

# **Institutional determinants of student employer entrepreneurs at Catalan universities**

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## **Abstract**

This article investigates the influence of informal and formal institutions on the university students' decision of becoming employer entrepreneurs in the context of Catalonia. A sample of 1,207 students from the Universitat Autònoma de Barcelona (UAB) and the Universitat Oberta de Catalunya were surveyed for the period of 2012-2015, and probit regressions over pooled data were used. The main findings suggest that formal factors (university's lack of incentives to create a new business, entrepreneurial knowledge, training and skills, and entrepreneurship education) are higher correlated with the student employer entrepreneurs than informal institutions (role models, entrepreneur's social image and fear of failure). Despite that the entrepreneur's social image does not seem to have an influence on the entrepreneurial decision of university students, the other variables analysed are statistically significant, correlated with entrepreneurship as a choice. Specifically, entrepreneurship education is the most relevant variable in explaining the decision of university students becoming employer entrepreneurs. The paper contributes with policy discussions in order to extend the current debate about the role of the universities in the entrepreneurial process and also the importance of entrepreneurial universities to the society.

**Keywords:** Student employer entrepreneurs, entrepreneurial universities, institutions, Catalonia.

## 1. Introduction

Since Schumpeter (1911), there has been an explicit and generalized recognition of the role played by the entrepreneurs in generating economic development. According to Audretsch (2012), in the last decades a growing explosion of articles providing theoretical and empirical evidence about the effect of entrepreneurship has occurred. In this respect, entrepreneurial activity has been linked to economic growth (Audretsch and Keilback, 2008; Wennekers and Thurik, 1999; Urbano and Aparicio, 2015), as well as cluster formation (Lee et al., 2012; Li et al., 2015; Rocha, 2004) and new jobs creation (van Praag and Verslot, 2007; van Stel et al., 2014b), among other effects. According to van Praag and Verslot (2007), entrepreneurship contributes to society by including individuals in the labour market, sharing with them a common project.

Although literature dealing with the entrepreneurial decision of individuals in creating jobs exists (Millán et al., 2012; Millán et al., 2015; Thurik et al., 2008; van Stel et al., 2014a,b, among others), most of the works are focused on understanding the individual characteristics conditioning the probability of become an entrepreneur. However, recent evidence has suggested that other non-individual factors could affect this probability. For instance, van Stel et al. (2014a) have found that the technological environment affects the probability of becoming an employer entrepreneur. These authors define this category as those entrepreneurs creating new firms that employ personnel, contributing therefore to the growth and development process. In line with the technological environment analysis, science and technology are considered some of the main sources of economic and social development at both regional and national levels (Aghion and Howitt, 1992). Presumably, the development is obtained through technical and social innovations brought to the market via knowledge mechanisms (Karaka and Öner, 2015). In this respect, universities play an important role by providing this innovative environment, which is widely recognized. For example, Guerrero et al. (2015) found that entrepreneurial university, through the knowledge spillover and creation, could impact the economic growth. Also, Etzkowitz and Leydersdorff (1995, 2000) and Etzkowitz et al. (2000) suggest that the enhanced role of universities could increase the knowledge-based societies. Thus, given the universities' function creating and consuming new knowledge, their role in social value creation has gained attention in the sense that universities could be promising scenarios that encourage the worth entrepreneurial activity, and therefore, they could be viewed as an important policy mechanism influenced by the institutional factors (Guerrero and Urbano, 2012). Although there are studies analyzing those institutions affecting the development of entrepreneurial universities and their subsequent influence on socioeconomic performance (Kirby, 2006; Kirby et al., 2011; Guerrero et al., 2014, 2015; Guerrero and Urbano, 2012), few studies have considered how institutional environment influences students to become entrepreneurs by hiring

employees and including them into a common project (Urbano and Guerrero, 2013). Here, further studies could extend the current debate about the role of the universities in the entrepreneurial process and also the importance of entrepreneurial universities to the society.

Therefore, this article investigates the influence of informal and formal institutions on the university students' decision of becoming employer entrepreneurs in the context of Catalonia. By using institutional economics (North, 1990, 2005), we consider informal (role models, entrepreneur's social image and fear of failure) and formal institutions (the university's lack of incentives to create a new firm, entrepreneurial knowledge, training and skills and entrepreneurship education). A sample of 1,207 students from the Universitat Autònoma de Barcelona (UAB) – onsite university – and the Universitat Oberta de Catalunya – online university – were surveyed for the period of 2012-2015 and probit regressions over pooled data were used. Throughout probit models, we predict the probability of student entrepreneurs hiring between 1 and 50 workers or at least one employee and also more than 50 employees. Our findings show that the formal factors (university's lack of incentives to create a new firm, entrepreneurial knowledge, training and skills, and entrepreneurship education) have greater effect on the probability of becoming a student employer entrepreneur than informal institutions (role models and fear of failures). Among the formal factors, entrepreneurship education is found to have the greater impact in explaining the entrepreneurial decision of university students.

The remainder of the paper is as follows. Section 2 examines the literature on institutions and entrepreneurship in terms of university students. Section 3 then describes the data collection and the methodology used to empirically examine the influence of institutions on student employer entrepreneurs. Section 4 presents the results and the robustness check, and section 5 discusses some of the policy implications related to the significance of entrepreneurial universities and their contribution to society. In the final section, the paper concludes and suggests future research lines.

## **2. Theoretical framework: Institutional economics and entrepreneurial universities**

As noted before, we base our analysis upon the institutional economics framework (North, 1990, 2005). In this regard, North (1990) defines the institutions as those rules shaping the human interactions and economical decisions that create specific market qualities. These rules can be either informal institutions, such as the culture, values and the social norms of a particular society, or formal, such as regulations, contracts, procedures and so on. Informal rules arguably tend to reduce the uncertainty originated by the complex and dynamic interactions between the individuals; meanwhile, formal institutions are aimed to reduce transaction costs based on regulations (North, 1990, 2005). Here, depending on whether those interactions are complex and how the individual intentionality toward progress is, higher regulative efficiency could be achieved or not, which improves or deters the

social norms that create progress intentionality. Thus, informal institutions constrain the nature of formal institutions and vice versa. In terms of time, formal institutions can change in the short-term, whereas informal institutions tend to change in the long-term (Williamson, 2000).

Building upon the institutional economics, some scholars have been interested in understanding how the entrepreneurial activity is framed by institutions (Aidis et al., 2008; Bruno et al., 2013; Bruton et al., 2009, 2010; Jennings et al., 2013; Thornton et al., 2011; Urbano and Alvarez, 2014; among others). In this respect, both informal institutions (cultural and social norms, perception of start-up opportunities and the entrepreneur's social image, among others) and formal rules (intellectual property rights, procedures, laws and so on) have been found to be influential factors in entrepreneurship (Aparicio et al., 2015; Autio and Fu, 2015; Knörr et al., 2013; Maas et al., 2014; Stenholm et al., 2013; Stephan et al., 2015; Turró et al., 2014; van Hemmen et al., 2015; Zhang, 2015; among others). Recently, an increasing amount of works have recognized and provided additional empirical evidence about the significant effect that institutional factors, in addition to other variables, specifically have on student entrepreneurs and on the creation and development of entrepreneurial universities in general (Guerrero et al., 2014; Guerrero et al., 2015; Guerrero and Urbano, 2012; Urbano and Guerrero, 2013). In this sense, Guerrero and Urbano (2012) highlight that student entrepreneurs socialize according to informal institutions (e.g., role models, university community's attitude toward entrepreneurship and reward system), as well as formal factors, such as university governance structure, support measures for entrepreneurship and entrepreneurship education. Here it has been argued that knowledge-based entrepreneurship, emerging from both the institutional norms outside the university and those university's laws, structures and supports toward entrepreneurship, is quite relevant to achieve higher levels of job creations, competitiveness and economic growth (Guerrero et al., 2015; Urbano and Guerrero, 2013).

In terms of informal institutions, among other authors, Aidis et al. (2008), Estrin and Mickiewicz (2012), Noguera et al. (2013), Stephan et al. (2005) and van Hemmen et al. (2013), have suggested that role models, entrepreneur's social image and fear of failure, among other factors, affect the entrepreneurial activity, urging or discouraging its development process. In general, there is a vast amount of literature arguing the importance of these variables, as those institutions highly correlated with the entrepreneurial activity. For instance, Álvarez et al. (2014) present a literature review identifying that role models, entrepreneur's social image and fear of failure are vastly explored within the entrepreneurship research. Likewise, Urbano and Alvarez (2014) outline these three elements, among others, as the most relevant due to their proximity to the informal institutions. Taking into consideration the importance of these institutions, Guerrero and Urbano (2012) proposed an integrated model to understand how role models, rewards system and specific attitudes toward entrepreneurship explain the inner dynamics of entrepreneurial universities. According to Guerrero et al. (2014), these informal institutions could define the creation of new ventures among the researchers, professors and university students.

In this sense, we are attempting to evaluate whether or not the already-identified institutions affect the student employer entrepreneurs.

Specifically, regarding the role models, it has been argued that people might reduce the level of uncertainty and have more confidence, since they know and learn from other entrepreneurs, which in turn raises the likelihood of starting a new venture (Davidsson and Honig, 2003). For example, some authors suggest that children with entrepreneur parents are likely to have worked with them at an early age, which allows children gaining experience and attitudes, useful later to start their own business (Carroll and Mosakowski, 1987; Hoffmann et al., 2015; Lindquist et al., 2015; Scott and Twomey 1988; Scherer et al. 1989; van Auken et al. 2006). Role models from family and labour experience lead to the perception of oneself as an entrepreneur (Scott and Twomey, 1988; Zapkau et al., 2015). Scherer et al. (1989) argue that entrepreneurial role models are a property of a high number of entrepreneurs. Van Auken et al. (2006) and Hoffmann et al. (2015) show that many business owners include their family members like sons and daughters, among others, in their businesses, generating interaction and involvement of individuals within the new firm, which means the greatest impact on entrepreneurial intentions in those family members. Moreover, some of the literature focused on the intentions suggests that the family background affects positively the entrepreneurial attitudes (Kolvereid, 1996; Krueger, 1993; Maes et al., 2014; Matthews and Moser, 1995; Scherer et al., 1989; among others). Thus, the presence of entrepreneurs with labour experience in family business and successful role models transmit positive effects to potential entrepreneurs (Gnyawali and Fogel, 1994). Likewise, Arenius and Minniti (2005) posit that different social sciences recognize the importance of knowing other entrepreneurs for business creation choice. For example, in psychology, some authors have discussed the importance of role models because of their ability to enhance self-efficacy (Baron, 2000; Begley and Boyd, 1987). Minniti (2005), in economics, has discussed increases in individuals' confidence generated by the presence of knowing other entrepreneurs and the individuals' ability to reduce ambiguity. In sociology, for example, Aldrich (1999) has discussed the role of personal networks and their ability to enhance entrepreneurial confidence by providing advice, support and examples. In terms of university scientists and students, Guerrero and Urbano (2012), Guerrero et al. (2014) and Kirby et al. (2011), among others, have discussed and provided evidence about the importance of role models for these kinds of entrepreneurs. Likewise, Venkataraman (2004) has suggested that forums and meetings often occur in the university environment, and these activities open opportunities for entrepreneurial role models to exert informal influence that might positively influence the entrepreneurial activity in students. Finally, we propose the following hypothesis:

**H1.** Role models have a positive effect on the probability of university students becoming employer entrepreneurs.

Concerning the entrepreneur's social image, authors such as Weenekers and Thurik (1999) and Acs et al. (2013) address the debate toward the importance of entrepreneurs not only for economic but also for social value creation. Recently,

Laužikas and Dailydaitė (2015) have related the entrepreneur's social image with the social capital created by the entrepreneurs. If entrepreneurs, through their actions (i.e., innovations, productivity and employment generation, etc.), reflect their success in the society, they gain trust and good reputation, and therefore, social networks increase (Carter et al., 1998). Alvarez et al. (2011b) have explored the entrepreneurial activity in Spanish regions, where the informal institution, such as the entrepreneurial social image, is positive and statistically significant correlated with the entrepreneurial activity. Similarly, Jayawarna et al. (2013), throughout cluster analysis, identified that prestige is a useful element required by the business life course, especially for early establishments. Parker and van Praag (2010) and van Praag (2011) posited that depending on the status generated by the entrepreneurs, other individuals would tend to choose the entrepreneurship as a professional career. Particularly, van Praag (2011) has found that the entrepreneur's status is positively associated with the probability of an individual becoming an entrepreneur. In this respect, the way in which the entrepreneur is perceived within the society encourages this kind of initiatives in the individuals. Additionally, it is also found that the entrepreneur's prestige not only encourages the entrepreneurial activity but also its survival across time (Chou et al., 2013). In this regard, Warnecke (2014) has argued that the design of some public policies dealing with entrepreneurship explained their efficacy. Warnecke's work is useful to understand how the trust gained (or lost) by the entrepreneurs has led to creation of microfinance strategies, which are specially needed by those young entrepreneurs. However, the trust-building process seems not to be enough for those student entrepreneurs. Although Loras and Vizcaino (2013), for a sample of engineering students, have found positive evidence concerning the effect of entrepreneur's social image on the decision to become an entrepreneur, their results were not statistically significant, suggesting that despite the entrepreneurial recognition, potential engineering entrepreneurs prefer to look to work for established firms. Still, from the theoretical perspective, the entrepreneur's social image is expected to positively influence the entrepreneurial activity. Here, Nielsen and Lassen (2012) have provided a thorough literature review on the image of entrepreneurs who are facing problems such as opportunity recognition, complex evolution, contingencies and social challenges. Hence, we posit the following hypothesis:

**H2.** A favourable entrepreneur's social image has a positive effect on the probability of university students becoming employer entrepreneurs.

In terms of fear of failure, it is argued that individuals are averse to risk, and therefore, the perceived possibility of failure is an important component of an individual's decision to become an entrepreneur, affecting the choice to set up a new firm (Minniti and Nardone, 2007). Langowitz and Minniti (2007) suggest that risk exists when individuals make decisions about financial support and market explorations, among other decisions. Here, to some degree, fear of failure affects the behaviour of individuals. Business creation *per se* has risk in the overall process (i.e., ideas exploration, evaluation and exploitation). In this sense, Weber and Milliman (1997) claim that if individuals are the most risk averse, it is likely to reduce the level of

starting a new business. Therefore, fear of failure can reduce the alertness to perceive some business ideas, and hence, it limits the evaluation capacity of opportunity exploitation. Nevertheless, Cacciotti and Hayton (2015) suggest that there could be dualistic nature of this factor since previous failure experiences could be positive for entrepreneurs facing difficulties and high-risk decisions. The recent and thorough work of Cacciotti and Hayton concludes that the fear of failure is defined as context-specific phenomenon that most of the literature reviewed considers as a barrier for entrepreneurs. A cross-country analysis at individual level, Urbano and Alvarez (2014) provide empirical evidence about the effect of fear of failure on the entrepreneurial activity. These latest findings are highly relevant, due the country specification. Here, Urbano and Alvarez (2014) suggest that this factor is common worldwide. Similarly, Wennberg et al. (2013) find that the relationship between fear of failure and entry is moderated by cultural practices of institutional collectivism and uncertainty avoidance. At regional levels, Mancilla and Amorós (2015) provide evidence regarding the differences of the fear of failure between women and men. Accordingly, female entrepreneurship tends to suffer greater negatives than their male counterparts (Koellinger et al., 2013; Noguera et al., 2013). In terms of entrepreneurial students, Lukes and Souhar (2015) have found that even though fear of failure deters the probability of becoming entrepreneurs, there is a lower effect of this variable compared to non-students, since the university context easily allows the perception of new opportunities. Still, the above literature vastly suggests the negative impact of fear of failure on the probability to become an entrepreneur, especially if those new entrepreneurs face not only risk for them but also for their workers (van Stel et al., 2014a). Thus, the hypothesis proposed is:

**H3.** Fear of failure has a negative effect on the probability of university students becoming employer entrepreneurs.

Concerning formal institutions, it is also well documented that entrepreneurs socialize in particular contexts, which are under regulative norms and government structures (Aparicio et al., 2015; Djankov et al., 2002; Guerrero and Urbano; 2012; Kirby et al., 2011). With our particular concern, Wach (2014) has studied the evolution of the entrepreneurship education policy in Europe. According to this author, although since the 1980s, the importance of entrepreneurship for social development has been recognized, in the early 2000s a specific policy was designed to promote entrepreneurship in higher education, where universities must include a specific subject dealing with entrepreneurial knowledge, training and skills. In this regard, an important part of the curriculum across the undergraduate (and also graduate) programmes should be focussed on entrepreneurship. Here it is expected a growing intention toward entrepreneurship based on opportunities recognition. Additionally, political structure of universities should be in accordance with these policies. Wach (2014) finds that an incentive mechanism is also proposed in the European entrepreneurship policies. Accordingly, universities should be enabling professors, researchers and students to achieve outcomes related to the entrepreneurial activity, thus allowing the knowledge transfer to the society (Guerrero et al., 2014).

In the above respect, the formal institutions of the university context are argued to frame student entrepreneurs (Guerrero and Urbano, 2012). In this regard, special emphasis has been given regarding the role of universities in development construction nowadays (Trippel et al., 2015). Universities should not only serve as the actors' articulator (e.g., innovation systems and incumbent firms), but also as an environment encouraging the entrepreneurial activity among the students. In this sense, university incentives toward the entrepreneurial activity could define the intentionality of their potential entrepreneurial students. Following Guerrero et al. (2008), Kirby (2006) and Wright et al. (2007), an accurate system of incentives represents strategic actions aimed to promote entrepreneurship in two ways: monetary (scholarships, fellowships, etc.) and non-monetary (contests, awards, etc.). Additionally, the work of Rendisch et al. (2015) supports that the universities incentives toward the alliances between the university and incumbent firms is a constructive exchange of experience and knowledge useful to the regional growth and the competitiveness. Here these strategies could be the key point to attract student employer entrepreneurs and to recruit highly qualified employees. However, according to Audretsch et al. (2014) and Audretsch et al. (2012), it is possible that the competitiveness gained from the knowledge spillover causes a crowding-out effect for those new entrepreneurs. In this respect, the work of Audrestsch et al. (2014) suggests that the university incentives should take into account these kinds of side effects, since the established firms of professors and researchers do not allow the development of the new firms in younger entrepreneurs. Here it is also possible that the lack of incentives or inappropriate strategies prove harmful for the entrepreneurial intentions of university students. Therefore, the following hypothesis is proposed:

**H4.** The universities' lack of incentives has a negative effect on the probability of university students becoming employer entrepreneurs.

Regarding the entrepreneurial knowledge, training and skills, Estrin and Mickiewicz (2012) have argued that these elements are highly important in the decision to set-up a new businesses, in particular those requiring a high level of knowledge. According to Harper (2003), entry decisions are conditional on individual skills as well as on the national economic context. Some skills related to new business creations are powered by the self-confidence of each entrepreneur (van Hemmen et al., 2013) and the university environment where they belong. According to the work of Hemmen et al., education and skills could promote positive interaction between the groups that form each new firm based on opportunity. With respect to the benefits for each entrepreneur, Harper (2003) suggests that particular training and skills in entrepreneurship enhance the feelings of internal control and personal agency, which at the same time promote the alertness in entrepreneurs. This alertness sensitivity leads to opportunity perception with a lower level of uncertainty. Thus, entrepreneurial education positively affects the capacity to create new businesses by opportunity with a higher potential for growth. In this sense, Estrin and Mickiewicz (2012) find empirical evidence about the impact of some skills on entrepreneurship. Additionally, Guerrero et al. (2014) have found that students enrolled in a university



with entrepreneurial characteristics increase their possibility to detect opportunities in the labour market. In essence, particular characteristics of entrepreneurship programmes within the universities, such as the orientation to increase the university students' attitudes/values, enhanced managerial skills and developed networks that are detected to be beneficial to those future employer entrepreneurs. To transform the entrepreneurial mindset of student entrepreneurs, a balance between knowledge, skills and training is necessary. In line with Moog et al. (2015), it is likely that particular skills and training positively affect the decisions of university students to become entrepreneurs. Kolstad and Wiig (2015) find that a variety of skills not only affect the entrepreneurial intention but also the entrepreneurial success, which means that entrepreneurs are growing and constantly creating jobs. Thereby, we propose the following hypothesis:

**H5.** Entrepreneurial knowledge, training and skills have a positive effect on the probability of university students becoming employer entrepreneurs.

Regarding an entrepreneurship education policy from the university, the literature provides examples of its importance for those potential student entrepreneurs. For instance, Link and Scott (2005) and Grandi and Grimaldi (2005) suggest instruments such as the support of centres of small-university businesses, research facilities, research groups, technology transfer strategies and incubators, in order to provide entrepreneurial experience (e.g., through learning-by-doing process) to enrolled students. This could increase the knowledge of how small firms operate, the identification of opportunities and the development of networks, among other increases (Link and Scott 2005; Grandi and Grimaldi 2005). In this regard, Fayolle (2007a,b) suggests that an adequate educational programme could provide a wide variety of situations, aims, and methods oriented toward improving entrepreneurial skills and attributes of enrolled students who could develop both creative and critical thinking. Also, Guerrero and Urbano (2012), Louis et al. (1989) and Liñán et al. (2011), among others, argue that entrepreneurship education from the beginning of undergraduate programmes could enhance the students' attitudes toward the entrepreneurial activity and could favourably facilitate the development of potential entrepreneurs at all university levels. These important university policies affecting students' entrepreneurial activity allow the recognition of those potential entrepreneur agents who identify opportunities, mobilize resources, and constantly create social and economic value (Degroof and Roberts, 2004). Hence, the university policies about entrepreneurship education should be in line with those institutions building capacities toward sustainable regional and national economic development (Feldman, 2014). By doing this, entrepreneurs obtain benefits from these locations in terms of support, resources, contacts and so on. In terms of the university courses, the main benefits obtained from topics such as business plan, business model, marketing strategy, among others, not only increase entrepreneurial intention but also improve the learning of their future jobs (Chen et al., 2015). Additionally, the entrepreneurship education at tertiary level increases the official formation of new businesses and decreases the unofficial activity (Jiménez et al., 2015). Overall, given that the university student entrepreneurs are also pivotal agents of change that can transform

the regional and national development, the universities and their entrepreneurship education system contribute indirectly to the positive dynamics of jobs creation, competitiveness and socioeconomic development (Guerrero et al., 2015). Taking into account the previous discussion, the following hypotheses is posited:

**H6.** Entrepreneurship education has a positive effect on the probability of university students becoming employer entrepreneurs.

### **3. Methodology**

#### *3.1. Data and variables*

Two Catalan universities were selected to analyse the influence of informal and formal institutions on the university students' decisions of becoming employer entrepreneurs. It is worth mentioning that Catalonia is considered to be a main Spanish industrial centre. According to the Spanish Statistical Office (Instituto Nacional de Estadística, INE), Catalonia produces 18.6% of the total Spanish GDP and creates 17.8% of total employment, with high productivity dynamics. In 2014, it represented 16.09% of the total Spanish population, with an income level above the national average (118%). In terms of its entrepreneurial activity, the Catalan number of existing and newly created firms is approximately 20% of the total number of firms in Spain.

Catalonia counts as a university system with nine universities well positioned in the European context within the high top rankings (i.e., QS World University Rankings, Shanghai Academic Ranking of World Universities, etc.). Additionally, the geographical localization, as well as the high quality educational level, has made Catalonia an attractive place to students worldwide. According to Espinet et al. (2015), despite the civil war suffered in Spain during the middle of the twentieth century, the Catalan educational system was consolidated in the 1970s and 1980s. Through this consolidation process, some Catalan universities have emerged in order to extend the coverage of young and adult populations. Hence, the Universitat Autònoma de Barcelona (UAB) and the Universitat Oberta de Catalunya (UOC) were created in 1968 and 1995, respectively, with the purpose to offer a wide range of disciplines (i.e., humanities, social sciences, health sciences, experimental sciences, etc.). However, both of them are differently characterized. For instance, on the one hand, UAB has a very large campus, where most the academic and research activities are developed, making it a favourable environment to innovate and undertake. In this regard, UAB has 226 research groups constantly producing patents, research papers and spin-offs. On the other hand, though UOC is an online university, it also has an important research production. For instance, UOC has 46 research groups contributing with articles, books, research projects and spin-offs. Here, it is worth mentioning that UOC contains one technology transfer office that supports its innovative and entrepreneur students. The main characteristics of both universities are summarized in Table 1.

**Table 1. Main details of surveyed universities**

Description		UAB <sup>a</sup>	UOC <sup>b</sup>
General information	Focus	Humanities, Social Sciences, Health Sciences, Experimental Sciences and Engineering.	
	Year of foundation	1968	1995
	Nature	Public University	Public University
	University size	28012 undergraduates	52513 undergraduates
	University mode	Onsite	Online
	No. of Professors and researchers	3571 (Staff)	324 (Staff); 3022 (Collaborators)
Technical details	Criteria	University students enrolled in Economics and Business Administration	
	Population	2634 <sup>c</sup>	4962 <sup>d</sup>
	Sample size	629	578
	Sample error	2.84%	
	Confidence interval	95% ( $Z = 1.96, p = q = 0.5$ )	

<sup>a</sup> Source: <http://www.uab.cat/web/conoce-la-uab-cei/la-uab-en-cifras-1345668682739.html> (Accessed 6 September/2015).

<sup>b</sup> Source: <http://www.uoc.edu/portal/es/universitat/coneix/fets-xifres/index.html> (Accessed 6 September/2015).

<sup>c</sup> Source: <https://www.uab.cat/web/la-facultad/la-facultad-en-cifras/estudiantes-1345672798019.html> (Accessed 6 September/2015).

<sup>d</sup> Source: [http://www.uoc.edu/portal/es/uoc-news/actualitat/2014/noticia\\_163/graduacio-barcelona-2013-2014.html](http://www.uoc.edu/portal/es/uoc-news/actualitat/2014/noticia_163/graduacio-barcelona-2013-2014.html) (Accessed 6 September/2015).

Given the previously mentioned characteristics, in this paper we analyse the student entrepreneurs of these two universities. Thus, empirical data for this research was obtained from a total population of 7,596 university students, during the period of 2012–2015 (2,634 students from UAB and 4,962 students from UOC; the last year is covered until June). The empirical analysis has been carried out upon a sample of 1,207 university students from the UAB (629) and UOC (578). This is a convenience sample very often used in entrepreneurship research (Fayolle and Gailly, 2005; Kolvereid, 1996; Krueger et al., 2000; Liñán et al., 2011; Tkachev and Kolvereid, 1999; Veciana et al., 2005).

In particular, the data were obtained from the Observatory for University Entrepreneurial Activity (Observatori d'Emprenedoria Universitària –OBSEU) (Alvarez et al., 2011a; Urbano et al., 2015), whose main instrument to gather the information was the previously tested questionnaire on the attitudes toward the new firm's creation. Questionnaires were promoted optionally online from the Centre for University Entrepreneurship (CIEU, Centre d'Iniciatives Emprenedores Universitàries - UAB), which is part of UAB Emprèn and collaborates with the Entrepreneurial University Network (Xarxa d'Emprenedoria Universitària –XEU). Those students who were enrolled for business and economics degrees, with previous professors' authorization, were questioned. In that context, response rate was very high. Only a small number of them were incomplete or lacked consistency, and were therefore rejected. Few others had a small proportion of missing data, but they were always less than 2% of items. They were therefore retained. Given the final usable questionnaires, the sample error obtained was  $\pm 2.84\%$  at a 95% confidence level ( $Z = 1.96$ ,  $p = q = 0.5$ ). Nevertheless, questionnaires with missing data have been left out for the specific analysis of some items in which data were lacking. Additionally, the instrument was carefully crosschecked with those instruments used by other researchers, such as Chen et al. (1998), Kickul and Zaper (2000), Kolvereid (1996), Kolvereid and Isaksen (2006), Krueger et al. (2000) or Veciana et al. (2005). Ajzen's (1991, 2001, 2002) work was useful to carefully revise and solve any discrepancy that could arise during the questionnaire-making process, compared with other instruments.

Concerning the variables, first, our dependent variables include those university students that have created a new firm and have hired between 1 and 50 employees, and those who have created at least one job and also more than 50 jobs. Following van Stel et al. (2014a), we pretend to measure the probability of those student entrepreneurs that have the intention to create employment, taking into account or not the new firm size. Concerning the informal factors, binary variables that capture if students know entrepreneurs in their families (role model), if there is a positive acceptance of the entrepreneurial activity within their close environment (entrepreneur's social image), and if their perception of fear of failure is considered as an entrepreneurial barrier were used. In terms of formal institutions, two binary variables regarding if university students have the knowledge, training and skills to carry out an entrepreneurial project, as well as if they consider that they have learned entrepreneurial topics, such as business plan and business model within the university, were used. Moreover, a 5-point scaled variable assessing if the university's

lack of incentives to create new business is an obstacle (1 not important; 5 very important) was used.

In terms of control variables, we include some observable heterogeneity regarding the income level, gender and age. According to Carree et al. (2002, 2007), the entrepreneurial activity is related to the country development stage. By analyzing at individual level, it is relevant to relate the income level to the entrepreneurial decision, since it is expected that higher income level explains higher entrepreneurial activity rate. Concerning the gender analysis, Arenius and Minniti (2005) have found that the men tend to have higher entrepreneurship rate than the women. And Urbano and Alvarez (2014) suggest that individuals at certain ages upwards tend to present higher attitudes toward the entrepreneurial activity. Table 2 presents the variables used to carry out our analysis.

**Table 2. Variables description**

Variables	Description
<b>Dependent variables</b>	
Student employer entrepreneurs (1-50 workers)	Dummy variable that takes the value 1 if university students have created a new firm with employees between 1 and 50; 0 otherwise.
Student employer entrepreneurs (1 or more workers)	Dummy variable that takes the value 1 if university students have created a new firm with more than 1 employee.
<b>Independent variables</b>	
<b>Informal institutions</b>	
Role model	Dummy variable that takes the value 1 if respondents have entrepreneurs in their families; 0 otherwise.
Entrepreneur's social image	Dummy variable that takes the value 1 if respondents have a favourable perception about success entrepreneurs in their closer environment; 0 otherwise.
Fear of failure	Dummy variable that takes the value 1 if respondents manifest fear of failure as obstacle to undertake.
<b>Formal institutions</b>	
University's lack of incentives to create a new firm	Lack of incentives to create a new firm at university for students entrepreneurs. Scaled variable ranged from 1 (is not important) and 5 (is very important).
Entrepreneurial knowledge, training and skills	Dummy variable that takes the value 1 if respondents have acquired knowledge and entrepreneurial abilities from university; 0 otherwise.
Entrepreneurship education	Dummy variable that takes the value 1 if respondents have developed business plan preparation at the university; 0 otherwise.
<b>Control variables</b>	
Income less than 1000€	Dummy variable that takes the value 1 if respondents have declared less than 1000€ as income level; 0 otherwise.
Income between 2000 and 4000€	Dummy variable that takes the value 1 if respondents have declared an income level between 2000 and 4000€; 0 otherwise.

Variables	Description
Income between 4000 and 7000€	Dummy variable that takes the value 1 if respondents have declared an income level between 4000 and 7000€; 0 otherwise.
Gender	Dummy variable that takes the value 1 if respondent is man; 0 otherwise.
Age	Variable created according to the difference between 2015 and the year of birth.

### 3.2. Methods

In order to provide a framework for the empirical analysis, standard binary probit models were used. Thus, as usual, the probability of switching from the starting status to the final is assumed to depend on a set of observed informal and formal institutions, as well as on individual characteristics (as control variables),  $II_t$ ,  $FI_t$  and  $X_t$ , respectively. Thus, a university student who is either a non-entrepreneur or entrepreneur without employees at time  $t$  will be observed in student entrepreneur employer (with 1 and 50 workers or at least 1 worker and also more than 50 workers) at time  $t$  if the utility derived from becoming entrepreneur creating employment (student employer entrepreneur, SEE) exceeds that obtained from being a regular student, paid employee or entrepreneur without workers (Other). Consequently, the probability of switching can be written as:

$$\begin{aligned}
\Pr(Y_{i,t} = 1) &= \Pr(SEE_{i,t} = 1 | II_{i,t}, FI_{i,t}, X_{i,t} = 0) \\
&= \Pr(U_{i,t}^{SEE_{1-50} \text{ or } SEE_{>1}} > U_{i,t}^{Other} | U_{i,t}^{SEE_{1-50} \text{ or } SEE_{>1}} \leq U_{i,t}^{Other}) \\
&= F(\gamma' II_{i,t} + \delta' FI_{i,t} + \beta' X_{i,t} + \varepsilon_{i,t}) \quad (1)
\end{aligned}$$

where  $Y_{i,t} = 1$  if the university student becomes employer entrepreneur (with 1 and 50 workers,  $SEE_{1-50}$ ; or at least 1 worker and also more than 50 workers,  $SEE_{>1}$ ) in period  $t$ , and  $Y_{i,t} = 0$ , if the individual continues as student, paid employee or entrepreneur without employees in period  $t$ . For this exercise,  $\gamma$ ,  $\delta$  and  $\beta$  are the associated vectors of informal institutions ( $II_{i,t}$ ), formal institutions ( $FI_{i,t}$ ) and control variable coefficients to be estimated, respectively;  $\mu_{i,t}$  is a disturbance term that includes the time-invariant unobserved heterogeneity, and  $F(\cdot)$  is specified as the normal cumulative distribution function.

For comparison purpose, our estimations are based upon the linear probability model (through ordinal least square, OLS) (Models 1 and 2), a discrete choice model without university fixed-effects (Models 3 and 4) and with university fixed-effects (Models 5 and 6) through probit estimation. The first set models (1, 3 and 5) estimate the probability of a university student becoming an employer entrepreneur, hiring between 1 and 50 employees; whereas the second set of models (2, 4 and 6) assess the probability of a university student becoming an employer entrepreneur, hiring at least 1 employee and also more than 50 employees. Here, our purpose is to explore the differences between those new firms restricted to one specific size and those new ventures no matter their size.

#### **4. Results and discussion**

Table 3 provides means, standard deviations and pairwise correlation coefficients for the variables we studied. The table shows that in our sample there is on average 9.3% of university students that are employer entrepreneurs hiring between 1 and 50 employees, and 9.8% are student employer entrepreneurs that have at least one worker and also more than 50 employees.

**Table 3. Descriptive statistics and correlation matrix**

	Variable	Obs	Mean	Std. Dev.	Min	Max	1	2	3	4
1	Student employer entrepreneurs (1-50 workers)	1207	0.093	0.290	0	1	1			
2	Student employer entrepreneurs (1 or more workers)	1207	0.098	0.297	0	1	0.972*	1		
3	Role model	1207	0.698	0.459	0	1	0.043	0.053*	1	
4	Entrepreneur's social image	1207	0.781	0.414	0	1	0.017	0.019	0.014	1
5	Fear of failure	1206	0.536	0.499	0	1	-0.080*	-0.085*	-0.087*	0.022
6	University's lack of incentives to create a new firm	1207	3.998	0.952	1	5	-0.081*	-0.069*	-0.039	0.003
7	Entrepreneurial knowledge, training and skills	1206	0.498	0.500	0	1	0.139*	0.130*	0.040	-0.059*
8	Entrepreneurship education	1207	0.600	0.490	0	1	0.121*	0.115*	0.015	0.055*
9	Income less than 1000€	1204	0.116	0.321	0	1	0.037	0.047	-0.072*	-0.014
10	Income between 2000 and 4000€	1204	0.411	0.492	0	1	0.031	0.022	-0.021	-0.002
11	Income between 4000 and 7000€	1204	0.140	0.348	0	1	0.028	0.029	0.062*	0.047
12	Gender	1207	0.439	0.496	0	1	0.103*	0.097*	-0.068*	-0.008
13	Age	1207	30.338	8.926	16	70	0.038	0.037	-0.003	-0.038

  

	Variable	5	6	7	8	9	10	11	12	13
5	Fear of failure	1								
6	University's lack of incentives to create a new firm	0.038	1							
7	Entrepreneurial knowledge, training and skills	-0.150*	-0.013	1						
8	Entrepreneurship education	-0.103*	-0.016	0.182*	1					
9	Income less than 1000€	0.068*	0.019	-0.024	0.016	1				
10	Income between 2000 and 4000€	-0.016	-0.019	0.056*	0.011	-0.303*	1			
11	Income between 4000 and 7000€	-0.018	-0.055*	0.018	0.042	-0.147*	-0.338*	1		
12	Gender	-0.078*	-0.085*	0.155*	0.089*	-0.008	-0.022	0.071*	1	
13	Age	-0.059*	-0.044	0.089*	0.029	-0.042	0.020	-0.031	0.031	1

\* p &lt; 0.1.



Additionally, the correlation analysis shows several significant correlations that met our expectations in terms of the informal and formal institutions. In order to test for the problem of multicollinearity, we calculated the VIF value for equation (1), which is 1.11. Thus, multicollinearity is not a problem in the analysis. Furthermore, to address the possibility of heteroskedasticity among observations pertaining to the same university, robust standard errors were estimated.

#### *4.1. Main findings*

Table 4 shows that all the models are highly significant ( $p \leq 0.000$ ). The  $F$ -statistic confirms that the joint effect of informal and formal institutions, along with the control variables, explains the decision of university students to become employer entrepreneurs. Additionally, the higher adjustment is obtained when university fixed-effects (in our case, a dummy variable representing UOC) is introduced within the model. Thus, Model 5 explains the 9.9% of the variability of those university students becoming employer entrepreneurs with between 1 and 50 workers; while Model 6 explains 8.8% of the variability of those student entrepreneurs without new firm size restriction. Furthermore, the AIC and BIC criteria show that Models 5 and 6 are higher relevance than Models 1-4.

**Table 4. Estimating the probability of becoming a student employer entrepreneur**

	Linear probability model				Probit					
	(1)		(2)		(3)		(4)		(5)	
	Student employer entrepreneurs (1-50 workers)	Student employer entrepreneurs (1 or more workers)	Student employer entrepreneurs (1-50 workers)	Student employer entrepreneurs (1 or more workers)	Student employer entrepreneurs (1-50 workers)	Student employer entrepreneurs (1 or more workers)	Student employer entrepreneurs (1-50 workers)	Student employer entrepreneurs (1 or more workers)	Student employer entrepreneurs (1-50 workers)	Student employer entrepreneurs (1 or more workers)
	Estimation	Estimation	Estimation	dy/dx	Estimation	dy/dx	Estimation	dy/dx	Estimation	dy/dx
Role model	0.026 (0.017)	0.034* (0.017)	0.197* (0.119)	0.024* (0.014)	0.242** (0.118)	0.032** (0.015)	0.217** (0.119)	0.027** (0.014)	0.259** (0.117)	0.034** (0.014)
Entrepreneur's social image	0.016 (0.019)	0.018 (0.020)	0.116 (0.130)	0.014 (0.015)	0.114 (0.128)	0.015 (0.016)	0.125 (0.131)	0.016 (0.015)	0.122 (0.129)	0.016 (0.016)
Fear of failure	-0.028* (0.016)	-0.033* (0.017)	-0.149 (0.106)	-0.019 (0.014)	-0.182* (0.105)	-0.026* (0.015)	-0.140 (0.106)	-0.018 (0.014)	-0.175* (0.105)	-0.025* (0.015)
University's lack of incentives to create a new firm	-0.020** (0.009)	-0.017* (0.009)	-0.131** (0.052)	-0.017** (0.007)	-0.108** (0.052)	-0.015** (0.007)	-0.132** (0.052)	-0.017** (0.007)	-0.109** (0.052)	-0.015** (0.007)
Entrepreneurial knowledge, training and skills	0.042** (0.017)	0.039** (0.017)	0.300*** (0.112)	0.039*** (0.015)	0.259** (0.108)	0.037** (0.015)	0.266** (0.114)	0.035** (0.015)	0.228** (0.110)	0.032** (0.016)
Entrepreneurship education	0.053*** (0.015)	0.051*** (0.016)	0.351*** (0.120)	0.044*** (0.014)	0.311*** (0.115)	0.042*** (0.014)	0.362*** (0.122)	0.045*** (0.014)	0.319*** (0.116)	0.043*** (0.015)
Income less than 1000€	0.071** (0.030)	0.081*** (0.031)	0.446** (0.180)	0.075** (0.037)	0.477*** (0.173)	0.086** (0.038)	0.459** (0.181)	0.077** (0.037)	0.487*** (0.174)	0.089** (0.039)
Income between 2000 and 4000€	0.036** (0.018)	0.034* (0.018)	0.245* (0.133)	0.033* (0.018)	0.215* (0.130)	0.031+ (0.019)	0.239* (0.133)	0.032* (0.018)	0.210 (0.130)	0.030 (0.019)
Income between 4000 and 7000€	0.039 (0.026)	0.040 (0.027)	0.233 (0.167)	0.034 (0.027)	0.221 (0.161)	0.035 (0.028)	0.238 (0.168)	0.035 (0.028)	0.225 (0.163)	0.034 (0.028)
Gender	0.040** (0.017)	0.039** (0.017)	0.238** (0.109)	0.032** (0.015)	0.218** (0.106)	0.031** (0.015)	0.234** (0.109)	0.031** (0.015)	0.215** (0.106)	0.031** (0.015)
Age	0.000* (0.000)	0.000* (0.000)	0.011** (0.005)	0.001** (0.001)	0.011** (0.005)	0.002** (0.001)	0.009* (0.005)	0.001** (0.001)	0.009* (0.005)	0.001** (0.001)
Constant	0.032 (0.050)	0.025 (0.051)	-2.071*** (0.349)		-2.050*** (0.344)		-2.116*** (0.344)		-2.085*** (0.339)	

University fixed-effects	Yes	Yes	No	No	Yes	Yes
Observations	1202	1202	1202	1202	1202	1202
(Pseudo) R <sup>2</sup>	0.055[0.000]	0.051[0.000]	0.095[0.000]	0.086[0.000]	0.099[0.000]	0.088[0.000]
Probability			0.068	0.074	0.068	0.074
Log likelihood			-334.918	-350.836	-333.532	-349.758
Wald $\chi^2$			56.04	51.59	58.82	53.17
AIC	389.431	450.353	693.836	725.672	693.063	725.516
BIC	455.623	516.545	754.936	786.773	759.256	791.708

+ p = 0.1, \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

Note: Heteroskedasticity corrected standard errors are shown in parentheses. *F*-statistic in brackets. Estimates for university fixed-effects dummies are not presented but can be supplied upon request.

With regards to the first hypothesis, we proposed that role models have positive effects on the probability of university students becoming employer entrepreneurs. We found support for Hypothesis 1 (due to the marginal effect of this variable), which is positive and significant in all models, especially in Model 5 ( $p < 0.05$ ) and Model 6 ( $p < 0.05$ ). This result is in accordance with evidence that knowing or having an entrepreneur in the family and socializing with him/her increases the probability of becoming an employer entrepreneur (Davidsson and Honig, 2003; Urbano and Alvarez, 2014). In this respect, our findings suggest that this informal institution is highly relevant, considering that our analysis is particularly focused on university students. Although most of the literature deals with the regular entrepreneurs (Kolvereid, 1996; Krueger, 1993; Maes et al., 2014; Matthews and Moser, 1995; Scherer et al., 1989), we provide new evidence in line with Guerrero and Urbano (2012), Guerrero et al. (2014) and Kirby et al. (2011), among others, who suggest that role model is a particular characteristic of the university community aimed toward the entrepreneurial activity, which is statistically significant and highly correlated with the intention of setting up a new firm. In this sense, those university students with entrepreneurial as well as job creation intention, are marginally influenced by the role models (0.027 in Model 5; and 0.034 in Model 6).

Regarding the second hypothesis, which posits that a favourable entrepreneur's social image has a positive effect on the probability of university students becoming employer entrepreneurs, the coefficient of this variable in all models is not statistically significant, and therefore, we cannot conclude anything. Although the sign is expected, H2 is not supported by the results, which is somehow in accordance with the literature. In this regard, there has been a social acceptance of entrepreneurs (Weenekers and Thurik, 1999; Acs et al., 2013). Perhaps, although this generalization exists, it could not be relevant to explain the entrepreneurial activity and specially the university student intention toward entrepreneurship. Another reason in explaining the low significance level is based on the foundations of Laužikas and Dailydaitė (2015). According to these authors, entrepreneur's social image is associated with the social capital created by the entrepreneurs. In this regard, it seems that the social acceptance of the entrepreneurial success is not directly linked to the entrepreneurial decisions, but a mechanism could be required to explain its influence on entrepreneurship. In fact, Warnecke's (2014) work goes along this line, since it is suggested that the trust gained by the entrepreneurs is presumably beneficial to the access of the financial system. Here, even though our evidence is neither suggestive nor conclusive, we agree that public policies should not deviate from encouraging the trust's gains required to increase the entrepreneurial activity across individuals.

Concerning H3, which proposes that fear of failure has a negative effect on the probability of university students becoming employer entrepreneurs, we found evidence in not rejecting this hypothesis. Here, the literature suggests that fear of failure is a barrier deterring the entrepreneurial intentions of women and men (Koellinger et al., 2013; Noguera et al., 2013). In line with Cacciotti and Hayton's (2015) work, our theoretical framework suggests that this factor could be considered as context-specific phenomenon. In this regard, although the Model 5 is not

statistically significant, it has the expected sign; whereas Model 6 is significant ( $p < 0.1$ ), supporting the idea that some risks in decision-making processes could generate fear in those entrepreneurs (Langowitz and Minniti, 2007; Minniti and Nardone, 2007). Additionally, our two models are shedding light on the influence of this latent variable in university students who have the intention to set up a firm and create jobs. In this context, the marginal effect found in Model 6 (and specially its significance) suggests that the probability of becoming an employer entrepreneur decreases by 0.025% when university students with the intention to create a medium or a large firm manifest to have fear of failure. This is especially useful to understand the entrepreneurial dynamics within the university context, since higher ambitions are accompanied by higher risk aversion, and therefore, less probability to become an entrepreneur.

Regarding the hypothesis about the universities' lack of incentives and their influence on the probability of university students becoming employer entrepreneurs, Model 5 and Model 6 allow not rejecting this hypothesis ( $p < 0.05$  for both models). Our results suggest that if a university does not generate incentives through rewards, in general, students will be discouraged to engage in entrepreneurial activities that create jobs. According to Liñán et al. (2011), Guerrero and Urbano (2011) and Guerrero et al. (2014), among others, the university's rewards system is an important mechanism in providing entrepreneurial opportunities for the community. In this respect, universities should consider that the lack of this element is harmful for the entrepreneurial strategy and knowledge transfer. Precisely, our results suggest that if the lack of incentives to create new businesses is perceived by the university students, the probability of them becoming employer entrepreneurs tend to decrease whether they have the intention to create a small or medium firm (-0.017%) or even set up a large firm (-0.015%). Following the work of Rendisch et al. (2015), our results also underline the importance of creating an incentive system in order to allow the flow of knowledge from the university to the firms, whose result could increase the attractiveness of new employers in the economic sector. In this regard, by improving the rewards system, universities are not only playing a fundamental role to better the markets but also to encourage the creation of new ones (Kirby, 2006; Urbano and Guerrero, 2013).

In the case of H5, which is proposing that the entrepreneurial knowledge, training and skills have a positive effect on the probability of university students becoming employer entrepreneurs, we found support through our estimation results. Our findings suggest that if the university formally includes not only entrepreneurship subjects but also topics in the curriculum of the related areas, the knowledge, training and skills will increase in the students, and therefore, their probability will be positively and statistically modified ( $p < 0.05$  for both models). According to Kolstad and Wiig (2015), if the university student knowledge about entrepreneurship is increased, not only an encouragement but also an achievement in terms of success could be obtained. Our findings provide evidence in this regard, since if the university students declare to have knowledge, training and skills in entrepreneurship, the probability of becoming employer entrepreneurs increases (0.035% in Model 5; and

0.032% in Model 6), which means that they are also playing a role in the economy by transferring their knowledge to workers. In this respect, universities are generating a multiplier effect through those students who are becoming entrepreneurs and are hiring employees. Additionally, our results could be suggestive in the sense that the entrepreneurial alertness is increased, along with the perception of opportunities (Estrin and Mickiewicz, 2012; Guerrero et al., 2014). Here student entrepreneurs are pragmatically contrasting the theoretical foundations with their entrepreneurial experience or attitudes toward the entrepreneurial activity (Kolstad and Wiig, 2015).

In terms of H6, it has been posited that entrepreneurship education has a positive effect on the probability of university students becoming employer entrepreneurs. Given the results, we cannot reject the hypothesis, since this formal institution is found positive and statistically significant in explaining the employer student entrepreneur ( $p < 0.001$  for both models). In this case, the importance of universities creating development through their student entrepreneurs is seen in the appropriate selection (and high quality) programmes of entrepreneurship (Fayolle, 2007a,b). In this respect, this is not enough with the acceptance of entrepreneurship in the curriculum, but in defining the necessary topics highly useful to conduct an entrepreneurial decision. Here entrepreneurship subjects and related topics in other areas (i.e., marketing, strategy, project management, microeconomics, etc.) should be designed from the academic government structure with a practitioner scope. The practical characteristic of those subjects could enhance the entrepreneurial attitudes in undergraduate students from the beginning (Guerrero and Urbano, 2012; Liñán et al., 2011; Louis et al., 1989). In this respect, if university students manifest to have knowledge about business plan elaboration, the probability of becoming employer entrepreneurs increases (0.045% in Model 5; and 0.043% in Model 6). Hence, our results agree with the idea that the university strategy about entrepreneurial courses should be in line with the entrepreneurship and innovation system created to accomplish sustainable regional and national economic development (Feldman, 2014; Guerrero et al., 2015).

Our control variables are also in accordance with the literature. For instance, Carree et al. (2002, 2007) suggest that the income level, at a certain point, is positively associated with the entrepreneurial activity. Our results show that the first income level (less than 1,000€) statistically increases the probability of one becoming a student employer entrepreneur. In terms of gender, Arenius and Minniti (2005) have suggested that there are differences between women and men entrepreneurs, in favour of the latter. In terms of the age, Urbano and Alvarez (2014) have argued that higher age increases the probability of one becoming an entrepreneur. In this regard, our results show a marginal effect of age increasing the probability of university students becoming employer entrepreneurs.

#### *4.2. Robustness checks*

We perform several robustness checks to see if our previously reported results still hold in front of a different set of variables and different econometric techniques. In particular, as noted earlier, we conduct the same model by employing three

identification strategies. All these methodologies allow the perception that the magnitudes and relationships remain stable across models with little differences in both estimations and standard errors. The same occurs when the non-linear models are assessed by including a different set of variables. Comparing these models with those having all variables, the results hold. Likewise, in terms of signs, apart from the estimations results, the correlation matrix (Table 3) also shows that the relationships between the variables are as expected.

In terms of the different methods used, Models 1 and 2 correspond with the results from running a simple linear probability model through OLS regressions, while Models 3-6 are assessed through discrete choice model (i.e., probit estimations). Even though OLS regressions are inappropriate in our setting, the estimated coefficient associated with the informal and formal institutions, as well as the control variables, is still economically and statistically significant. The same is true for the binomial regression in Models 3-6, being that the results of Models 5 and 6 are highly accurate. It is reassuring that the coefficient estimates of Models 1-4 are in the middle range of the corresponding estimated coefficients presented in Models 5-6.

Regarding the different set of variables, an important observation from Table 4 is that the two dependent variables (student employer entrepreneurs hiring between 1 and 50 workers, and those student entrepreneurs hiring at least one employee and also more than 50 employees) seem to have high-predicting power regarding the effect of set variables representing informal and formal institutions. In this regard, changing the dependent variables, the model structure holds. Additionally, by excluding the university fixed-effects (Models 3 and 4), the estimation results suffer few variations, indicating once again, a robust structure.

The findings from the checks described above show that our results are stable to various changes applied to the original specification. Therefore, we are confident that the informal and formal institutions, as well as the control variables we studied, had a robust positive effect on student employer entrepreneurs.

## **5. Policy implications**

The results previously described could extend the current debate about the importance of universities creating social dynamics. For instance, our results show that those variables related to the university norms have a greater impact on student employer entrepreneurs than informal institutions. This is quite interesting, since it has been argued that informal institutions tend to have greater impacts (Urbano and Alvarez, 2014). However, given the nature of the context of the UAB and UOC, it seems that students present higher response to those variables related to the university. In this regard, Audretsch et al. (2014) highlight the importance of university strategies regarding a defined rewards system, encouraging the entrepreneurial activity. Here some financial issues (i.e., scholarships, awards, financial cooperatives for university community, etc.) could enhance the knowledge transfer from universities to firms and society. According to Guerrero et al. (2015), the role of entrepreneurial universities on

regional competitiveness and growth could depend upon if there is cooperation between universities, industry and governments to encourage the innovation and knowledge-based entrepreneurial activity. This interaction between the agents could foster the economic-development process, which is particularly affected by the continuous economic crisis and increasing unemployment nowadays.

Considering the loop between the entrepreneurial activity emerged from the university context and the regional competitiveness and development (Audretsch et al., 2012), the work of Audretsch et al. (2012) suggests a balance between those public policies aimed at encouraging the entrepreneurial activity within the universities and the strategies from the regional and national systems of entrepreneurship and innovation. In this regard, societies involved in long-term knowledge dynamics should force universities to re-design their existing managerial models in order to generate an appropriate environment of collaboration with industry and government, who also should be engaged in the same long-term development project. Here, Audretsch et al. (2014) argue that financial as well as defined market structures could be created to foster the expansion of those student entrepreneurs involved in small firm projects generating jobs. Otherwise, a crowding-out effect could result if the policies and strategies do not take into account the entrepreneurial attitudes and intentions of university communities at all levels. For instance, knowledge spillover effects could be in favour only of those medium and large firms, displacing the creation of small firms from university students (Audretsch et al., 2012). In this line, Ács et al. (2014) suggest that the regional and national system of entrepreneurship should provide support in linking government, industries and society aimed toward a common purpose.

In the above respect, if university community does not transfer knowledge, a possible negative relationship between university strategies and the firm dynamics could be created (Ponomariov, 2008). Our results suggest that this negative interaction could be overcome in the long-term through either encouraging those students with entrepreneurial characteristics to set up a new firm or shaping their attitudes toward entrepreneurship. In this respect, universities should make the most of those experienced entrepreneurs, as well as incumbent firms, to convert them to other types of role models for the university students at all levels. Here Guerrero and Urbano (2012) suggest that seminars, business meetings and labs could define places for the interaction between those potential role models and the university students. Given the high correlation found between this variable and the probability of becoming a student employer entrepreneur, a positive loop of the oldest with the newest students across time could increase the entrepreneurial motivation within the university community.

According to Feldman (2014), experience and knowledge should be also obtained from those who have faced relevant decisions and failures. In this regard, universities are ideal scenarios for joining those with entrepreneurial experience to those who want to create a new venture. Feldman's work has suggested that a development process in certain places could emerge, since individuals with enough knowledge and entrepreneurial attitudes transform the developing places into new market



opportunities. In this sense, universities could be that catalyst required to generate the entrepreneurial regions, constantly reinforced by the knowledge transfer and spillover from the relationship between universities and firms (Audretsch et al, 2014).

Given that our results suggest that entrepreneurship education policies and the teaching of particular entrepreneurial skills are beneficial for those university students with the intention to create a new business with employees, the quality of those strategies, as well as programmes dealing with entrepreneurship, is crucial for the entrepreneurial development. Research, teaching and innovation should stimulate the creativity of the university students toward the applicable inventions, usefulness and worth for society. Recalling that one of the main goals of universities is the production, diffusion and knowledge preservation, undergraduate programmes should adopt a new and updated view of student's profile management. This implies addressing the entrepreneurial attitudes of students, not only in terms of new firms but also in terms of new research projects. In this regard, Guerrero and Urbano (2012) point out that universities are those actors generating a specific context to promote the entrepreneurial alertness and opportunity recognition, mainly throughout educational strategies. Here, universities are not indifferent to the context in which they are involved. Taking into consideration that, for instance, entrepreneurs presumably are facing higher uncertainty, the entrepreneurial knowledge, training and skills taught within classrooms should consider that informal context affects the reality of those entrepreneurs. Hence, universities must provide the necessary information to manage the uncertainty and the subsequent fear of failure.

## **6. Conclusions**

In this paper, pooled data (for the period of 2012–2015) have been used to investigate the influence of informal and formal institutions on the university students' decision of becoming employer entrepreneurs. Using institutional economics, hypotheses regarding informal institutions (role models, entrepreneur's social image and fear of failure) and formal factors (the lack of incentives to create new businesses, entrepreneurial knowledge, training and skills, and entrepreneurship education policy) were explored. Hence, the information from surveyed students of UAB and UOC was used to estimate linear probability models as well as estimate discrete choice models (i.e., probit).

In terms of the results, despite the lower statistical significance of an entrepreneur's social image, both informal and formal institutions contribute to the probability of a university student becoming an employer entrepreneur. Particularly, in this paper we found that those formal factors highly related to the university dynamics have higher influence on the student employer entrepreneurs than informal institutions. In this respect, the three formal factors assessed were statistically significant in explaining the probability. Of these three, entrepreneurship education was found most relevant in explaining the decision of becoming an employer entrepreneur. This result is in line with Guerrero and Urbano's (2012) and Fayolle's (2007a,b) works, which suggest that the entrepreneurial activity within the universities depends on the capacity to

implement high-quality programmes that provide elements such as business plan preparation or business model identification. Thus, university students could receive an appropriate training, useful to easily perceive the entrepreneurial opportunities.

In terms of the informal institutions, our results provide evidence regarding the influence of the role models and fear of failure. Both of them are highly documented in the entrepreneurship literature (Álvarez et al., 2014). In this case, role models positively explain the probability of becoming an employer entrepreneur. Concerning fear of failure (although for those entrepreneurs with 1-50 employees there is not statistical significance), for those entrepreneurs hiring at least one and also more than 50 entrepreneurs, it is likely that higher risk is perceived, and hence, fear of failure emerges as a barrier. In this case, the informal institution deters the probability of becoming an employer entrepreneur that creates large firms.

We consider that our results could be useful to extend the current debate about the importance of universities promoting development and contributing to the society. In this regard, the recognition of the 'heroic entrepreneur' is not the only factor determining the entrepreneurial success, and here, the institutions can play an important role in encouraging new ventures into fully fledged, value-adding growth ventures (Ács et al., 2014). Thus, as Williamson (2000) recognized, a policy discussion was performed, taking into account the interactions between formal and informal institutions. Basically, formal institutions, such as university norms and their government structure, must be in accordance with the environment in which university students are involved. In this sense, in the short-term, strategies related to the re-designed courses and curriculums of entrepreneurship should take into account the students' profiles, addressing them not only toward new business creation but also toward research projects identification. Additionally, a rewards system generating constant incentives must be provided to the university community. For the long-term, scenarios where experienced entrepreneurs interact with those potential entrepreneurs should be created. A reinforced loop could be achieved, enhancing the entrepreneurial attitudes and motivation toward entrepreneurship within the university community. Here, we could expect that the university system would contribute to the regional and national development by providing skilled entrepreneurs.

Our analysis also allows the identification of some limitations. First, the sample size is limited only to two universities. Although, in general, there were not important differences between UAB and OUC, future studies could consider the inclusion of the other seven universities within the Catalan system. Here, it is worth synchronizing all the universities in order to obtain higher and similar sample size to compare the informal and formal institutions that influence the university student entrepreneurs. Likewise, it would be interesting the application of the instrument in a different university system in order to compare the results. Second, given the utility of the questionnaire, other analysis could also be taken into account. For instance, the assessment of gender gap (Noguera et al., 2013) between university students could be possible, along with the influence of the university strategy in solving this issue.

Finally, due to the nature of our treated variables, probabilistic models were performed. Nonetheless, survival approach (Millán et al., 2012) could provide other insights regarding not only the analysis in terms of becoming employer entrepreneurs but also in knowing the probability of incorporating this decision in the next period. Additionally, in order to embrace higher complexity, a simultaneous equation approach would suggest how institutions (where universities are considered), entrepreneurship and jobs creation are interacting constantly (Aparicio et al., 2015). In this respect, futures research lines could extend the analysis of the university contribution to society.

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