, and thus supports H1a and H2a. This reflects the “lower” entrepreneurial capabilities of agricultural business owners (Alsos and Carter, 2006; McElwee, 2008; Pyysiäinen et al., 2006). To better understand these characteristics Figure 2.3 and 2.4, respectively, show the marginal effects of these entrepreneurial capabilities on the probability of becoming a new or established agri-entrepreneur as compared to non-agricultural ones and with 95% confidence intervals. Both figures indicate that likelihood of becoming an agricultural entrepreneur decreases for those individuals who have these entrepreneurial capabilities. We can observe how this effect is even greater in established entrepreneurs, especially in the case of entrepreneurial skills, whose

marginal effect falls from 13.2% for individuals who reported low entrepreneurial skills to 8% for individuals with higher entrepreneurial skills.

Furthermore, established agri-entrepreneurs seem to be less EO than other sectors. Regarding proactiveness, opportunity scanning has a significant and negative effect, which partially supports H3a, whereas results were non-significant for export proactiveness. Despite the well-known multiple activities of this sector and the necessity to increase income through non-farming activities, established agri-entrepreneurs do not seem to be proactive in searching business opportunities in the area where they live. Regarding risk-taking behaviour, it is not significant and the directionality, as hypothesised, is positive. However, H4a is not supported. Therefore, we cannot confirm that agricultural entrepreneurs at the established stage are more risk-averse than those in other sectors (Chavas and Holt, 1996; Naldi et al., 2007). In terms of the innovativeness of established agri-entrepreneurs compared to non-agricultural ones, we find that at the early stage product innovativeness has a negative and significant effect, which partially supports H5a. These findings reinforce the effect of previous productivist policies, which encouraged scale economies and cost-competition through process innovation (McElwee and Bosworth, 2010). Institutional factors play a different role in established agri-entrepreneurs. In particular, the social legitimacy of entrepreneurship is positively related to being an established agri-entrepreneur, which leads to the rejecting of the hypothesis that agri-entrepreneurs have less legitimacy in terms of entrepreneurial activity (H6). This result contrasts with previous studies showing farmers' low legitimacy as entrepreneurs (Burton and Wilson, 2006).

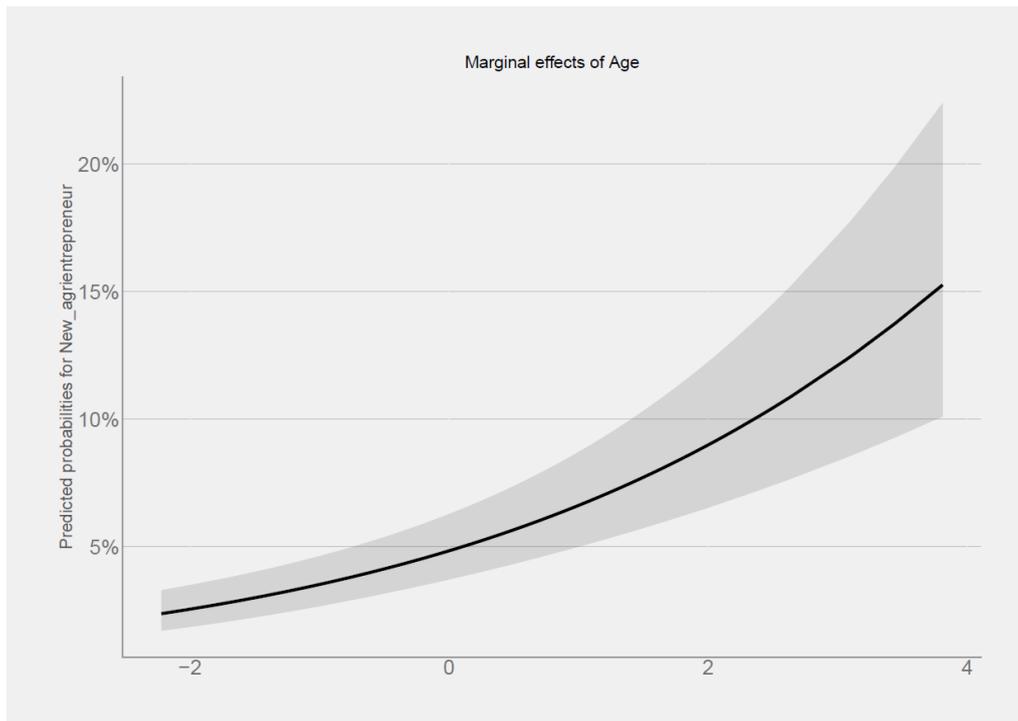
The results presented in the Model 3 –differences across agri-entrepreneurs – shows that self-confidence in entrepreneurial skills is not significant. Thus, we did not find evidence to support the hypothesis that new entrants into agriculture have greater entrepreneurial skills than established ones (H1b). This result is consistent with studies revealing the heterogeneity of entrepreneurial skills across farmers, even as the latest CAP reforms and market liberalization are expected to develop new entrant farmers' entrepreneurial skills (Deakins et al., 2016; Morgan et al., 2010; Vesala and Vesala, 2010). Personal networks have a non-significant impact on being an established agri-entrepreneur. Therefore, we cannot conclude that new entrepreneurs have less social capital than established ones (H2b). This result contrasts with the literature that emphasizes how the strong values of rural communities may hinder the establishment of social ties for new agro-entrepreneurs (EIP-AGRI, 2016; Jack and Anderson, 2002). Regarding the EO variables, the results show that new entrepreneurs have greater proactiveness and innovativeness than established ones. H3b proposed that new agri-entrepreneurs are more proactive than established ones. In this regard, opportunity scanning and export proactiveness have a negative and significant effect on established agri-entrepreneurs, which gives support to H3b. These findings are consistent with the fact that new entrants in agriculture tend to be more likely to identify business

opportunities (EIP-AGRI, 2016). Likewise, despite the fact that –a priori– established agri-entrepreneurs would be more export oriented as a consequence of past policies encouraging large-scale farming and export subsidies, new entrants exhibit greater export proactiveness, which reflects their propensity to be involved in value-added farming (Bailey et al., 2016; Sutherland et al., 2015). By contrast, H4b (new agri-entrepreneurs are more risk-taking) is not supported as the variable measuring entrepreneurs' risk-taking behaviour is not significant.

In terms of product innovativeness, it is statistically significant and negatively related to the established stages of the process. This partially supports H5b. This result suggests that despite the fact that agri-entrepreneurs have less product innovativeness than other sectors, new entrants into agriculture have greater product innovativeness than established agri-entrepreneurs. On the other hand, there are no significant differences in process innovation capabilities. As to the legitimacy of entrepreneurial activity, H6b, which proposes that new entrants have greater entrepreneurial legitimacy than established agri-entrepreneurs, is not supported. This result contrasts with the idea that new entrants into agriculture have been influenced by the new policies and thus have assumed their role as entrepreneurs (Vesala and Vesala, 2010; Zagata and Sutherland, 2015).

Finally, in terms of age, gender and household income i.e. the control variables which capture socio-demographic factors, they were all significant in Model 1 and Model 2. Age is positively related to agricultural entrepreneurship and this result highlights the “*young farmer problem*” in European agriculture (Zagata and Sutherland, 2015). Figure 2.5 shows the marginal effect of age on likelihood of becoming a new agri-entrepreneur reflecting the fact that individuals aged above the mean are more likely to start agricultural ventures, and that this probability increases with age. Male gender is positively related to the probability of becoming an agri-entrepreneur, which shows how women continue to have difficulties in taking over entrepreneurial activity (Arenius and Minniti, 2005). The results show a negative relationship between household income and the probability of becoming an agri-entrepreneur. Furthermore, the results show that the quality of human capital (education and previous entrepreneurial experience) has a negative effect on the decision to become an agricultural entrepreneur, indicating that individuals with greater knowledge, which means more human capital, prefer to start businesses in other sectors with higher profits (Hormiga et al., 2011). The low income obtained by farmers has been one of the main reasons for pluriactivity in the sector (Barbieri and Mahoney, 2009). Thus we would expect individuals who start agricultural activity to have other sources of income and higher entrepreneurial experiences as a resource, but this previous entrepreneurial experience has a negative effect on agri-entrepreneurship compared to other sectors.

**Figure 2.5. Marginal effect of age on new agri-entrepreneurs.**



Source: The figure is based on Model 1 in Table 2.2, and presents the values of for the variable age (standardized), indicating the change in the average expected probability that the new entrepreneur is within the agricultural sector.

Regarding the environmental control variables, the economic crisis has a positive but not significant effect on being a new agri-entrepreneur. Thus, we do not find support for the assumption that high rates of unemployment in other sectors push entrants into the agricultural sector (European Commission, 2013). Nonetheless, the environmental control in an economic crisis has a positive and significant effect on established agri-entrepreneurs (Model 2), which supports the view that agricultural entrepreneurship has shown greater business and employment resilience than other sectors in the crisis. This result confirms and expands previous national studies that have shown that agricultural employment is more resistant during recessionary shocks (Giannakis and Bruggeman, 2015b). On the other hand, results from the subsample of agricultural entrepreneurs suggest that new entrants have faced barriers to market entry.

## 2.5 Conclusions

The latest CAP reforms and reorientation towards more market-oriented agriculture have highlighted the role of farmers as entrepreneurs (Vesala and Vesala, 2010). The agricultural entrepreneurship literature offers a number of important insights which may be too specific (case or country specific) for a general study of the agricultural entrepreneurial process showing different results about the entrepreneurial orientation and skills of these farmers. Therefore, in order to find out whether or not there is a

tendency towards a more entrepreneurial agriculture, this study aimed to analyze the resources and capabilities, entrepreneurial orientation, as well as the institutional factors which influence the starting of a new venture in the agricultural sector and how these factors influence agri-entrepreneurs once they are established, compared with non-agricultural entrepreneurs. We also analyzed the differences between new and established agri-entrepreneurs in order to study their entrepreneurial behaviour as they attempt survive in the market. We used GEM data for 20 European countries, which allowed us to analyse agricultural entrepreneurs (defined as owner-managers of agricultural businesses that they established) from an international perspective and capture the heterogeneity of the process between countries with common agricultural institutions.

The results show that new agri-entrepreneurs are characterized by fewer resources and capabilities than other entrepreneurs. Specifically, they have lower entrepreneurial skills and lower social capabilities than other economic activities. However, new agri-entrepreneurs did not seem to have less entrepreneurial orientation than other sectors, though they do show less product innovativeness than other sectors, as a consequence of the previous product oriented policies which have encouraged process innovativeness to improve productivity through cost-cutting. Established agri-entrepreneurs show the same weakness at the early-stage; poor entrepreneurial skills and social capabilities. Furthermore, they have less entrepreneurial orientation than non-agricultural established entrepreneurs, which reveals the strong influence of previous product-oriented policies. In this regard, they seem to be less proactive than other sectors. The strong family embeddedness of agricultural holdings and industry characteristics (mature markets and subsidies) may determine this conservative behaviour. On the other hand, this sector shows a greater legitimization of the entrepreneurial activity. By contrast, when we examine the differences across agri-entrepreneurs, the results show that new entrants have greater proactiveness and product innovativeness, which suggests that new entrants tend to be more entrepreneurship-oriented. This seems to suggest that the liberalization of the sector encourages entrepreneurship among new farmers.

Another interesting result of this study is that it offers empirical evidence on the fact that agricultural entrepreneurship has shown greater employment resilience than other sectors in the recent economic crisis. However, this recession has negatively affected the entry into agricultural activity. Finally, the analysis points out the homogeneity of new agri-entrepreneurs across Europe when they start the activity.

The contributions of this study are both theoretical and practical. First, the study contributes to the agricultural entrepreneurship literature in a number of ways. It advances the application of general entrepreneurship research in the analysis of agriculture studying the capabilities and entrepreneurial behaviour of these entrepreneurs. Furthermore, this work contributes to the improvement of knowledge

about agricultural entrepreneurship using an international perspective. From a practical point of view, public policies should deal with the lack of entrepreneurial capabilities in agri-entrepreneurship and work on the greater entrepreneurial social legitimacy perceived. Since entrepreneurial capabilities can be learned through education and training (Kuratko, 2005), there is a need, first of all, to better understand how farmers acquire these capabilities in order to design or improve specific educational and training programs for new entrants and established agricultural business owners addressing their own characteristics and the specificities of the sector (Seuneke et al., 2013). Furthermore, and in view of the fact that the main political instrument to promote an entrepreneurial culture (which includes entrepreneurship education) among rural European areas are the Rural Development Programs<sup>3</sup> (CAP Pillar II), there is a need to evaluate the effectiveness of their measures in supporting teaching and learning entrepreneurial capabilities among farmers (North and Smallbone, 2006). These measures should complement the direction established by CAP Pillar I policies (e.g. lower market support) towards a more entrepreneurial agriculture. The specific measures to support new entrants<sup>4</sup> (i.e. direct payment scheme for young farmers from Pillar I, and business start-up aid for young farmers from Pillar II) do not seem to have decreased their entrepreneurial orientation despite the negative effects associated with this kind of subsidies (Shane, 2009). Therefore, public policies should continue to support new entrants given their capacity to boost the agricultural sector. Overall, agricultural policies need to provide farmers not only with resources to cope with the liberalization of the sector and its specific disadvantages, but also with ways to acquire the necessary tools (capabilities) to become competent agri-entrepreneurs and contribute to the development and continuity of European agriculture.

This research has some limitations that could provide indications for future lines of research. It will be necessary to produce complex databases that permit the collecting of internal and external variables of the same entrepreneur over time. The GEM data allows us to capture the entrepreneurial process from an international perspective, but future research will have to include different national regions, different agricultural productions, and more family level variables. A more in-depth study of agri-entrepreneurs' resources and capabilities with more accurate proxy variables is also needed. As previously described, the strong regulatory environment of the sector affects the skills and strategies of economic actors. Therefore future research should take into account indicators of start-up subsidies, among other support measures.

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<sup>3</sup> See Articles 14 and 15 of Regulation (EU) No 1305/2013 of 17 December 2013.

<sup>4</sup> See Articles 50 and 51 of Regulation (EU) No 1307/2013 of 17 December 2013, and Article 19 of Regulation (EU) No 1305/2013 of 17 December 2013.

## Appendix – Chapter 2

**Table A2.1. Correlation matrix.**

V1. Early Stage Agro-entrepreneur	V1	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Entrepreneurial Skills	-0.034***													
2. Personal Networks	-0.047***	0.092***												
3. Proactiveness: Opportunity scanning	-0.031***	0.090***	0.149***											
4. Proactiveness: Export Behaviour	-0.024**	0.021**	0.088***	0.058***										
5. Entrepreneurial Risk: Fear to Failure	0.022**	-0.139***	-0.035***	-0.094***	-0.019*									
6. Product Innovativeness	-0.064***	0.023**	0.060***	0.063***	0.119***	-0.010								
7. Process Innovativeness	-0.010	-0.017*	0.041***	0.036***	0.060***	-0.009	0.076***							
8. Legitimation	-0.005	0.012	0.020*	0.066***	0.006	0.034***	-0.013	0.025**						
9. Age	0.052***	0.031***	-0.087***	-0.010	-0.031***	-0.015	-0.007	-0.042***	-0.051***					
10. Gender	0.018*	0.053***	0.073***	0.036***	0.040***	-0.062***	-0.019*	0.011	0.015	-0.016*				
11. Household income	-0.071***	0.074***	0.085***	0.035***	0.046***	-0.069***	-0.022**	-0.018*	-0.018*	0.089***				
12. Education	-0.034***	0.024**	0.068***	0.054***	0.042***	-0.016*	0.083***	0.000	-0.047***	0.022**	-0.027***	0.081***		
13. Entrepreneurial experience	-0.027***	0.022**	0.041***	0.023**	0.059***	-0.001	0.018*	0.026***	0.001	0.006	0.053***	0.016*	-0.003	
14. Crisis	0.012	-0.016*	-0.027***	-0.091***	-0.014	0.026**	-0.001	0.012	-0.006	-0.345***	0.015	0.106***	-0.153***	0.021**
V2. Established Agro-entrepreneur	V2	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Entrepreneurial Skills	-0.096***													
2. Personal Networks	-0.052***	0.114***												
3. Proactiveness: Opportunity scanning	-0.030***	0.083***	0.178***											
4. Proactiveness: Export Behaviour	-0.022**	0.038***	0.080***	0.072***										
5. Entrepreneurial Risk: Fear to Failure	0.030***	-0.144***	-0.074***	-0.113***	-0.018*									
6. Product Innovativeness	-0.098***	0.042***	0.079***	0.058***	0.162***	-0.027***								
7. Process Innovativeness	-0.011	0.002	0.034***	0.009	0.069***	0.012	0.087***							
8. Legitimation	0.007	0.019**	0.015*	0.057***	-0.010	0.019**	0.020**	0.018*						
9. Age	0.068***	-0.007	-0.078***	0.023**	-0.036***	-0.049***	-0.060***	-0.040***	-0.019*					
10. Gender	0.008	0.090***	0.074***	0.047***	0.014	-0.052***	0.003	0.003	-0.001	0.018*				
11. Household income	-0.105***	0.088***	0.082***	0.053***	0.015*	-0.089***	-0.001	-0.008	-0.030***	-0.023**	0.079***			
12. Education	-0.086***	0.050***	0.090***	0.085***	0.050***	-0.051***	0.094***	0.005	-0.041***	-0.004	-0.012	0.118***		
13. Entrepreneurial experience	-0.022**	0.022**	0.061***	0.038***	0.083***	0.011	0.047***	0.016*	-0.008	-0.031***	0.037***	0.004	0.018*	
14. Crisis	0.036***	-0.035***	-0.042***	-0.155***	-0.027***	0.095***	-0.023**	0.015*	-0.023**	-0.263***	0.011	0.072***	-0.183***	0.010

Source: GEM 2003-2010. Continuous variables are standardised. The correlation matrix is based on observations used in estimation.

## Chapter 3

# SEARCHING FOR THE ENTREPRENEURS AMONG NEW ENTRANTS IN EUROPEAN AGRICULTURE: THE ROLE OF HUMAN AND SOCIAL CAPITAL<sup>5</sup>

### 3.1 Introduction

During the last decade, the European agricultural sector has faced different economic changes, such as liberalisation of agricultural trade and successive Common Agricultural Policy (CAP) reforms, which have led to a more market oriented and less protected agriculture (Giannakis and Bruggeman, 2015a; Serrano and Pinilla, 2014). Further, agricultural markets have experienced an increasing volatility of prices and increasing cost of inputs, which have resulted in a reduction of farms' profitability and, therefore, a reduction of economic attractiveness of agricultural activity to new entrants into the sector (DGIP, 2012; Zagata and Sutherland, 2015).

However, that does not mean that entrepreneurial activity is absent. Industrial changes (e.g. technological progress, demand changes and regulatory developments) as well as socio-political change (e.g. the credit crunch) have also created new business opportunities in agriculture. There is interesting group of so-called 'new entrances' in agriculture who have a very different background, engage in different business practices and networks than more traditional farmers (Lans et al., 2017). The term 'new entrants into farming' addresses a wide range of entry points to agriculture, ranging from ex-novo new entrants (complete newcomers to the sector), to individuals or families returning to a family-held farm later in life (Sutherland, 2015). Examples include multifunctional farms developed from outside the agricultural sector (Hassink et al., 2016), start-ups of completely new, innovative farming products as well as the initiation of urban farming practices (Dieleman, 2017). So next to a dominance of family farms, agriculture has also become a sector with entrepreneurial behaviour of start-ups (Joose and Grubbström, 2017).

Over the last decade a growing body of research has explored the mechanisms by which farmers engage in entrepreneurial activities (Fitz-Koch et al., 2017; Grande, 2011; McElwee, 2006; Vesala and Vesala, 2010; Methorst et al., 2017; Morris et al, 2017). These studies have stressed opportunity identification as a core process of agricultural entrepreneurship (Lans et al., 2017; Seuneke et al., 2013). Whether entrepreneurial opportunities are discovered or created, scholars from general entrepreneurship literature do agree that specific knowledge, skills and competence, as well social capital

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<sup>5</sup> This chapter has been submitted as Pindado, E., Sánchez, M., Verstegen, J. A. A. M., & Lans, T. (submitted). Searching for the entrepreneurs among new entrants in European agriculture: the role of human and social capital.

seem to play a crucial role in the opportunity recognition process. Whilst there are an increasing number of studies addressing established farmers' human and social capital in relation to entrepreneurship, our understanding of the role of human and social capital in the context of new entrants in agriculture is very limited. (Pindado and Sánchez, 2017; Seuneke et al., 2013).

This lack of understanding is striking if we consider that scholars have highlighted how new entrants into agriculture may create more value added to the sector and to rural areas than their established counterparts (Agarwal et al., 2009; Hulsink, 2005; Vik and McElwee, 2011; Zagata and Sutherland, 2015). A greater understanding of entrepreneurially inclined new entrants could contribute not only to the competitiveness and survival of the agricultural sector but also to the vitality of countryside (Alsos et al., 2011; EIP-AGRI, 2016; Hassink et al., 2016).

Therefore, the central research questions in this work are:

- (1) What are the general characteristics of European new entrance farmers that identify new business opportunities in their business environment?
- (2) What is the influence of specific human capital and social capital on perceived opportunity identification of European new entrance farmers in their business environment?

To address these questions, this research draws upon two main areas of the (agricultural) entrepreneurship literature: the role that entrepreneurs' human capital plays on entrepreneurs' capacity to identify business opportunities (Alsos et al., 2003; Lans et al., 2014; Shane, 2000; Shepherd and DeTienne, 2005; Ucbasaran et al., 2008), and the role of social capital on access to information, which increases entrepreneurs' opportunity identification (Baron, 2006; Davidsson and Honig, 2003; McElwee and Bosworth, 2010; Lans et al., 2016; Shane, 2003b; Singh et al., 1999). Since the literature states that opportunity identification is affected by the context in which entrepreneurs operates (Kwon and Arenius, 2010; Methorst et al., 2017; Stuetzer et al., 2014), the theoretical framework proposed for this study considers individual factors as well as contextual features. Capturing both is necessary for econometric analyses that address heterogeneity across different national contexts and thus to answer adequately the research questions proposed (Rabe-Hesketh et al., 2005). In order to do so, the data for this study were sourced from the cross-country database of the Global Entrepreneurship Monitor (GEM) and subsequently merged with data from the World Bank. Altogether, this led to a sample of 20 European countries and 843 individuals for the years 2004-2010. As the focus was on new entrants, the sample only included agricultural entrepreneurs involved in the start-up process, or owner/managers of agricultural businesses that were created in the past 42 months.

As already stated, the contribution of this paper is both theoretical and practical. First, our findings contribute to the agricultural entrepreneurship literature by showing the determinants of opportunity identification among agri-entrepreneurs, an area which has been very little studied and even less so in an international context like the European

Union (Methorst et al., 2017). Furthermore, we make a distinction between social and human capital and therefore extend the understanding of the role both play in entrepreneurial processes within this particular sector (Marvel et al., 2014; Moyes et al., 2015). The specificities of the agriculture (e.g. embeddedness in rural areas, uncertainty and variability of production, high entrance costs and support schemes) may provide useful information on opportunity identification processes in rural small businesses.

Second, our results contribute to the ongoing debate –driven by the premise that new market challenges in agriculture require new knowledge and competencies – on the mechanisms how farmers’ formal and informal learning enables them to pursue market needs (Šūmane et al., 2017). Identifying and pursuing entrepreneurial opportunities is a complex process, requiring the adequate combination of different human resources, as well as the support of social networks (Esparcia, 2014). While several studies have investigated the impact of diverse sources of knowledge and social interactions on agri-entrepreneurship, results remain inconclusive as studies typically have used small samples (Morgan and Murdoch, 2000; Morgan et al., 2010; Moyes et al., 2015). Thus, using an international widely recognised dataset, our study aims to shed more light on the role of different kinds of human and social resources in the entrepreneurial orientation of new entrants into the sector.

Finally, the literature highlights that (aspect of) opportunity identification can be developed in entrepreneurship education (DeTienne and Chandler, 2004; Karimi et al., 2016). By further disentangling the specific characteristics of new farmers entrants as well as the role human and social capital plays in the early stages of their entrepreneurial endeavours, this study contributes agricultural education and extension programs that aim at strengthen farmers’ opportunity identification competence either via formal or informal learning (Matricano, 2016; Mc Fadden and Gorman, 2016). Overall, our findings provide useful insights for policy makers and sector developers to develop policies aimed to improve specific education and training programs aimed to foster entrepreneurial behaviours among new entrants into the European agriculture, and, therefore, increase the competitiveness of the European agriculture and the welfare of rural areas.

The article is structured in the following way: first, we review the literature on opportunity identification and (agricultural) entrepreneurship. In particular we zoom in on the characteristics of new entrants in agriculture and present the framework and research model. The methods section presents the details of the variables employed and the econometric model used to answer the research questions. The next section presents the results of the empirical analysis undertaken. Finally, we discuss the findings of the study and point out the most relevant conclusions and contributions.

## 3.2 Background and Theoretical Framework

### 3.2.1 Entrepreneurship, opportunity-seeking and new entrants in agriculture

Since there is no widely accepted definition of entrepreneurship, multiple complementary definitions coexist (Jantunen et al., 2005). Among these different approaches, the identification and pursuit of opportunities has been one of the core in entrepreneurship (Lans et al., 2014; Shane and Venkataraman, 2000; Shane, 2003a). According to Kirzner (1973), entrepreneurs are those individuals who have special alertness to identify and exploit new business opportunities. Opportunities, therefore, can be defined as those situations where, through specific means, individuals may generate profits which have not been exploited yet or are not currently exploited by other individuals (Baron, 2006). Hence, entrepreneurship can be seen as a process through which individuals identify, evaluate and exploit these opportunities (Shane and Venkataraman, 2000).

Since Shane and Venkataraman (2000), there have been a growing number of studies focused on understanding how individuals identify situations to generate value (Davidsson, 2015; Gaglio and Katz; 2001; Ma and Huang, 2016). Although there is still considerable discussion about the nature of opportunities, there are common elements in the pattern of the opportunity process (Vogel, 2016). The opportunity process starts with idea generation (e.g. via search, accidental or legacy). Subsequently, the individual evaluates whether or not the idea has potential for a hypothetical other person, so not necessarily one's own business (i.e. third-person belief) (Wood and McKinley, 2010). After business idea evaluation, the idea further objectifies into an opportunity for oneself (i.e. first-person belief) through a process of reshaping, change, refinement, adding on, based on interactions with others. Whereas idea generation and evaluation are often taken together under the label opportunity identification, the further development of the opportunity into a new product, process, service, or practice is what can be referred to as pursuit or the enactment of the opportunity (Baggen et al., 2015).

Opportunity identification in agriculture has been mainly connected to studies of existing farmers: farmers that diversified, grew or innovated their farms (see e.g. Lans et al. 2014; Methorst, 2016). However, it should be stated that the share of existing farms that truly identify and pursue entrepreneurial opportunities is still rather small. For instance the number of Dutch firms in agriculture and horticulture that can be labelled as true innovators —meaning they have introduced a new product or process new for the Netherlands— is about 2.4%, which seems to be a relatively stable picture over the last decade (Lans et al., 2016). Many firms in agriculture are inherited from father to son, therefore, entrepreneurial competence has always been subject to 'limited' selection (Sutherland et al., 2012). Recent studies emphasise the fact that farmers have limited capabilities (including human and social capital) to completely exploit their opportunities and successfully develop new business (Grande, 2011).

Considering the small group of existing farms that engage in (necessary) entrepreneurial behaviour (i.e. identifying and exploiting opportunities), new entrants in agriculture are therefore an interesting phenomenon as they may represent more robust answers to the challenges European agriculture seem to be facing. New entrants into farming are widely recognised as important to the ongoing vitality and competitiveness of the agricultural sector and rural regions in Europe as they are more likely to be involved in alternative and value added farming activities (e.g. alternative agri-food networks, local certification schemes) (EIP-AGRI, 2016). Next to that it has been suggested that they may bring other potential assets to the agricultural sector: new knowledge and techniques, new business models, networks and organisational models, (more) sustainable farming systems and enhanced connections between farming and the local community (Sutherland, 2015). Finally, it has been suggested that new entrants tend to be younger, operate smaller farms, are higher educated, are more likely to be female and operate smaller farmers (Sutherland, 2015).

However, as stated above, until now, there has been limited research addressing new entrants in farming, it remains unclear who this group is, and, when they actively engage in opportunity identification, what enables their opportunity identification process.

### **3.2.2 Theoretical Framework and Hypotheses**

The entrepreneurship literature posits that opportunity identification and pursuit depends on the knowledge embodied within the entrepreneur, as well as the acquisition of external information (Shane, 2003). Identification of entrepreneurial opportunities requires the possession prior knowledge as well as the knowledge and abilities necessary to evaluate and exploit this information, recognising the value of new information that they have acquired (Baggen et al., 2015; Carter, 1998; Fiet, 1996, Shane, 2000). In this sense, social networks play a critical role in the access to external information, which finally increases the knowledge and enhances opportunity identification (Arenius and De Clercq, 2005; Birley, 1985; Ramos-Rodríguez et al., 2010; Singh et al., 1999). Therefore, simply speaking the determinants of entrepreneur's opportunity identification can be grouped into two general dimensions, entrepreneur's human capital (e.g. knowledge and skills) and entrepreneur's social capital (e.g. access to external information and knowledge).

Human capital represents the education, experience, knowledge, and skills that entrepreneurs possess to perform the task that they have set out (Dimov and Shepherd, 2005; Unger et al., 2011). Scholars' interest in human capital is reflected in the vast literature that has analysed the impact of entrepreneurs' human capital on entrepreneurial opportunity identification (Davidsson and Honig, 2003; Shane, 2000; Shepherd and DeTienne, 2005; Ramos-Rodríguez et al., 2010; Ucbasaran et al., 2008). Drawing from the literature concerning human capital, much of these research have adopted the distinction proposed by Becker (1975) between general and specific human capital. General human capital refers to knowledge and skills acquired through formal education and work experience, while specific human capital refers to knowledge and

skills with a scope of application limited to specific activities (Dimov and Shepherd, 2005). This distinction is useful to assess the role that different types of human capital may have in opportunity identification (Marvel, 2013).

An entrepreneur's general human capital is defined as his or her education and general work experience (Becker, 1975; Gimeno et al., 1997; Hickie, 2011). Entrepreneur's education and prior knowledge from past work experiences influence the entrepreneur's capacity to understand and interpret new information, which determines their ability to identify new business opportunities (Davidsson and Honig, 2003; Dimov and Shepherd, 2005; Shane, 2000). On the other hand, entrepreneurship-specific human capital includes those skills necessary to scan the market and select opportunities, formulate strategies to exploit these opportunities, as well as manage the business (Unger et al., 2011). Entrepreneurs with higher specific human capital possess better knowledge of market demands (i.e. industry-specific knowledge) and customer needs within the context of their new venture (Gimeno et al., 1997). Consequently, specific human capital helps in the identification and exploitation of new business opportunities (Ucbasaran et al., 2008; Unger et al., 2011).

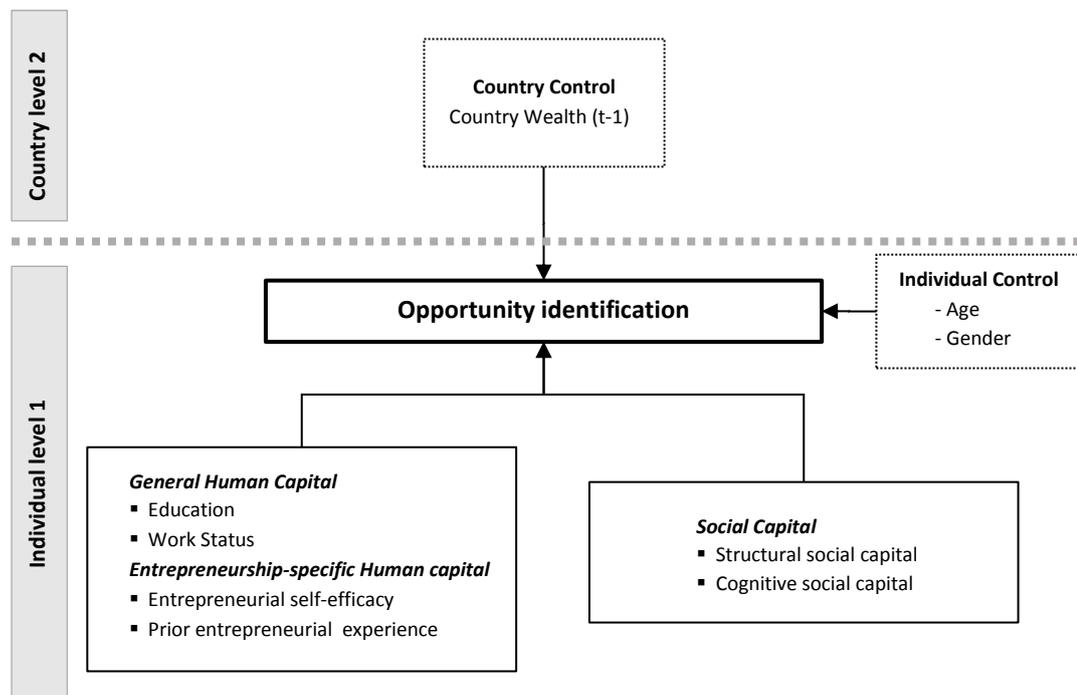
In social capital theory, social capital is broadly referred to as "*assets that inhere in social relations and networks*" (Anderson and Jack, 2002, pp. 195). From the perspective of entrepreneurship several studies have demonstrated the importance of social capital through studies on entrepreneurs' networks that showed significant influence on opportunity identification (Arenius and De Clercq, 2005; Davidsson and Honig, 2003; Hills et al., 1997; Morales-Gualdrón and Roig, 2005; Ramos-Rodríguez et al., 2010).

Following Nahapiet and Ghoshal's (1998) classification of social capital, it can be analysed from three interrelated dimensions: structural, relational and cognitive. The structural dimension refers to the overall pattern of relations between actors (Inkpen and Tsang, 2005). A pattern or configuration can, for instance, be more bonding or bridging. Bonding refers to frequent interactions and horizontal ties between actors, whereas a bridging configuration refers to accessing or linking to new, external networks (Burt, 1997). The relational dimension refers to the nature, in terms of quality and trust, of interpersonal relationships (De Carolis and Saporito, 2006). Finally, the cognitive dimension can be defined as those resources providing "*shared representations, interpretations, and systems of meaning among parties*" (Nahapiet and Ghoshal, 1998). In this regard, new venture creation is not only a process based on intentionality, resources, boundary, and exchange, it is also a process based on organisational legitimacy (Liao and Welsch, 2003). Entrepreneur's social networks not only provide access to information and resources, they also provide the legitimacy necessary to be accepted within the community and, therefore, access to specific resources needed (Johannisson, 1986; Liao and Welsch, 2003). Furthermore, cognitive capital provides entrepreneurial social support which, at the community level, increases the willingness to accept failure and, as consequence, increases the openness of individuals to exchange information (Liao and Welsch, 2003).

The extant literature also shows that the opportunity identification by entrepreneurs is influenced by external determinants, such as economic conditions, socio-political environment, cultural norms and beliefs, and institutional settings (Kwon and Arenius, 2010; Stuetzer et al., 2014; Wood and McKinley, 2010). In this sense, as is argued by Welter (2011), context can provide opportunities for individuals (e.g. demand changes), and, at the same time, it may establish boundaries for their identification process (e.g. the strong values in rural areas to maintain traditions).

Thus, based on the above literature a series of hypotheses were developed that analyse the human and social capital affecting the identification of business opportunities by new entrants in agriculture. These factors are classified as follows: (1) general human capital, (2) entrepreneurship-specific human capital, (3) structural and cognitive social capital and (4) control variables (see Figure 3.1). The rationale for the inclusion of each of these factors and the proposed hypotheses will now be given.

**Figure 3.1. Theoretical framework for opportunity identification in agricultural new ventures.**



### 3.2.2.1 Entrepreneur's general human capital

#### Education

Education is one of the main components of general human capital (Gimeno et al., 1997), and has been found to be positively related to opportunity identification (Arenius and De Clercq, 2005; Davidsson and Honig, 2003; Ucbasaran et al., 2008). It is argued that higher-educated individuals may not decide to start a new venture due to the lower wages compared to other employments, but once they decide to start an

entrepreneurial activity they achieve better results as compensation for their investment in human capital (Cassar, 2006). These better results are consequence of their greater ability to identify more profitable opportunities (Qian and Acs, 2013). Further, these extra years invested in gaining education may also provide valuable networks with other “knowledgeable” individuals, which finally increases the access of information and therefore the identification of higher quality opportunities (Arenius and De Clercq, 2005). In addition, the agricultural entrepreneurship research suggests that higher educated new entrants tend to identify and exploit more business opportunities, maintaining the farm business (Carter, 1998). Therefore, we proposed the following hypothesis:

**H1:** It is more likely that new entrants in agriculture identify entrepreneurial opportunities when they have a higher education.

#### *Work status*

In general, individuals that are currently active in the labour market have greater chances to identify opportunities in their own and contiguous industries, as well as the possibility of establishing professionally oriented networks which may allow acquiring valuable information (Arenius and De Clercq, 2005). Continuously developing work experience is an important dimension of entrepreneurs’ human capital building and is considered a mechanism for the development of work-related knowledge and skills (Becker, 1975; Gimeno et al., 1997). Individuals’ experience in specific tasks increases their effectiveness to identify opportunities because experience helps to learn to focus on key dimensions of significant problems or challenges (Shepherd and DeTienne, 2005). Within the agricultural sector, it is often argued that the non-farming backgrounds of newcomers in agriculture are a driving mechanism behind the identification of new multifunctional farming business opportunities. For instance, individuals with backgrounds in health services can see opportunities in care farming (EIP-AGRI, 2016; McElwee and Bosworth, 2010). Hence, based on the above arguments, we formulated the following hypothesis:

**H2:** It is more likely that new entrants in agriculture identify entrepreneurial when they are active in the labour market.

### **3.2.2.2 Entrepreneurship-specific human capital**

#### *Entrepreneurial self-efficacy*

Several studies have shown that an individual’s propensity to identify entrepreneurial opportunities is influenced by the confidence in their entrepreneurial skills (Davidsson and Honig, 2003; González-Álvarez and Solís-Rodríguez, 2011; Ucbasaran et al., 2008). The concept of entrepreneurial self-efficacy has received an enormous amount of attention in entrepreneurship literature. These studies depart from the notion that those with high self-efficacy for a specific task are more likely to pursue and then persist in that task than those who have low self-efficacy beliefs (Bandura, 1977). The perceived ability to execute a target determines opportunity identification due to the perception

of controllability is necessary for this process (Ardichvili et al., 2003; Krueger and Carsrud, 1993). The rationale behind this idea is that opportunities are limited and emerge from constrained environments where the existing uncertainty requires perception of control to persevere and identify the outcomes of a situation as positives and, therefore, as opportunities (Wood and Bandura, 1989). Thus, individuals who see themselves as competent, are more likely to see an action as feasible, being more likely to see an opportunity (Krueger, 2000; Mohammed and Billings, 2002). Although the number of studies from agriculture on entrepreneurial self-efficacy is much smaller, it has often been suggested by scholars that the development (or lack off) entrepreneurial self-efficacy plays a key role in the process of developing towards non-conventional modes of farming (Pyysiäinen et al. 2006). Thus, we propose the following:

**H3:** It is more likely that new entrants in agriculture identify entrepreneurial opportunities when they consider that they have the capabilities necessities to start their own business.

#### *Prior entrepreneurial experience*

As we have noted before, prior knowledge influences opportunity identification (Shane, 2000; Shepherd and DeTienne, 2005). According to Ucbasaran et al. (2003), business ownership experience of habitual starters (i.e. multiple start-ups) provides them unique resources (e.g. assets, expertise and networks) that impact in their information scan and business opportunity identification behaviour. These entrepreneurs have more diverse experiences and resources than novel entrepreneurs and, therefore, have greater ability to identify business opportunities (Ucbasaran et al., 2008). However, the entrepreneur's specific human capital acquired during past experiences founding new ventures determine their discovery of entrepreneurial opportunities, but also the learning process from these experiences is important (Corbett, 2007). In this sense, habitual entrepreneurs not only learn from successful experiences, but also from entrepreneurial failure: learning from their mistakes (MacMillan, 1986; Ucbasaran et al., 2003). This is a relevant feature for the agricultural sector because it is suggested that the sector serves as a safety net for other sectors, which means that individuals that have discontinued an entrepreneurial activity in other sectors may decide to come back to the rural (European Commission, 2013). In this respect, their prior entrepreneurial experience may increase their propensity to identify opportunities (EIP-AGRI, 2016; Hassink et al., 2016). Accordingly, we propose the following hypothesis:

**H4:** It is more likely that new entrants in agriculture identify entrepreneurial opportunities when they have previous start-up experience.

### **3.2.2.3 Social Capital**

#### *Structural social capital*

Nahapiet and Ghoshal (1998) suggests that one of the assets of bridging social capital is access to new knowledge. This access to new knowledge, knowledge that the individual not possess, may increase their opportunity identification (Arenius and De Clercq, 2005;

De Carolis and Saporito, 2006). The entrepreneurship literature has analysed how the connections between entrepreneurs increase their exposure to new ideas and opportunities and, thus, individuals with a large entrepreneurial network identify more opportunities (Ramos-Rodríguez et al., 2010). For the agricultural sector, recent studies have shown that new entrants' networks outside the sector (i.e. bridging social capital) may enhance their opportunity identification (Moyes et al., 2015; Sutherland et al., 2015). Further, most new entrants into farming need technical farming skills that they use to learn in courses, thus automatically meeting other entrepreneurs (EIP-AGRI, 2016). Nevertheless, the rural area where they live, which is relatively socially isolated, may hinder opportunities identification compared to urban areas where bridging social capital (i.e. structural holes) is easier to create (Arenius and De Clercq, 2005). Hence, under these rurality conditions, bridging networks may not be efficient attracting the knowledge and information required to identify new business opportunities since bonding social capital facilitates the access to specific resources (e.g. agricultural market knowledge and advice) and encouragement (Davidsson and Honig, 2003; Mailfert, 2007). Thus, we test the following hypothesis:

**H5:** It is more likely that new entrants in agriculture identify entrepreneurial opportunities when they know other entrepreneurs.

#### *Cognitive social capital*

As already noted, opportunities arise from interactions among individuals due to the asymmetry distribution of knowledge among them (Barreto, 2012). In this exchange of knowledge through social interactions, the cognitive dimension of the social capital represents the common values and shared vision of the actors sharing information (Tsai and Ghoshal, 1998). These shared values provide social support which increases the exchange of information among individuals (Liao and Welsch, 2003). Furthermore, these common ways to perceive their context help individuals to interpret the new knowledge (De Carolis and Saporito, 2006). In this sense, the common value within a society that entrepreneurship is a good career option increases the attentive to individuals to identify entrepreneurial opportunities and then become entrepreneurs (Liao and Welsch, 2003). Indeed, prior research has shown how the ideological context determines the farming practices and entrepreneurial behaviour of new generations of farmers (Joosse and Grubbström, 2017; Vesala and Vesala, 2010; Zagata and Sutherland, 2015). When previous generations of farmers have experimented productivist policies they can consider new forms of farming and business as a step backwards, hindering these activities (Kohler et al., 2014). Based on these arguments, we propose that:

**H6:** It is more likely that new entrants in agriculture identify entrepreneurial opportunities when they consider that the entrepreneurial activity is socially supported in their country.

### 3.3 Data and Methodology

The data used in the empirical analysis are drawn from the 2004-2010 adult population surveys (APS) of the Global Entrepreneurship Monitor (GEM). The GEM project is recognised as one of the richest sources of harmonised individual-level information on entrepreneurial motivations and aspirations worldwide. The APS captures the entrepreneurial attitudes, activity and aspirations of adults (18 to 64 years) randomly selected in samples of at least 2000 individuals in each country. The GEM project defines entrepreneurs as those adults that are actively preparing to set up a new independent business or actually owning a new venture created in the past 42 months. A detailed description of all methodological aspects of the GEM project can be found in Reynolds et al., 2005.

As this study only focused on agricultural, only those individuals who currently are involved in the development of new agriculture venture or currently are the business owners of an agricultural firm with less than 42 months of economic activity were selected. Together this group is named as ‘new entrants in agriculture’. This has resulted in a dataset is comprised of 843 individuals across 20 European countries<sup>6</sup>.

#### *Dependent variable*

As the focus of this study was on explaining opportunity identification – as an indication of entrepreneurship among the new entrances in agriculture (e.g. opposed to non-entrepreneurially inclined new farmers) – the dependent variable was: the new agricultural entrants’ personal assessment whether in the next six months there will be good opportunities for starting a business in the area in which he or she lives. Details of the variables used in this study are shown in Table 3.1.

**Table 3.1. Definition and descriptive statics for the variables used in the regression.**

Variable	Description	Values	Source	Mean	S.D.
<i>Dependent Variable</i>					
Opportunity identification	Variable indicating whether the new entrant into the agriculture believes that in the next six months there will be good opportunities for starting a business in the area in which he or she lives.	1. Yes 0. No	GEM APS	0.38	0.49
<i>Individual Level</i>					
Age	Age of new entrant measured in years.		GEM APS	34.73	14.33
Gender (male)	Gender of new entrant.	0. Female 1. Male	GEM APS	0.66	0.47
Education level	The education level is a scale ranging from 1 to 5.		GEM APS	3.21	1.09
Work Status	Work Status of the new entrant	1. Unemployed 2. Retired or students	GEM APS	2.87	0.48

<sup>6</sup> Note: Austria, Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, The Netherlands, Portugal, Romania, Slovenia, Spain, Sweden, United Kingdom.

Variable	Description	Values	Source	Mean	S.D.
		3. Full-time or part-time employed			
Entrepreneurial self-efficacy	Variable indicating whether the new entrant believes he or she “Has the knowledge, skills and experience required to start a business.”	1. Yes 0. No	GEM APS	0.84	0.37
Prior Entrepreneurial Experience	Variable indicating whether the new entrant has experienced a business failure in the last 12 months.	1. Yes 0. No	GEM APS	0.03	0.17
Structural SC	Variable indicating whether the new entrant knows someone who has started a business in the last two years.	1. Yes 0. No	GEM APS	0.52	0.50
Cognitive SC	Variable indicating whether the new entrant considers that in his/her country people who have achieved success when starting a business have a high level of social status and respect.	1. Yes 0. No	GEM APS	0.59	0.49
<i>Country Level</i>					
Country Wealth (t-1)	Log. GDP per capita, constant at 2005\$USD.		WBI	10.20	0.51

Source: Authors based on GEM data.

### *Independent Variables*

As we noted previously, this study focus on the internal factors (i.e. human and social capital) that influence the opportunity identification by new entrants to agriculture, taking into account the heterogeneity between the countries. Therefore, to test our hypothesis related to the general human capital we use the education level as a scale from 1 (None) to 5 (Graduate experience), and work status as a categorical variable (1. Unemployed, 2. Retired or students, 3. Full-time or part-time employed). Next, to test the hypothesis related to specific human capital belief in their own entrepreneurial skills was used (dummy variable: 1= positive assessment, 0= negative assessment) and previous entrepreneurial experience (dummy variable: 1=yes, 0=no) from GEM survey. These variables have been used in other analyses of opportunity identification by entrepreneurs (Arenius and De Clercq, 2005). In order to test the effect of social capital, we use the new entrants’ entrepreneurial networks (dummy variable: 1= knows someone who has started a business in the last two years, 0=no) to analyse the structural dimension of their social capital, and the consideration of entrepreneurial activity as a desirable career choice in their society (dummy variable: 1=yes, 0=no) to study the cognitive dimension of their social capital (Liao and Welsch, 2003).

### *Control variables*

Previous GEM-based research has shown that opportunity identification depends on age and gender, so we include controls these factors (Arenius and De Clercq, 2005; Ramos-Rodríguez et al., 2010). Furthermore, due to the human capital development over the time (i.e. individuals acquire experience and skills during their life but also their human capital suffers depreciation as consequence of ageing), we controlled for the age square term to analyse the existence of U-shaped curvilinear effects (Ucbasaran et al., 2009). In addition, this may serve to analyse the role of young entrants in agriculture versus

older entrants, which is an important consideration for policy formulation dealing with the problem of generational renewal that suffers this sector in Europe (Zagata and Sutherland, 2015). Finally, at the national level, previous studies have shown that the economic context influences the capacity to identify opportunities (Stuetzer et al., 2014), thus we control the level of wealth for each country measures as the per capita GDP (as logarithm and constant 2005 US dollars).

### *Model and Estimation*

To capture the hierarchical structure of the cross-sectional dataset used, we applied a Logistic regression with random effects (Rabe-Hesketh et al., 2005). This approach allows addressing the unobserved heterogeneity of the database, where entrepreneurs of the same country are usually more similar to each other than other entrepreneurs in a different country (Faraway, 2004). The regression model took the following form (Gelman and Hill, 2006):

$$\pi_{ijk} = \text{probability}(\text{OpportIdentification}_{ijk} = 1)$$

(1)

$$\begin{aligned} & \text{logit}(\pi_{ijk}) \\ &= \beta_0 + \beta_1 \text{Age}_{ijk} + \beta_2 \text{Age}_{ijk}^2 + \beta_3 \text{Male}_{ijk} \\ &+ \beta_4 \text{EducationLevel}_{ijk} + \beta_5 \text{WorkStatus}_{ijk} + \beta_6 \text{EntrepreneurialSelfEfficacy}_{ijk} \\ &+ \beta_7 \text{PriorEntrepreneurialExp}_{ijk} + \beta_8 \text{StructuralSC}_{ijk} + \beta_9 \text{CognitiveSC}_{ijk} \\ &+ \beta_{10} \ln(\text{Wealth}_{jk}) + u_j + \varepsilon_{ijk} \end{aligned}$$

(2)

\*ln. is added to indicate that the variables are lagged one year.

The random effects approach proposed assumes that individual identification of business opportunities  $\text{OpportIdentification}_{ijk}$  is dependent on individual characteristics as well as contextual factors. Where  $i$  represents an individual,  $j$  a specific country,  $k$  a specific year. The combination of  $u_j + \varepsilon_{ijk}$  represents the random part of the equation, in which  $u_j$  are the country residuals and  $\varepsilon_{ijk}$  those of the individual. In our framework, the term “random effects” refers to that we allow only the intercept term to vary randomly across countries to account for the variance in the dependent variable. We do not allow any of the regression coefficients (slopes) to vary randomly.

A three-step testing strategy was used. First, we test the significance of the between-country variance for our dependent variable by excluding predictor variables and controls (the null random model) to justify the use of random effects modelling. Second, we added individual-level predictors to test the effect of new entrants’ human and social capital on the probability of identification of new business opportunities. Finally, we added country-level controls in the model to see if country conditions affect significantly the dependent variable.

In our model, we lagged the country wealth by 1 year to avoid potential problems of reversed causality (Fritsch and Falck, 2007). Further, there are no problems of multicollinearity in the database as is indicated in the VIF test carried out. Likewise, the examination of the correlation matrix (Table 3.2) showed little evidence of multicollinearity.

**Table 3.2. Correlation Matrix.**

	1	2	3	4	5	6	7	8	9
1. Opportunity identification									
2. Age	-0.04								
3. Gender	0.11**	0.01							
4. Education level	0.05	-0.15***	-0.10**						
5. Work status	-0.08*	0.01	0.04	0.02					
6. Entrepreneurial self-efficacy	0.09*	0.07*	0.11**	0.01	0.02				
7. Prior entrepreneurial Experience	0.11**	0.01	0.08*	0.04	-0.05	0.04			
8. Structural SC	0.14***	-0.18***	0.01	0.12***	0.00	0.07	0.09*		
9. Cognitive SC	0.11**	0.01	0.03	-0.08*	-0.01	-0.05	-0.01	0.05	
10. Country Wealth (t-1)	0.08*	0.04	-0.03	0.09**	0.16***	-0.13***	-0.09**	-0.06	0.06

Source: GEM 2004-2010 and WBI. Continuous variables are standardised. Correlation matrix based on observations used in estimations. Level of significance: '\*\*\*' 1% '\*\*' 5% '\*' 10%.

### 3.4 Results

Considering our first research question, what characterises new entrants in agriculture, Table 3.3 summarises frequencies of variables used on the basis of whether the new entrant has identified opportunities or not. Interestingly, this already shows clear differences between the two groups. The mean age of the new entrants who consider that there will be business opportunities in the short time in their business environment is lower than the age of non-identifiers agri-entrepreneurs. The presence of women in this kind of entrepreneurial activity is lower than that of men. With regard to the education level, the majority of the new entrants have a secondary education; similar patterns were found for opportunity-identifiers and non-identifiers. The majority of new entrants reported other sources of incomes. The percentage of new entrants who lack previous entrepreneurial experience is high, especially in the non-identifiers group. The high level of confidence in entrepreneurial skills in both groups of new entrants is notable. The proportion of individuals who know other entrepreneurs is relatively low for non-identifiers, whereas is higher for the opportunity-identifiers group. The variables measuring cognitive social capital have a more or less homogeneous distribution, it being mostly non-identifiers agri-entrepreneurs who consider that entrepreneurial activity is associated with high social status.

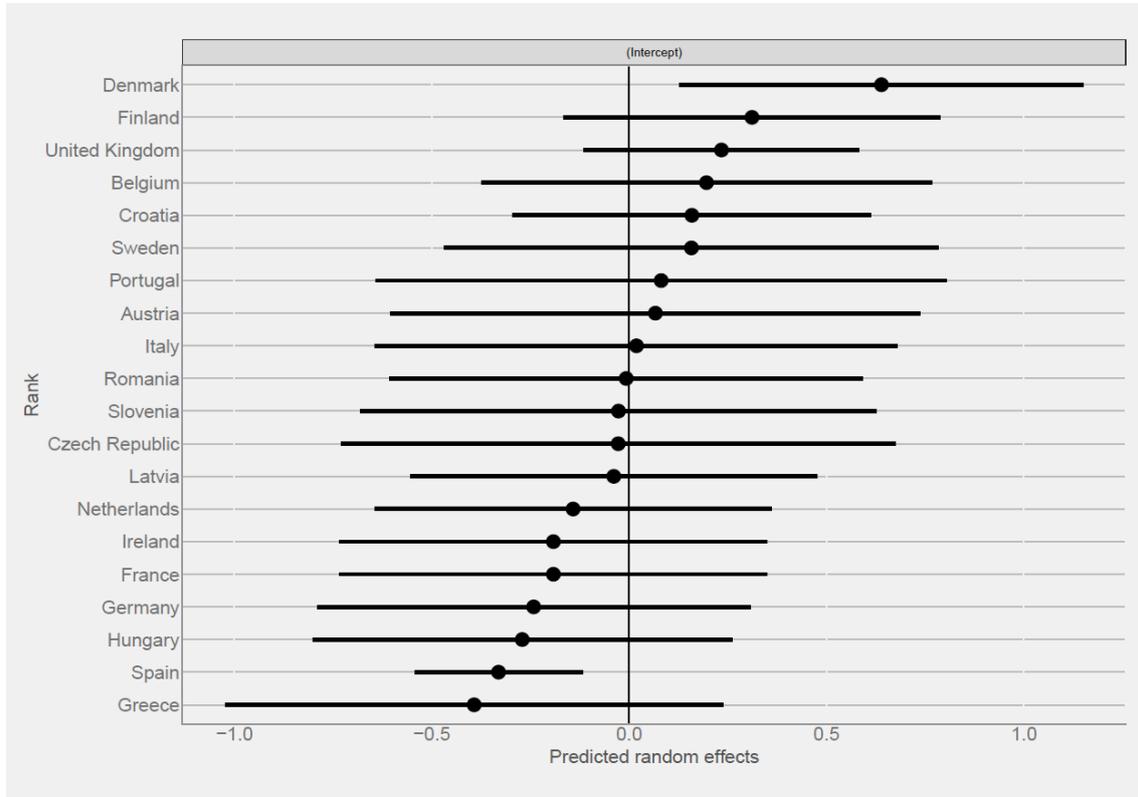
**Table 3.3. Characterization of the sample.**

		Opportunity identification (No) n= 508	Opportunity identification (Yes) n=315
Age		35.19	34.01
Gender	Female	23.45%	10.58%
	Male	38.27%	27.70%
Education level	None	0.85%	0.24%
	Some secondary	20.41%	10.81%
	Secondary degree	17.74%	11.79%
	Post-secondary	13.12%	8.75%
	Graduate experience	9.61%	6.68%
Work status	Unemployed	2.67%	3.16%
	Retired or students	1.21%	0.61%
	Full-time or part-time employed	57.84%	34.51%
Entrepreneurial self-efficacy	No	11.66%	4.74%
	Yes	50.06%	33.54%
Prior entrepreneurial Experience	No	60.75%	36.21%
	Yes	0.97%	2.07%
Structural SC	No	33.05%	15.07%
	Yes	28.67%	23.21%
Cognitive SC	No	27.95%	13.24%
	Yes	33.78%	25.03%

Source: Authors based on GEM.

Considering the second research question (what explains opportunity identification), we assess the heterogeneity of the opportunity identification process across different countries due to the effect that external context (e.g. economic, institutional and cultural national conditions) has on opportunity identification by newcomers in agriculture (Methorst et al., 2017; Welter, 2011). Hence, a random effects model was used, capturing the unobserved heterogeneity of our pooled cross-sectional dataset (Rabe-Hesketh et al., 2005). A precondition for running a random effects model is that significant variance exists among countries in the probability of identifying business opportunities by new entrants (Bliese, 2000). Thus, the significance of the effect group has been analysed by comparing the null random model with a null single-level model (likelihood ratio test), with a significant effect found with a likelihood ratio test of 10.266 ( $p < 0.01$ ). Figure 3.2 shows the differences between European countries in the likelihood of identifying opportunities by new entrants with 95% confidence intervals calculated from a random-intercept model that include only country effects. We could observe the heterogeneity across countries, justifying the use of random effects model. The econometric model used allows for consideration of the heterogeneity of the opportunity identification process across Europe. The intraclass correlation (ICC) indicated that 4.11% of the total variance in the new agricultural entrants' opportunity identification process can be attributed to country characteristics.

**Figure 3.2. Country effects ranked for alert agri-entrepreneurs.**



Source: Country residuals estimated from a random-intercept model that includes only country effects. Used GEM database 2004-2010.

Table 3.4, shows the random effects logistic regression models. Model 1 includes individual level controls and predictors, whereas Model 2 adds control for the country level. The goodness-of-fit measures show that the models have an acceptable fit. Overall, the results show that both human and social capital of new entrants into agriculture determine their opportunity identification (Arenius and De Clercq, 2005; Davidsson and Honig, 2003). However, results indicate that general and specific human capital, as well as, structural and cognitive social capital impact opportunity identification by new agri-entrepreneurs differently.

**Table 3.4. Regression results for opportunity identification among new entrants in agriculture.**

	Model 1	Model 2
<i>Individual level variables</i>		
<b>General Human Capital</b>		
Education	0.045 (0.081)	0.044 (0.081)
Work status (Unemployed)		
Retired or students	-0.976 (0.660)	-0.901 (0.659)
Full-time or part-time employed	-0.688** (0.338)	-0.766** (0.339)
<b>Specific Human Capital</b>		
Entrepreneurial self-efficacy	0.489** (0.226)	0.520** (0.227)
Prior entrepreneurial experience	1.125** (0.466)	1.196** (0.469)
<b>Social Capital (SC)</b>		
Structural SC	0.433*** (0.159)	0.441*** (0.159)
Cognitive SC	0.478*** (0.161)	0.463*** (0.161)
<i>Individual Controls</i>		
Age	-1.129*** (0.307)	-1.137*** (0.311)
Age^2	0.966*** (0.300)	0.965*** (0.305)
Gender (Male)	0.462*** (0.168)	0.457*** (0.168)
<i>Country Control</i>		
Country Wealth (t-1)		0.222** (0.110)
Intercept	-0.503 (0.930)	-0.613 (0.911)
Year controls	Yes	Yes
N country	20	20
Observations	823	823
Variance of intercept	0.210 (0.458)	0.126 (0.355)
AIC	1042.925	1041.364
-2 Log-Likelihood	1006.925	1003.364
Chi-square	78.044	81.606
Probability > Chi-square	***	***
LR test of model fit	—	*

Note: Standard errors in parentheses. Level of significance: \* p<.05, \*\* p<.01, \*\*\* p<.001. Continuous variables are standardised. A likelihood ratio test was conducted, comparing Models 1 and 2, to test the improvement of fit when the country control variable was introduced into the model.

Concerning the new entrants' general human capital, we observe that education level is not significant. Thus, we did not find evidence to support the hypothesis that higher education level increases new entrants' opportunity identification (H1). Regarding the new entrant's work status, we reject the hypothesis that active workers are more likely to identify more business opportunities (H2). With respect to specific human capital, findings show that self-confidence in own entrepreneurial competencies has a positive and significant effect ( $p < 0.01$ ) on the probability of identifying new business

opportunities, giving support for the H3. In addition, having recent entrepreneurial failure experience has a positive and significant effect ( $p < 0.01$ ), as hypothesised, on opportunity identification; therefore, H4 is supported. Regarding the new farmers' social capital, we found that both dimensions (structural and cognitive) have a positive and significant effect ( $p < 0.001$  for both) on opportunity identification. H5 and H6, therefore, received support in our empirical model based on GEM data.

Finally, we observed interesting effects for individual and country-level control variables. First, we found evidence for a U-shaped relationship between new farmer's age and their opportunity identification. Second, new farmer's gender has a significant effect on business opportunities identification, suggesting that male new farmers tend to identify more opportunities. Third, the country's wealth is positively related to new farmers' opportunity identification. In Model 2, the variance component of intercept decreases from 0.21 to 0.126 which suggests that 40%  $\left(\frac{0.21-0.126}{0.21} \times 100\right)$  of the country-level variance (after accounting for individual level controls and predictors) may be explained by the country wealth conditions. Likewise, Table 3.4 reports that the introduction of the country control significantly improved the model fit, given support for the need of include entrepreneur's external context.

### 3.5 Discussion and Conclusions

New entrant farmers, are widely recognised as important to the ongoing vitality and competitiveness of the agricultural sector and of rural regions and represent important sources of innovation and entrepreneurship within agriculture (EIP-AGRI, 2016). Surprisingly, there has been very little research addressing new entrants in agriculture. Most studies focus on established, often family-owned, firms. In this paper it is theorized that especially new entrants that show entrepreneurial behaviour are important for a competitive and sustainable agriculture (Seuneke et al., 2013). Opportunity identification is a core characteristic of entrepreneurial behaviour (Gaglio and Katz, 2001; Shane and Venkataraman, 2000). Moreover, the identification of business opportunities are highly depended on entrepreneurs' human and social capital as well as the context where entrepreneur operates (Baron, 2006; Davidsson and Honig, 2003; Shepherd and DeTienne, 2005; Ucbasaran et al., 2008). Therefore, it is interesting to research how new agricultural entrants identify opportunities based on their prior knowledge, experience, and social networks (McElwee and Bosworth, 2010; Methorst et al., 2017; Lans et al., 2014). Based on GEM data for 20 European countries from 2004 to 2010, this research provides an empirical analysis on how the general human capital, entrepreneurial specific human capital, structural and cognitive social capital, and country economic conditions, determine the business opportunity identification by business/owner managers of new agricultural businesses less than 42 months.

Coming back to the first research question of what are the characteristics of the newcomers, the results show that for the whole group the newcomers have lower levels of education, women are underrepresented and others source of income are deemed to be important. As such these results seem to be different from what is often described

as the 'stereotype' new entrant in agriculture: female, high educated and opportunity-driven (Sutherland, 2015; Zagata and Sutherland, 2015). In addition they have little entrepreneurial experience but have high confidence in their entrepreneurial competencies. Zooming further into the differences between new entrants who see and who don't see opportunities in their business environment, results are more nuanced. The group of new entrants that identify opportunities are a bit younger and seemed to be better networked: they know more entrepreneurs than non-identifiers.

With regard to the second research question, concerning how new farmers' human and social capital determines opportunity identification, the results from the random model showed that new agricultural entrants' general and specific human capital, as well as their structural and cognitive social capital, affect opportunity identification differently.

Firstly, we did not find a relationship with the new farmer's education level. This is inconsistent with Carter (1998), who found that higher educated new agricultural entrants tend to identify more business opportunities. This result may be due to the fact that GEM's education level not captures the type of education followed (e.g. food technology or rural development) which previous research has suggested may influence the personal preferences to have a proactive orientation to identify new business opportunities or, contrary, to have preference to maximisation of production (Methorst et al., 2016). This reflects the importance that specific educational and training programs may have on the entrepreneurial behaviour of new entrants due to the knowledge required into the sector is very context-specific (Bergevoet and Woerkum, 2006).

Secondly, regarding work status, our results indicate that new agricultural entrants' from unemployment have greater scope to identify business opportunities. This finding contrasts with the literature indicating that active workers tend to identify more opportunities because they have more business networks which provide them new information (Arenius and De Clercq, 2005). An alternative explanation, which point in the direction observed in this study, can be found in the cognitive mechanisms underlying the new farmers' opportunity identification (i.e. the mental processes that farmers use to assess opportunities) (Corbett, 2007; Mitchell et al., 2002; Hansson et al., 2012; McNamara and Weiss, 2005; Pfeiffer and Reize, 2000). Someone who enters into farming part-time (an individual working in the tertiary sector who decided to start an agricultural activity, treating farming as a sideline due to they have other main sources of income), may consider the combination between farming and off-farm job as a long-run stable income situation. This in turn decreases the propensity to find and evaluate new business opportunities (Kimhi, 2000). Conversely, new farmers starting from unemployment may be forced to find new sources of income due to the lower agricultural wages, increasing, thus, their scan of business opportunities (Grande, 2011; Liñán et al., 2011).

Thirdly, our study shows that new farmer's entrepreneurial specific human capital (entrepreneurial self-efficacy and prior entrepreneurial experience) clearly increases their likelihood of identifying business opportunities. These findings reinforce the relevance that farmers' entrepreneurial competencies and their previous experiences

have on their entrepreneurial behaviour (Bergevoet and Woerkum, 2006; EIP-AGRI, 2016; Seuneke et al., 2013). The significant influence of new farmer's entrepreneurial self-efficacy is in line with studies showing that higher levels of self-confidence in one's entrepreneurial competencies are necessary to identify opportunities within turbulent environments (Davidsson and Honig, 2003; González-Álvarez and Solís-Rodríguez, 2011; Ucbasaran et al., 2008).

Our results also indicate that new entrant's prior entrepreneurial experience may serve to help new farmers to identify new business opportunities. This finding is consistent with the literature which states that entrepreneurs' previous entrepreneurial experiences allow them to learn, making them more astute, and therefore increasing their capacity to analyse new information and identify opportunities (Farmer et al., 2011; Mitchell et al., 2008; Ucbasaran et al., 2008). The literature differs, however, on whether individuals learn more from failure or, contrarily, these "traumatic" events lead to conservative entrepreneurs in their search for opportunities (Ucbasaran et al., 2010). In light of our results, new entrants in agriculture from previous failed ventures seem to learn from their failures and the sector allows them to develop their entrepreneurial behaviour. Therefore, the agricultural sector can not only provide entry for failed entrepreneurs (it is supposed that the sector can provide refuge during recessionary times), but also benefit from their entrepreneurial experiences learned, increasing the entrepreneurial behaviour of European agriculture.

Fourthly, our results indicate that farmers' structural and cognitive social capital positively affect opportunity identification. Concretely, we found support for the idea that new entrants into agriculture increase their exposure to new information and knowledge —which finally increases their opportunity identification— through their social interactions as other economic sectors (Arenius and De Clercq, 2005; Ramos-Rodríguez et al., 2010). Our finding about the new farmer's structural social capital in terms of entrepreneurs' weak ties (i.e. knowing other entrepreneurs) is consistent with Singh et al. (1999), who found that the social relationships beyond family and friends increase the exposure to business opportunities. This finding is consistent with the assumption that farmers could mitigate their possible deficit on entrepreneurial capabilities by their participation in social and professional networks with other farmers to increase their entrepreneurial behaviour (Mailfert, 2007; Moyes et al., 2015; Seuneke et al., 2013). Likewise, we found support for the idea that the shared values and cognitions of actors sharing information increase the exchange and interpretation of new information and knowledge (De Carolis and Saporito, 2006; Liao and Welsch, 2003). This is in line with Vesala and Vesala (2010) and Kohler et al. (2014), who suggested that the farmers' entrepreneurial identity and beliefs, which are influenced by their social context, determine their entrepreneurial behaviour.

Finally, this study reveals the curvilinear relationship between farmer's age and their opportunity identification capacity, the barriers that women have in this process and how the country wealth increases the capacity to identify opportunities by new entrants in agriculture. Thus, it suggests that not only the young newcomers into the sector tend

to identify new business opportunities due to they may have greater capacity to access new sources of knowledge (e.g. they have higher internet skills and entrepreneurial training as consequence of the increasing weight that these competencies have gained in the national education programs), but also that the experienced new entrants into the agriculture may apply the knowledge acquired in their life to identify new business opportunities. This contrasts with the general wisdom that young entrants have greater entrepreneurial behaviour (Carter, 1998; McNamara and Weiss, 2005), reflecting the important role that human capital plays in the entrepreneurial process. Findings about new farmer's gender reflect how women continue to face barriers (e.g. work and family conciliation and less access professional networks) within rural entrepreneurship (Seuneke and Bock, 2015). Regarding the national context, results showed how new entrants identify more business opportunities in more developed countries, which contrasts with the consideration that there are more business opportunities for entrepreneurs in developing countries (Estrin et al., 2013).

The article contributes to the agricultural entrepreneurship literature in the comprehension of how new entrants in agriculture identify business opportunities by providing evidence of the role of new farmers' human and social capital in this process. Furthermore, due to the cross-country dataset used in the empirical analysis, the work provides a general and extensible approach to understand the drivers behind the entrepreneurial behaviour of European farmers. The GEM data capture new entrants into agriculture of all ages, as well as, a wide variety of their entrepreneurial attributes. Hence, this study responds to recent calls for more research on the drivers and characteristics of new agricultural entrants beyond the official statistics, capturing the fact that new entrants over the age of 40 represent a reality, and may play an important role within the sector (Zagata and Sutherland, 2015).

To sum up, findings from this study provide useful insights for both policy-makers and practitioners in their desire to improve the entrepreneurial behaviour and competitiveness of European agriculture. Although new entrants are often stereotyped as higher educated, opportunity-driven, often female 'entrepreneurs' our results clearly show that this group is far more diverse. First, we found a lack of evidence that higher educated new entrants, as well as those active in the labour market, tend to be more entrepreneurial. However, this work underlines the importance that new entrants' entrepreneurial competencies have in their entrepreneurial behaviour through the identification of business opportunities. Since education and training allow new farmers to acquire and learn entrepreneurial competencies (Kuratko, 2005), European agricultural policies should indeed continue to promote effective entrepreneurial educational programs for new entrants in agriculture. Second, in view of the fact that new farmers' weak ties increase their entrepreneurial behaviour, there is a need to promote the establishment and development of these relationships. Hence, practitioners and agricultural teachers involved in agricultural education might foster teamwork and collaboration among future new entrants, as well as their communication skills and cultural openness to break the social barriers of rural areas. Further, in doing so, new farmers could not only increase their social networks, but also learn from each

other, increasing and sharing their implicit knowledge which increases their entrepreneurial competencies as consequence of the required context-specific knowledge (Bergevoet and Woerkum, 2006). Third, agricultural research and extension services play a central role as facilitators of the knowledge-sharing and entrepreneurial learning within farm communities (Morgan and Murdoch, 2000; Spyridakis and Dima, 2017). Thus, in the light of our results, extension services should facilitate spaces for interaction among new farmers and other rural entrepreneurs, as well as organise and conduct networking activities to increase their information-sharing which finally increase their opportunity identification and, therefore, their entrepreneurial behaviour. Additionally, fostering the new farmers' social networks with others entrepreneurs would increase their shared understanding about entrepreneurship (i.e. cognitive social capital) which in this work has been found as a significant factor affecting their opportunity identification (Phillips et al., 2013).

As with any research, this study has some limitations that need to be acknowledged. The GEM data allows us to capture the entrepreneurial behaviour and attitudes of agricultural business owners from an international perspective, but future research needs to include more specific variables about the paths and backgrounds that farmers have followed to identify business opportunities such as whether they are inheritance or ex-novo farmers, full-time workers in industries related to agriculture and, the nature and structure of their social relations. Further, it will be necessary to create more accurate databases that capture the region and productive characteristics (e.g. farm economic indicators and characteristics) as well as policy measures that may influence in their opportunity costs associated with pursuing and identifying an opportunity. Future research is still needed in order to identify the determinants of farmers' entrepreneurial behaviours.

## Chapter 4

# GROWTH-ORIENTED NEW AGRICULTURAL VENTURES: THE ROLE OF ENTREPRENEURIAL RESOURCES AND CAPABILITIES UNDER CONVERGENCE FORCES<sup>7</sup>

### 4.1 Introduction

Growth-oriented entrepreneurs (also called ‘high-growth’, ‘ambitious’ or ‘high-potential’ entrepreneurs) contribute to economic development more than entrepreneurial activity in general and have been identified as drivers of employment generation, promotion of innovations and economic transformation (Coad et al., 2014; Hölzl, 2014; Mason and Brown, 2013, Autio and Rannikko, 2016). From an entrepreneurial perspective, growth-oriented new ventures can be defined as those entrepreneurs who have substantially increased their sales or number of employees over a period of time at their initial stages of entrepreneurial activity (Terjesen et al., 2015). The literature suggests that the growth of these ventures results from the interaction between entrepreneurs’ internal resources and capabilities, the constraints of institutions, and the industrial context where they carry out their activities (Autio and Acs, 2010; Bamiatzi et al., 2016; Estrin et al., 2013).

A growing body of literature based on cross-country analysis has contributed to the understanding of a country’s institutional and socio-economic influences on growth-oriented entrepreneurs, but relatively little attention has been paid to industry specific conditions within these studies (Du and Temouri, 2015; Krasniqi and Desai, 2016). Research has noted that this kind of entrepreneur is not exclusive to high R&D intensity industries, and that the industry’s technological regime and structure, as well as individual characteristics such as specific human capital, play a crucial role in these ventures (Daunfeldt et al., 2015; Henrekson and Johansson, 2010). However, existing research has not fully addressed the interactions between entrepreneurs’ strategic assets and capabilities, industry, institutions and growth orientation (Bamiatzi et al., 2016). In this regard, the existing literature suggests that, within specific industries, the inherent characteristics of the business (e.g. rural embeddedness, small-sized firms, family ownership and management) and industry dynamics (e.g. heavily regulated environments and mature markets) may shape the rewards of entrepreneurial behaviours (Alsos et al. 2014; Grande et al., 2011; Lumpkin and Dess, 1996; Zilberman et al., 2017). The agricultural sector, therefore, provides a suitable setting for researching these internal and external determinants of entrepreneurial strategic

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<sup>7</sup> This chapter has been submitted as Pindado, E., & Sánchez, M. (submitted). Growth-oriented new agricultural ventures: the role of entrepreneurial resources and capabilities under convergence forces.

choices because of its characteristics and the presence of growth-oriented entrepreneurs (Brown, 2011; Henrekson and Johansson, 2010). Additionally, there is still little knowledge about the drivers or the external influences of those individuals who can significantly contribute to the economic progress of the rural communities (Grande, 2011; Lans et al., 2014; Pindado and Sánchez, 2017; Zagata and Sutherland, 2015).

Therefore, the objective of this paper is to examine the resources and capabilities that affect the probability of an individual becoming a growth-oriented agro-entrepreneur, as well as the influence of institutional and industry conditions on this kind of entrepreneur. For this purpose, the study builds upon insights from the resource-based view and institutional theory, as well as the industry-based view. We examine the applicability of the above theories to a specific agricultural setting. The data for the empirical analysis has been drawn from the Global Entrepreneurship Monitor (GEM) and World Bank data. In the current study, we use a sample of 71 countries and 1,619 individuals for the years 2004-2010. To test our hypotheses, we used multilevel modelling which takes into account the hierarchical structure of the dataset in which individuals represent level one and the country-year level two.

The contributions of this research are both conceptual and practical. First, this study is, to our knowledge, the first empirical analysis of growth-oriented agricultural entrepreneurship which uses cross-country data. Second, we adopt an approach developed in the strategic management literature – combining the resource based view, institutional theory and the industry-based view– to analyse the multidimensional nature of new ventures’ growth orientation within the agricultural sector. In doing so, we extend these theories to new ventures operating in mature and regulated markets. Thus, we address recent calls to increase knowledge about how specific industry conditions determine the growth of new ventures (Krasniqi and Desai, 2016; Stam and Bosma, 2015). Specifically, we explore whether the growth orientation of new ventures may be shaped by convergence effects in the level of international competitiveness of an industry (Delgado et al., 2014). Hence, we contribute to the discussion concerning the role that entrepreneurs play in their entrepreneurial outcomes versus exogenous influences (Wright et al., 2014). Our findings confirm the assumption that new ventures’ growth is, to a great extent, determined by the entrepreneur and his innovative behaviour. Therefore, we provide insights into the critical role that entrepreneurs’ competencies play in industries where specific features, such as resource constraints and engagement with the rural-natural environment, may hinder entrepreneurial efforts. Finally, the paper proposes some recommendations that may increase the effectiveness of agricultural entrepreneurial policies.

## **4.2 Theoretical Background**

### **4.2.1 Growth-oriented new ventures and agriculture**

A review of the emerging literature on growth-oriented entrepreneurs reveals that we do not yet understand enough about the determinants of these entrepreneurs within

specific industries, and, hence, more research is still needed (Autio and Rannikko, 2016; Coad et al., 2014). Nonetheless, from a general point of view, the prior literature indicates that this typology of entrepreneurship is determined by entrepreneurs' individual characteristics and external environment.

On this count, several researchers have examined entrepreneurs' internal factors associated with growth-oriented new ventures. For example, these new ventures are frequently team based with a higher level of market orientation, are often knowledge-based and innovative, and seem to be globally oriented (Mason and Brown, 2010). Moreover, growth-oriented entrepreneurs tend to be more highly educated than the average entrepreneur and have greater entrepreneurial experience as they are usually serial entrepreneurs (Autio, 2007; Mason and Brown, 2010). Furthermore, it is important to note that these entrepreneurs not only support their growth on the basis of their human capital, but also on their social capital; they use their social networks to acquire strategic resources reducing growth constraints (Littunen and Niittykangas, 2010).

An increasing number of studies have addressed the influence of entrepreneurs' external environment on the growth of the new ventures (Autio and Rannikko, 2016; Bravo-Biosca, 2010; Estrin et al., 2013; Littunen and Niittykangas, 2010; Mason and Brown, 2013). Research shows that the greater availability of human and financial resources to entrepreneurship and the flows of knowledge across actors positively affect the growth of the new ventures (Bowen and DeClercq, 2008). Likewise, studies have emphasized the influence of institutions (e.g. market regulations and cultural conditions) on growth-oriented entrepreneurs (Autio and Acs, 2010; Estrin et al., 2013; Stenholm et al., 2013). Finally, evidence suggests that industry specific characteristics such as competitive environment and technological innovation shape new firm growth (Eckhardt and Shane, 2011).

The agricultural sector has been traditionally associated with low-growth entrepreneurship as a consequence of its marginal productivity of labour, low R&D expenditures and specific market structure (Roucan-Kane et al., 2011). Market imperfections are responsible for growth opportunities, so markets like agriculture, which have been strongly supported, have not experienced these imperfections that enhance entrepreneurial behaviour (Alsos et al., 2011; De Lauwere, 2005). Nevertheless, this situation has changed as a result of "more open policies" and of changes in demand and structural change which have opened up possibilities to develop agriculture through entrepreneurs offering value added products with high-growth perspectives (Grande, 2011; Vesala and Vesala, 2010).

In terms of these growth-oriented entrepreneurs, few studies have analysed new agricultural ventures' growth. Research has generally focused on established farms and country specific cases. Some of these studies have been focused on farm characteristics such as size and mechanisation and have arrived at different conclusions (Gardebroeck et al., 2010). It is thus evident that the economic results of these agricultural ventures are influenced by other factors such as farmer characteristics as well as external

constraints such as weather and location (Barbieri and Mshenga, 2008). Indeed, the role of the owner/manager is essential; their decision-making process and behaviour affect factors required to stay in the market and to obtain competitive advantage (Grande, 2011; De Lauwere, 2005). Hence, agro-entrepreneurs' characteristics such as demographic attributes, human capital (e.g. agriculture specific education, management experience and opportunity recognition capabilities), as well as their social capital, influence farm growth (Barbieri and Mshenga, 2008; Gray et al., 2004; Lans et al., 2016).

However, business owners' characteristics are not the only factors that affect the new agricultural enterprises' venture revenue and income. There are numerous factors in the national economy that affect the farm economy, such as the national levels of unemployment, international trade and fiscal policies and economic welfare in general (Siudek and Zawajska, 2012). Furthermore, as pointed out above, the growth of these ventures is determined by the institutional context. Studies have shown how the changes in agricultural policy and agricultural chain norms (e.g. contracts among operators) affect the intentions of farmers regarding growth (Lobley and Butler, 2010; Van Herck et al., 2012). Moreover, the literature reflects how specific industry characteristics (e.g. number of competitors, access to land and agricultural commodity prices) influence the growth of farm enterprises (Van Herck and Swinnen, 2015). Therefore, institutional changes may create entrepreneurial opportunities and establish the rules to exploit it, but the specific industry context provides the frame that determines and drives the achievement of these opportunities within the agricultural sector (Zahra et al., 2014).

Thus, summarizing the above literature, the determinants of growth-oriented entrepreneurship within agriculture still remain scattered and underdeveloped. Agricultural scholars have focused on established firms more than on the initial stage of the new venture creation process. Moreover, much of the literature analysing external influences on agricultural entrepreneurship has overlooked the internal micro-processes of entrepreneurial action, and vice versa, literature focusing on individuals has overlooked their context. Consequently, there is a need for further knowledge recognizing the multidimensional nature of new ventures' growth within agriculture, where growth-oriented entrepreneurs may be critical actors in developing rural areas (Krasniqi and Desai, 2016; Pindado and Sánchez, 2017; Seuneke et al., 2013).

#### **4.2.2 Theoretical framework**

As the strategic management literature suggests, firm growth can be attributed to the three way interaction between a firm's resources and capabilities, the constraints of the institutional context, and the industry conditions in which it operates (Bamiatzi et al., 2016). Our theoretical framework, therefore, draws on the resource-based view and institutional theory, and also on the industry-based view, thus recognising the multilevel nature of new ventures' growth (Delmar et al., 2003; Lounsbury and Glynn, 2001; Lumpkin and Dess, 1996).

The resource-based view (RBV) allows us to analyse the internal factors that affect a new agricultural venture's growth. RBV defines a business as a unique collection of resources and capabilities, and those that are valuable, rare and inimitable, together with the suitability of the firm's organization to exploit these tangible and intangible assets (VRIO framework) give the firm competitive advantage and consequently greater financial rewards (Barney et al., 2001). Entrepreneurship literature has used RBV to understand the processes behind new firm creation and it has been extensively adopted in explaining the success and growth of these new ventures (Cassia and Minola, 2012; Wiklund and Sheperd, 2003).

However, despite the fact that RBV has been a core and fruitful perspective to explain firms' competitive advantages, it has overlooked or underestimated the influence of the external context on firms' strategic behaviour and results (Peng et al., 2008). In this regard, aggregate conditions such as institutional, cultural, demographic, technological and economic factors determine not only the decision to start a new venture, but also the strategy and behaviour of the new firm (Baumol, 1996; Wennekers et al., 2002). Institutions, together with the constraints of economy, therefore define the opportunities in the economic system as well as the profitability and feasibility of new ventures exploiting them (Veciana and Urbano, 2008).

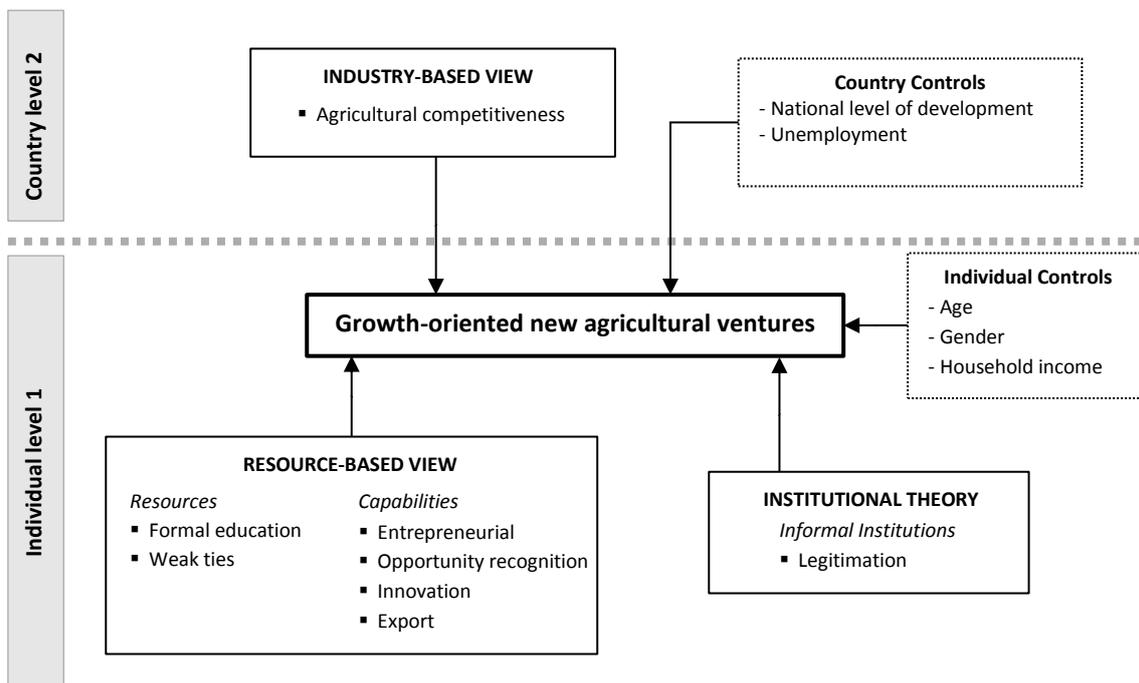
Accordingly, the institutional theory provides a well-established conceptual framework for assessing the effects of the social system on entrepreneurial activity and outcomes (Autio et al., 2013; Stenholm et al., 2013; Veciana and Urbano, 2008). This theory holds that institutions shape the entrepreneurial processes by providing the rules and norms, thus determining the appropriability of actions for entrepreneurial organizations within a specific society (Bruton et al., 2010). Following North's institutional perspective (1990), institutions can be classified into formal and informal. Informal institutions refer to values, beliefs and norms that determine socially acceptable behaviour, and formal institutions refer to regulations and law. Formal institutions provide new ventures with the guidelines related to the sanction or endorsement of their actions whereas informal institutions provide the guidelines about what is appropriate in social and commercial interactions (Bruton et al., 2010). Entrepreneurship literature has shown that new ventures that act under the framework of these institutions and, therefore have greater legitimacy from their peers, usually tend to achieve better results and growth (Lounsbury and Glynn, 2001; Zimmerman and Zeitz, 2002). Likewise, an important stream of research has dealt with the effect that formal institutions (e.g. protection of property rights, government activity and regulatory frameworks) have on new ventures' growth (Bowen and DeClercq, 2008; Estrin et al., 2013; Puffer et al., 2010).

Additionally, the industry-based view of the firm may be adopted to complement the understanding of new ventures' strategic choices to pursue and achieve growth (Yamakawa et al., 2008). This view of the firm suggests that market structure (e.g. industry maturity, barriers to entry, set-up costs, and degree of product differentiation and market concentration) within an industry shapes firms' behaviour and growth (Bamiatzi et al., 2016; Porter, 1980). The influence of these industry conditions on new

ventures' performance and survival have been shown by several studies within the entrepreneurship field (Eckhardt and Shane, 2011; Larrañeta et al., 2014).

Thus, based on these theoretical approaches, a series of hypotheses will now be proposed that analyse the resources and capabilities, as well as the contextual variables affecting growth oriented agricultural new ventures. These factors will be classified as follows: (1) resources and capabilities, (2) institutional factors, (3) industry context and (4) control variables (see Figure 4.1). The rationale for the inclusion of each of these factors and the proposed hypotheses will now be given.

**Figure 4.1. Research model.**



#### 4.2.2.1 Resource-based view

**Formal Education as a resource.** As widely acknowledged in the literature, high quality human capital enhances the ability to perceive and successfully exploit profitable entrepreneurial opportunities (Unger et al., 2011). Formal education is a core component of human capital and provides the knowledge and cognitive skills required to understand new information arising in the environment and elaborate adequate strategies to achieve higher returns from these identified opportunities (Ucbasaran et al., 2008). This positive relationship between formal education and growth oriented new ventures has been highlighted in the literature (Estrin et al., 2013; Terjesen and Szerb, 2008). Regarding the agricultural sector, higher levels of education have been associated with higher performance of new ventures in prior research (Barbieri and Mshenga, 2008; Gray et al., 2004). Thus we propose the following hypothesis:

**H1:** It is more likely that new agricultural ventures will be growth-oriented when new entrants have higher formal education.

***Weak ties as a resource.*** External relationships allow entrepreneurs to better access valuable resources such as market information and knowledge, and also provide better access to technology, financial capital and customers (Liao and Welsch, 2005). Hence, this social capital supports the growth of the new venture (Bosma et al., 2004; Estrin et al., 2013). Regarding the nature of this social capital, scholars have distinguished between weak ties (i.e. acquaintances, strangers and colleagues) and strong ties (i.e. family and close friends) based on Granovetter's classification (1973). Research reflects how weak ties increase the alertness of new entrants to industry changes which directly influences the growth of the new venture (Stam et al., 2014). Here, the agricultural literature has identified the importance of personal networks on new farm growth. However, the role that weak ties play remains unclear (Gray et al., 2004; Lans et al., 2016). Hence, we test the following hypothesis:

**H2:** It is more likely that new agricultural ventures will be growth-oriented when new entrants know other entrepreneurs.

***Entrepreneurial capabilities.*** Prior literature has argued that new business owners who possess the necessary capabilities for the management and setting up of a firm have a greater chance of success (Lockett et al., 2011; Terjesen and Szerb, 2008; Unger et al., 2011). As Baum et al. (2001) note, entrepreneurial skills facilitate the implementation of the entrepreneur's strategy, as does their entrepreneurial mind-set, which ultimately provides competitive advantage to new ventures. Despite the scarcity of these entrepreneurial skills among farmers –outlined in the literature – a series of studies have noted that farmer's entrepreneurial capabilities directly affect the farm's performance (De Lauwere, 2005; Ondersteijn et al., 2003). Consequently, we posit that:

**H3:** It is more likely that new agricultural ventures will be growth-oriented when new entrants have entrepreneurial capabilities.

***Opportunity recognition capabilities.*** Opportunity recognition is the ability to recognize a profitable idea and exploit it for business development (Lumpkin and Lichtenstein, 2005). Properly recognizing what products, processes or business models can generate commercial value can enable entrepreneurs to evaluate and generate suitable commercial strategies and successfully deal with the barriers that they find during the initial stages, thus producing better results (Baron, 2004). The literature has verified the positive effects of entrepreneurs' capacity to identify opportunities for their firm's growth and performance (Mayer-Haug et al., 2013; Sambasivan et al., 2009). For agricultural ventures, opportunity identification has also been distinguished as a core capability for entrepreneurial performance and growth (Lans et al., 2014). Therefore, we hypothesized the following:

**H4:** It is more likely that new agricultural ventures will be growth-oriented when new entrants have the capability to recognize business opportunities.

**Export capabilities.** The entrepreneur's export behaviour is driven by specific capabilities such as fluency in foreign languages, knowledge and understanding of foreign markets and cultures and the capacity to establish international business relationships (Navarro et al., 2010). As the literature shows, export orientation enhances the economic results of the new venture due to the fact that export-oriented entrepreneurs tend to be more innovative, to use capital more intensively and be more productive on average (Mason and Brown, 2013; Terjesen and Szerb, 2008). However, despite the fact that export strategies have been identified as a source of farm competitiveness, new agricultural ventures can meet growth opportunities within domestic markets as a consequence of their high-value products and changes in demand in local communities (Hazell et al., 2010). Thus, we test the following hypothesis:

**H5:** It is more likely that new agricultural ventures will be growth-oriented when new entrants have export capabilities.

**Innovation Capabilities.** Innovative assets such as accumulated scientific knowledge and capabilities required for product development, among others, enhance firms' innovation (Christensen, 1995). Entrepreneurs introduce new products, processes or services in order to take competitive advantage from identified market opportunities (Stenholm, 2011). Thus, this innovative behaviour is positively related to firm growth (Terjesen and Szerb, 2008; Stenholm, 2011). Consequently, growth-oriented entrepreneurship has been traditionally related to innovations (Bamiatzi and Kirchmaier, 2014; Coad, 2009). The literature has emphasized growth through technical effectiveness and scale efficiency in the case of agricultural producers. Nevertheless, modern supply chains require innovative products offering valuable opportunities for new entrants growth (Pindado and Sánchez, 2017; Gray et al., 2004; Rao et al., 2012). Based on this, we propose the following hypothesis:

**H6:** It is more likely that new agricultural ventures will be growth-oriented when new entrants have product innovation capabilities.

#### **4.2.2.2 Institutional theory**

**Legitimation.** Scholars have used legitimacy "to describe the prescriptions of both formal and informal institutions" (Webb et al., 2009). As such, institutional legitimacy has been classified into regulatory, normative and cognitive legitimacy in the literature (Pollack et al., 2012). The first corresponds to the regulations, standards and expectations created by governments and organizations, an acknowledgment that the new venture is a good corporate citizen. Normative legitimacy corresponds to the norms and values of a society and cognitive legitimacy describes how stakeholders passively make "legitimacy judgments" about an organization (Pollack et al., 2012; Zimmerman and Zeitz, 2002). Entrepreneurship scholars have emphasized the importance of normative and cognitive legitimacy for access to and the acquisition of valuable resources which enhance the growth of new ventures (Khaire, 2010; Zimmerman and Zeitz, 2002). Hence, we propose the following hypothesis:

**H7:** It is more likely that new agricultural ventures will be growth-oriented when new entrants perceive legitimation of their entrepreneurial activity.

#### **4.2.2.3 Industry-based view**

**Industry competitiveness.** Empirical research has shown faster growth of firms in emerging markets and industries than in developed ones (Mitra et al., 2014). This fact relates to the concept of global convergence, which argues that developing economies grow faster due to their greater marginal gains in productivity (Mankiw et al., 1992). This convergence can be found at the aggregate level as well as in industries (Ball et al., 2004; Dumais et al., 2002). At the industry level, cost based competition, limitations on resources and congestion costs in highly competitive industries may diminish the returns of new ventures (Delgado et al., 2014). However, the literature also states that the presence of specialized firms and institutions in highly competitive regions may generate knowledge spillovers that foster the creation of new ventures with high growth potential (Acs et al., 2009; Delgado et al., 2014). In this regard, Martin and Mitra (2001) noted how agriculture is influenced by rapid convergence dynamics in less competitive countries. Consequently, we propose the following hypothesis:

**H8:** It is more likely that new agricultural ventures will be growth-oriented in less agriculturally competitive countries as a consequence of convergence forces.

#### **4.2.2.4 The moderating effect of industry competitiveness on the innovativeness-growth relationship**

Several studies in the literature have provided evidence to the fact that the relationship between innovation and firm growth is moderated by the firm's external context (De Clercq et al, 2010; Rosenbusch et al., 2011). However, understanding of the external market conditions under which product innovation is more or less beneficial is still limited (Prajogo, 2016). The literature has reflected how within competitive markets, where resources are constrained and price competition is intense, product innovation is a significantly effective strategy in achieving competitive advantage for new entrants (Covin and Slevin, 1989; Lumpkin and Dess, 2001). Nevertheless, within these highly competitive environments, the number of competitors, innovative products and substitutes is higher, which may limit the potential to generate profits from innovative products and entrepreneurs may find cost competition through process innovations more efficient (Prajogo, 2016). Hence, we test the following:

**H9:** A country's agricultural competitiveness moderates the positive relationship between a new agricultural entrant's product innovation capabilities and the growth orientation of the new venture such that as competitiveness increases, product innovation capabilities have a stronger influence.

## 4.3 Data and Methodology

Our theoretical framework attempts to explain what constitutes a growth-oriented agro-entrepreneur based on internal (level 1) and external factors (level 2). Consequently, a multi-level analysis is required to test the proposed hypotheses. Hence, the study uses a dataset created by the authors by merging data from the Global Entrepreneurship Monitor (GEM) with environmental economic data from the World Bank. In this study we analyse early stage agricultural entrepreneurs defined as owner-managers of new businesses less than 42 months old belonging to the agriculture, forestry or fisheries sectors, in accordance with the International Standard Industrial Classification (ISIC). The initial dataset included a total of 1,619 new agricultural ventures from the GEM adult population surveys (APS) from 2004 to 2010 in 71 countries (Table A4.1 in the Appendix lists the countries included). The APS collects the entrepreneurial activity, attitudes and aspirations of individuals from representative samples of at least 2,000 adults (18–64 years old) per country (see Reynolds et al., 2005).

### 4.3.1 Description of variables

*Dependent variable.* The literature has identified growth-oriented new ventures as the subset of entrepreneurs that have achieved a substantial increase in employees (firm size) or sales (firm outputs) over a period of time (Terjesen et al., 2015). Related to this, several studies have demonstrated with strong empirical validity the role played by entrepreneurs' employment growth aspirations in predicting their current and future growth (Covin and Wales, 2012; Delmar and Wiklund, 2008). Thus, here we define growth-oriented agro-entrepreneurs as those entrepreneurs whose employment growth aspirations are among the top 25% of all agro-entrepreneurs' aspirations, so as to clearly differentiate them from those that do not achieve substantial growth (Delmar et al., 2003). Following Estrin et al., (2013), we calculated employment growth aspirations as the difference between the natural logarithms of the agro-entrepreneur's expected level of employment in five years and the current number of jobs. We eliminated the extreme outliers from the dataset defined as those observations greater than three times the inter-quartile range.

*Independent variables.* Three groups of independent variables are considered in this study: new agricultural entrants' resources and capabilities, institutional legitimation and the country's agricultural competitiveness. At the individual level, to test our hypotheses related to entrepreneurs' resources (H1 and H2) we use tertiary education to assess their general human capital and weak social ties to capture their social capital. In order to test the influence of new entrants' entrepreneurial capabilities on new ventures' growth orientation (H3) we use the individual's self-assessed entrepreneurial capabilities as proposed by Gist (1987). For the entrepreneurial capabilities reflecting the new farmer's proactiveness (H4 and H5), we use the new entrants' opportunity recognition capabilities and export capabilities (Pindado and Sánchez, 2017). To test the effect of product innovation strategy on growth orientation (H6), we use entrepreneurs'

product innovation capabilities. All these variables have been used in empirical analyses based on GEM data analysing new ventures' growth (Autio and Acs, 2010; Estrin et al., 2013; Stenholm et al., 2013). We also use –for H7 – the perceived legitimization of the entrepreneurial activity by the new entrant to analyse the effect of informal institutions on new agricultural ventures' growth orientation (Liñán et al., 2011). Finally, at country level, we use the agricultural value added per worker from the World Bank data as a proxy for the national level of agricultural competitiveness to test the effect of industry conditions on new agricultural ventures' orientation (H8) (Audretsch et al., 2012; Buckley et al., 1988; Lio and Liu, 2008).

*Control variables.* Prior research suggests that entrepreneurs' socio-demographic profile and country socioeconomic conditions influence the growth of new ventures (Bravo-Biosca, 2010; Estrin et al., 2013). Thus, at the individual level, we control for the entrepreneurs' age, gender and household income, which have been considered as factors that affect new venture growth (Autio and Acs, 2010). At country level, we control for the level of development (i.e. country's wealth) measured through per capita GDP measured in purchasing power parity terms (Aidis et al., 2012). Finally, we control for the unemployment rate given that it may act as a pull or push factor for new entrants in agriculture (Pindado and Sánchez, 2017; Wennekers et al., 2005). All these country controls were taken from World Bank data. Table 4.1 shows the definition of the variables and the descriptive statistics for observations used in estimations is shown in the Appendix in Table A4.2.

**Table 4.1. Definitions of variables used.**

Variable	Description	Possible Values
<i>Individual level variables</i>		
<i>Resource-based view</i>		
Formal education	Variable indicating whether new agricultural entrant has graduate experience	1. Yes 0. No
Weak ties	Variable indicating whether the new agricultural entrant knows someone who has started a business in the last two years.	1. Yes 0. No
Entrepreneurial capabilities	Variable indicating whether the new agricultural entrant believes that he or she has the knowledge, skills and experience required to start a business.	1. Yes 0. No
Opportunity recognition capabilities	Variable indicating whether the new agricultural entrant believes that there will be good opportunities for starting a business in the area in which he lives in the next six months.	1. Yes 0. No
Export capabilities	Variable indicating whether the new agricultural entrant considers that over 25% of his customers will be from abroad.	1. Yes 0. No
Product innovation capabilities	Variable indicating whether the new agricultural entrant considers that his clients (some or all) believe his product to be new.	1. Yes 0. No
<i>Institutional theory</i>		
Legitimation	Variable indicating whether the new agricultural entrant believes that in his/her country most people believe that entrepreneurship is a good career option.	1. Yes 0. No
<i>Individual level controls</i>		
Age	Age of new agricultural entrant measured in years.	
Gender	Gender of new agricultural entrant.	0. Female 1. Male
Household income	Household income scale	1. Lowest 33% 2. Middle 33% 3. Upper 33%
<i>Country level variable</i>		

Variable	Description	Possible Values
Agricultural competitiveness (t-1)	Agriculture value added per worker, constant at 2005 US\$ (WBI).	
<i>Country level controls</i>		
Wealth (t-1)	GDP per capita at purchasing power parity, constant at 2011 international \$ (WBI).	
Unemployment (t-1)	Share of the labour force that is without work but available for and seeking employment.	
<i>Dependent Variable</i>		
Growth-oriented agro-entrepreneur	Variable equal to 1 if the agro-entrepreneur is among the top 25% of all agro-entrepreneurs in terms of the employment growth aspirations distribution and 0 if not.	1. Yes 0. No

Source: GEM 2004-2010.

### 4.3.2 Estimation Methods

Given the hierarchical and clustered structure of the database used, observations of agro-entrepreneurs within the same country and year are usually more similar to each other than other entrepreneurs in different countries and years. This structure violates the OLS assumption of the independence of all observations. Therefore, to avoid biased results, multilevel models have to be used to capture the unobserved heterogeneity (Rabe-Hesketh et al., 2005). Hence, we used multilevel logistic regressions, which include random intercepts and fixed slopes at the specified levels (i.e. individuals represent level one and country-year represent level two) to test the effects of individual and country-year variables (Hox, 2002).

A five-step testing strategy was used to estimate the influence of the entrepreneur's resources and capabilities, and country-year factors on the probability of becoming a growth-oriented agro-entrepreneur. First, we performed an LR test (likelihood ratio approach), comparing the null multilevel model with a null single-level model to test the significant variance across country-years groups for the dependent variable, justifying the use of multilevel analysis (Bliese, 2000). Next, we performed a multilevel logistic regression including individual and country-year levels controls to estimate the percentage of variance explained by these controls. Third, we included the individual-level variables to estimate their effects on growth-oriented agro-entrepreneurship and evaluate the remaining variance explained by these factors. Fourth, we included country-year variable to test their effect. Finally, we tested the interaction hypothesis. The correlations between the explanatory variables, shown in the Appendix (Table A4.2), do not initially show severe multicollinearity problems (Hair et al., 1995). We lagged the country-year variables by 1 year to avoid potential problems of reversed causality (Fritsch and Falck, 2007). A multicollinearity test was carried out for each regression and the results (Variance Inflation Factors) rule out any problems in this regard in the database.

## 4.4 Results

A pre-condition for multilevel modelling is that significant between-group variance exists for the dependent variable (Bliese, 2000). The intra-class correlation coefficient (ICC) reveals that 8.86% of the total variance in the dependent variable is attributable to

specific country-year circumstances. Hence, the significance of the effect of country-year groups has been analysed through an LR test with a significant effect being found for growth-oriented agro-entrepreneurs with an LRT of 44.67813 ( $p < 0.001$ ), which supports the use of multilevel models.

The estimated parameters obtained for the multilevel logistic regressions and model fit statistics are shown in Table 4.2. Model 1 in Table 4.2 includes only individual and country-year controls. It allows us to analyse the proportion of variance in growth-oriented agro-entrepreneurship accounted for by the controls. The variance of random intercept decreases from 0.32 in the null model (not shown in Table 4.2) to 0.19 in Model 1 in Table 4.2, suggesting that our controls explain 40.62%  $\left(\frac{0.32-0.19}{0.32} \times 100\right)$  of the country-year level variance.

Model 2 in Table 4.2 shows the significant and positive influence of new agricultural entrants' capabilities, particularly their entrepreneurial capabilities ( $p < 0.01$ ), opportunity recognition ( $p < 0.001$ ) and product innovation capabilities ( $p < 0.01$ ) on growth-oriented agro-entrepreneurship, supporting hypotheses 3, 4 and 6. Likewise, the positive effect of perceiving entrepreneurial activity as legitimate on the growth orientation of the new venture (hypothesis 7), has been found positive and significant ( $p < 0.10$ ). Regarding the effect of national agricultural competitiveness, Model 3 in Table 4.2 shows that agricultural productivity is significant ( $p < 0.01$ ) and negatively related to the probability of becoming a growth-oriented agro-entrepreneur. This suggests that the growth orientation of new agricultural ventures is driven by convergence forces thus supporting Hypothesis 8. When we introduce the effect of agricultural competitiveness in Model 3, the effect of new entrants' weak ties with other entrepreneurs becomes significant ( $p < 0.10$ ) and positive thus supporting hypothesis 2.

**Table 4.2. Estimation results for growth-oriented agro-entrepreneurship. Multilevel random intercept model.**

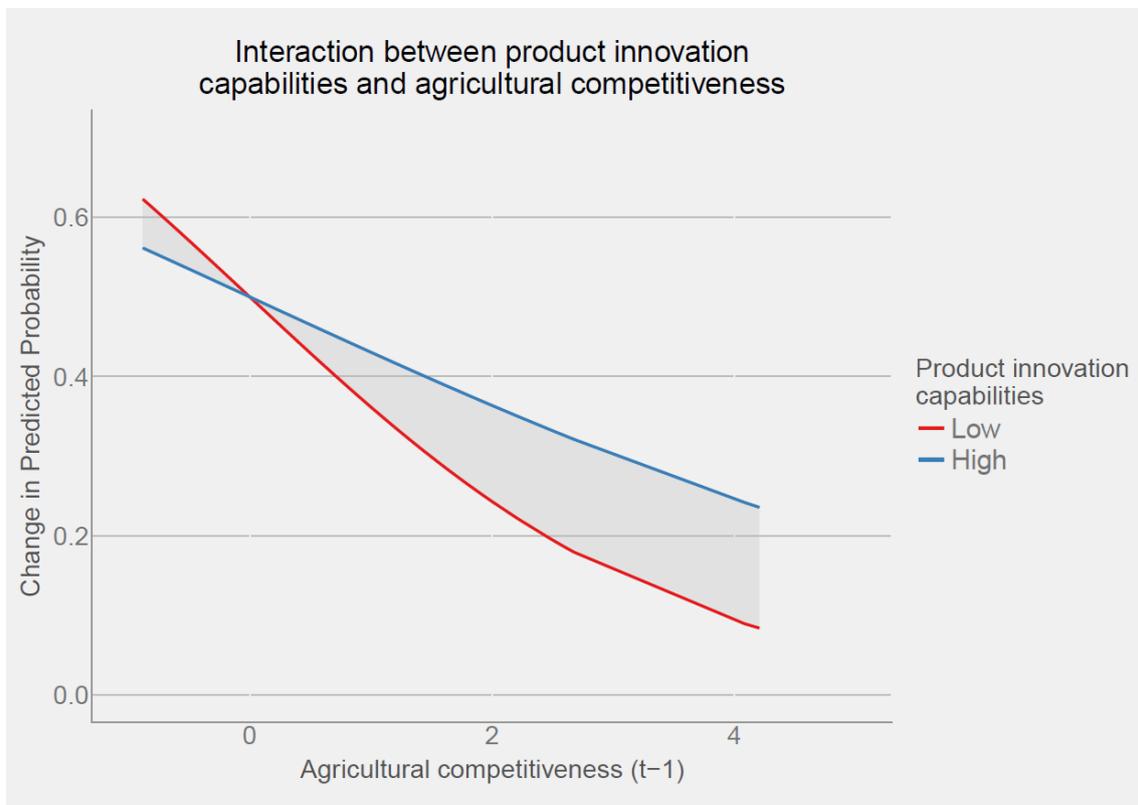
	Model 1	Model 2	Model 3	Model 4
<i>Individual level controls</i>				
Age	0.428 (0.274)	0.434 (0.276)	0.447 (0.273)	0.451* (0.274)
Age (squared)	-0.620** (0.293)	-0.610** (0.294)	-0.619** (0.291)	-0.623** (0.291)
Gender (Male)	0.382*** (0.135)	0.274** (0.139)	0.257* (0.140)	0.255* (0.140)
Household income	0.157* (0.080)	0.092 (0.082)	0.100 (0.083)	0.107 (0.083)
<i>Individual level variables</i>				
Formal education		-0.017 (0.241)	0.020 (0.242)	0.007 (0.242)
Weak ties		0.222 (0.138)	0.233* (0.138)	0.230* (0.138)
Entrepreneurial capabilities		0.675*** (0.183)	0.683*** (0.183)	0.694*** (0.183)
Opportunity recognition capabilities		0.370*** (0.140)	0.377*** (0.140)	0.366*** (0.140)
Export capabilities		-0.089 (0.153)	-0.023 (0.154)	-0.021 (0.154)
Product innovation capabilities		0.435*** (0.144)	0.384*** (0.145)	0.450*** (0.148)
Legitimation		0.252* (0.149)	0.280* (0.150)	0.284* (0.150)
<i>Country level control variables</i>				
Wealth (t-1)	-0.471*** (0.092)	-0.386*** (0.096)	0.001 (0.146)	-0.005 (0.145)
Unemployment (t-1)	-0.083 (0.080)	-0.094 (0.081)	-0.097 (0.080)	-0.104 (0.079)
<i>Country level variables</i>				
Agricultural competitiveness (t-1)			-0.496*** (0.150)	-0.569*** (0.158)
<i>Interaction terms</i>				
Product innovation Capabilities x Agricultural competitiveness (t-1)				0.289* (0.168)
Constant	-1.603*** (0.203)	-2.519*** (0.267)	-2.589*** (0.268)	-2.618*** (0.268)
<i>Model fit statistics</i>				
N <sub>country:yrssurv</sub>	166	166	166	166
Variance of random intercept	0.19(0.43)	0.16(0.41)	0.14(0.38)	0.13(0.36)
ICC <sub>country:yrssurv</sub>	0.055	0.048	0.042	0.039
Observations	1,383	1,383	1,383	1,383
-2 Log Likelihood	1,532	1,485	1,473	1,470
Chi-square	53.19	100.34	112.57	115.48
Probability>chi-square	***	***	***	***
AIC	1,548.24	1,515.1	1,504.87	1,503.96
Pseudo R <sup>2</sup>	0.1424	0.1857	0.1995	0.2051
LR test of model fit	-	***	***	*

Note: Level of significance: '\*\*\*' 1% '\*\*' 5% '\*' 10%. Standard errors in parentheses. Continuous variables are standardised. R-squared values according to Nakagawa and Schielzeth (2013). A likelihood ratio test was conducted, comparing Models 1 through 4 between each other to test the improvement of the goodness of fit when we introduced individual and country-year variables as well as the interaction term. AIC, Akaike Information Criterion.

As we can see from the results shown in Table 4.2, the addition of individual and country-year variables increases the explanation of the country-year variance that exists in the dependent variable, which is reflected in the decreasing value of the variance component of the intercept from 0.16 to 0.14 in models 2 and 3 respectively. It assumes that the addition of individual level variables explains an additional 17.8%  $\left(\frac{0.19-0.16}{0.19} \times 100\right)$  of the country-year level variance, and the addition of the second level variable (i.e. agricultural competitiveness) explains an additional 12.5%  $\left(\frac{0.16-0.14}{0.16} \times 100\right)$ .

The moderating effect of agricultural competitiveness on the relationship between product innovation capabilities and the growth orientation of new agri-ventures is significant ( $p < 0.10$ ) and positive as is shown in Model 4 in Table 4.2, indicating that when agricultural competitiveness was stronger, new entrants' product innovation capabilities were a stronger influence on the growth orientation of the new agricultural ventures. To facilitate the interpretation of the moderating effect of agricultural competitiveness, the interaction was plotted in Figure 4.2 and shows how individuals with higher levels of product innovation capabilities are about twice as likely to become growth-oriented agro-entrepreneurs in more highly competitive agricultural countries.

**Figure 4.2. A country's agricultural competitiveness as a moderator of the relationship between product innovation capabilities and growth-oriented agro-entrepreneurship.**



Control variables at individual and country level provided interesting findings. The effect of age is positive and significant, but the effect of age squared is negative and significant in Model 4 in Table 4.2. Thus, the relationship between age and growth-oriented agro-entrepreneurship is curvilinear (inverse U-shaped). Furthermore, being male is positively and significantly associated with growth-oriented agro-entrepreneurship. At the country-year level, national wealth measured by GDP per capita is negatively related to growth-oriented agro-entrepreneurship in Model 1 in Table 4.2, but lost significance with the addition of industry specific variables reinforcing the role that industry dynamics play on entrepreneurial outcomes.

## 4.5 Discussion

Assuming that growth-oriented entrepreneurs can be found in all sectors and are identified as those entrepreneurs who have greater capacity to contribute to regional economic development and invigorate the industries where they operate (Autio and Rannikko, 2016; Coad et al., 2014), it is interesting to understand what triggers these growth-oriented new ventures within strategic sectors such as agriculture, where the characteristics of the agricultural business and rural work force, together with their strong linkages with the rural environment, institutions and related industries, shape the entrepreneurial outcomes of new entrants into the economic activity.

This study analyses, therefore, new agricultural entrants' resources and capabilities, as well as the institutional factors and industry specific economic conditions which influence the starting of a new venture with a clearly entrepreneurial orientation towards growth in the agricultural sector. For this purpose we employed a multilevel-framework that includes individual and country-year level variables. We analysed data for 71 countries from 2004 to 2010, which allowed us to analyse the new farmer's entrepreneurial growth orientation from an international perspective capturing the heterogeneity of the process between countries and their multidimensional nature.

Our findings suggest that new farmers' bridging social capital developed by weak ties with other entrepreneurs has a positive effect on the growth orientation of new agricultural ventures. This supports the view that social capital provides access to new information and learning required to identify more profitable entrepreneurial opportunities within changing industries (Liao and Welsch, 2005; Stam et al., 2014). As Lans et al., (2016) have shown, farmers' external networks provide access to key resources (e.g. consumer trends and product development) that significantly impact the growth of agricultural business in the short run, outweighing the disadvantages of their relative isolation from markets.

However, our results suggest that agro-entrepreneurs' resources provide an incomplete explanation of their entrepreneurial outputs and need to be complemented with the appropriate capabilities to successfully manage their resources and accomplish entrepreneurial goals. In fact, our study showed that entrepreneurial and opportunity recognition capabilities significantly increase the probability of being an agricultural

entrepreneur with high-potential for growth. These results are in line with earlier studies that found that entrepreneurial capabilities are, unequivocally, positively related to competitive advantage and firm growth (Eggers et al., 2013). During the growth of the new agricultural venture, contexts continuously change (e.g. geographic expansion or internationalization suppose new challenges for farmers), and therefore a set of entrepreneurial capabilities is required (e.g. creativity, resource and finance management to set up and maintain the firm) which allow for the better managing of these changes, exploiting market trends and overcoming barriers (Macpherson and Holt, 2007). Furthermore, prior research has also shown how entrepreneurs with higher levels of opportunity recognition capabilities are able to more effectively exploit growth opportunities as they implant better exploitation strategies and anticipate future challenges (Mayer-Haug et al., 2013; Sambasivan et al., 2009). Hence, our findings reinforce the view that agricultural entrepreneurs need to have the capabilities necessary not only to perceive opportunities but also those required to capitalize on them and adapt to the changing environment during the initial stages of firm growth (Grande, 2011).

In addition to these capabilities that influence the decision-making processes of new agricultural entrants (i.e. the decision to exploit an opportunity and how to do it), our study reveals the importance of product innovation capabilities on new agricultural ventures with a clear growth orientation. It means that new entrants who have the technical skills and product development capacity to translate the opportunity identified into an effective new product realization meeting the needs of their customers have a greater chance of achieving a competitive advantage (Choi and Shepherd, 2004; Stenholm, 2011). This finding is further evidence for the positive effect that product innovation and adoption have on agricultural smallholders' performance, despite the fact that the literature has pointed out the risk of failure of early adoptions by young firms (Reece and Sumberg, 2003; Schipmann and Qaim, 2010).

The empirical results of this study also provide evidence of the multidimensional nature of the agro-entrepreneurial process, and how contextual factors affect the strategic behaviour and results of new agricultural ventures. In this respect the results suggest how the perceived legitimation of the entrepreneurial activity by new farmers in their environment positively impacts the growth orientation of their new ventures. This is consistent with the research showing that cultural-cognitive institutions (i.e. informal institutions), which establish rules and beliefs about the entrepreneurial activity and guide behaviour among economic actors, play an important role in access to resources that improve the results of new ventures such as external finance, networks and qualified employees (Khair, 2010; Zimmerman and Zeitz, 2002). Thus, contrary to Stenholm and Hytti (2014), who emphasized that entrepreneurial farmers tend to be independent from their local communities' social norms and values and act as change agents in relation to them, we found here that, at least for growth-oriented agro-entrepreneurs, the local acceptance and desirability of entrepreneurship matters for the strategic choices and performance of their ventures.

On the other hand, our findings clearly indicate that national industry conditions influence the growth orientation of new agricultural entrants. This was reflected in the substantial variance explained (12.5%) in the dependent variable by the specific country-year level of agricultural competitiveness. We found that agro-entrepreneurs in countries with lower levels of agricultural competitiveness have a greater probability of becoming growth-oriented. This means that agro-entrepreneurs operating in countries with less competitive agriculture have greater marginal returns on entrepreneurial opportunities as a consequence, for example, of lower costs of specialized inputs (Delgado et al., 2014; Zilberman et al., 2017). Thus, in terms of growth of new agricultural ventures, it corroborates the findings of Martin and Mitra (2001) about the convergence dynamics that exist in the agricultural sector across nations.

Furthermore, we also found the role of industry context to be significant as a moderator of the relationship between product innovation capabilities and the growth orientation of the new agricultural ventures. New entrants' innovation capabilities are more effective in supporting the growth orientation of agro-entrepreneurs in highly competitive agricultural countries. This reflects that for new agri-ventures operating in highly competitive contexts product innovation is a key strategy to break out of the price-based competition that characterizes these environments and leads to a higher level of competitive advantage (Curzi and Olper, 2012; Lumpkin and Dess, 2001). Nevertheless, previous studies have noted how the normative barriers and high entry costs of these environments, together with the inherent uncertainty of agricultural production, determine that new entrants usually choose conservative strategies to compete (McDonald et al., 2014).

Considering the above, this study contributes to the existing literature in the following ways: first, it contributes to the agricultural economics literature shedding light on what makes new agricultural entrants become entrepreneurially oriented with a greater inclination to expand their ventures. Further, this study is based on an international sample of new agricultural entrants capturing different entrepreneurial capabilities and perceptions, which provides a broader and complete view of the entrepreneurial process within the sector. Moreover, our study extends to agricultural entrepreneurship the theoretical basis of strategic management that firms' entrepreneurial outcomes are self-determined by applying an approach that integrates the resource-based view, institutional theory and an industry-based view (Bamiatzi et al., 2016). We confirm that despite the influences of institutions and industry conditions on new agricultural ventures' outcomes, the role of new farmers is crucial to the new venture's orientation and results, which supports the view that new agricultural entrants can be characterized as entrepreneurs instead of price takers (Pindado and Sánchez, 2017).

Additionally, our research contributes to the entrepreneurship literature by moving beyond cross-countries studies based on GEM surveys and focusing on a specific sector, thus responding to recent calls for analysis of the contextual influences on entrepreneurial outcomes (Krasniqi and Desai, 2016; Stam and Bosma, 2015). In this regard, we encourage researchers to investigate the relationship between the

entrepreneur's capabilities and their financial rewards within specific technological and market conditions, which may provide useful insights to understanding the entrepreneurial behaviour of new entrants (Prajogo, 2016).

Finally, new agricultural ventures labelled as "value-added agriculture" have been a mantra for policy-makers that want to promote higher incomes than traditional commodity production and distribution to contribute to rural welfare and agricultural development (Gray et al., 2004). Consequently, policies seeking to promote entrepreneurship in rural areas and agriculture represent a significant amount of governments' resources. However, their effectiveness has been limited (Knudson et al., 2004; Stephens et al., 2013). In rural areas and in the agricultural sector in particular, there exists a scarcity of entrepreneurs with a high potential for growth (Pindado and Sánchez, 2017).

This research, therefore, could facilitate the design of policies aimed at increasing the entrepreneurial behaviour of new agricultural entrants as well as specific measures and programmes boosting growth-oriented agricultural ventures. Since new farmers' entrepreneurial capabilities to set up a business and to recognize market opportunities play a central role in triggering agricultural ventures with high potential for growth, education and training programs for new entrants need to include and support the learning of this set of skills (Seuneke et al., 2013; Schmit and Gomez, 2011). Given that farmers not only need the managerial capabilities necessary to exploit the opportunity identified, but also those necessary to identify it in the first place, entrepreneurial education programs within the sector should include idea generating techniques and opportunity search strategies (Heinonen et al., 2011). Furthermore, these programs should develop the creative thinking of new farmers, especially in highly competitive markets where product innovation capabilities have been identified as key to new ventures' competitive advantage (Martins and Terblanche, 2003). The development of these capabilities among farmers directly relates to the role that social ties with other entrepreneurs play in this entrepreneurial process by increasing information sharing, the learning of new capabilities and fostering the legitimization of the entrepreneurial activity (Lans et al., 2016). Therefore rural policies should facilitate social interaction among rural entrepreneurs (i.e. regardless of their economic activity) and prevent agricultural entrepreneurs from being isolated from their peers. However, we must not forget that entrepreneurial outcomes are largely self-determined even in farming. Thus, new agricultural business owner managers should concern themselves with developing their entrepreneurial capabilities and competencies through training and education, as well as increasing their exposure to new information and professional networks outside agriculture.

Although the current study provides interesting findings on agricultural entrepreneurship, it has some limitations that need to be acknowledged. Despite the fact that GEM data provides the most relevant source for cross-country research on entrepreneurial activity, larger and more complex databases which include farm variables (e.g. size, land tenure, farm type and financial support) and external variables

(e.g. agricultural innovation systems) for the same entrepreneur over time are needed for a better understanding of the agro-entrepreneurial process (Barbieri and Mshenga, 2008).

Likewise, the use of secondary data such as GEM limits the research on the role that specific human capital (i.e. new farmers' background) plays in the information and knowledge flows within the sector and subsequently in opportunity identification (Methorst et al., 2016). Moreover, the role that strong social ties play in this process is restricted in GEM data since there is no measure that captures farmers' bonding social capital, although research has stated its relevance in agricultural start-up phase (Mailfert, 2007). Moreover, prior research has shown how the family context determines the farming practices and entrepreneurial orientation of new generations of farmers (Vesala and Vesala, 2010; Zagata and Sutherland, 2015). Future research should explore how the succession process, women's involvement and the resources and capabilities resulting from family interactions shape and shift new entrants' strategic choices (Chrisman et al., 2003; López-Fernández et al., 2016).

Another concern is the inherent link between agriculture and rurality, which implies high variability between regions in terms of productivity and infrastructures supporting enterprise formation and development (North and Smallbone, 2006). This study has used country-level predictors limited by the cross-country nature of the dataset. Therefore, additional cross-regional research is needed to improve understanding of these growth-oriented entrepreneurs. Differences at the regional-industry level, as well as between related industries within regions, such as the presence of specialized institutions and the structure of regional social networks may determine convergence or divergence patterns in entrepreneurial returns (Delgado et al., 2014). In this regard, an interesting topic for further research could be to examine the influence of knowledge intensive business services (KIBS) on the entrepreneurial outcomes of new entrants based on their different knowledge bases and sector affiliation (Pina and Tether, 2016).

We also acknowledge that the growth orientation of the new entrants could be measured in different ways with a narrower definition of growth oriented new agro-ventures. Nevertheless, the variable used allowed for investigating the process from an international perspective and obtain representative results. Finally, the cross-sectional nature of our data limited us to carrying out panel data estimations analysing how changes in capabilities or industry dynamics shape growth-oriented ventures.

## 4.6 Conclusion

Based on a multilevel-framework, this study analyzed the entrepreneurs' resources and capabilities, institutional factors and industry competitive context which influence the starting of a clearly growth-oriented venture in the primary sector. Specifically, we found that the context matters; our results indicate that the growth orientation of new agricultural ventures is influenced by the convergence between countries' levels of agricultural competitiveness, which means that new farmers in less competitive

countries have a greater orientation towards growth. Likewise, the perceived legitimization of the entrepreneurial activity by new agricultural entrants in their context positively supports their growth orientation. Even so, the role that the agricultural entrepreneur plays in the determination of this orientation towards growth is crucial. Their social interactions with other entrepreneurs increase their likelihood of becoming growth-oriented. The analysis also indicates that the capabilities necessary to identify market opportunities and to set up a firm to exploit these opportunities strongly support the growth orientation of these ventures. Furthermore, the capabilities to effectively develop and offer new products to their customers (i.e. product innovation capabilities) determine the growth orientation of these agro-entrepreneurs. The study also revealed that the influence of product innovation capabilities on growth are to some extent contingent upon the industry environment, being more effective in supporting the growth orientation of agro-entrepreneurs in highly competitive agricultural countries. This study contributes to the literature on agricultural entrepreneurship and its strategic orientation in different competitive environments and highlights the role of new farmers as individuals acting as entrepreneurs to achieve success in the markets.

## Appendix – Chapter 4

**Table A4.1. List of countries used in the analysis.**

Angola	Finland	Mexico	Trinidad & Tobago
Argentina	France	Montenegro	Tunisia
Australia	Germany	Morocco	Turkey
Austria	Greece	Netherlands	Uganda
Azores	Guatemala	New Zealand	United States
Belgium	Hungary	Norway	United Kingdom
Bolivia	Iceland	Pakistan	Uruguay
Bosnia and Herzegovina	India	Peru	Vanuatu
Brazil	Indonesia	Philippines	Venezuela
Canada	Iran	Romania	West Bank & Gaza Strip
Chile	Ireland	Russia	Zambia
China	Israel	Saudi Arabia	
Colombia	Italy	Serbia	
Costa Rica	Jamaica	Slovenia	
Croatia	Japan	South Africa	
Czech Republic	Kazakhstan	Spain	
Denmark	Korea	Sweden	
Dominican Republic	Latvia	Switzerland	
Ecuador	Macedonia	Taiwan	
Egypt	Malaysia	Thailand	

**Table A4.2. Descriptive statistics and correlation matrix.**

	Mean	SD	V1	1	2	3	4	5	6	7	8	9	10	11	12
V1. Growth-oriented agro-entrepreneur	0.276	0.447													
1. Age	31.553	14.484	-0.098***												
2. Gender	0.620	0.485	0.073**	0.042											
3. Household income	1.973	0.809	0.086**	-0.090***	0.039										
4. Forma education	0.086	0.281	-0.005	-0.055*	-0.036	0.074**									
5. Weak ties	0.568	0.496	0.108***	-0.139***	0.036	0.116***	0.070**								
6. Entrepreneurial capabilities	0.761	0.427	0.149***	0.021	0.176***	0.143***	0.088**	0.116***							
7. Opportunity recognition capabilities	0.475	0.500	0.173***	-0.121***	0.082**	0.096***	-0.003	0.190***	0.194***						
8. Export capabilities	0.299	0.458	-0.026	-0.001	0.020	0.051	0.115***	0.061*	0.074**	0.036					
9. Product innovation capabilities	0.286	0.452	0.084**	-0.018	-0.032	0.025	0.051	0.049	-0.027	0.057*	0.099***				
10. Legitimation	0.681	0.466	0.103***	-0.083**	0.008	0.059*	-0.078**	0.055*	0.046	0.138***	-0.086**	0.025			
11. Wealth (t-1)	21,131.558	15,854.079	-0.189***	0.199***	0.007	-0.076**	0.170***	-0.107***	0.019	-0.230***	0.258***	-0.094***	-0.252***		
12. Unemployment (t-1)	7.814	5.254	-0.002	0.010	0.085**	0.057*	-0.023	-0.010	0.134***	0.030	0.044	-0.056*	-0.018	-0.140***	
13. Agricultural competitiveness (t-1)	17,321.876	19,394.370	-0.198***	0.168***	-0.016	-0.036	0.153***	-0.053*	0.022	-0.180***	0.285***	-0.124***	-0.164***	0.799***	-0.124***

Source: Cross-sectional GEM data 2004-2010. Statistics reported are based on observations used in multilevel estimations (1,383 observations). For correlation matrix parameters, continuous variables were standardised. Level of significance: '\*\*\*' 1% '\*\*' 5% '\*' 10%.

## Chapter 5

# THE INNOVATIVE ENTREPRENEUR: A MULTILEVEL APPROACH TO ENTREPRENEURIAL INNOVATION<sup>8</sup>

### 5.1 Introduction

Entrepreneurship is widely regarded as an important mechanism for economic development with positive effects on innovation, employment and growth (Acs et al., 2008; Wennekers and Thurik, 1999). However, research on entrepreneurial innovation reports significant performance variations across countries and regions (Acs et al., 2008; Fritsch and Schroeter, 2011; Gries and Naudé, 2010; Vivarelli, 2013), suggesting that high levels of entrepreneurial activity *per se* do not guarantee economic growth but rather the type of innovative new venture (Colombelli et al., 2016; Shane, 2009; Wong et al., 2005). In that sense, two types of nascent entrepreneurs are typically identified in the literature: i) *replicative entrepreneurs* – those who create similar new ventures to those around them, and ii) *innovative entrepreneurs* – those who embrace innovation and launch high risk/high revenue ventures (Baumol, 2010).

Innovative entrepreneurs fit Schumpeter's '*creative destruction process*'; they introduce new products and services that make current technologies and products obsolete, generating new opportunities to extract rents (Schumpeter, 1942). Further, these innovative new ventures are, on average, more productive, exhibit higher survival rates and employment growth, and generate positive spillover effects (Cefis and Marsili, 2006; Coad and Rao, 2008; Stam and Wennberg, 2009). However, in practice, the vast majority of entrepreneurs are replicative in nature and the rates of innovative entrepreneurs vary significantly across countries, suggesting the need to consider the effect of the external context on entrepreneurial innovative behaviour (Baumol, 2010; Kelley et al., 2010). The innovative entrepreneur operates within a national ecosystem involving a variety of interdependent actors and contexts (Isenberg, 2011). Such combination supports the development, and subsequent growth, of innovative start-ups, and, further, motivates nascent entrepreneurs to launch high risk/high revenue ventures (Spigel, 2015). The literature further suggests that different types of entrepreneurial innovation could be explained by the interplay between different ecosystem configurations and individual attributes (Wright, 2014). Thus, there is a need for a more encompassing and multi-dimensional approach to entrepreneurial innovation in order to create suitable ecosystems where these innovative ventures "*can flourish*" (Stam, 2015).

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<sup>8</sup> This chapter has been submitted as Pindado, E., Sánchez, M., & García, M. (submitted). The innovative entrepreneur: a multilevel approach to entrepreneurial innovation.

Responding to recent calls to investigate entrepreneurial innovation in terms of the type of innovative new venture pursued and operating context (Autio et al., 2014; Agarwal and Shah, 2014; Tödtling et al., 2009), this study draws on the National Systems of Entrepreneurship (NSE) theory's premise that entrepreneurial behaviour is driven by the individual pursuit of opportunity and its outcomes are regulated by institutions (Acs et al., 2014; Acs et al., 2016). Additionally, we consider the role exerted by the national technological context and social and spatial structures on entrepreneurial innovations (Acs et al., 2009; Buesa et al., 2010; González-Pernía et al., 2015; Rodríguez-Pose and Crescenzi, 2008). Given that entrepreneurship involves human agency, we also draw on the resource-based view (RBV) of the firm to assess the impact of individual-level agency on entrepreneurial innovation (Alvarez and Busenitz, 2001; Lin and Wu, 2014).

The data for the empirical analysis has been drawn from the Global Entrepreneurship Monitor (GEM), Eurostat, the World Bank and the Heritage Foundation. To test the research hypotheses, we use multilevel analysis to account for the hierarchical structure of the dataset where individuals represent level one and the country level two. In the current study, we use a sample of 20 European countries and 18,171 early-stage entrepreneurs between the period 2005-2010, capturing different dimensions of innovation, namely product, market and process innovation.

This paper contributes to entrepreneurial innovation research by proposing a holistic approach to entrepreneurs' innovative behaviour through the integration of different well-established theories in the literature. Koellinger's (2008) and subsequently Pathak et al., (2013), Laplume et al., (2014) and González-Pernía et al., (2015) considered the internal and external drivers of entrepreneurial innovation; however, these studies fail to capture the influence of different overlapping contexts in shaping entrepreneurial innovation (Zahra et al., 2014). By integrating multiple contexts, we advance NSE theorising (Acs et al., 2014; 2016) and highlight the importance of the technological setting, social structure and spatial proximity on entrepreneurial innovation (Rodríguez-Pose, 1999; Rodríguez-Pose and Crescenzi, 2008). This conceptualisation provides evidence to the premise that contextual dimensions influence entrepreneurial innovation differently.

Further, evidence on the effect of entrepreneurs' resources and competencies on innovative outputs remains largely fragmented (Agarwal and Shah, 2014; Vargo et al., 2015). Thus, by analysing different typologies of entrepreneurial innovation and capturing multiple contextual dimensions together with entrepreneurs' internal resources and capabilities, we improve understanding of the drivers of entrepreneurial innovations. Our findings provide new insights to policymakers seeking to create suitable ecosystems for innovative new ventures (Borrás and Edquist, 2013, Camagni and Capello, 2013).

The article is structured as follows. After this introduction, section two reviews the extant literature on entrepreneurial innovation and contextual influences, and presents the research hypotheses. Section three details the research design and methods, and section four presents the results. We discuss our results in section five together with the

theoretical and managerial implications of our findings, and a direction for future research and practice in entrepreneurial innovation.

## 5.2 Theoretical Background and Hypotheses Development

Research suggests that entrepreneurial innovation results from the interplay between entrepreneurs' resources and capabilities and the external context where they develop their economic activity (Autio et al., 2014; Lin and Wu, 2014; Romero and Martínez-Román, 2012; Sautet, 2013). The extant entrepreneurship literature has largely focused on the entrepreneur's individual characteristics (e.g., family background, education, prior experience, entrepreneurial and networking competencies) driving innovativeness of start-ups whereas research on the effect of contextual variables (e.g., socio-political, technological and spatial environment) remains limited (Acs et al., 2016; Autio et al., 2014). This research gap reflects the complex and multidimensional nature of entrepreneurial processes (Gartner, 1985). Hence, several overlapping theoretical frameworks have been used to explain why new ventures engage in innovative activities (Kuratko et al., 2015).

At individual level, RBV and the dynamic capabilities approach have been extensively used to understand the entrepreneurial process and the birth of innovative new ventures (Alvarez and Busenitz, 2001; Alvarez and Barney, 2004; Turro et al., 2013; Wiklund and Shepherd, 2008) and entrepreneurial innovative behaviour (Alvarez and Busenitz, 2001; Lockett and Wright, 2005; Paradkar et al., 2015). RBV defines a business as a collection of tangible and intangibles assets, and these resources and capabilities which, are valuable, rare and inimitable, together with their appropriate organization (VRIO framework) are a source of sustainable competitive advantage (Barney et al., 2001). In this sense, innovation is a critical strategy to compete effectively in complex markets (Hitt et al., 2001). Innovative entrepreneurs discover new opportunities for extracting rents through new products, processes or services, and, in order to pursue and exploit market opportunities, they require specific capabilities (Zahra et al., 2006). Therefore, the dynamic capabilities framework offers a complementary approach to RBV in examining the entrepreneurial process (Teece, 2014).

In addition to the entrepreneurs' internal capabilities, the extant literature highlights the importance of contextual factors on the rates and typologies of entrepreneurial innovation across countries and regions (Acs et al., 2016; Stenholm et al., 2013). In particular, there is a need for an overarching approach that integrates various contextual dimensions influencing entrepreneurial innovation (Autio et al., 2014). Specifically, the geography of innovation approach suggests that innovation processes arise from new economic knowledge and are influenced by institutions and the spatial and social context (Asheim et al., 2011; Audretsch and Feldman, 1996; Rodríguez-Pose, 1999). Within this research strand, the national systems of innovation (NSI) emphasizes the importance of knowledge as a resource produced and accrued through a collective and cumulative process of innovation, which is embedded in a national institutional environment (Lundvall, 1992; Martin, 2012; Nelson, 1993).

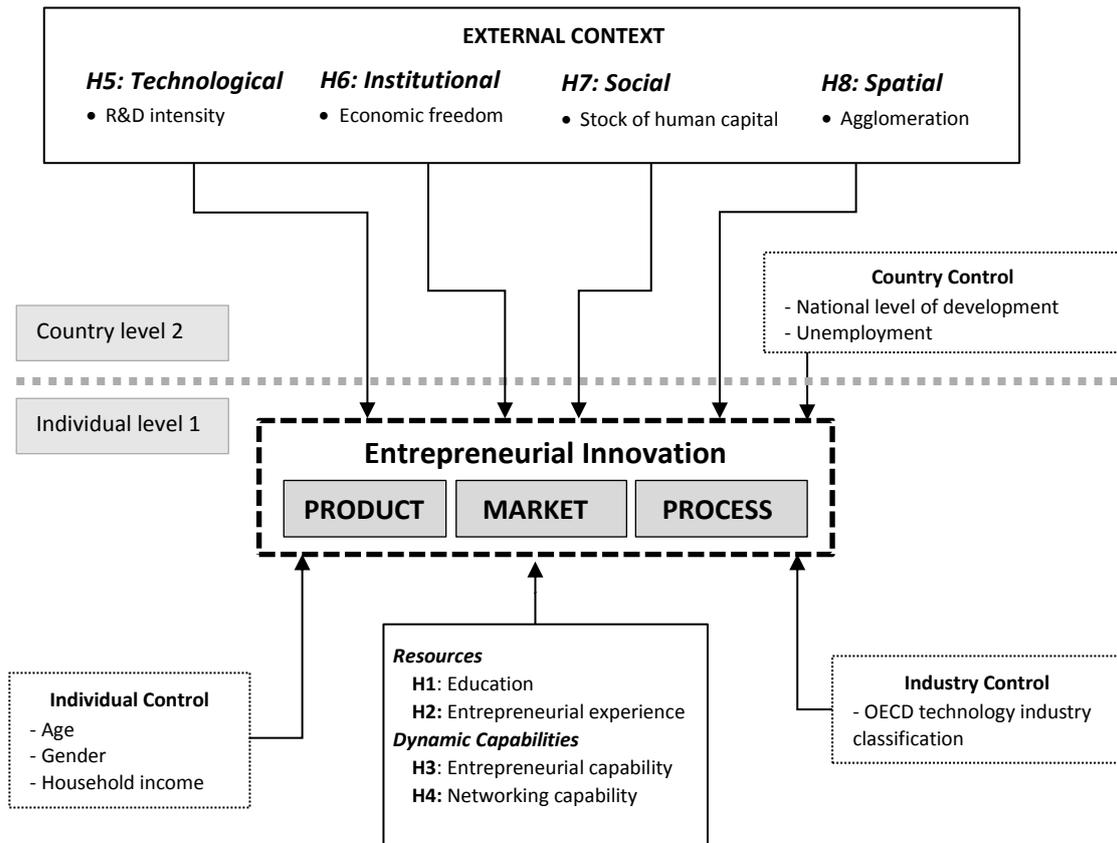
While the NSI literature emphasizes the role of institutions, the cluster literature argues that ultimately firms introduce and commercialize innovations, which are produced within geographic clusters of interconnected firms and institutions (Porter and Stern, 2001, Furman et al., 2002). Specifically, the cluster approach highlights the key role exerted by the spatial dimension on knowledge spillovers and innovation performance (Audretsch and Feldman, 1996). However, studies on the geography of innovation argue that the spatial dimension is not the main driver of innovations but that the capacity of institutional networks to act as a “catalysts” for innovation also depends on the region-specific social and structural characteristics (Rodríguez-Pose, 1999; Rodríguez-Pose and Crescenzi, 2008).

Similarly, the entrepreneurship literature has recognized the role exerted by these contextual influences (Acs et al., 2014; Gertler, 2010; Ghio et al., 2015; Hung and Whittington, 2011). Specifically, the knowledge spillover theory of entrepreneurship (KSTE) argues that innovative new ventures are the result of the exploration and exploitation of the new knowledge acquired by entrepreneurs in the technological context (Audretsch et al., 2006; Audretsch et al., 2008; Acs et al., 2009; González-Pernía et al., 2015; Ghio et al., 2015). Further, these knowledge flows are determined by the spatial context, that is, proximity decreases the “cost of accessing and absorbing knowledge spillovers”, and therefore enhances innovation performance (Audretsch and Lehmann, 2005). Likewise, KSTE introduces the concept of ‘knowledge filters’ as a set of institutions that could shape the flows and commercialization of knowledge by entrepreneurs (Acs et al., 2009; Carlsson et al., 2009).

KSTE, however, does not detail the working of the institutional context within the entrepreneurship process (Acs et al., 2016). To fill this research gap, the national systems of entrepreneurship (NSE) theory argues that a new venture’s feasibility and desirability are driven by the individual-level opportunity pursuit, and regulated by contextual country-level factors, such as institutions, culture, and resource availability (Acs et al., 2014). The NSE framework argues that the actions of entrepreneurs are important for the entrepreneurial process, but emphasizes that the interaction between institutions and entrepreneurs is critical in this process (Cowling, 2016). NSE theory stresses the need to consider both individual and country level factors when examining differences in new venture generation and innovativeness across countries (Schillo et al., 2016).

In sum, the literature reveals how entrepreneurial innovation arises from entrepreneurs’ resources and competencies to access and commercialize new knowledge. In turn, this knowledge creation, sharing and exploitation is influenced by the technological, institutional, social and spatial contexts. Therefore, the theoretical framework proposed in the current study (Figure 5.1) integrates the multiple factors influencing entrepreneurial innovations. Further, the study distinguishes between different types of entrepreneurial innovation, namely product, market and process, and argues that each form of innovation could be explained by different context and individual configurations (Agarwal and Shah, 2014; Dollinger, 1999).

Figure 5.1. Theoretical Framework.



### 5.2.1 Entrepreneurs’ resources and dynamic capabilities promoting entrepreneurial innovation

Innovation is a process derived from the strengthening of an organisation’s internal resources and capabilities (Vega-Jurado et al., 2008). Innovative new ventures create competitive advantages by using specific “*bundles of tangible and intangible assets*”, including knowledge, management skills and organizational processes (Barney et al., 2001; Katila and Shane, 2005).

Human capital theory affirms that individual skills, knowledge and capabilities are valuable resources and an important source of economic productivity, and that those skills can be built through education and experience (Becker, 1964). Entrepreneurs recognize opportunities based on their existing knowledge which creates a “*knowledge corridor*” allowing them to analyse, understand, interpret and realize new information and knowledge (Marvel and Lumpkin, 2007; Subramaniam and Youndt, 2005).

Formal education increases the entrepreneur’s stock of knowledge and reasoning skills which in turn increases cognitive and problem-solving performance and, therefore, innovation identification and exploitation (Marvel and Lumpkin, 2007; Smith et al., 2005). Entrepreneur’s education has been found positively related to innovative new

ventures (Romero and Martínez-Román, 2012). Similarly, accumulated experience (e.g., work, market, management and entrepreneurial) increases innovation opportunity recognition and development by providing relevant knowledge and skills which facilitate decision-making, exchange and combination of new information, identification of inconsistencies in information and better formulation of entrepreneurial strategy and the acquisition of resources (Marvel and Lumpkin, 2007; Smith et al., 2005). Research further suggests that different types of innovations may require different type of resources (Tödtling et al., 2009). For instance, entrepreneurial and managerial knowledge may be particularly relevant to technological new ventures for the optimal allocation of resources (Park, 2005). In contrast, prior general knowledge gained through formal education may provide sense-making capabilities for the market-technology linking required in product innovation (Dougherty et al., 2000; Smith et al., 2005). Accordingly, we test the following hypotheses:

**H1.** The entrepreneur's education is positively associated to entrepreneurial innovation.

**H2.** The entrepreneur's entrepreneurial experience is positively associated to entrepreneurial innovation.

Entrepreneurial innovation however not only arises from the possession of knowledge but also the appropriate capabilities to exploit it (Lockett and Wright, 2005). Specifically, the dynamic capabilities framework highlights the importance of business processes inside and outside firms to meet changing customer needs (Teece, 2014). Hence, the essential dynamic capabilities for innovative entrepreneurs in the early stages are those needed to assemble and utilize complementary assets, that is, capabilities to access external knowledge assets (*networking capability*) and capabilities to properly seize the opportunity through the appropriate architecture and strategic management of the new venture (*entrepreneurial capability*) (Eisenhardt and Martin, 2000; Paradkar et al., 2015; Teece, 2007). We therefore hypothesise that:

**H3.** The entrepreneur's entrepreneurial capability is positively associated to entrepreneurial innovation.

**H4.** The entrepreneur's networking capability is positively associated to entrepreneurial innovation.

## **5.2.2 Contextual factors promoting entrepreneurial innovations**

### **5.2.2.1 Technological context**

The technological environment depends on the common knowledge base (Andergassen et al., 2006), and could be broadly defined as the scientific knowledge and technology available to entrepreneurs within a specific country (Colovic and Lamotte, 2015). Empirical studies provide support for the relationship between the amount of new knowledge generated through R&D and national rates of entrepreneurial innovation (Audretsch and Keilbach, 2007). However, research also indicates that different types of innovation outcomes arise from different configurations of innovation systems, and,

therefore, different provisions of new knowledge (i.e. creation of knowledge through R&D or individual competence building), different demand-side requirements, and different institutions and support services (Edquist, 2011). In fact, the new knowledge generated within a system determines the technological opportunities and an increasing level of these opportunities reduces the cost of new product and processes creation and adoption by entrepreneurs (Martinez-Ros, 1999). The foregoing arguments lead to the following hypothesis:

**H5.** A country's technological context is positively associated to entrepreneurial innovation.

### **5.2.2.2 Institutional context**

The institutional context significantly influences the form and patterns of entrepreneurial processes within a specific country (Stam and Nooteboom, 2011; Levie et al., 2014). Institutions represent the rules and norms that articulate and organize the economy and, therefore, have an important impact on new ventures' innovativeness (Galindo and Méndez-Picazo, 2013; Stenholm et al., 2013). Thus, it is important to understand the institutional conditions that promote or hinder certain types of entrepreneurial innovation (Edquist, 2011). The entrepreneurship literature points in particularly to the need for sophisticated institutions favouring innovative new ventures as an advanced form of entrepreneurship (Estrin et al., 2009).

One of the main elements influencing the quality of institutions is economic freedom (DiRienzo and Das, 2015). Economically free institutions provide incentives to engage in innovation activities, such as high returns on innovation, higher property rights, and allocation of country's resources needed to support innovations (Berggren, 2003). However, the literature suggests that these conditions may affect entrepreneurial innovativeness differently. Advanced institutions may establish the necessary technical knowledge inputs, as well as the adequate regulative and normative framework for product and technological innovation (Kim and Lui, 2015; Sobel, 2008). Conversely, highly innovation-supportive institutions may induce the stagnation of technological innovations due to the '*destructive hypercompetition*' generated, increasing opportunities for market innovations which serve as a breaking point for institutional change (Henrekson and Sanandaji, 2011; Holmes et al., 2016). Hence, we propose the following hypothesis:

**H6.** A country's institutional context is positively associated to entrepreneurial innovation.

### **5.2.2.3 Social context**

The social context refers to "*any social entity, system or group of people involved in the innovation process*" (Baregheh et al., 2009, p. 1332). Past research highlights the importance of knowledge exchange and interactions among social agents for new knowledge production and, therefore, entrepreneurial innovation (Acs et al., 2009). The

entrepreneurship literature typically refers to social networks as a measure of the social context (Welter, 2011). Yet, the capacity of each nation to build a successful innovation infrastructure to generate technological and institutional contexts, which increase the innovativeness of the new ventures, is closely linked to the existing social structure (Rodríguez-Pose, 1999; Rodríguez-Pose and Crescenzi, 2008). The existing social context acts as a “social filter” which regulates the capacity of any society to adopt innovations and transform it into a business (Buesa et al., 2010; Rodríguez-Pose, 1999). Scholars have identified a variety of social structural characteristics that would make a country more likely to generate and adopt innovations, such as the accumulation of skills or the structure of productive resources. However, studies highlight the role of educational achievements within this contextual dimension (e.g. level of well-educated working population) in enabling knowledge flows and innovations (Crescenzi et al., 2007; Marrocu et al., 2013).

It is important to acknowledge that the existing socio-structural conditions may affect differently each innovative activity of the new ventures. The distinction between technical innovations (i.e. product and process) and market innovations reflects a general distinction between technology and social structure (Evan, 1966). Consequently, research suggests that market innovations follow a top-down process from the social environment of the firm whereas technical innovations tend to be internally sourced (Gopalakrishnan and Bierly, 2001). Nevertheless, empirical studies have demonstrated that the social structure of regions influence firms’ technical innovativeness (Cabrer-Borras and Serrano-Domingo, 2007). Thus, we propose the following hypothesis:

**H7.** A country’s social context is positively associated to entrepreneurial innovation.

#### **5.2.2.4 Spatial context**

The spatial context is an important dimension of the entrepreneurial context, overlaying the other contextual dimensions (Autio et al., 2014). The spatial dimension refers to the location in which entrepreneurs operate and its characteristics. The literature on economic geography of innovation argues that innovations emerge from the agglomeration of economic activities (Crescenzi et al., 2012; Moreno et al., 2005; Porter and Stern, 2001). The rationale behind this argument is that the concentration of skilled workers and firms in one spatial dimension increases the creation and flows of knowledge (Carlino et al., 2007). These flows of knowledge between agents refer to the concept of ‘knowledge spillovers’, which allow entrepreneurs to identify and exploit innovative opportunities, and proximity is an important factor for the diffusion of these spillovers (Acs et al., 2009; Audretsch and Feldman, 1996; Delgado et al., 2010). However, different typologies of innovations are differently determined by contextual factors, although the empirical evidence remains inconclusive (Damanpour, 2010). The literature has emphasised that proximity not only enhances technological knowledge spillovers and therefore technological innovations, but also the learning and sharing of market knowledge that finally results in increasing market innovations (Boschma, 2005; Gilbert et al., 2008). Hence, we pose the following hypothesis:

**H8.** A country's spatial context is positively associated to entrepreneurial innovation.

## 5.3 Methodology

### 5.3.1 Data and sample

The data for the quantitative analysis has been drawn from various sources. Data on entrepreneurial innovation was taken from the (cross-sectional) database created by the Global Entrepreneurship Monitor (GEM). This dataset captures the skills, activity and aspirations of entrepreneurs, and is extensively used to study entrepreneurial behaviour<sup>9</sup>. GEM Adult Population Surveys apply different survey techniques to avoid common method bias (see Bosma and Levie, 2010). To test our research hypotheses and capture contextual variables affecting entrepreneurial innovation, we merged GEM data with a variety of indicators and control variables from Eurostat, the World Data Bank and the Heritage Foundation. In the current study, we use a sample of 20 European countries<sup>10</sup> and 18,171 individuals for the period 2005-2010. We focus on individuals involved in the early-stages of entrepreneurial process (i.e. manage/own a business created in the past 42 months).

### 5.3.2 Measures

#### 5.3.2.1 *Dependent variables*

The GEM survey distinguishes between i) product innovation, ii) market innovation and iii) process innovation. *Product innovation* is a binary variable indicating whether entrepreneurs reported that all or some of their customers see their products or services as 'new'. *Market innovation* is a binary variable indicating whether there are few or no other businesses offering the same product. Finally, *process innovation* is a binary variable indicating whether the entrepreneur uses the latest technology (less than year ago). These variables have been used in previous empirical studies to measure entrepreneurial innovation (González-Pernía et al., 2015; Koellinger and Thurik, 2012; Laplume et al., 2014; Pathak et al., 2013).

#### 5.3.2.2 *Independent variables*

This study integrates two levels of analysis - individual and country level. Therefore, to test our hypotheses related to entrepreneur's resources and dynamic capabilities (H1 to H4), we use the entrepreneur's level of formal education (binary variable: 1=Graduate, 0=Non-graduate), previous entrepreneurial experience (binary variable: 1=yes, 0=no), the entrepreneur's self-assessed entrepreneurial capabilities (binary variable: 1=yes,

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<sup>9</sup> For more details on the GEM project see Reynolds et al. (2005).

<sup>10</sup> The study includes the following European countries: Belgium, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, The Netherlands, Portugal, Spain, Sweden, United Kingdom, Croatia, Slovenia, Greece, Austria, Latvia, Czech Republic and Romania.

0=no) (Gist, 1987) and networking capabilities (binary variable: 1= knows someone who has started a business in the last two years, 0=no) from the GEM survey.

To measure the country's technological context, we use R&D intensity measured as the amount of the money invested in R&D as percentage of the country GDP obtained from World Bank Indicators (WBI) (Audretsch and Keilbach, 2007). For the institutional context, we use the Index of Economic Freedom from the Heritage Foundation, capturing the quality of the institutional environment (Sobel, 2008). The Index of Economic freedom considers 10 factors: property rights, freedom from corruption, fiscal freedom, government spending, business freedom, labour freedom, monetary freedom, trade freedom, investment freedom and financial freedom). A country's overall score is calculated as the average of its 10 factors (scaled 0 to 100), being 100 the highest economic freedom. For the social context, we followed Crescenzi et al. (2012) and used the stock of human capital measured as the percentage of total population with tertiary education (Eurostat). Finally, for the spatial context, we used the logarithm of population density calculated from Eurostat as a proxy of agglomeration (Crescenzi et al., 2012).

### **5.3.2.3 Control variables**

Previous GEM-based research (Koellinger, 2008; González-Pernía et al., 2015) has shown that start-ups innovative behaviour depends on age, gender and the household income (1 = lower income tier; 2 = middle income tier; 3 = upper income tier), hence we control for these factors. The entrepreneur' industry affiliation determines their innovation behaviour (Audretsch, 1997). Thus, we control for industry effects (dummy variable: 1= High or Medium-tech; 0= Low-tech) following the OECD classification (OECD, 2005). At national level, previous studies have shown that a country's level of economic development influences the innovativeness of new ventures (González-Pernía et al., 2015), thus we control for the level of wealth of each country measured as the GDP per capita (as a logarithm and constant 2005 U.S. dollars). Finally, we also control for the productive use of human resources (Gordon, 2002) measured by the country's rate of unemployment (WBI). Details of the variables used in this study are shown in the Appendix (Table A5.1).

### **5.3.3 Estimation Models**

We use multilevel modelling which takes into account the hierarchical structure of the dataset in which individuals represent level one and the country level two. This hierarchical structure violates the OLS assumption of independence of all observations (Faraway, 2004). Observations from entrepreneurs within the same country are usually more similar to each other compared to those from a different country. Thus, the use of statistical methods that assume independence of observations can lead to biased and inefficient results due to an underestimation of standard errors given their non-normal distribution (Hofmann et al., 2000). A multilevel approach, therefore, allows addressing the unobserved heterogeneity of the database (Rabe-Hesketh et al., 2005).

We use a multilevel random intercept model that includes random intercepts and fixed slopes at the specified levels. The regression model is defined as (Gelman and Hill, 2006):

$$\pi_{ijk} = \text{probability}(\text{InnovationActivity}_{ijk} = 1)$$

(1)

$$\begin{aligned} \text{logit}(\pi_{ijk}) = & \beta_0 + \beta_1 \text{Age}_{ijk} + \beta_2 \text{Male}_{ijk} + \beta_3 \text{HHincome}_{ijk} + \beta_4 \text{Sector}_{ijk} \\ & + \beta_5 \text{Formal. Education}_{ijk} + \beta_6 \text{Entrepreneurial. Experience}_{ijk} \\ & + \beta_7 \text{Networking. Capabilities}_{ijk} + \beta_8 \text{Entrepreneurial. Capabilities}_{ijk} \\ & + \beta_9 \text{l. Wealth}_{jk} + \beta_{10} \text{l. Unemployment}_{jk} + \beta_{11} \text{l. R\&DIntensity}_{jk} \\ & + \beta_{12} \text{l. Economic. Freedom}_{jk} + \beta_{13} \text{l. Stock. HC}_{jk} \\ & + \beta_{14} \text{l. Agglomeration}_{jk} + u_j + \varepsilon_{ijk} \end{aligned}$$

(2)

\* l. is added in equation 2 to indicate that the variables are lagged one year.

The multilevel approach proposed assumes that an individual decision to start an innovative new venture (i.e. product, market or process innovation) is dependent on the individual characteristics as well as the contextual factors.

Where  $i$  represents a specific entrepreneur,  $j$  a specific country,  $k$  a specific year.  $\beta_0$  is the overall mean of the intercepts across country groups and the combination of  $u_j + \varepsilon_{ijk}$  represents the random part of the equation, in which  $u_j$  are the country residuals and  $\varepsilon_{ijk}$  those of the individual. In our multilevel framework, the term “random effects” indicates that we only allow the intercept term to vary randomly across countries to account for the variance of the dependent variable. We do not allow any of the regression coefficients (slopes) to vary randomly.

A three-step testing strategy was used for each innovation outcome (Hofmann et al., 2000). First, we test the significance of the between-country variance for each dependent variable to justify the use of multilevel models. Next, we added individual-level predictors and individual and country-level controls to test the effect of entrepreneur’s resources and capabilities on entrepreneurial innovation. Third, we added the country-level predictors and performed the likelihood ratio test to examine whether the inclusion of country predictors improves the goodness of fit, justifying the use of multilevel techniques to analyse the effect of contextual variables on entrepreneurial innovation. In addition, we established a lag structure in our data by measuring the contextual variables in year  $t-1$  to avoid simultaneity and revers causality problems (Bradley et al., 2010; Fritsch and Falck, 2007; Kim and Li, 2014). There are no problems of multicollinearity in the database as is indicated by the analysis of the variance inflation factor (VIF) values (all variables are below 10). Descriptive statistics, pairwise correlations and collinearity diagnostic for the variables used the empirical study can be found in the Appendix (Table A5.2).

## 5.4 Results and Discussion

As noted above, a necessary condition for running a multilevel model is that a significant between-group variance exists for the dependent variable (Bliese, 2000). Hence, in order to test the significance of the country membership effect on entrepreneurial innovation outcomes we performed a likelihood ratio test (LRT) for each dependent variable, comparing the null multilevel model to a null single-level model. We found a significant effect for product innovation (LRT = 75.199,  $p < 0.01$ ), market innovation (LRT = 467.244,  $p < 0.01$ ) and process innovation (LRT = 343.980,  $p < 0.01$ ). Furthermore, the intraclass correlation (ICC) values indicate that 1.6% of the total variance in entrepreneurial product innovation may be attributed to country characteristics, 2.4% for entrepreneurial market innovation and 12.5% for entrepreneurial process innovation. These results therefore suggest statistically significant differences in innovative entrepreneurship across countries, being the country effect greater for process innovation.

Table 5.1 presents the results of the multilevel random intercept model. The goodness-of-fit measures indicate that the models have an acceptable fit. Overall, results show that both individual and country level variables are significantly associated to entrepreneurial innovation, providing support to the view of the multidimensional nature of entrepreneurial innovation (Acs et al., 2014).

**Table 5.1. Multilevel Random Intercept model.**

	Product innovation		Market innovation		Process Innovation	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Individual-level control variables</i>						
Age	-0.013 (0.016)	-0.011 (0.016)	-0.020 (0.016)	-0.014 (0.016)	-0.151 *** (0.029)	-0.140 *** (0.030)
Gender (male)	-0.065 * (0.031)	-0.064 * (0.031)	-0.108 ** (0.031)	-0.107 ** (0.031)	-0.018 (0.057)	-0.024 (0.057)
Household income	-0.064 ** (0.019)	-0.070 *** (0.019)	0.005 (0.019)	-0.001 (0.019)	-0.101 ** (0.035)	-0.111 ** (0.035)
Low technology sector	-0.301 *** (0.061)	-0.297 *** (0.061)	-0.077 (0.061)	-0.083 (0.061)	-0.481 *** (0.096)	-0.490 *** (0.096)
<i>Individual-level variables</i>						
<b>H1:</b> Formal education	0.289 *** (0.035)	<b>0.297 ***</b> <b>(0.036)</b>	0.255 *** (0.036)	<b>0.265 ***</b> <b>(0.036)</b>	-0.008 (0.066)	0.024 (0.066)
<b>H2:</b> Entrepreneurial Experience	0.121 (0.065)	0.121 (0.065)	-0.093 (0.065)	-0.095 (0.065)	0.227 * (0.108)	<b>0.235 *</b> <b>(0.109)</b>
<b>H3:</b> Entrepreneurial capabilities	0.154 ** (0.048)	<b>0.151 **</b> <b>(0.048)</b>	0.239 *** (0.048)	<b>0.240 ***</b> <b>(0.048)</b>	-0.124 (0.082)	-0.132 (0.083)
<b>H4:</b> Networking capabilities	0.229 *** (0.032)	0.232 *** (0.032)	0.052 (0.032)	0.054 (0.032)	0.203 ** (0.059)	0.204 ** (0.059)
<i>Country-level control variables</i>						
Wealth (t-1)	-0.001 (0.042)	-0.132 (0.075)	0.114 ** (0.040)	-0.059 (0.057)	0.059 (0.104)	-0.191 (0.208)
Unemployment (t-1)	-0.138 *** (0.024)	-0.167 *** (0.026)	0.016 (0.0249)	-0.011 (0.025)	0.018 (0.046)	-0.046 (0.052)
<i>Country-level variables</i>						
<b>H5:</b> R&D intensity (t-1)		0.013 (0.067)		0.027 (0.051)		<b>0.927 ***</b> <b>(0.163)</b>
<b>H6:</b> Economic freedom (t-1)		-0.121 (0.075)		<b>0.137 *</b> <b>(0.061)</b>		<b>-0.394 *</b> <b>(0.175)</b>
<b>H7:</b> Stock of human capital (t-1)		<b>0.235 ***</b> <b>(0.056)</b>		<b>0.106 *</b> <b>(0.047)</b>		-0.051 (0.127)
<b>H8:</b> Agglomeration (t-1)		0.046 (0.071)		0.051 (0.050)		<b>0.715 **</b> <b>(0.239)</b>
Constant	-0.202 (0.111)	-0.077 (0.131)	-0.133 (0.110)	-0.133 (0.110)	-1.549 *** (0.230)	-1.903 *** (0.362)
<i>Model fit statistics</i>						
Num. of groups	18	18	18	18	18	18
Num. of observations	18,171	18,171	18,171	18,171	18,171	18,171
Degrees of freedom	10	14	10	14	10	14
Log-Likelihood	-12,265.9	-12,257.0	-12,298.4	-12,289.6	-5,006.2	-4,991.1
Chi-square	242.46	260.19	109.79	127.47	81.02	111.1
Probability > Chi-square	***	***	***	***	***	***
Pseudo R <sup>2</sup> <sup>a</sup>	0.040	0.052	0.029	0.033	0.146	0.422
LRT for goodness of fit <sup>b</sup>		***		**		***
Akaike Information Criterion	24,555.79	24,546.06	24,620.85	24,611.17	10,036.38	10,014.29

Note: Standard errors in parentheses. Level of significance: \* p<.05, \*\* p<.01, \*\*\* p<.001. Continuous variables are standardised. a. R-squared values according to Nakagawa and Schielzeth (2013). b. Likelihood ratio test (LRT) was conducted to confirm the goodness of fit. LRT was conducted between the model considering the contextual variables and the model without them for each dependent variable. LRT suggest a significant improvement of fit due to the addition the variables at country level.

### 5.4.1 Impact of entrepreneur's resources and dynamic capabilities on entrepreneurial innovation

Results show that entrepreneurs' formal education has a significant and positive effect on entrepreneurial product and market innovation whereas the coefficient for entrepreneurial process innovation is not significant. Therefore, we find partial support for H1. These results are consistent with previous studies showing how the general knowledge gained from formal education enhances the sense-making processes necessary for product innovation (Dougherty et al., 2000; Smith et al., 2005). Prior knowledge provides meaning to the connections between market opportunities for new products and the technology to develop them (i.e. sense-making), which allows the successful exploitation of these opportunities (Ravasi and Turati, 2005). Similarly, our findings support the view that entrepreneurial market innovations arise through the exploitation of entrepreneurs' existing knowledge base rather than the acquisition of new knowledge (Popadiuk and Choo, 2006).

However, results do not provide support for the positive effects of entrepreneurs' higher education level on entrepreneurial process innovations reported by González-Pernía et al. (2015). Our findings suggest that entrepreneurial process innovation relies on tacit knowledge, gained through experience, compared to explicit knowledge developed through formal education (Davidsson and Honig, 2003; Popadiuk and Choo, 2006). This hypothesising directly relates to our findings on the effect of previous entrepreneurial experience on entrepreneurial innovation (H2). Results show that previous entrepreneurial experience only has a positive and significant impact on entrepreneurial process innovation. Hence, we find partial support for H2. These findings side with Park (2005) and Wright et al. (2007) and highlight the key role exerted by managerial knowledge acquired from prior entrepreneurial experiences on entrepreneurial process innovativeness, which allows an optimal allocation of resources to correctly exploit and implement process innovation.

With regard to the effects of entrepreneurs' dynamic capabilities (H3 and H4), our results indicate that entrepreneurial and networking capabilities affect differently new ventures innovation activities. Specifically, results show that entrepreneurial capabilities have a significant and positive effect on entrepreneurial product and market innovativeness. This is consistent with past studies regarding entrepreneurial capabilities as a core capability for product innovative new ventures as it confers the ability to identify which products become valuable to consumers and feasible to produce (Antolín-López et al., 2015). These capabilities, additionally, provide appropriate management competences to effectively commercialize new products by adjusting strategic resources to the needs of the marketplace (Eisenhardt and Martin, 2000; Paraskar et al., 2015). For entrepreneurial market innovation, as noted by Kuratko and Audretsch (2009), entrepreneurial-related capabilities drive strategic actions aimed at finding new markets and acquiring unique positions, by formulating and implementing strategies to achieve domain redefinition. Contrary to previous studies (González-Pernía et al. 2015; Park, 2005), entrepreneurial capabilities are not significant for process

innovation suggesting that entrepreneurs tend to compete in hostile environments where entrepreneurial capabilities are not sufficient to provide a competitive advantage, and therefore the need for higher levels of technological capabilities to improve processes and cost competing (Ortega, 2010). Hence, we find partial support for H3.

Entrepreneurs' networking capabilities also show differential effects on new ventures' innovation. We find a significant and positive effect on entrepreneurial product and process innovation. These results are in line with previous research reporting how networking capabilities encourage innovation among entrepreneurs by enabling better access to resources and knowledge flows (Acs et al., 2009; Kaasa, 2009). For product innovation, our results support prior research suggesting that for new product idea generation and commercialization, entrepreneurs need capabilities to access external market knowledge (Paradkar et al., 2015). Additionally, our findings support the notion that rapid changes in technology require continuous knowledge acquisition to maintain firm competitiveness (Kogut and Zander, 1992). In this sense, social capital and networks create opportunities for knowledge acquisition and subsequent exploitation, being especially important for innovative process entrepreneurs due to the rapid technological change (Lane and Lubatkin, 1998; Yli-Renko et al., 2001). In contrast, the effect of networking capabilities on market innovative new ventures is not significant. This result suggests the 'dark side' of the relationship between knowledge transfer and social capital, and how closed networks exist, where access to outsiders is restricted, and, therefore, entrepreneurs only establish relations with a reduced number of contacts (Lambooy, 2010). Hence, we find partial support for H4.

#### **5.4.2 Impact of entrepreneur's context on entrepreneurial innovation**

Our results show that the level of R&D intensity has a positive and significant effect on entrepreneurial process innovation. In contrast, it is not significant for entrepreneurial product and market innovations. Hence, we find partial support for H5. This result is consistent with KSTE and NSE theories, which argue that entrepreneurial innovativeness results from the exploitation of knowledge available in their technological context (Acs et al., 2009; Audretsch and Keilbach, 2007; González-Pernía et al., 2015). However, we find support to the view that different provisions of knowledge foster specific typologies of innovation (Edquist, 2011). In fact, new technological knowledge generated within a specific system increases the technological opportunities for entrepreneurs and in particular process innovations (Martinez-Ros, 1999; Rouvinen, 2002). This reflects the important role exerted by the technological context on the transfer and adoption of new technologies by entrepreneurs (Griffith et al., 2004).

Our results for the institutional context (H6) show that the degree of economic freedom impacts differently each type of innovation. We find a positive and significant effect on entrepreneurial market innovation in line with earlier studies suggesting that economically free institutions foster new ventures innovative behaviour (Berggren, 2003; McMullen et al., 2008). However, economic freedom has a negative and

significant effect on entrepreneurial process innovations. This result suggests complex relationships between the degree of development of institutions and new ventures' process innovation. Although economically free institutions could foster technological entrepreneurship (by facilitating entrepreneurs' access to resources or protecting their technology through property rights), they might also impede these innovative new ventures through higher costs of technology adoption (e.g. entrepreneurs unable to afford the cost of patented or copyrighted new technologies) (Pathak et al., 2013). It appears, therefore, that an economically free institutional environment lead to '*destructive hypercompetition*' where market innovative entrepreneurs serve as a breaking point of stagnations for technological innovations as a result of resource constraints (Henrekson and Sanandaji, 2011; Holmes et al., 2016; Kim and Hoskisson, 2015). Hence, we find partial support for H6.

On the other hand, we find that the social context plays an important role on new venture's innovation, highlighting the importance of social structures in a country's ability to generate innovative new ventures (H7). In particular, we observe a positive and significant effect on product and market innovation. Hence, we find partial support for H7. These results are consistent with previous research indicating that a country's social structure determines its capacity to generate and adopt innovations (Crescenzi et al., 2012). Thus, entrepreneurs create innovative new ventures based not only on the new knowledge generated but also on the embodied knowledge of people (Audretsch and Lehmann, 2005). In fact, a country's human capital increases the country's ability to create and commercialize product innovation, by increasing the acquisition of new knowledge from customers (Buesa et al., 2010; Griffith et al., 2006; Rodríguez-Pose, 1999). Moreover, our results related to market innovation reflect how high stocks of human capital at country level enhances entrepreneurial absorptive capacity, which allows entrepreneurs recognize new market opportunities (Qian and Acs, 2013). Likewise, it reinforces the idea that technical innovation tends to be internally stimulated, while product and market innovations arise in response to society need and wants (Gopalakrishnan and Bierly, 2001).

Finally, regarding the spatial context (H8), agglomeration only has a positive and significant effect on entrepreneurial process innovation. Therefore, H8 is partially supported. In line with previous studies, proximity increases the diffusion of technological knowledge and the creation of technological new ventures (Acs et al., 2009; Audretsch and Feldman, 1996). However, in the case of new products or markets, agglomeration might per se not be enough to foster innovative behaviours among entrepreneurs, being necessary the presence of specialized institutions and services (e.g. knowledge intensive business services), and an adequate structure of regional social networks (Delgado et al., 2014; Smit et al., 2015).

### **5.4.3 Impact of control variables on entrepreneurial innovation**

Socio-demographic factors were significant with different effects on entrepreneurial innovative behaviour. Age has a significant and negative effect on entrepreneurial

process innovation whereas being a male entrepreneur is negatively associated to product and market entrepreneurial innovation. Results show a negative relationship between household income and the probability of becoming a product or process innovative entrepreneur. Industry technological characteristics are significant determinants of entrepreneurs' product and process innovation. Consistent with previous studies, we found a negative relationship between regional unemployment and innovative start-ups (Audretsch et al., 2015).

## 5.5 Conclusions

Recognizing that innovative new ventures are the main actors of economic change (Audretsch et al., 2006; Baumol, 2010) and that the decision to become an innovative entrepreneur is determined by personal characteristics and the external context (Acs et al., 2016; Schillo et al., 2016), it is critical to understand what drives an individual to engage in particular types of innovation and how the different contextual dimensions influence this process. Thus, based on GEM data for 20 European countries for the period 2005-2010, this research provides evidence that different entrepreneurial behaviours are determined by different internal and contextual factors.

Our findings indicate that entrepreneurs' build different innovative ventures based on different configurations of knowledge and capabilities. The study shows a significant and positive impact of formal education on entrepreneurial product and market innovation. Prior entrepreneurial experience was significantly associated with process innovations. Thus, the findings unveiled the importance of explicit knowledge for product and market innovation, providing the capabilities needed to market-technology linking and to effectively commercialize new products, and those necessities to define unique positions in new product-market arenas (Popadiuk and Choo, 2006; Smith et al., 2005). Conversely, tacit knowledge acquired through entrepreneurial experience impacts process innovation, which suggests that this knowledge enables the optimal allocation of resources required for process innovation (Wright et al., 2007). Our results also stress that entrepreneurial capabilities influence product and market innovations, which highlights the need for competencies for adequate venture planning and organization, fulfilling the market requirements (Paradkar et al., 2015). Networking capabilities appear to be an important determinant of product and process innovations due to the rapid change of technology and the need for market knowledge for product innovation.

Looking at the external factors determining entrepreneurial innovation, the social context plays an important role in product innovation, suggesting the importance of social structures in a country's ability to innovate (Rodríguez-Pose, 1999). Higher stocks of human capital enhance a country's capability to create and absorb product innovations by entrepreneurs. This result reinforces the notion that innovative new ventures not only depends on the knowledge embodied within the entrepreneur itself but also the knowledge of the society, which allows a better absorption of the new knowledge created within a country to transform it into new business, as well as a better acceptance of these innovations by the society (Qian and Acs, 2013). For entrepreneurial

market innovations, both institutional and social context plays a key role. This reflects the fact that market innovation arise in response to society needs and wants (Gopalakrishnan and Bierly, 2001).

We also show that technological, spatial and institutional contexts are significant for process innovations. The quality of the national innovation infrastructure is critical to create an environment that induces entrepreneurs to adopt the latest process technology (Griffith et al., 2004). Agglomeration has a positive effect on entrepreneurial process innovation; proximity increases the diffusion of technological knowledge. These results are consistent with KSTE theory (Acs et al., 2009). In contrast, an economically free institutional context has a negative impact on process innovations, suggesting that this typology of innovative new ventures in Europe may be negatively affected by the higher cost of new-technology adoption as consequence of stronger property rights and regulations, as well as hyper-competition which leads to process innovations be rapidly created and eroded (Kim and Hoskisson, 2015).

#### *Research and Managerial implications*

Our study has important implications for research and practice. This paper empirically analysed the joint impact of technological, institutional, social and spatial contexts on different entrepreneurs' innovative behaviours, addressing recent calls for more multilevel research considering both individual-level and combined contexts (Autio et al., 2014). Prior entrepreneurship research has analysed the innovativeness of the new ventures considering each context independently, thereby obviating the entrepreneurial ecosystem where entrepreneurs are embedded. Thus, this present work complements and extends previous multilevel research (NSE literature), by analysing how combined contexts shape different typologies of innovative new ventures. By examining three different entrepreneurial innovation behaviours (i.e. product, market and process innovations), this study goes beyond the NSE literature highlighting the role that different contextual dimensions have as external filters, as well as the internal attributes as internal filters, which trigger the transformation of new knowledge into different innovative activities depending on their nature.

On a practical level, our findings indicate the salient features of each different entrepreneurial innovation behaviour, which may facilitate the design of policies aimed at improving the European innovative entrepreneurial ecosystems since much of the policies foster replicative entrepreneurship (Brown and Mason, 2014). However, there is no 'one-size-fits-all' innovation policy; thus, different innovations require specific interventions within specific regions (Tödtling and Trippl, 2005). It implies that policy makers need continuous information on the specificities of each context to identify the weakness of entrepreneurial ecosystems both at entrepreneur and contextual level (Stam, 2015). In this sense, future research should explore what other regional attributes might influence different entrepreneurial innovative behaviours and extend this research to validate our findings at regional level.

Moreover, since education and training allow entrepreneurs to acquire and learn entrepreneurial competencies (Kuratko, 2005), European policies should promote effective entrepreneurial educational programs within specific contexts (e.g. clusters) addressing the needs of their entrepreneurial population based on their typology. In addition, we must not forget that entrepreneurial outcomes are mainly self-determined. Thus, new business owner/managers with innovative aspirations —especially product innovation— should develop their entrepreneurial capabilities and competencies through education and training, as well as increase their exposure to new knowledge and information and professional networks.

Although the current study provides interesting findings on innovative entrepreneurship, it has some limitations that could provide the basis for future research. Despite the GEM data provides the most relevant initiative to cross-country research on entrepreneurial activity, larger and complex databases of the same entrepreneur over time are needed. Likewise, due to the complexity of innovation processes across industries, future research should take into account industry-specific level variables. Also it would be interesting to improve these cross-country datasets with measures of the degree of radicalness of innovations, the typology of entrepreneurs' social networks, as well as entrepreneurs' previous experience (i.e. business, market, industry). Finally, recognizing that entrepreneurs develop their economic activity within entrepreneurial ecosystems, additional cross-regional research is needed to improve understanding of innovative entrepreneurs. System dynamics models may provide useful insights to understand the relationships between entrepreneurs and their environment.

## Appendix – Chapter 5

**Table A5.1. Definition of the variables.**

Variable	Description	Values	Source
<i>Dependent Variables</i>			
Product Innovation	Variable indicating whether the respondent believes that his/her clients (some or all) believe his/her product or service to be new.	1. Yes 0. No	GEM APS
Market Innovation	Variable indicating whether the respondent believes that few, or no other businesses offer the same products or services to their potential customers.	1. Yes 0. No	GEM APS
Process Innovation	Variable indicating whether the respondent believes that the technologies used to obtain his/her products became available in the last 12 months.	1. Yes 0. No	GEM APS
<i>Individual Level</i>			
Age	Age of respondents measured in years.		GEM APS
Gender (male)	Gender of respondents.	0. Female 1. Male	GEM APS
Household income	Household income.	1. Lowest 33% 2. Middle 33% 3. Upper 33%	GEM APS
Formal education	Variable indicating whether individual has Graduate experience.	1. Yes 0. No	GEM APS
Entrepreneurial Experience	Variable indicating whether individual has experienced a business failure in the last 12 months.	1. Yes 0. No	GEM APS
Entrepreneurial capabilities	Variable indicating whether the respondent believes that he or she “Has the knowledge, skills and experience required to start a business.”	1. Yes 0. No	GEM APS
Networking capabilities	Variable indicating whether the respondent knows someone who has started a business in the last two years.	1. Yes 0. No	GEM APS
Low technology sector	OECD technology industry classification.	0. Medium- or high-tech 1. No/low technology	GEM APS
<i>Country Level</i>			
Wealth (t-1)	Log. GDP per capita, constant at 2005\$USD.		WBI
Unemployment (t-1)	Share of the labour force that is without work but available for and seeking employment.		WBI
R&D Intensity (t-1)	Share of GDP Expenditures for research and development.		WBI
Economic Freedom (t-1)	Index of Economic Freedom.		Heritage Foundation
Stock of human capital (t-1)	Share of Population (ages 15 to 64) who have completed tertiary education.		Eurostat
Agglomeration (t-1)	Log. Population density.		Eurostat

Source: Authors based on GEM, WBI, Heritage Foundation and Eurostat.

**Table A5.2. Descriptive statistics and correlation matrix.**

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Product Innovation	0.42	0.49																
2 Market Innovation	0.48	0.49	0.259***															
3 Process Innovation	0.08	0.28	0.076***	0.059***														
4 Age	33.34	13.76	-0.012	0.026***	-0.049***													
5 Gender	0.61	0.48	-0.011	-0.027***	0.005	-0.015*												
6 Household income	2.08	0.81	-0.012	-0.018*	-0.008	-0.107***	0.082***											
7 Formal education	0.25	0.43	0.075***	0.061***	-0.009	0.040***	-0.032***	0.027***										
8 Entrepreneurial experience	0.05	0.23	0.011	-0.003	0.016*	0.011	0.050***	0.004	-0.003									
9 Entrepreneurial capabilities	0.88	0.32	0.027***	0.034***	-0.016*	0.029***	0.051***	0.068***	0.024**	0.021**								
10 Networking capabilities	0.60	0.49	0.065***	0.010	0.033***	-0.100***	0.075***	0.104***	0.067***	0.047***	0.093***							
11 Low tech. sector	0.93	0.24	-0.041***	-0.013	-0.038***	0.043***	-0.069***	-0.066***	-0.045***	-0.009	0.001	-0.031***						
12 R&D Intensity (t-1)	1.60	0.62	-0.015*	0.055***	-0.005	0.020**	0.001	-0.011	-0.027***	0.010	-0.029***	0.067***	-0.009					
13 Economic Freedom (t-1)	71.90	6.14	-0.037***	0.145***	-0.061***	0.165***	-0.029***	-0.141***	0.030***	0.033***	-0.013	-0.073***	-0.008	0.368***				
14 Stock of human capital (t-1)	25.40	4.00	0.004	0.068***	-0.046***	0.062***	-0.020**	-0.075***	0.037***	-0.015*	0.031***	-0.053***	-0.014	0.277***	0.637***			
15 Agglomeration (t-1)	4.83	0.69	-0.043***	0.091***	-0.002	0.115***	-0.030***	-0.095***	-0.044***	0.022**	-0.002	-0.086***	-0.025***	0.051***	0.476***	0.081***		
16 Wealth (t-1)	10.35	0.36	-0.018*	0.097***	-0.024**	0.135***	-0.026***	-0.126***	0.019**	-0.001	-0.001	-0.038***	-0.032***	0.600***	0.706***	0.636***	0.435***	
17 Unemployment (t-1)	7.77	3.04	-0.007	-0.112***	0.013	-0.187***	0.025***	0.149***	-0.101***	-0.018*	0.040***	0.006	0.032***	-0.273***	-0.521***	-0.093***	-0.457***	-0.454***

Source: GEM 2005-2010, WBI, Heritage Foundation and Eurostat. Continuous variables are standardised. Correlation matrix based on observations used in estimations. Level of significance: '\*\*\*' 1% '\*\*' 5% '\*' 10%.

## Chapter 6

# USING TWITTER TO IDENTIFY NEW FOOD TRENDS COMMUNITIES AND ADDRESS THEIR SOCIAL REPRESENTATIONS<sup>11</sup>

### 6.1 Introduction

Over the past decade the variety and number of innovative food trends like new products, new packages, new forms of consumption and commerce have increased considerably due to changes in consumer habits and globalization. However, failure rates are still high (Aqueveque, 2016; Bäckström et al., 2004). Some of these food trends generate insecurity and suspicion, whereas others are considered to be already familiar (Grunert and Valli, 2001). These perceptions directly affect consumers' behaviour and acceptance of innovations (King et al., 2008; Laros and Steenkamp, 2005; Siegrist et al., 2013). Therefore, a vast amount of research has been conducted to understand, conceptualize and measure food consumers' perception and adoption of innovations (Barrena and Sánchez, 2013).

The acceptance of these innovative food trends may be due to factors of the trend itself (e.g. benefits from healthy products or e-commerce), consumers' personal characteristics (e.g. demographics and innovativeness), or the influence of the social understanding of the food innovations (Bartels and Reinders, 2010). Indeed, recent studies suggest that a common understanding of food innovations is a strong predictor of innovation adoption decisions by food consumers (Bäckström et al., 2004; Huotilainen et al., 2006; Onwezen and Bartels, 2013). In response to changing environments, consumers socially form and share common knowledge that constitutes common sense about unfamiliar topics allowing them to deal with the novelty (Huotilainen et al., 2006; Moscovici, 2001). This form of knowledge with a practical vision of a common trend and developed through socio-cognitive processes is what the literature has referred to as social representations (Howarth, 2006; Jodelet, 2008). Social representations express an attitude (positive or negative) towards an object or topic and are shaped by the social interactions and the cultural context of social groups and communities (Howarth, 2006; Moscovici, 2001; Penz, 2006).

A series of studies have focused on how different social representations of food innovations vary across different communities and cultures (Barrena et al., 2015; Bartels and Reinders, 2010; Onwezen and Bartels, 2013). However, the specificity of studies on food consumers' social representations of innovations –based mainly on limited samples – has prevented the obtaining of generalizable results, and so has offered multiple

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<sup>11</sup> This chapter has been submitted as Pindado, E. & Barrena, R. (submitted). Using Twitter to identify new food trends communities and address their social representations.

research opportunities (Casini et al., 2015; Del Casino, 2015; Gurtner and Soye, 2016; Mäkinen et al., 2014).

These studies have been traditionally based on surveys, case studies and focus groups requiring large amount of time and resources. The growth of social media has changed the way in which consumers communicate and, therefore, the way in which researchers access consumers' information. As a result of this, a growing literature on consumer behaviour is exploring the use of social networks to measure consumers' attitudes (Pawar et al., 2015). Twitter is one of the most popular social platforms, and the attitudes and sentiments of individuals can be easily found in tweets (Chamlertwat et al., 2012). Additionally, this platform allows the geolocation of Twitter users, which can provide information of great interest for the study of communities and their social phenomena (Herdağdelen et al., 2013; Widener and Li, 2014).

Thus, this work investigates the potential of Twitter for studying the social representations of innovative food trends among different geolocated communities. We attempt to shed light on the cross-cultural differences and spatial dynamics of food consumers' behaviour across the world. For this purpose, we used 7,014 messages broadly containing the words "new foods" to capture multiple food related innovations, defined here as innovative food trends. We developed a three-step approach for the identification and characterization of food trends communities. First, we analysed the geographical distribution of the users who have posted tweets on this topic. Second, we applied a density based clustering algorithm to identify regions of consumers sharing content about innovative food trends. Finally, we carried out a sentiment analysis of tweets published within these areas to address the positive or negative attitude of their social representations towards food novelties.

In doing so, we contribute to the food innovation literature by showing the potential of using combined information of content and location from social platforms to understand the geographies of innovation. The methodology proposed can provide policy makers and marketers with a practical approach for the identification and surveillance of regions with a positive attitude towards their innovation.

This paper is structured as follows: first, we summarize prior research related to Twitter and its application to identifying communities and characterizing attitudes. Second, we provide details of the data and methodology employed. Third, the results and discussion are presented followed by their implications for scholars and practitioners. Limitations and future research lines are also covered. Finally, the paper sets out conclusions.

## 6.2 Related Work

Over recent years, microblogging platforms like Twitter have become a fruitful source of data for the study of human behavior (Hilbert, 2016). It has been successfully used to address a variety of research topics such as consumer confidence, political preferences and people's emotions on specific issues (O'Connor et al., 2010; Roberts, 2017). These

studies have been mainly based on the analysis of opinions expressed in Twitter messages using data mining techniques (Bifet and Frank, 2010).

However, users of these platforms not only provide the content of the message published but also secondary information such as localization, which can be easily harvested (Stefanidis et al., 2013). This location is not only geographic data per se; it also conveys contextual information about people's perceptions and preferences (Stefanidis et al., 2013). Thus, this information has been used to analyze human phenomena like crime distribution, identification of social points of interest, response to disasters and mobility patterns (Li et al., 2012; Sakaki et al., 2010; Steiger et al., 2015; Sun et al., 2013; Villatoro et al., 2013).

Within this spatial perspective, there is an increasing amount of research identifying geolocated online communities (Gruzd et al. 2016). These communities can be defined as groups of users that are more densely connected to each other than to the rest of the users of the platform (Bakillah et al., 2015). These groups, furthermore, can be characterized as communities of interest where individuals share information and engage in social interactions based on their common interests (Chiu et al., 2006). Hence, these communities have a structural dimension (i.e. bounded location) and a socio-psychological one in the form of a sense of shared values and understandings regarding a specific topic (Porter, 2004).

The structural identification of these communities within social platforms can be seen as a partitioning or clustering problem (Croitoru et al., 2015) while applying sentiment analysis provides the means to determine the attitudes of these communities (socio-psychological dimension) through the content that they have shared (Deitrick and Hu, 2013; Pang and Lee, 2008). The combination of both approaches leads to a more in-depth understanding of the social phenomenon studied (Deitrick and Hu, 2013). Consequently, there is an increasing number of studies based on Twitter adopting this joint approach (Gomide et al., 2011; Hridoy et al., 2015; Khanaferov et al., 2014; Torres and Vaca, 2017).

However, much of this research has been focused on event analysis and research on food consumers' behaviour is still scarce. Thus far, food researchers have addressed these dimensions (spatial and socio-psychological) separately, revealing this platform to be a rich data source to understand food consumer behaviour (Vidal et al., 2015; Vidal et al., 2016; Widener and Li, 2014). Thus, there have been recent calls for further investigation of the potential of social media platforms to discover consumers' openness to innovations (Carr et al., 2015; Rutsaert et al., 2015; Bartels and Onwezen, 2014).

Understanding what consumers think or believe about specific situations plays a critical role in the acceptance of innovations (Huotilainen et al., 2006) particularly in terms of the configuration of attitudes, emotions, and knowledge that are built and shared by social groups defined as social representations (Howarth, 2006; Jodelet, 2008). This socio-psychological process is directly related to the combined analysis of community identification and sentiment analysis developed in Twitter studies.

Therefore, in light of the above, the aim of this study is the identification of food trends geolocated communities, defined here as dense groups of people broadcasting information and opinions about innovative food trends (i.e. any food-related concept implying novelty), and the characterization of their attitudes towards this topic as a pillar of its social representation (Moscovici, 1961). Below, we describe the methodology employed to address these issues.

## 6.3 Data and Methods

### 6.3.1. Data collection

The data for this paper were acquired using R software and the “Twitter application programming interface” (API) through the twitterR package (Gentry, 2015; R Core Team, 2016). The data collection methodology consisted in retrieving the tweets containing the English words “new foods” over the 11-31 January 2016 period. In doing so, we captured messages related to the broad topic of innovative food trends in a simple way,<sup>12</sup> trends understood here as new directions in which a topic is developing or changing (Celi and Rudkin, 2016). The Twitter site allows for the retrieval of tweets published up to one week before the search in samples of 1,500 tweets. Therefore, several searches were conducted during this period to cover the maximum number of tweets possible.

An initial sample of 18,911 tweets was obtained. In order to clean the dataset for further analyses, the next step was data pre-processing, which is necessary as tweets frequently contain noise e.g. links, non-Latin characters, numbers and users. Likewise, due to the gathering procedure and the possibility of redundancies, duplicate tweets were removed.

The clean data contained information regarding the username of the author of each tweet, which can be used to get the location provided by users in their own profile using the twitterR package. Once we had obtained the location, we were able to geolocate each tweet author using the "Google geocoding web-service" through the "dismo" package (Hijmans et al., 2017). After data geolocation, we obtained a localized sample of 7,014 messages about innovative food trends.

### 6.3.2 Spatial analysis of georeferenced tweets and community identification

To analyse the spatial distribution of tweets about food trends across the world, we performed a kernel density analysis using the tweet’s user location. Kernel density is a

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<sup>12</sup> Guerrero et al. (2009), identified “novelty-change” as one of the main dimensions that consumers relate to innovative food products. This, together with the fact that microblogging services like Twitter only allow for the sharing of short pieces of information usually written in an informal language, led us to select the terms new and foods to capture the tweets referring to innovative food trends (Thelwall et al., 2011).

non-parametric method to estimate the intensity of points by calculating a smooth surface based on a bivariate normal probability distribution (Bailey and Gatrell, 1995). This approach has been extensively used to explore spatial patterns in consumer behaviour and Twitter's sentiment analysis (Roig-Tierno et al., 2013; Widener and Li, 2014).

We applied spatial clustering techniques in order to analyse the spatial patterns of these users more in depth and to discover the underlying distribution of geolocated communities. Density-based cluster methods are the most frequent approach for assessing non-random geospatial patterns (Kriegel et al., 2011). These aggregating mechanisms have the capacity to identify high density regions separated from regions with low densities in spatial datasets. Among these methods, the Density Based Spatial Clustering of Application with Noise (DBSCAN) algorithm, proposed by Ester et al. (1996), is one of the most used due to its capacity to find spatial clusters with arbitrary shapes in spatial data with noise (Bakillah et al., 2015; Han et al., 2001; Khalifa et al., 2017). Many authors have used this approach to detect spatial clusters among Twitter users based on the advantages offered by DBSCAN such as the identification of noise points and clusters of different sizes and shapes without the pre-assumption on the number of clusters (Baralis et al., 2013; Khalifa et al., 2017; Luo et al., 2016; Stefanidis et al., 2017; Torres and Vaca, 2017).

DBSCAN is based on the idea that the density of each neighbourhood (i.e. cluster) has to exceed a given threshold defined by the cluster core point, the radius of the cluster ( $\epsilon$ ) and the minimum number of points inside the cluster (*MinPts*), which determines density. Thus, DBSCAN algorithms are sensitive to the  $\epsilon$  and *MinPts* thresholds.

To describe the DBSCAN method, we need the following concepts based on a dataset D:

- The neighbourhood within a radius  $\epsilon$  of a given point  $p$  ( $p \in D$ ) is the subset called  $\epsilon$ -neighbourhood (denoted by  $N(p)$ ) defined as:  $N_\epsilon(p) = \{q \in D \mid \text{dist}(p,q) \leq \epsilon\}$
- A point  $p$  ( $p \in D$ ) is denoted as a core point if the  $\epsilon$ -neighbourhood of  $p$  contains at least *MinPts* points.
- A point  $p$  ( $p \in D$ ) is denoted as a noise point if the  $\epsilon$ -neighbourhood of  $p$  contains less than *MinPts* points.
- A point  $q$  ( $q \in D$ ) is denoted as a directly density reachable point from the point  $p$  ( $p \in D$ ) if  $p$  is a core point and  $q$  is in the  $\epsilon$ -neighbourhood of  $p$ .
- A point  $p$  ( $p \in D$ ) is denoted as a density reachable point from the point  $q$  ( $q \in D$ ) if  $p$  is in the  $\epsilon$ -neighbourhood of  $q$  and  $q$  is not a core point but they are reachable through a chain of directly density reachable points.
- Two points  $p$  ( $p \in D$ ) and  $q$  ( $q \in D$ ) are denoted as density connected points, with respect to  $\epsilon$  and *MinPts*, if there exists a point  $o$  ( $o \in D$ ) such that  $p$  and  $q$  are density-reachable from  $o$  with respect to  $\epsilon$  and *MinPts*.

DBSCAN algorithm starts with an arbitrary point  $p$  ( $p \in D$ ), finds all density-reachable points from  $p$  and if  $q$  ( $q \in D$ ) is a core point a cluster will be created. The algorithm iteratively adds points that do not correspond to any cluster and are directly density reachable from the new cluster's core points. When the new cluster cannot be expanded, a cluster is completed. Then, DBSCAN arbitrarily selects a remaining unvisited point and the clustering procedure continues until all points are visited and new clusters cannot be created. Those points excluded from the clusters identified are marked as noise. As previously stated, the algorithm requires the definition of two parameters ( $\epsilon$  and  $MinPts$ ), which requires a sorted k-dist graph analyzing the nearest distances between points to find the suitable value of  $\epsilon$  (Ester et al. 1996).

### 6.3.3 Sentiment analysis

To explore the general orientation (i.e. attitude that expresses a position) of the social representations of innovative food trends across the communities, a sentiment index was developed using the tweets generated by users within the identified clusters (Bauer and Suerdem, 2016). Sentiment analysis can be defined as the field of study that deals with people's opinions about products, organizations, events, or topics expressed in written texts (Liu, 2015). As Pang and Lee (2008) indicate, sentiment analysis methods are based on two basic steps: opinion extraction and sentiment classification. Opinion extraction is the task of obtaining subjective texts, while sentiment classification is the task of classifying opinion words into sentiment categories. These tasks can be carried out to different levels of detail such as word, sentence, document and feature (Kumar and Sebastian, 2012).

A broad approach to sentiment classification is to use a pre-existing lexicon with information about which words and sentences are positive and which are negative (Wilson et al., 2009). These approaches are usually called dictionary-based methods; the semantic orientation score (i.e. the degree of positive or negative sentiment scaled from +1 to -1 respectively) is calculated by point-wise mutual information measures (Wang et al., 2014). However, it is important to note that the sentiment polarity of a given sentence may be different from the prior polarity of the words that compose that sentence (Wilson et al., 2009).

Hence, as Twitter allows users to share pieces of information limited to 140 characters containing several phrases, we adopted a sentence-level sentiment approach (Yu et al., 2013). Specifically, we performed a dictionary-based approach based on Jocker's (2017) dictionary, which calculates the average score sentiment taking into account contextual valence shifters of the sentences contained in each tweet (Rinker, 2017).

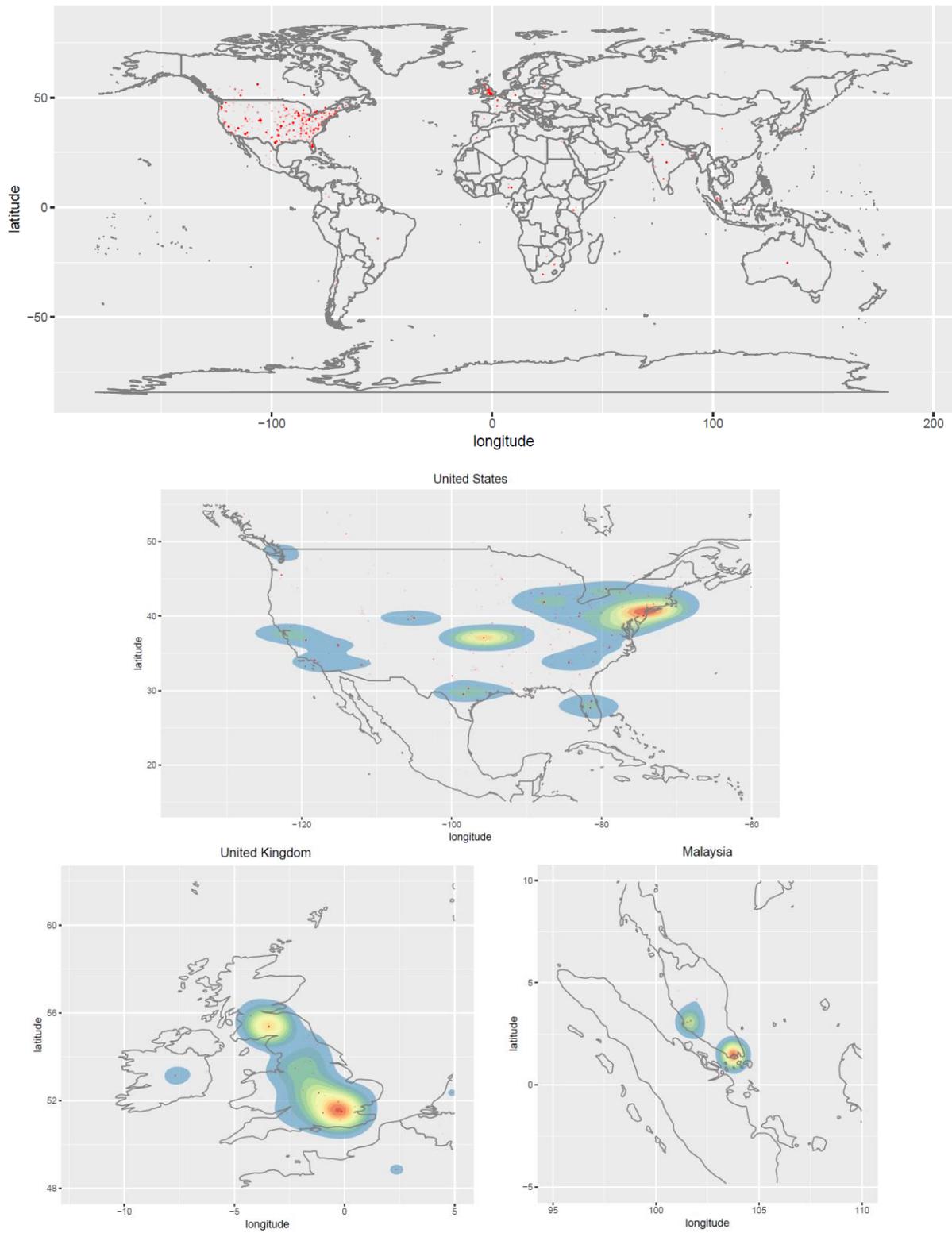
## 6.4 Results and Discussion

Before examining the geolocated communities of Twitter users concerned with innovative food trends and their sentiments, it is important to offer an overview of the spatial distribution of data collected across the world. Thus, Figure 6.1 shows the data

points on a world map. As expected, there is a greater concentration of tweets among English speaking countries due to the nature of the dataset and, furthermore, we can appreciate several areas with a high intensity of points. Although the points are plotted slightly transparently, the patterns observed are in accordance with population density areas, which suggests “overplotting” problems (Poorthuis and Zook, 2015). In other words, “points are *layered on top of one another to the point*” which makes it difficult to discern meaningful spatial patterns (Shelton, 2017). Furthermore, this reflects the fact that urban residents are more likely to use Twitter than rural users (Smith and Brenner, 2012).

Therefore, to avoid the problem of overplotting and visually identify high aggregation areas, we generated a heat map (see Figure 6.1) using kernel density estimation (Poorthuis and Zook, 2015). In Figure 6.1 we show the three main regions, or global hotspots, corresponding to a higher density of users tweeting about innovative food trends. Specifically, we can identify several areas within the United States (namely, California, Texas Triangle/Gulf Coast, Florida, Great Lakes/Piedmont Atlantic/Northeast, and Cascadia), the United Kingdom area, and finally the area of Malaysia. Overall, these patterns seem to correspond to areas of higher density of English speakers and urban agglomerations (Pavalanathan and Eisenstein, 2015). However, it is important to notice the low densities shown in the Australian region and other areas with high population of English speakers. This reinforces the idea that users make different uses of social media to share their experiences, in this case about food, depending on the sociocultural values of their environment (Hodeghatta and Sahney, 2016).

Figure 6.1. Geolocated tweets and kernel density surfaces.

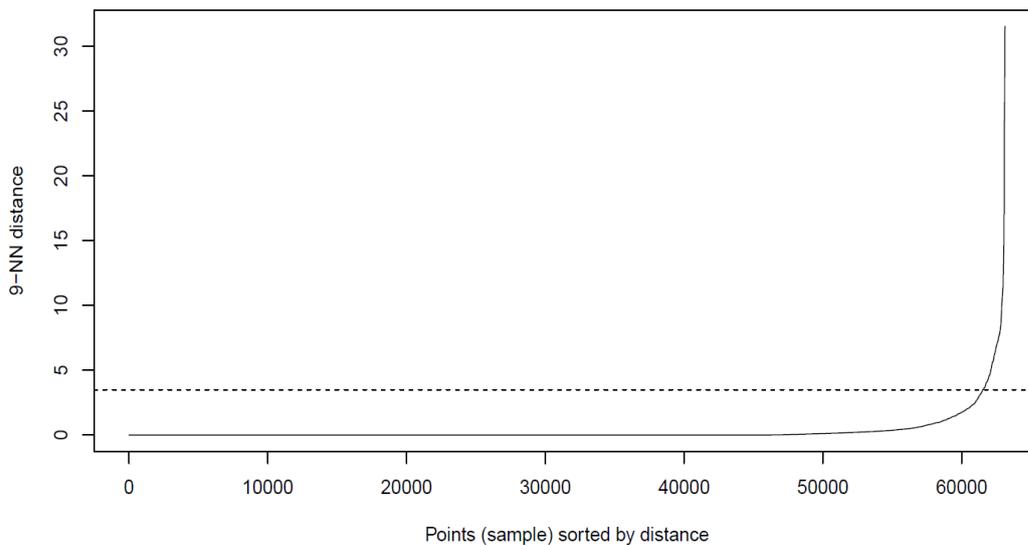


Note: Location of tweets (red points) based on users' profile information and kernel density surfaces where red tones correspond with higher densities and blue ones with lower densities.

Nevertheless, heat maps assume that the underlying spatial processes are continuous, which may hinder the identification of social phenomena like geolocated communities (Poorthuis and Zook, 2015). Thus, in order to address in a meaningful way how individuals discussing innovative food trends are spatially distributed, we applied the DBSCAN algorithm to group users into spatial communities based on users' proximity (Bakillah et al., 2015).

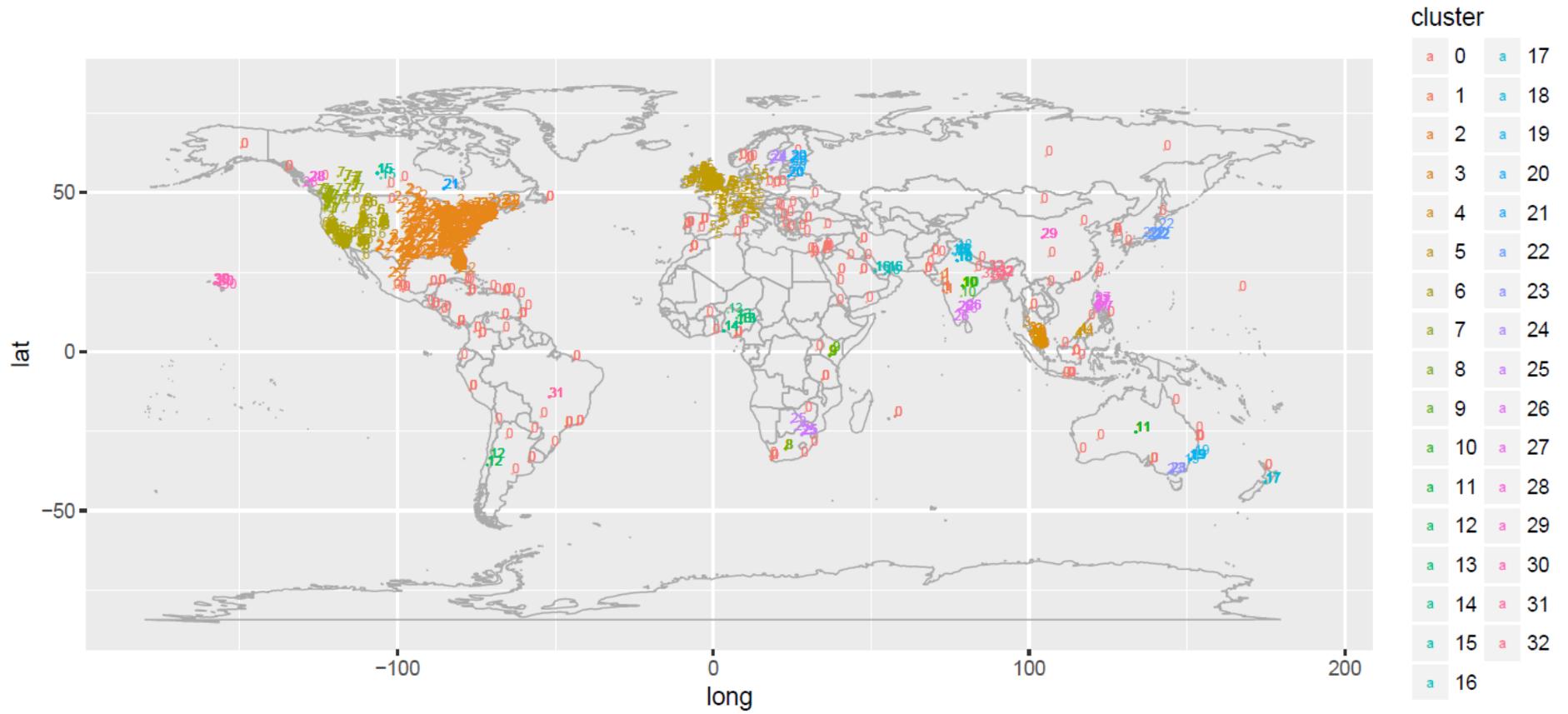
Before running the DBSCAN algorithm it is necessary to select its parameters  $\epsilon$  and  $MinPts$ . Here, we employ the heuristic method presented in Birant and Kut (2007), which suggests that,  $n$  being the size of the dataset, the parameter  $MinPts \approx \ln(n)$  and  $\epsilon$  must be estimated depending on the value of  $MinPts$ . This method requires the calculation of the distances to the  $k$ -nearest neighbours for each point (i.e. each located tweet),  $k$  being equal to  $MinPts$ . The threshold point is determined as the first "valley" of the sorted  $k$ -dist graph, the optimum  $\epsilon$  being the distance between this point to its  $k$ th nearest neighbour. Figure 6.2 shows the  $k$ -dist graph ( $k=9$ ) for the dataset, which indicates a threshold point of  $\epsilon = 3.5$  and  $MinPts = 9$ . We empirically tested the selection of the  $\epsilon$  parameter based on the minimum noise generated (Villatoro et al., 2013).

**Figure 6.2. Sorted 9-dist graph for points of the dataset.**



We applied a DBSCAN algorithm based on the above parameters, obtaining 32 clusters for the global dataset. Table 6.1 summarizes the characteristics of the clusters identified and Figure 6.3 shows their spatial distribution. A detailed map of the clusters distribution can be found in the Appendix.

Figure 6.3. Spatial distribution of clusters identified using the DBSCAN algorithm.



Results showed five main clusters –or communities – located in North America (clusters 2, 6 and 7), Europe (cluster 5) and Malaysia (cluster 3) accounting for the 87% of the total users sharing messages about food trends. Again, this pattern is in line with the nature of the Twitter data in that users tend to share messages in the predominant language in their area and the density of population directly influences the size of the communities (Pavalanathan and Eisenstein, 2015). However, the clusters generated differ substantially from the initial heat maps distribution, which reinforces the necessity for spatial clustering techniques to identify spatial patterns of human behaviour affected by different overlapped processes (Han et al., 2001; Pei et al., 2009).

In particular, we identified three very crowded clusters distributed in North America. The first and biggest is located in the east of North America, followed by a second region in the south-west and finally a third region on the north-west coast. Additionally, we can identify the other two main communities located in Europe (covering the United Kingdom, Western Europe, the east of Spain and north of Italy) and Malaysia. We can also appreciate how the rest of clusters identified across the world are distributed heterogeneously. For example, we could identify five clusters within India. Overall, the spatial distribution of these clusters suggests that, like other human behaviours, the formation of food trends communities depends not only on geographic and administrative boundaries but on cultural aspects and human interactions (Gao et al., 2017).

**Table 6.1. Characterization of clusters identified using DBSCAN and sentiment analysis.**

Cluster id	Associated Region	Cluster Observations			Sentiment Analysis	
		Border	Seed	Total	Mean	SD
0	Noise	244	0	244	0.364	0.236
1	Gujarat (India)	6	24	30	0.279	0.210
2	East of North America	14	3880	3894	0.299	0.241
3	Malaysia	1	266	267	0.740	0.165
4	Sabah (Malaysia)	5	4	9	0.472	0.328
5	Europe	9	780	789	0.315	0.263
6	South-West of North America	3	856	859	0.300	0.231
7	North-West of North America	0	284	284	0.273	0.208
8	South Africa	0	16	16	0.321	0.248
9	Kenya	0	17	17	0.237	0.115
10	India	0	41	41	0.314	0.206
11	Australia	0	24	24	0.288	0.217
12	Chile	0	9	9	0.403	0.215
13	Nigeria	1	59	60	0.219	0.167
14	Lagos (Nigeria)	0	65	65	0.183	0.136
15	Canada	0	83	83	0.370	0.301
16	Dubai- Qatar	4	12	16	0.301	0.179
17	New Zealand	0	9	9	0.252	0.293
18	Punjab (India)	1	31	32	0.353	0.185
19	Sydney (Australia)	0	24	24	0.362	0.234
20	Baltic States	6	10	16	0.403	0.160
21	Ontario (Canada)	0	12	12	0.382	0.320
22	Tokyo (Japan)	0	52	52	0.351	0.125
23	Melbourne (Australia)	0	10	10	0.365	0.144
24	Sweden	0	10	10	0.275	0.264
25	Pretoria (South Africa)	2	13	15	0.442	0.254
26	Karnataka (India)	0	19	19	0.258	0.221
27	Philippines	0	31	31	0.348	0.218
28	British Columbia (Canada)	0	23	23	0.313	0.217
29	China	0	9	9	0.419	0.150
30	Hawaii	0	13	13	0.156	0.230
31	Brazil	0	10	10	0.406	0.209
32	Bangladesh (India)	4	18	22	0.304	0.130

As Veltri and Atanasova (2015) stressed, the emotional component of Twitter messages provides valuable information to understand the social representations (i.e. social configuration of attitudes, beliefs, knowledge, and emotions) developed by distinct social groups towards a specific phenomenon. Therefore, and in order to gain insight of the social understanding of innovative food trends, we developed a dictionary-based sentiment analysis that calculates the average polarity score of the tweets shared within

the identified communities. This methodology enabled us to analyse the positive or negative attitude of communities' social representations towards food innovations across the world.

The sentiment scores of the communities are provided in Table 6.1. The overall sample has an average sentiment score of 0.335, which indicates that the users of this social platform tend to have a positive social attitude towards food trends. This is consistent with the fact that Twitter users are "information seekers", which is positively related to the propensity to adopt innovations (Rogers, 1995).

Additionally, we verified whether there is significant variance across the identified communities in terms of the sentiment score (Bliese, 2000). For this purpose, we performed a likelihood test (LRT) with a significant effect being found with a LRT of 813.16 ( $p < 0.01$ ). This indicates that users within the same spatial community are usually more similar to each other than other users in a different community, which reinforces the validity of the proposed clustering approach for identifying located thematic communities with shared values and social understandings (Porter, 2004).

The analysis of the differences across these communities revealed interesting results. For example, the highest-scoring polarity was found for Malaysia (mean 0.740) and the lowest one for Hawaii (mean 0.156). Likewise, the communities within North America present similar scores (about 0.30), the north-west of North America being the region with the slightly lower score (mean 0.273). Moreover, the European region presents higher scores (mean 0.315) than North America.

These findings revealed a complex picture of the potential factors (e.g. territorial identity, multiculturalism and food policies) that determine the positivity of the social representations with regard to innovative food trends (Bäckström et al., 2004; Goodman, 2016). Nevertheless, the propensity of specific communities like Malaysia to have a positive attitude towards food trends show the important effect that the cultural environment, its diversity, and the knowledge flows between members may exert on the building of positive social representations towards innovation in food consumption (Bartels and Reinders, 2010; Onwezen and Bartels, 2013; Pieniak et al., 2009). Further research is needed in order to determine the extent to which these socio-cultural factors influence social knowledge about food innovations.

Finally, it is important to note that Twitter users interact differently under specific conditions, which may imply different behaviours at the local scale (Lansley and Longley, 2016). Therefore, we aggregated users' sentiments and represented them in a grid map in order to investigate the spatial patterns within the communities. The results for the two largest communities in terms of surface area are presented in Figure 6.4 and Figure 6.5. We can observe how the concentrations of users with positive sentiments (i.e. hotspots) are heterogeneously distributed among the east of North America, whereas in Europe we can see that they are concentrated in the south-east. These patterns again reinforce that social representations are complex phenomena (Jodelet, 2008).

Figure 6.4. Cluster 2 “East of North America” spatial distribution of aggregated sentiments.

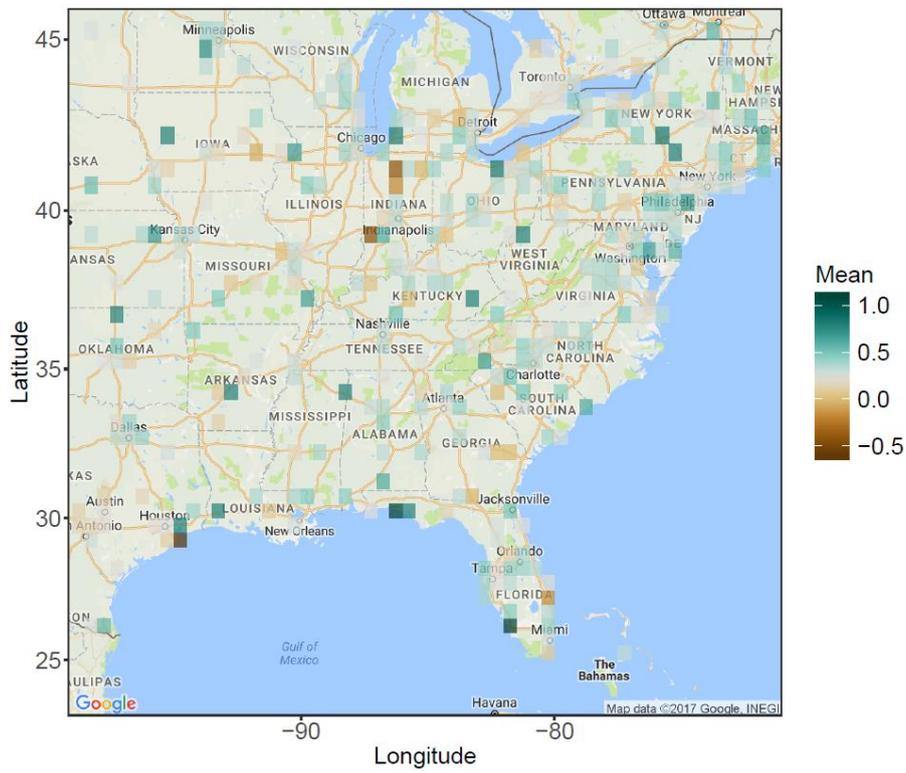
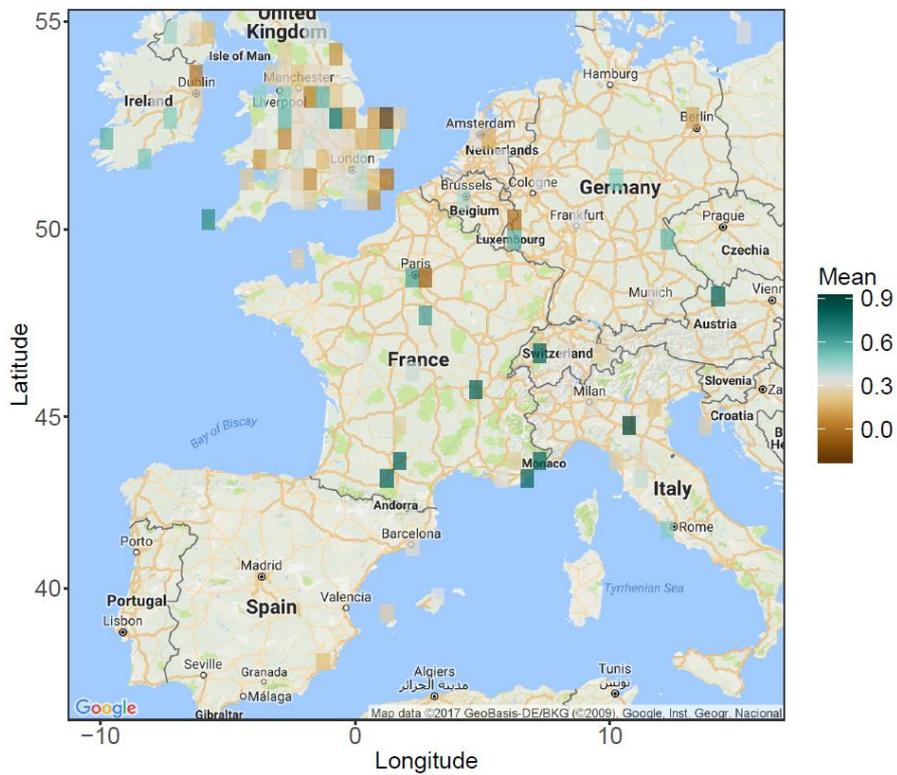


Figure 6.5. Cluster 5 “Europe” spatial distribution of aggregated sentiments.



In light of the above discussion, this paper offers a series of contributions to the literature on food consumers' innovative behaviour.

First, our methodology revealed how the spatial information associated with social platforms could provide valuable information to improve our knowledge regarding human phenomena (Khalifa et al., 2017; Scellato et al., 2011). In particular, community identification among users of social media employing spatial clustering techniques provides insights into cross-cultural perceptions of food innovations and global dynamics which cannot be reached by traditional studies. Moreover, the analysis of the sentiments shared within these communities goes beyond simple topic analyses, and leads to capturing the attitudes of these social groups on specific objects. In this sense, the application of social representations theory provides a well-established conceptual framework to address shared cultural values and meanings among Twitter users.

Second, since marketers need to identify target groups who are willing to buy and accept their innovations (Hoffmann and Soye, 2010), the approach presented here allows them to identify, characterize and monitor social food innovative regions and social hotspots, which can provide valuable information to design tailored marketing strategies for food innovations taking into account the characteristics and location of target communities (Culnan et al., 2010; Dholakia et al., 2004; Onwezen and Bartels, 2011). This is relevant for global marketers due to sociocultural differences among regions determining the need to pursue "glocalization" (i.e. necessity for local/regional adaptations) of their of business activities as a way of overcoming intense global competition (Matusitz, 2010; Sinclair and Wilken, 2009; Svensson, 2001).

Despite these contributions, we have to acknowledge the limitations of this research. As Vidal et al. (2015) pointed out, Twitter data are not a panacea but can provide a useful source of information for consumer researchers as long as their limitations are recognized. Among these are the facts that Twitter users are not representative of population due to the use of this platform being elective and influenced by urban agglomerations (Vidal et al., 2015). Likewise, the number of located tweets is small and the methods to infer users' location, despite their validity, are still imperfect (Alex et al., 2016). Furthermore, the content of shared tweets is influenced by personal perceptions which may be sensitive to spatiotemporal events (Widener and Li, 2014). Regarding the methods used to analyse this information, sentiment analysis techniques may fail to capture ambiguous meanings and DBSCAN algorithms are sensitive to parameters' values selection (Steiger et al., 2016).

Nevertheless, the approach presented provides a basis for future research employing geospatial and content information from social media platforms on food consumers' behaviour. In light of the multiple drivers that may impact food choices, which creates a complex picture, further investigation should include multilevel strategies to address the heterogeneity and community effects revealed here.

## 6.5 Conclusion

This paper proposes a geospatial analysis of attitudes toward innovative food trends among different communities using Twitter data. The research has demonstrated how content and spatial data harvested from Twitter can provide a valuable source of information for the analysis of social representations about specific topics across different cultures. The findings revealed density clustering and sentiment analysis to be valid methodologies to identify communities with significantly different socio-psychological processes. Based on the cross-cultural differences and spatial distribution, social representations among food consumers are identified as a complex factor which requires further research in order to understand the role –highlighted here – that territorial identity, diversity and flows of information may play in positive attitudes. Furthermore, the approach proposed could serve to identify agri-food consumer behaviour regarding multiple issues like food crises, and their social hotspots. Finally, from the practical point of view, this analysis could be used to design specific marketing and promotion strategies.

## Appendix – Chapter 6

Figure A6.1. Spatial distribution of clusters identified using DBSCAN algorithm in North America.

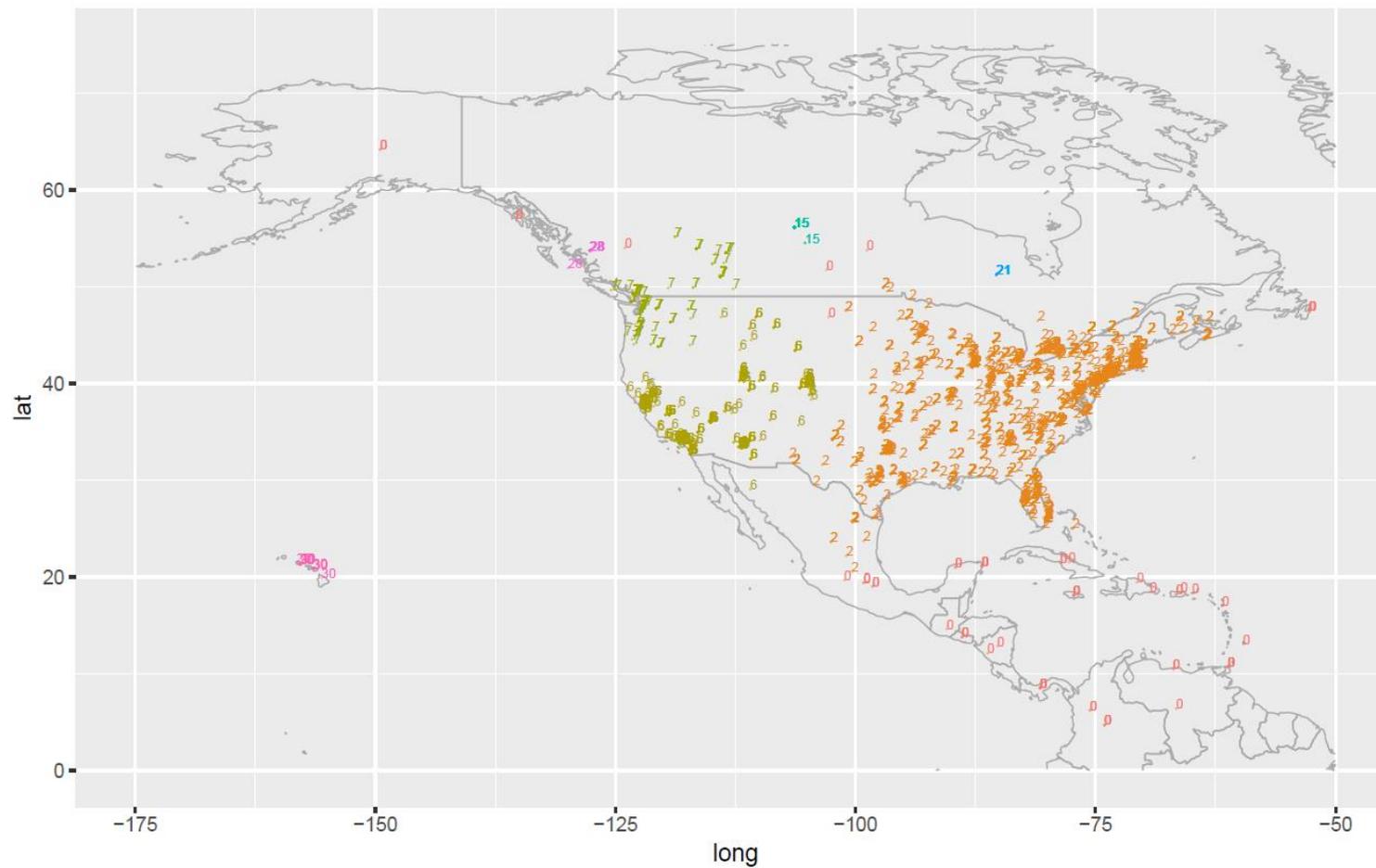


Figure A6.2. Spatial distribution of clusters identified using DBSCAN algorithm in South America.

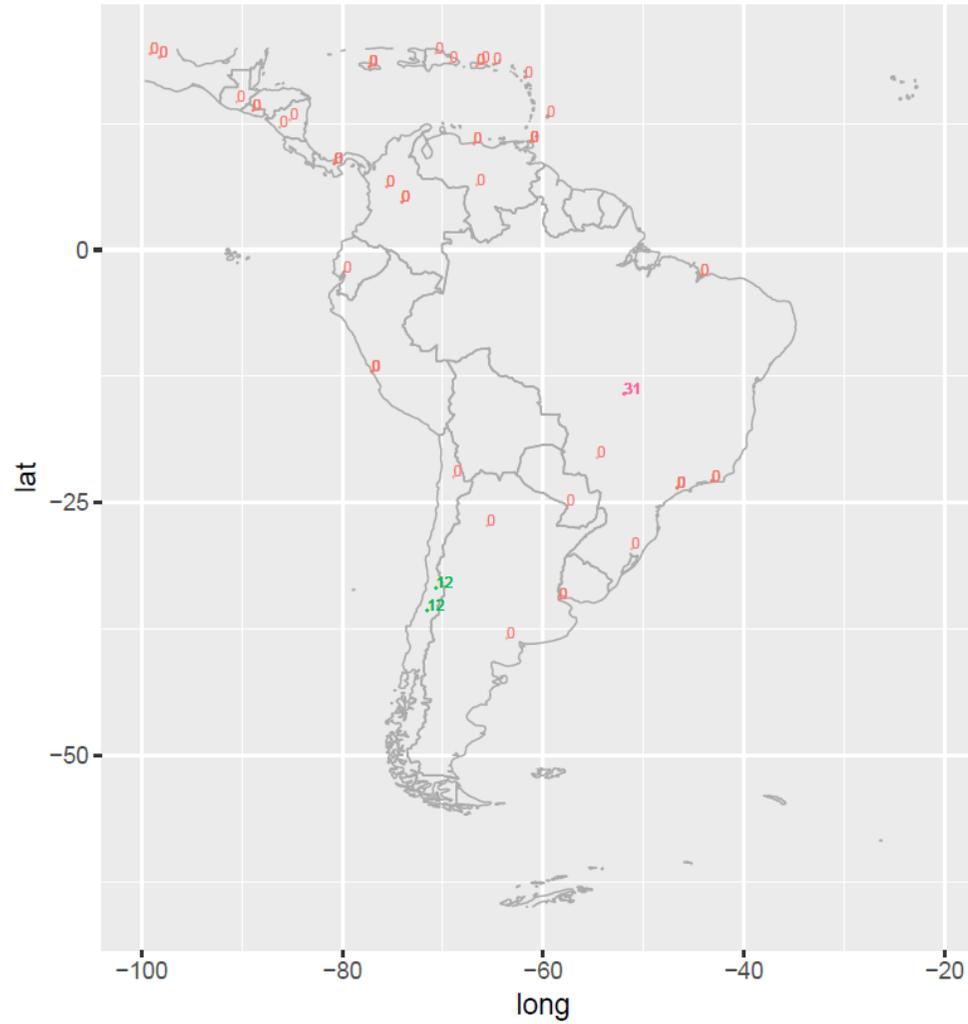


Figure A6.3. Spatial distribution of clusters identified using DBSCAN algorithm in Europe/Asia.

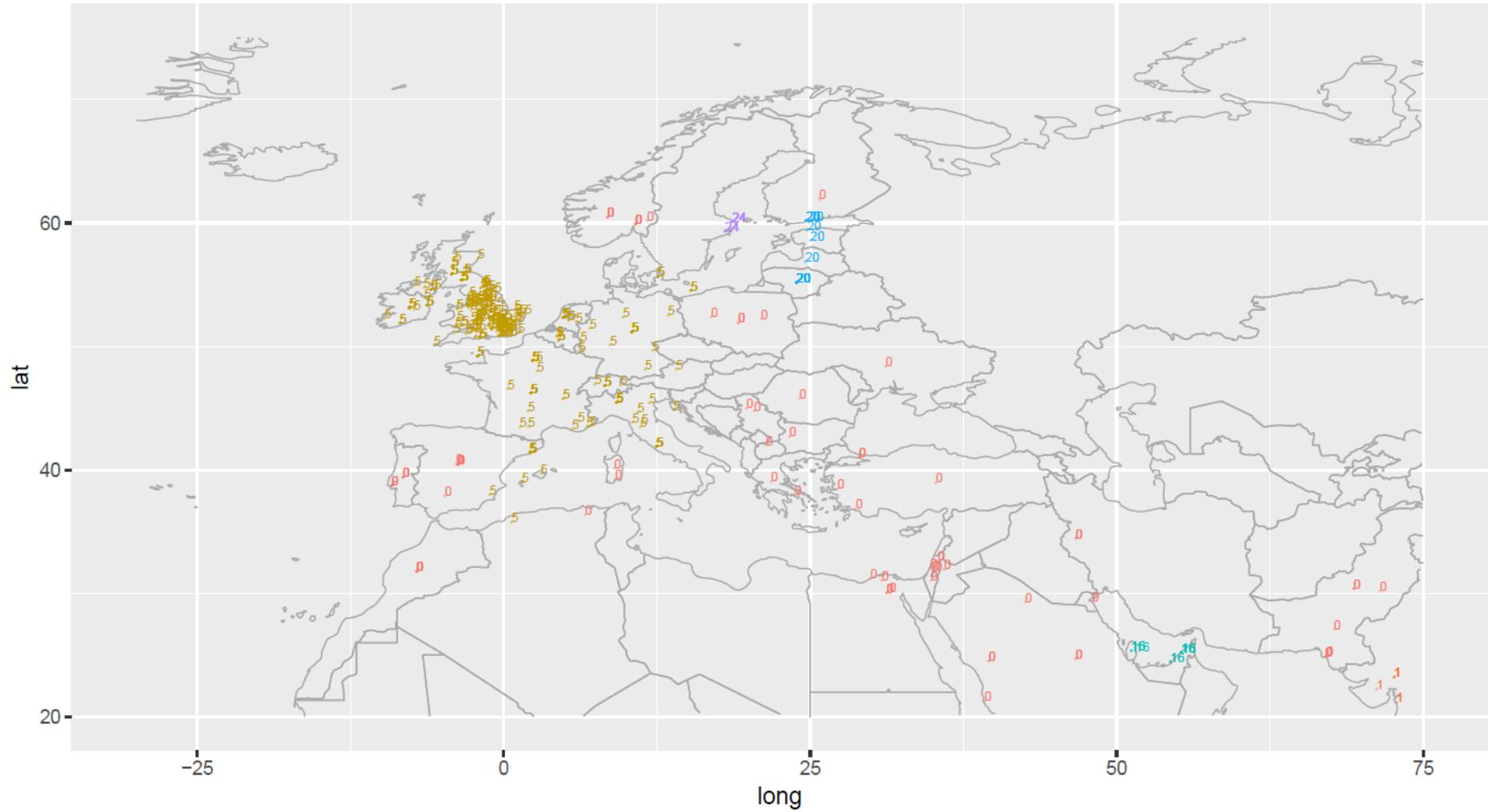
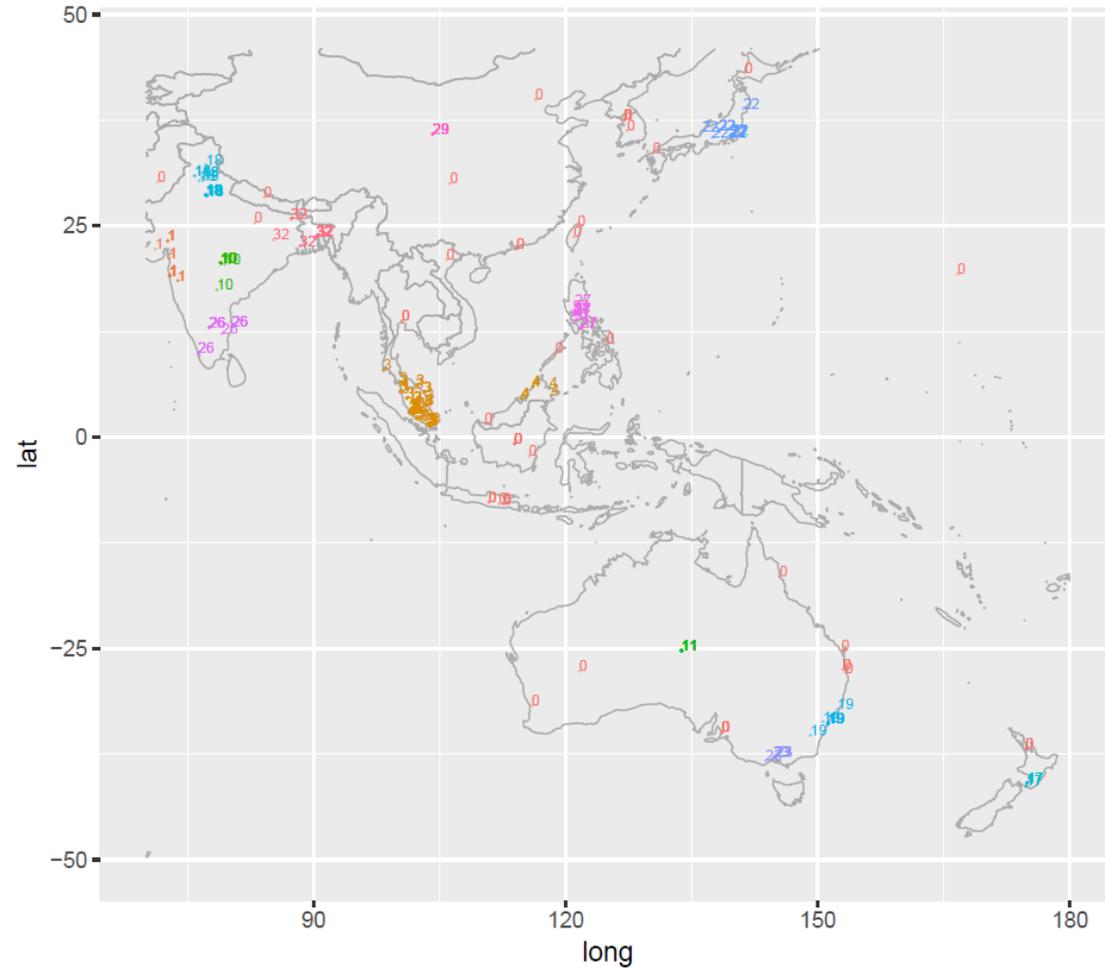




Figure A6.5. Spatial distribution of clusters identified using DBSCAN algorithm in North Asia/Oceania.



## Chapter 7

# CONCLUSIONS

### 7.1 Introduction

Scholars have advocated the need to contextualize the entrepreneurial process to extend our understanding of how entrepreneurship unfolds (Zahra et al., 2014). This contextualization implies paying attention to the characteristics and determinants of specific economic activities different from the high growth/technology businesses typically associated with entrepreneurship, thus obviating its heterogeneous nature (Welter et al., 2017). This call for further research is directly related to the growing literature dealing with the entrepreneurial process within the agricultural sector.

This literature argues that agriculture requires entrepreneurship to deal with the market, societal and institutional changes that have occurred over the last decade and to become sustainable in the future (Vesala and Vesala, 2010). Research on its determinants, nonetheless, is still sparse, and is focused mainly on the personal attributes triggering entrepreneurship among established business, and there are many questions remaining about the nature and context of agricultural entrepreneurship (Lans et al., 2017).

This thesis, therefore, addressed these research gaps by illuminating some of the internal and external factors shaping entrepreneurial behaviors of agricultural business owner /managers, with a special focus on new entrants into the sector. This overall objective was achieved through five interrelated research questions assessed in Chapters 2-6. These research questions concerned how farmers' entrepreneurial behaviour differs from other businesses; what are the personal attributes that provide the capability to identify new business opportunities; how industry characteristics influence their orientation towards growth; how contextual variables influence different innovation behaviours and how consumers perceive food innovation pushing agricultural entrepreneurship.

The next section sums up the previous chapters, presents their findings and theoretical contributions, and provides implications for policy makers and practitioners. Finally, this section discusses the scope and limitations of this thesis and provides avenues for further research.

### 7.2 Summary of Findings

Chapter 2 examines the extent to which there is a trend toward more entrepreneurial agriculture. To that end, the resources and capacities, entrepreneurial orientation (EO) and institutional influences of new entrants to agriculture and of those already established, were analyzed in relation to entrepreneurs engaged in non-agricultural activities. The results show that agricultural entrepreneurs have fewer resources and entrepreneurial skills. However, new entrants to agriculture do not appear to have lower EO than other sectors. Specifically,

by analyzing different EO sub-dimensions, the new entrants only present lower product innovativeness than other activities. For established agri-entrepreneurs, the results also reflect a less proactive pursuit of opportunities. This is due to the characteristics of the sector (e.g. high cost competitiveness) and the influence of previous productivist policies. Despite this, it is important to point out the greater legitimacy of entrepreneurial activity presented by established entrepreneurs vis-à-vis other sectors. When the differences among agricultural entrepreneurs were analysed, new entrants presented greater EO than established ones, which suggests that the liberalization of the sector encourages entrepreneurship among new farmers. Our results have also revealed that agricultural established entrepreneurs have shown greater employment resilience than other sectors in the economic crisis.

Chapter 3 focuses on the determinants of entrepreneurial behavior among new entrants to agriculture and specifically on the role of human capital (general and entrepreneurship-specific) and social and structural capital in identifying new business opportunities in their environment once they have started the activity. With regard to general human capital, the results suggest that proactiveness towards the search for and identification of new business opportunities requires specific knowledge and is influenced by complex opportunity-cost relations. In addition to this, entrepreneurship specific human capital plays a crucial role in this process. New entrants with confidence in their entrepreneurial skills and entrepreneurial experience tend to be more proactive in identifying new opportunities as they have the necessary skills to effectively exploit them. However, this proactiveness not only depends on the knowledge embodied within the new entrants but also on their capacity to access to external information. Our findings reveal that new entrants' weak social ties with other entrepreneurs increase their entrepreneurial behaviour to identify new business opportunities. Furthermore, the positive attitude of their environment towards entrepreneurship (i.e. cognitive social capital) enhances this process through entrepreneurial legitimation.

Chapter 4 analyzed how the competitiveness of the agricultural sector, together with institutional factors and the capacities and resources of new entrants in agriculture determine their orientation towards growth. Our results highlight the multidimensional nature of entrepreneurship within the agricultural sector and how individual and external factors affect strategic entrepreneurial choices in different ways. Specifically, our results reflect how growth-oriented new agricultural entrants are influenced by the convergence between countries' levels of agricultural competitiveness. This implies that new entrants in countries with low levels of agricultural competitiveness are more likely to be growth-oriented, partly as a result of the lower costs of specialized inputs. Furthermore, the legitimacy of their business activity perceived by the new farmers in their environment positively supports their orientation to growth. However, in spite of the effect exerted by these external factors, our study highlights the crucial role that entrepreneurs play in their orientation towards growth. Specifically, their competencies to establish relationships with other entrepreneurs, identify market opportunities and exploit them, as well as those to effectively offer new products to their customers, determine their orientation towards growth. The study also shows that the influence of competencies for product innovation on

the orientation to growth depends on the competitive environment; it being more effective in highly competitive agricultural countries at the international level.

Chapter 5 offered insights into how different dimensions of entrepreneurs' national context together with specific bundles of individual resources and capabilities determine different typologies of entrepreneurial innovations, depending on their nature. At the individual level, our results showed that product-market innovations require explicit knowledge acquired through formal education and embedded in entrepreneurs and, furthermore, entrepreneurial capabilities to effectively fulfill the market's requirements. Process innovations, by contrast, require tacit knowledge acquired from entrepreneurial experiences allowing efficient allocation of resources and capabilities to access the new information required to respond rapidly to technological changes. With regard to external factors, product innovations are favored by social contexts with high levels of human capital. This reflects how knowledge embodied in society allows for a better absorption of the new knowledge created and a better acceptance of these entrepreneurial innovations. Furthermore, market innovations are influenced by both these social conditions and by the economic freedom of institutions, which reflects how these entrepreneurs respond to the needs of society and requires institutions that favor entry to the market. For process innovations, the quality of the technological context positively affects the adoption of the latest technology. This adoption, moreover, is affected by the agglomeration of forces, which favors the diffusion of technological knowledge. Our results also revealed the negative effect that institutions with high economic freedom have on this type of entrepreneurs. Thus, while economically free institutions may provide incentives to engage in innovative activities, they also foster "hypercompetition", which causes process innovations to be short-lived and fade fast.

Finally, Chapter 6 offers a new perspective on how the analysis of consumers' attitudes to food product innovation pushes agricultural entrepreneurship. Through the use of Twitter data, this study shows how the information in messages shared by users of this microblogging platform, along with geolocation information, can serve to analyse the social representations of a specific topic. More specifically, the results show how the use of density spatial clustering techniques (DBSCAN) can serve to identify different geolocated communities of users sharing information about innovative food trends. Furthermore, the characterization of the sentiments expressed in these messages serves to define their attitude towards food innovations. This combined analysis allowed as to compare social representations about innovative food trends and, specifically, its attitudinal dimension in diverse world regions. The cross-regional differences observed revealed that social representations of food innovations are a complex phenomenon. However, our study highlighted the important role that cultural diversity and knowledge flows plays in the building of positive social representations towards food innovation. Furthermore, the spatial analysis within communities identified revealed that territorial identity may also influence this process.

## 7.3 Contributions to Theory

The above paragraphs summarize not only the main findings; they are also the basis for the theoretical contributions. The thesis as a whole advances the application of general entrepreneurship theories into the analysis of the agricultural sector, pushing the boundaries of these extant theoretical frameworks. In doing so, this dissertation contributes to the improvement of knowledge about agricultural entrepreneurship. Furthermore, the exploitation of international data like GEM, Eurostat, World Bank, Heritage Foundation and Twitter provides an appropriate research setting in which to obtain a general understanding about the determinants of the entrepreneurial process within agriculture.

While each of the chapters contributes to the literature stream on which it is based, Chapter 2 highlights the importance of contextualizing the entrepreneurial process within specific economic activities due to the inherent characteristics of its practitioners, and the environment that shapes it. This chapter analyzed the capabilities, entrepreneurial behaviour and institutional influences of agricultural entrepreneurs using an integrative lens based on the RBV and IE to assess how they can inform the entrepreneurial process for micro-sized firms within rural and regulated environments. Furthermore, when the origin of new opportunity identification among new entrants was analyzed in Chapter 3, we uncovered the role that both social and human capital play in entrepreneurial processes within agriculture. Hence, we contribute to the ongoing debate on the role of farmers' formal and informal learning in meeting market demands.

In Chapter 4, we contribute to the theoretical discussion on the role that entrepreneurs play in their outcomes versus exogenous influences. To that end, we expand an approach developed in the strategic management literature to analyse the multidimensional nature of new ventures' growth orientation operating in mature and regulated markets like agriculture. It combines the RBV, institutional theory and the industry-based view to address the extent to which entrepreneurial outcomes are self-determined. Furthermore, we take a step beyond this approach, exploring the presence of convergence effects on new ventures' growth orientation.

With regard to the context effect, Chapter 5 contributes to the literature of innovative entrepreneurship by integrating various well-established theories into a multilevel focus that captures the internal and external determinants of different entrepreneurial innovations. Specifically, in considering different dimensions of the entrepreneurial context, we use the National Systems of Entrepreneurship (NSE), theory, noting the importance that the technological, social and spatial contexts exert on entrepreneurial innovation beyond the country-specific institutional characteristics. In addition to this, analyzing at the individual level the effect of the resources and capacities of entrepreneurs in different typologies of innovative entrepreneurship, we contribute to clarifying the role they play in different innovations based on their specific nature.

Finally, Chapter 6 shows the potential of using information contained in Twitter messages along with spatial information associated with its users as a new way of gaining knowledge in the field of human behavior. Furthermore, the use of social presentation theory provides

a well-specified framework for the analysis of cultural values and meanings shared by Twitter users. The methodology used contributes to improving our knowledge about cultural differences in the adoption of food innovations and their possible determinants.

## **7.4 Policy and Business Implications**

The entrepreneurial process within agriculture is far from being a trivial issue given that it is the base for the continuity of the current agricultural production system and thus also for food security. Furthermore, it encourages the development and continuity of the food industry associated with agriculture as well as serving to maintain rural population levels and contributing to generational change. This population's engagement with rural and natural spaces can make this process different and complex. Consequently, practitioners and policy makers engaged in agricultural entrepreneurship development face a number of challenges with no easy solutions.

This thesis, therefore, provides valuable insights for understanding the internal and external factors triggering agricultural entrepreneurship. Our findings can help policy makers in designing education and training programs to foster entrepreneurial behaviours among farmers, as well as public policies to create favourable agri-entrepreneurial ecosystems.

Overall, this dissertation has highlighted the fact that the external context is important for farmers developing entrepreneurial behaviours. However, the role of the farmer as an entrepreneur is crucial. In this sense, the results have shown that agriculture can be generally described as a sector with lower levels of entrepreneurial skills. Therefore, public policies should deal with this through effective entrepreneurial educational programs. These programs not only have to build managerial capabilities but also those necessary for opportunity identification. This thesis has also shown the important role of product innovation capabilities in the growth of new agricultural ventures. Thus, educational programs should improve the creative thinking skills of farmers.

Additionally, farmers' social connections to other entrepreneurs increase their entrepreneurial behaviour. Consequently, there is a need to foster their teamwork, collaboration and communication skills. The possibility of organising networking activities with other rural entrepreneurs might be a useful tool for extension agents developing entrepreneurship. Improving their social networks develops their degree of legitimation regarding entrepreneurship, which has been found to be a significant factor affecting entrepreneurial behaviours among farmers.

The importance of the environment and institutions is reflected in the varying entrepreneurial behaviors of the farmers, which show that the latest agricultural policy changes toward market liberalisation have increased the entrepreneurial behaviour of new entrants. Therefore, public policies should continue in this direction and support the new entrants into the sector given their capacity to boost it. However, our results have also suggested that others contextual factors –apart from the institutional setting – determine different entrepreneurial behaviours. Policy makers need to accurately characterise the entrepreneurial ecosystems (i.e. the variety of actors and contexts surrounding the

entrepreneurs) and identify their weaknesses and strengths in order to create suitable environments where productive entrepreneurs can flourish. In this sense, this thesis has shown the potential that the analysis of Big Data drawn from social platforms like Twitter has in identifying and surveying social phenomena.

However, as we have stated, entrepreneurial outcomes are mainly self-determined. Thus, agricultural entrepreneurs should concern themselves with developing their entrepreneurial competencies through training and education, as well as increasing their exposure to professional networks outside agriculture. Furthermore, the emergence of Big Data has provided them with a huge opportunity for gaining access to new knowledge and acting strategically to achieve competitive advantage.

## **7.5 Limitations and Further Research**

Like any study of a complex phenomenon such as the entrepreneurial process, the present thesis can only shed light on a small number of its determinants within the agricultural sector. It is therefore necessary to clearly define its scope and limitations in order to be able to sketch future lines of research.

The first limitation concerns the use of the GEM database. This database allows us to study the entrepreneurial process from an international perspective. However, given the high cost of collecting data internationally, it only captures a limited number of variables on the characteristics of individuals who initiate, or have initiated, entrepreneurial activities. Therefore, future research should include more specific variables at the individual level on the skills, background and results of the new initiatives in order to provide an accurate picture of agricultural entrepreneurs. Especially within the agricultural sector, the path that individuals have followed up to the start of the activity (whether they are heirs or ex-novo farmers) and what kind of work experience they have and the time spent on entrepreneurship should be analyzed (if agriculture is their secondary activity). Detailed analysis of the effect of certain types of human capital (e.g. specific formal educational backgrounds) on entrepreneurship and its outcomes can provide insights into the nature of this process and contribute to the design of training programs within the sector.

Second, future studies should clarify the role of different types of social relationships (e.g. bridging versus bonding), and their characteristics (e.g. trust and reciprocity) on different agro-entrepreneurial behaviors. In this sense, the moderating effects that different types of social capital and the socio-demographic characteristics of farmers can have on entrepreneurial competences should be analyzed. Likewise, we recognize that intangible or latent factors not captured in the present study may moderate or mediate the relationship between entrepreneurial skills and entrepreneurial behaviors of farmers. Therefore, future empirical research should consider the application of structural equation modeling to further explore the posited determinants highlighted here. Furthermore, research is needed to capture the intensity and evolution of the above factors over time on the same individual in order to better describe the entrepreneurial process within the sector.

Third, it will be necessary to create databases that capture the regional dimension as well as economic-productive indicators of agricultural activity. In this sense, given the importance of institutional influences, future research should analyze the effect that certain aids have on entrepreneurial activity with more precise measurements. In addition, the presence of certain specialized industries and institutions at a regional level may influence entrepreneurial returns. Therefore, we encourage researchers to analyze the influence that certain institutions and industrial configurations have on the entrepreneurial process. The external context has revealed itself as a complex and multifaceted factor that interacts directly with the entrepreneurs, thus configuring the different entrepreneurial ecosystems. For the analysis of these ecosystems, future studies based on system dynamics models may contribute to a better understanding of their internal workings.

Finally, the use of Big Data to analyze the external determinants that affect the entrepreneurial process has shown itself to be a new and fruitful line of research. The use of these data, however, is not free from the limitations of representativeness and processing difficulties of traditional sources of information. Specifically, the use of microblogging platforms such as Twitter should take into account that the use of this platform is elective and influenced by external influences. The application of multilevel analysis strategies in future research using the geospatial and content information of this platform can contribute significantly to improving the understanding of the behavior of agri-food producers, marketers and distributors. Moreover, the analysis of the structure of interactions among users, identifying their roles (e.g. information hubs, opinion leaders or revenue leaders), will contribute to the development of agri-food entrepreneurship since information flows have proved to be crucial in the present research.

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