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UNBOUNDING ENTREPRENEURIAL INTENTS OF UNIVERSITY STUDENTS: A MULTIDISCIPLINARY PERSPECTIVE

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Unbounding entrepreneurial intents of university students: a multidisciplinary perspective

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Abstract

Entrepreneurial activities are seen as key drivers of innovation, job creation, and economic growth. Recent efforts are being pursued by several entities, including governments to promote entrepreneurial skills amongst the youngest. However, to design effective programs, policy makers have to uncover the determinants of entrepreneurship. To avoid that such efforts would be fruitless we argue that a multidisciplinary account of entrepreneurial intents among students is mandatory, circumventing past biased analysis towards business and engineering areas. Thus, in this paper we present the results of a survey to all final year university students of the largest Portuguese university. It encompasses a sample of 2431 students enrolled in 60 different undergraduate courses of 14 schools/faculties. Results evidence that the average entrepreneurial intents reaches a reasonable (by international standards) figure of 27%, with students enrolled in non-traditionally entrepreneurial focused areas – Humanities, Sports, Health and Sciences – and courses - Pharmacy, Veterinary, Law, Languages, History, History of the Arts and Archaeology, Sports, Biology and Chemistry, Dentistry - revealing higher entrepreneurial intents. Based on logit estimations, we further found that psychological factors, such as risk propensity, leadership profile, and creativeness, are the most important (positive) determinants of students' entrepreneurial intents. Contextual factors (e.g., family background and professional experience) failed to emerge as critical factors in explaining students' entrepreneurial intents - only business context emerged as important. Despite such results might at a first glance convey the idea that education policy for promoting entrepreneurship has limited application, we argue that it is not the case. What is required is different policy measures targeting students' attitudes and behaviors in both business and non business areas, avoiding the long-established mistake of confining entrepreneurial education related programs within business schools.

Keywords: Entrepreneurship; Intents; Students; Higher Education; Multidisciplinary; Portugal

JEL-Codes: M13; I21; A22

1. Introduction

The economic importance of entrepreneurship is well established in the literature. Entrepreneurship has been considered a way of boosting economic growth and job creation (Lee et al., 2006). In this way, in recent years, public policy has increased its attention in promote/stimulate entrepreneurial activities (Lüthje and Franke, 2003), as these activities are regarded as a driving force for innovation. As Lee et al. (2006) report, the increased interest in entrepreneurship has reached almost every country in the world due to increasing international competition based on agility, creativity and innovation. In this way, a vast set of programs and services (e.g. business plan competitions, education centers and chairs for entrepreneurship) have been implemented in order to provide a better infrastructure for new ventures (Lüthje and Franke, 2003). Part of these programs is directed to students as future entrepreneurs.

The idea of becoming an entrepreneur is more and more attractive to students because it is seen as a valuable way of participating in the labor market without losing one's independence (Martínez et al., 2007). Additionally, the desirability of self-employment is also related with an increasing disappointment with traditional occupations in large companies (Kolvereid, 1996). As a reaction to international competition, these companies have gone through a restructuring process which involves major cost cutting. Hence, the employment-related advantages of established companies (such as job security, reward of loyalty and stability) have lost their attraction (Jackson and Vitberg, 1987). At the same time, the work values usually linked with self-employed (independence, challenge and self-realization) have become more desirable (Lüthje and Franke, 2003).

In order to design effective programs, that is, programs that stimulate entrepreneurial activities, policy makers have to know which factors are decisive in influencing the entrepreneurial propensity (Scott and Twomsey, 1988), particularly among students. It is not widely known (and is currently subject to intense debate) whether contextual founding conditions or personal traits drive the students' career decision towards self-employment (Lüthje and Franke, 2003). This is because, while there has been significant research on the causes of entrepreneurial propensity, empirical research has seldom explored students as entrepreneurial subjects. In fact, as Lüthje and Franke (2003) pointed out, most of the existing empirical studies are based on samples of professionals who have either founded a company (entrepreneurs) or have work experience as employees of organizations. And since both populations can differ in a variety of important entrepreneurial characteristics, it seems

questionable to generalize these findings to students and graduates without make more research using student samples.

The existing studies focusing on the entrepreneurial intent among students are mainly restricted to small samples of business related majors. In this way, the majority of entrepreneurship initiatives at universities are offered by business schools (Ede et al., 1998; Hisrich, 1988) and for business students, while new venture opportunities exist within nearly all academic disciplines (e.g., graphic arts, nursing, computer science) (Teixeira, 2007). As Hynes (1996) advocates, entrepreneurship education can and should be promoted and fostered among non-business students as well as business students. Consequently, if a goal in designing entrepreneurial programs is to assist students within and outside the business school, it is important to understand the similarities and differences between business school students and their non-business counterparts. In the present paper we examine the entrepreneurial characteristics among students of sixty different courses, ranging from business, economics, engineering to sports, fine arts, humanities, medicine, to name but a few.

The paper is structured as follows. In the following section a brief review of the literature on students' entrepreneurial intentions is presented. Then, in Section 3, we detail the methodology and describe the data. The estimation model and results are presented in Section 4. Some conclusions are summarized in Section 5.

2. Students' entrepreneurial intentions: a brief literature review

The literature is full with different perspectives on entrepreneurship. The term has been used to define a wide range of activities such as creation, founding, adapting, and managing a venture (Cunningham and Lischeron, 1991). On the one hand, Gartner (1985) uses the term entrepreneur to refer to a person "who started a new business where there was none before". In the same line, Rumelt (1987) defines the term entrepreneurship as the creation of new businesses with some element of novelty. On the other hand, Schumpeter (1934) keeps the term to apply only to the creative activity of the innovator. The identification and exploitation of an opportunity was also referred by Kirzner (1973) and Peterson (1985) as entrepreneurial. Similarly, Garfield (1986) calls entrepreneur a person who develops a niche in the market or develop a strategy to satisfy some need. We can also report the economists' perspective of an entrepreneur provided by Vesper (1983): an entrepreneur is one who coordinates resources to create profits. Finally, as Parnell et al. (1995) report, most of the literature on entrepreneurship is based on the assumption that the entrepreneur is a risk-taker. Adapting Carland et al.'s (1984: 358) definition of "entrepreneur", we define 'potential entrepreneur' as

"an individual [final year student] who [admits the intention of] establish[ing] and manag[ing] a business for the principal purposes of profit and growth".

A long tradition of research is devoted to the question of why some people choose to become entrepreneur (be self- employed) and others are rather inclined to seek traditional wage or salary employment. A number of conceptual models structure the various factors that that influence the decision to start a new business (e.g., Bygrave 1989, Moore 1986). Although not specifically developed for students, they might explain their entrepreneurial intentions as well as the intentions of any other population (Frank and Lüthje, 2004). Most approaches distinguish between internal (personality) and external (contextual or environmental) factors (Figure 1).

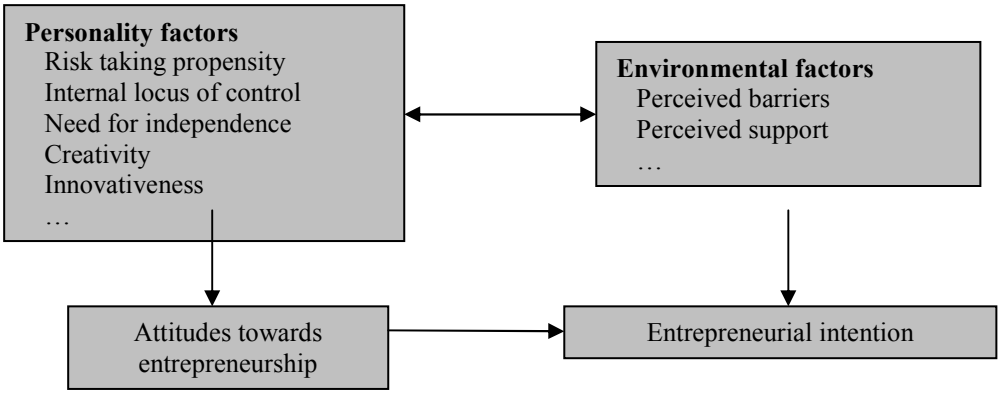


Figure 1: Structural model of entrepreneurial intent
Source: Adapted from Franke and Lüthje (2004)

Empirical research has revealed contradictory findings about the role of personality factors. For instance, while Lüthje and Franke (2003) using a simple of students at the MIT School of Engineering concluded that contextual factors and personality traits play a significant role in explaining entrepreneurial intent, later on the same authors (Franke and Lüthje, 2004), comparing the entrepreneurial intentions of students of business administration, at two German-speaking Universities (the Vienna University of Economics and Business Administration and the University of Munich) with the corresponding results for a leading institution in this field, the Massachusetts Institute of Technology (MIT), concluded that the huge differences in entrepreneurial intentions are essentially explained by the huge differences in the perceived environment.[1]

[1] In fact, authors' conclusion is that it is very plausible that the different levels of entrepreneurial culture in the three universities are at least partly responsible for the differences in entrepreneurial activity after graduation. Hence, these findings indicate that entrepreneurial intentions may be enhanced since they are associated with factors that are, at least partly, under the schools' control.

Lüthje and Franke (2003) analyse the causes of entrepreneurial intent among engineering students by testing a covariance structure model. More specifically, the authors explore whether perceptions of contextual founding conditions or personality traits have an impact on the students' intention to found their own business, i.e. to create its own employment. The authors concluded that the perceptions of contextual founding conditions (particularly the perceived contextual barriers and support factors) affect directly the entrepreneurial intent of technical students. Regarding the personality traits, the authors concluded that they have a strong impact on the attitude towards self employment and that this attitude is strongly linked with the intention to start a new venture/business.[2] The authors also concluded that the attitude towards entrepreneurship proved to contribute the strongest explanation for entrepreneurial intentions of the technical students. To sum up, these authors concluded that contextual factors and personality traits play a significant role in explaining entrepreneurial intent (both factors seems to have a similar effect).

On the other hand, Franke and Lüthje (2004) investigate the antecedents that may explain why differences of entrepreneurial intentions evolve across student populations (personality traits, attitudes towards entrepreneurship and perceptions of contextual factors). The results show that the intention to start a company is significantly lower among the German and Austrian students than among MIT students. However, the internal variables regarding personality and attitude towards self-employment are at a comparable level in both samples.[3] If the pertinent personality traits and attitudes barely differ, the huge differences in entrepreneurial intentions need to be explained by other factors. One possible explanation is provided by an analysis of the environment. In fact, huge differences are visible in the perceived environment. Specifically, the universities in Vienna and Munich are considered to be far less conducive to entrepreneurial development.[4]

Additionally, concerning the environmental factors, particularly those related with universities and their didactic activities, the few findings that exist are, also, partly inconsistent. In fact, although some empirical studies that base their research on student samples suggest that

[2] In other words, the conviction to start up a new venture is to some extent a question of personality structure, such as a propensity to high risk taking and internal locus of control.

[3] The authors found that the personality traits often associated with entrepreneurship are similarly distributed in all three samples – MIT students have a slightly higher willingness to take risks and a somewhat stronger internal locus of control (that is, they believe that they control their environment and not vice versa), but at the same time they show a lower need for independence. Even more surprisingly, the attitude toward self-employment is even more favorable among German-speaking students than among the respondents in the US sample.

[4] Both the macro environment (i.e., markets, capital markets, and governmental policy) and the micro environment (i.e., the university with its tasks of initiating, developing and supporting entrepreneurship inspiring, training, actively supporting, and networking students), which are crucial for new venture creation, are rated much more favorably by MIT students than by the students in Vienna and Munich. The differences are greatest in the case of micro environment.

courses in entrepreneurship and the image of business founders within the university help graduates to became entrepreneurs/self-employed, others have a pessimistic view of the effects of universities on entrepreneurial propensity. Concerning the first category of studies, Autio et al. (1997), based on a survey of technology students from four different countries (Finland, Sweden, USA, and South-East Asia), concluded that the career preferences and entrepreneurial convictions are influenced by the image of entrepreneurship as a career alternative and the support received from the university environment, and conviction emerges as the most important influence on intent. Kolvereid and Moen (1997) compare the behaviour of business graduates with a major in entrepreneurship and graduates with other majors from a Norwegian business school. Their results indicate that graduates with an entrepreneurship major are more likely to start new businesses and have stronger entrepreneurial intentions than other graduates.[5] Chen et al. (1998), based on a survey of MBA students at a large US college, concluded that the number of management courses the students had taken were positively related to entrepreneurial intention. Additionally, Sagie and Elizur (1999), comparing small business students and students with other business and economic majors, concluded that the formers have a higher need for achievement which in turn has a positive effect on the availability to found a company. It is not clear, however, whether self-selection effects or causal effects of the entrepreneurship courses are responsible for these results. Oakey et al. (2002), analyses the students propensity for entrepreneurial behavior. The study was conducted in the Manchester University (science departments). The included data provides evidence on the attitudes of 247 student respondents towards the prospect of new business formation and factors that might enhance or inhibit such propensities. The authors concluded that the key characteristics of the sub-group of students who would seriously consider founding their own business, tended to focus on the importance of independence and flexibility of choice in the work environment. In this way, the authors the authors consider that the general impression gained from the analysis must be one of optimism regarding the potential for increasing student entrepreneurship through correct policies. Finally, in a recent study, Souitaris et al. (2007) tests the effect of entrepreneurship education on the entrepreneurial attitudes and intentions of science and engineering students, in order to confirm (or disconfirm) conventional wisdom that entrepreneurship education increases the intention to start a business. The authors conducted the study in two major European universities, in London, UK and Grenoble, France. The group who participated in the programs took entrepreneurship as a compulsory or elective module within their curriculum

[5] Note, however, that as Kolvereid and Moen (1997) report, students who choose an entrepreneurship major in business school may have decided to become entrepreneurs prior to choosing their major.

while students in the control group did not participate in the programs. Applying empirically the theory of planned behaviour, the authors' results show that the programs raise some attitudes and the overall entrepreneurial intention. Regarding the second category of studies, in a longitudinal study of 89 business students conducted by Whitlock and Masters (1996), the authors concluded that after four years of business courses the interest in pursuing self-employment seemed to dissipate. Furthermore, in a preliminary study of students involved in an entrepreneurship programme, Hostager and Decker (1999) could not find a relationship between education and achievement motivation.

To sum up, there exist studies whose findings suggest that entrepreneurship, at least to some extent, is a function of factors which can be altered through education, that is, entrepreneurship concerns knowledge and skills which can be developed through education. However, there also exist studies that found opposite conclusions. Additionally, the existing studies also have limitations. For instance, as Franke and Lüthje (2004) emphasize, they infer causality where we only observe a correlative relationship. And as in all studies, they cannot rule out the possibility that they have omitted (relevant) independent variables. In this way, it would certainly be imprudent to attribute the huge differences in the entrepreneurial intentions of students solely to the environment and particularly to the universities. Future studies involving longitudinal data and many more objects (i.e., universities) might test the hypothesis about the general impact of environmental factors and the specific effect of a supportive university context on the intention to found new businesses.

3. Methodology and descriptive statistics

A questionnaire was developed and pre-tested during spring 2006. Final year students of all subjects at the largest (in terms of number of students enrolled) Portuguese university (Universidade do Porto) were surveyed regarding their entrepreneurial intents. The survey was mainly implemented in the classroom, but when that was impossible (some final year students did not have classes as they were in internship training) the survey was implemented through the corresponding online inquiry. The final year students totalled 3761 individuals, spread over 60 courses, offered by 14 schools/faculties. The survey was carried out from September 2006 up to March 2007. A total of 2430 valid responses were gathered, representing a high average response rate of 64.6% (ranging from a low of 24% in the Medicine course of Medicine Faculty to a high of 96% in the Education course). Of these responses, 575 (24%) were from Technologies (including Civil, Mechanical, Electro-technical, Industrial and Management, Chemical, Metallurgy, and Technology and Environmental Engineering) 490 (20%) from Economics and Management, 304 (13%), from

Law and Social Sciences (e.g., Psychology, Sociology, Philosophy) and 272 (11%) from Health (e.g., Medicine, Nutrition, Dentistry, Veterinary), to name the most representative (cf. Figure 2).

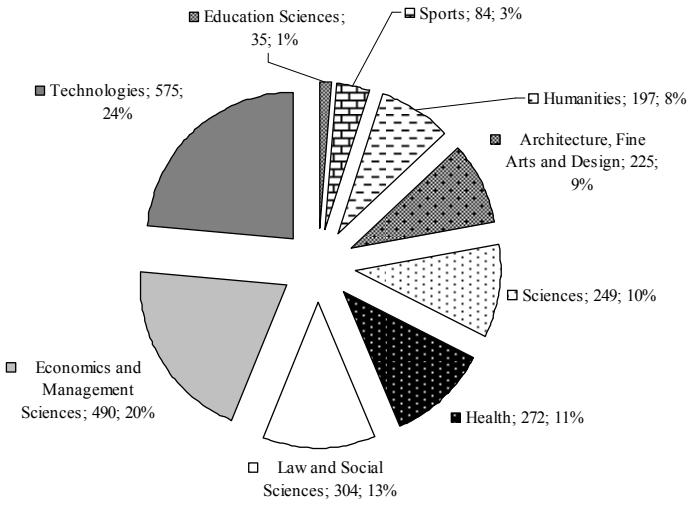


Figure 2: Distribution of final year students by areas of study

Source: Authors' computations based on data gathered from September 2006-March 2007

The questionnaire contained 17 questions, which include specific demographic descriptors (such as gender, age); participation in extra curricula activities, professional experience, academic performance, student status, social and regional context; statements designed to measure fears, difficulties/obstacles and success factors concerning new venture formation to which students responded using a 5-point Likert scale.

The entrepreneurial *intent* was directly assessed by asking students which option they would choose after completing their studies: starting their own business or being exclusively self-employed; to work exclusively as an employee; to combine employment and self-employment. Although such procedure is widely and extensively used in the literature on this subject (see, for instance, Ede et al., 1998; Lüthje and Franke, 2003; Franke and Lüthje, 2004; Gurol and Atsan, 2006), it is important to point the potential bias that it might involve as we are basing our argument on a general statement to a possible action in future. It would probably be more accurate to examine our research questions by employing an ex-post observation (e.g. 5 years later when these students are entrepreneurs or employees), but this would constitute not a measure of entrepreneurial *intent* but rather a measure of *effective* entrepreneurial behaviour. Moreover, to have such measure would require cohorts of students, which was not materially possible at this stage of the research.

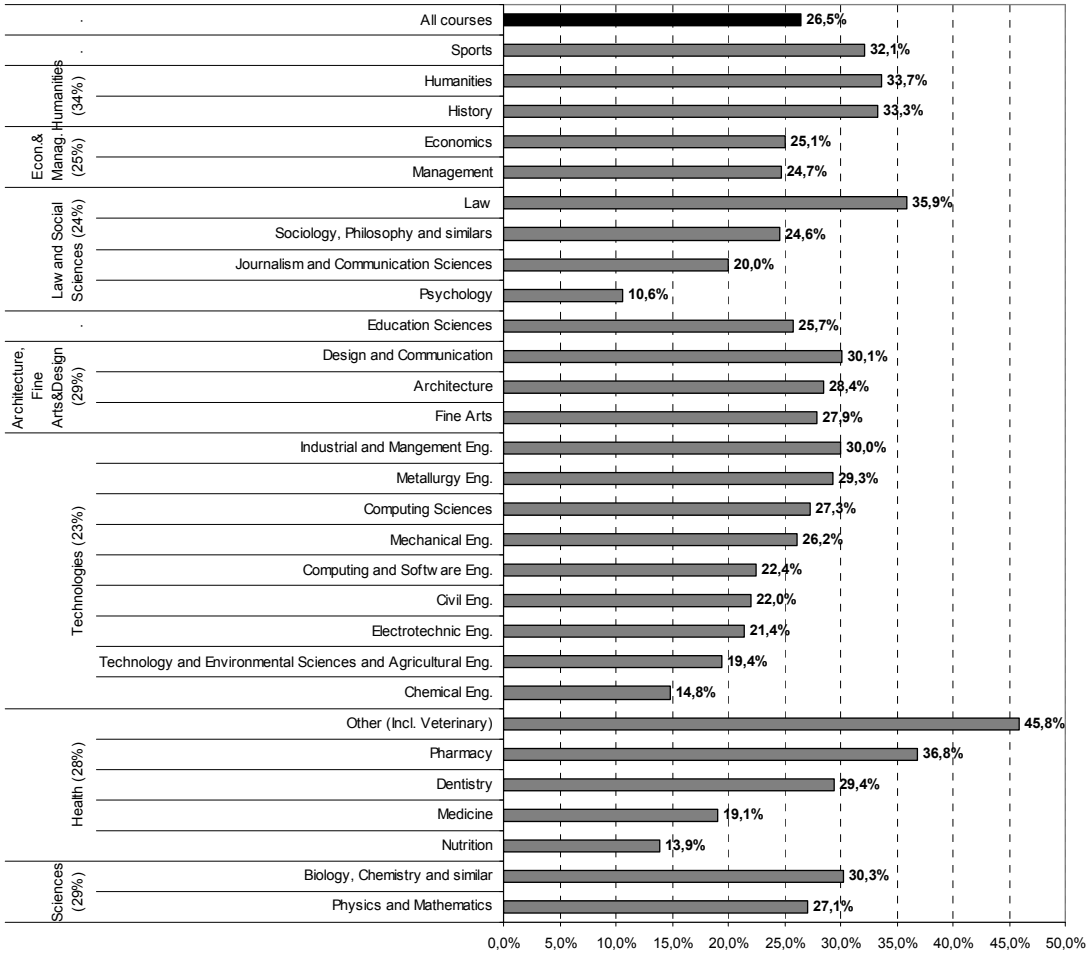
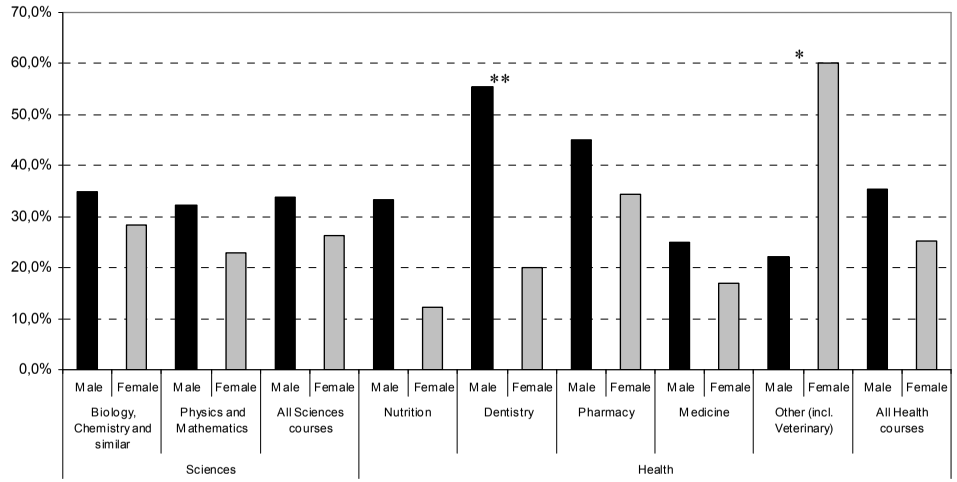
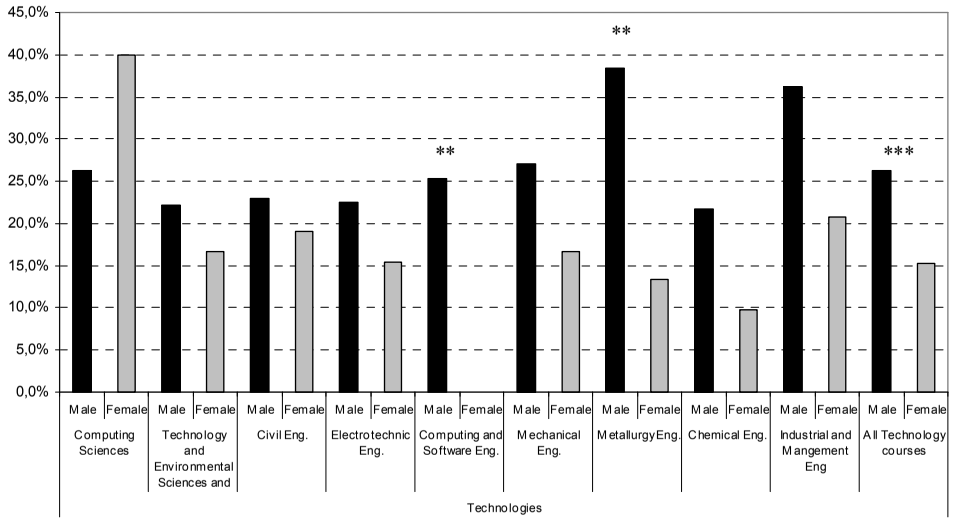


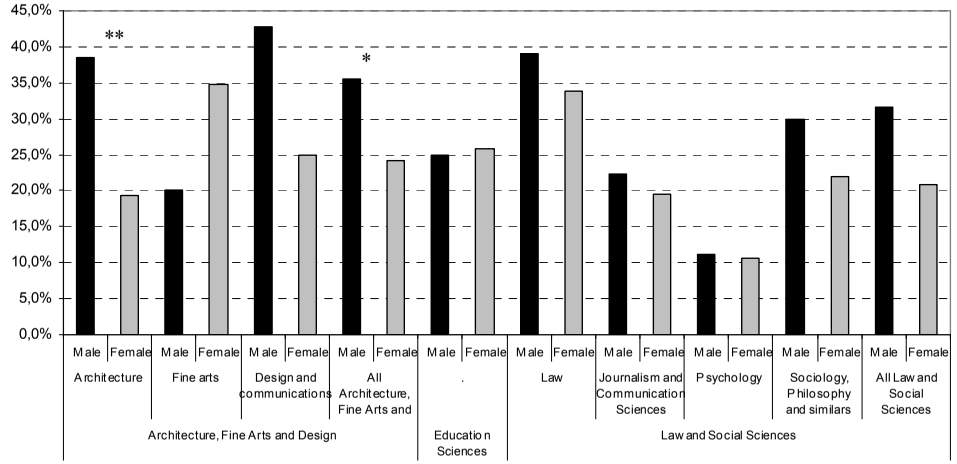
Figure 3: Entrepreneurial intents (%) by courses

Source: Authors' computations based on data gathered from September 2006-March 2007

On average, and considering all courses, 26,5% of the students surveyed claim that they would like to start their own business after graduation. An interesting evidence depicted in Figure 3 is the relative high propensity of Humanities (33,5%), Sports (32,1%) and Sciences (29,0%) students for entrepreneurship and the relative low values observed for Economics and Management (24,9%) and above all Technologies (23,4%) enrolled students. Recall that these latter courses are traditionally the target of entrepreneurship studies. This underlines the pertinence of including evidence from courses others than economics and engineering ones. Focusing on courses, instead of areas of study, we observe that Veterinary, Pharmacy, Law, Humanities (Languages studies), History and Sports students are the most potentially entrepreneurial led – on average, over a third of these courses' students would desire to become entrepreneurs after graduation. The above differences may be explained by the difficulties to get a job in some courses, namely Humanities and History. Additionally, the relative low propensity revealed by Economics and Management and Technologies students may result from the fact that these students are more conscious about the risks of become an entrepreneur as these courses usually have subjects concerning entrepreneurship.







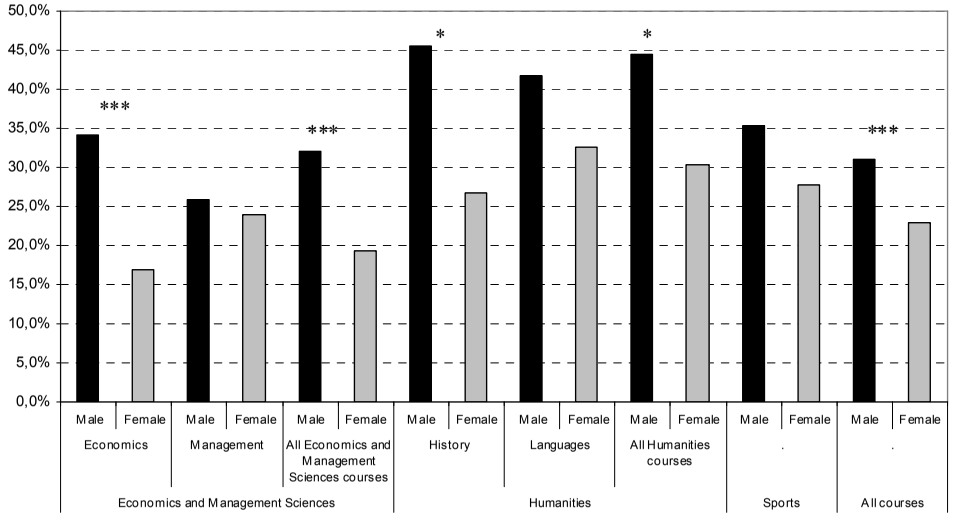
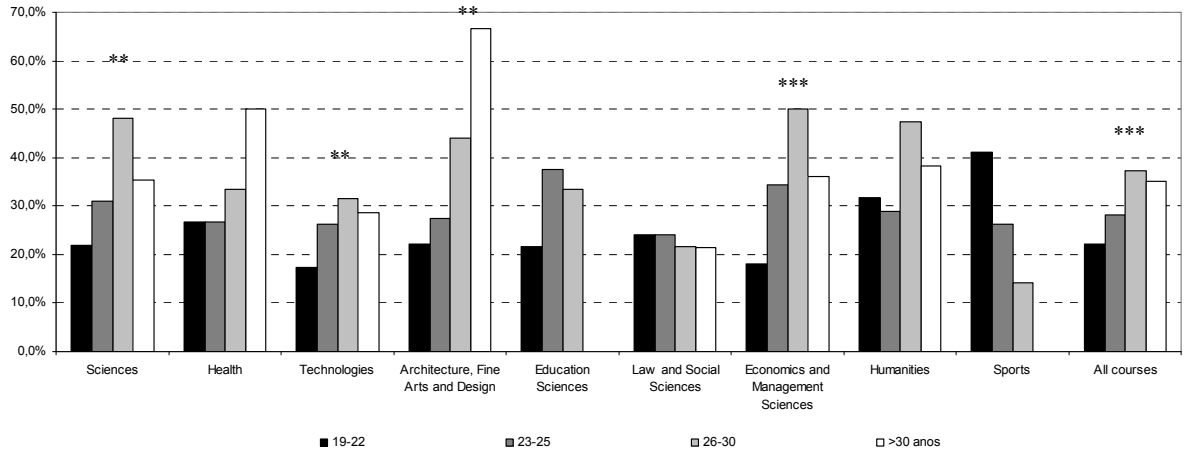


Figure 4: Entrepreneurial propensity by gender and courses

Note: ***(**)[*] significant at 1% (5%)[10%], according to Kruskall-Wallis Test

It is interesting to note that, in general, male students are statistically significant (using Kruskal-Wallis test) more entrepreneurially driven than their female counterparts - 31% of male students would like to start their own business after graduation, whereas in the case of female students, that percentage is around 23% (cf. Figure 4). Differences by course are particularly acute in Economics, Metallurgy Engineering, Computing and Software Engineering, Dentistry and Architecture On the contrary, in other Science and Health courses there is no evidence that statistical significant differences exist. The same happens with Law and Social Sciences related courses, Sports and Management. A remarkable exception to the overall pattern – male more entrepreneurial than female students - is Other Health courses (including Veterinary), where 60% of the female students claimed to desire start their own business after graduation against 22% of the male counterparts (this difference is significant at 10%). Computing Sciences also reveal a higher entrepreneurial propensity for female students than for male students (40% and 26%, respectively), however, such difference failed to reveal statistical significance.

In general (for All courses), older students (over 26 years old) are more entrepreneurial driven than their younger colleagues (cf. Figure 5). Differences between age groups are particularly evident (i.e., differences are statistically significant) in Economics, Architecture, Journalism and Communication Sciences, and Pharmacy. For the most part of the other courses differences are not statistically significant.



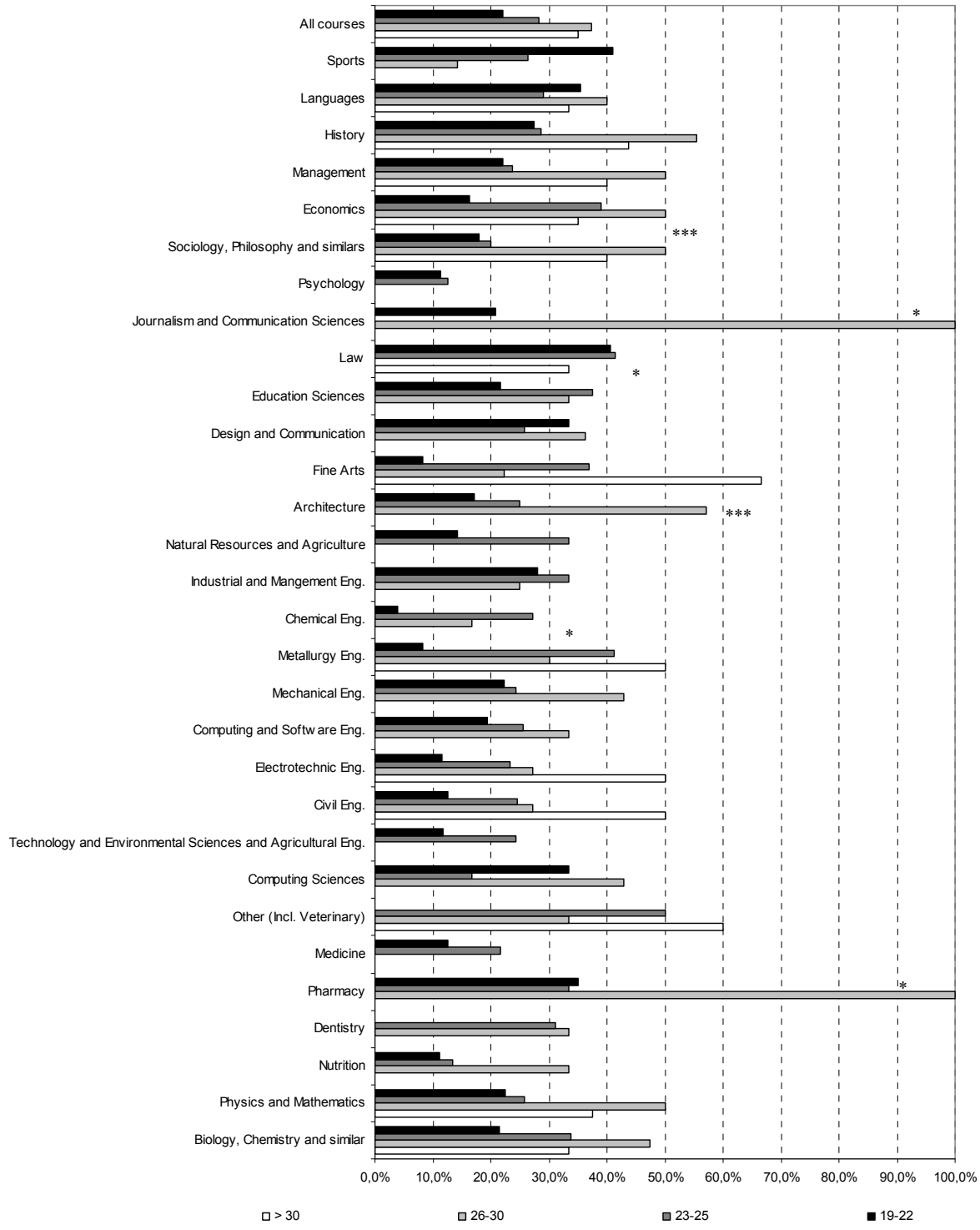


Figure 5: Entrepreneurial propensity by age and courses

Note: ***(**)[*] significant at 1% (5%)[10%], according to Kruskall-Wallis Test

Concerning the status of the student, as Figure 6 shows, for the whole sample there is no statistical important differences (cf. Kruskall-Wallis Test) between full time status and part time status (students involved in academically related issues - student association members -,

or professional occupation), By courses, there are differences in the entrepreneurial intents between full and part time students in Law and Metallurgy. For all the other courses differences in means are not statistically significant.

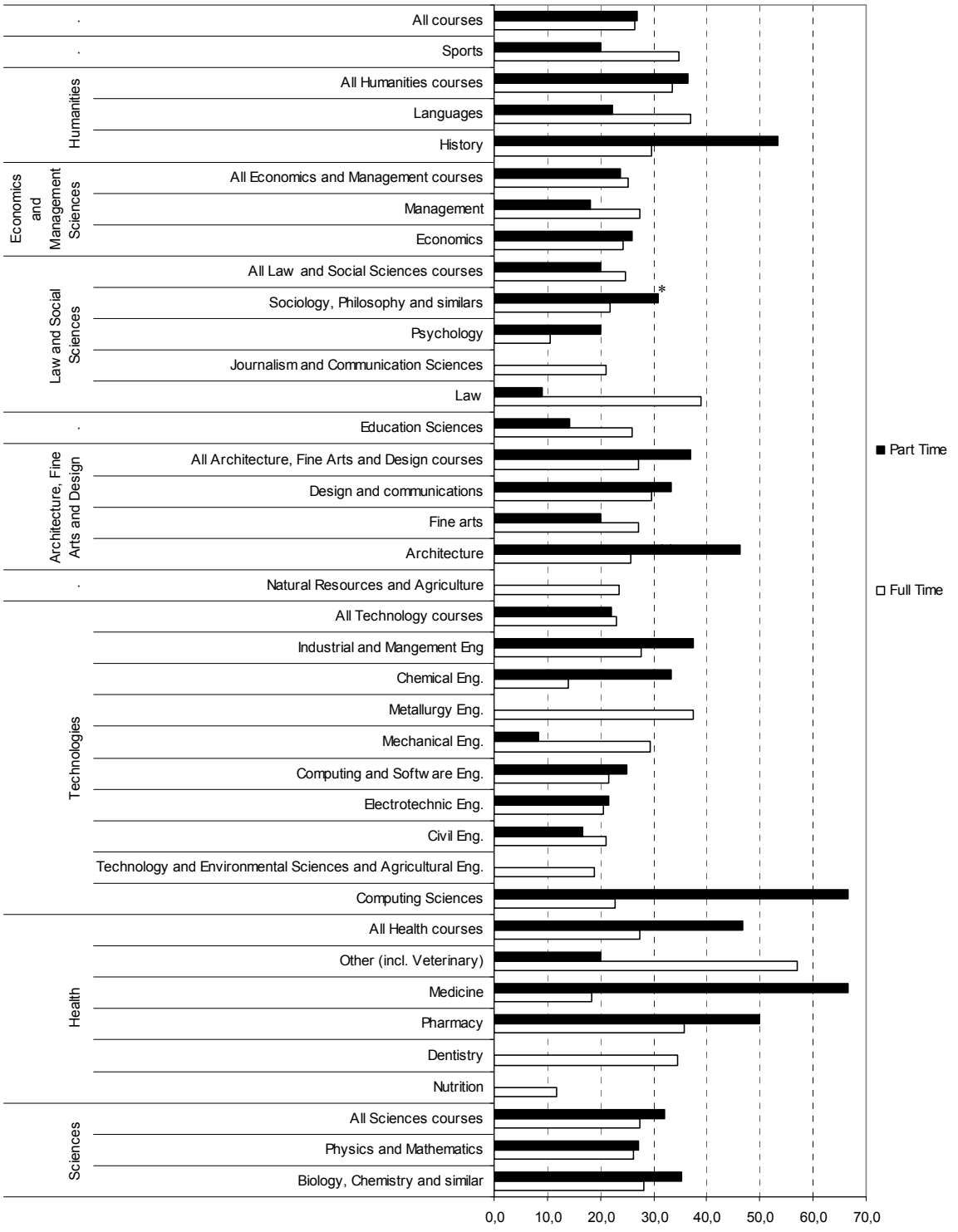


Figure 6: Entrepreneurial propensity by student status and course

Note: ***(**)[*] significant at 1% (5%)[10%], according to Kruskall-Wallis Test

Correlating entrepreneurial potential with some psychological attributes associated with an entrepreneur (cf. Section 2) – risk taking, no fear of employment instability and uncertainty in remuneration; leadership wishes; creative focus; and innovative focus – we obtain an interesting picture by course.

Risk taking behaviour was computed by considering the scores of the four items regarding the fear associated with new business formation – uncertainty in remuneration; employment instability; possibility to fail personally; possibility of bankruptcy. Firstly, dummies were computed for each item attributing 1 when the student responded small or no fear. Then we added up the four dummies and computed a new one which scored 1 if the sum variable totalled 3 or 4.

Today's businesses, workers, and educational institutions are making large investments in identifying and developing a personal characteristic called leadership. Some studies (e.g., Kuhn and Weinberger, 2005) identify 'potential leaders' as those students who reported that, within a given period, they were team captain or club presidents. Although we recognize that this might constitute a reasonable proxy, in the Portuguese university context these high school leadership activities are quite inexpressive. Thus, we devise an alternative proxy, based on the future desired occupation as employee. Baker and Aaron (1999) found evidence that one of the main skills associated to Chief Executive Officers (CEOs) occupations is leadership. Accordingly, we consider 'potential leaders' students that chose the option 'Directors/CEOs' (of firms or other organizations) when asked which occupation they would aspire in the case they were employees after graduation. In other words, leadership is a binary variable that assumes the value 1 when students identify Director as his/her future desired occupation (in case they were employee) and 0 otherwise.

Creativity is becoming more valued in today's global society (Florida, 2005). As in leadership, in the case of creativity behaviour, the proxy was based on students' answers to the future desired occupation. However, the occupation based procedure used here relies on Richard Florida's (2002) measure of creative class. Florida's work proposes that a new or emergent class, or demographic segment made up of knowledge workers, intellectuals and various types of artists is an ascendant economic force, representing either a major shift away from traditional agriculture- or industry-based economies, or a general restructuring into more complex economic hierarchies. The creative class is a class of workers whose job is to create meaningful new forms. The creative class is composed, for instance, of scientists and engineers, university professors, poets and architects. Their designs are widely transferable

and useful on a broad scale, as with products that are sold and used on a wide scale. Another sector of the creative class includes those positions which are knowledge intensive (Florida, 2005; Boschma and Fritsch, 2007). While by no means perfect, the procedure undertaken here enables, based on students indication of what type of occupation they would choose in case they opted by working as employees after graduation, to have a (rough) indicator of students' creativity potential/trait. In operational terms, creativity assumes the value 1 when students' future desired occupation is classified (in the taxonomy described above) as a creative occupation and 0 otherwise.

The literature concerning innovation-related classifications of industries is surprisingly scant and tends to be dominated by the Pavitt's (1984) taxonomy and the OECD's popular High-tech/Low-tech dichotomy. This OECD's dichotomy has recently been applied with regard to the concept of Knowledge Based Economy (KBE). The notion of KBE revolves around the tripod "use-production-distribution of knowledge". The OECD (1999) has focused on the first leg of this tripod and has not only adopted a working definition of knowledge-based sectors based on the intensity of inputs of technology and human capital but also has empirically identified the set of knowledge-based sectors. The OECD defines knowledge-based sectors as "those industries which are relatively intensive in their input of technology and/or human capital", and identifies the set of knowledge-based sectors with High- technology industries, Communication services, Finance insurance, real estate and business services, and Community, social and personal services (OECD, 1999: 18). Based on this study, we categorize sectors by degree of technology intensity and knowledge intensity. Thus, in the case students refer a sector classified as 'high tech- high knowledge intensive' (cf. OECD taxonomy), the variable 'innovation' assumed the value 1 (and 0 otherwise).

Considering the whole sample, Table 1 shows that risk taker students ('Yes') present, on average, a higher entrepreneurial potential than their non-risk taker ('No') colleagues – 41,2% of students with risk taker behaviour would like to start a business after graduation whereas in the case of non-risk taker students the corresponding figure is only 25,1%. For creativity this difference is also significant – 31,1% of students classified as having creativity behaviours ('Yes') are potential entrepreneurs whereas for non creativity prone students ('No') the corresponding percentage is 25,7%. Finally, leadership and innovative behaviours do not seem to discriminate between potential entrepreneurs, albeit in the case of leadership, students with this trait ('Yes') are more likely to aspire to become an entrepreneur after graduation.

Table 1: Entrepreneurial propensity by student psychological traits

		Risk		Innovation		Leadership		Creativity	
		No	Yes	No	Yes	No	Yes	No	Yes
Sciences	Physics and Mathematics	0,264	0,250	0,250	0,281	0,250	0,375	0,245	0,200
	Biology, Chemistry and similar	0,269	0,533	0,300	0,306	0,312	0,259	0,308	0,167
Health	Nutrition	0,139	-	0,176	0,105	0,133	0,167	0,147	0,000
	Medicine	0,188	0,222	0,238	0,176	0,184	0,500	0,191	0,191
	Dentistry	0,258	0,667	0,250	0,300	0,250	1,000	0,323	0,000
	Pharmacy	0,329	0,636	0,357	0,370	0,394	0,250	0,369	0,333
	Other incl. Veterinary	0,455	0,500	0,714	0,353	0,471	0,429	0,410	1,000
Technologies	Chemical Eng.	0,118	0,667	0,143	0,152	0,133	0,222	0,148	-
	Technology and Environmental Sciences and Agricultural Eng.	0,200	0,000	0,222	0,167	0,143	0,267	0,194	-
	Electrotechnic Eng.	0,180	0,667	0,205	0,222	0,175	0,333	0,210	0,333
	Civil Eng.	0,187	0,571	0,196	0,250	0,190	0,292	0,213	0,500
	Computing and Software Eng.	0,219	0,273	0,292	0,205	0,213	0,259	0,212	0,375
	Mechanical Eng.	0,262	0,250	0,235	0,290	0,229	0,353	0,270	0,000
	Computing Sciences	0,293	0,000	0,308	0,258	0,167	0,500	0,262	0,500
	Metallurgy Eng.	0,265	0,429	0,250	0,353	0,313	0,222	0,293	-
	Industrial and Mangement Eng.	0,280	0,400	0,294	0,308	0,250	0,325	0,293	0,500
Architecture, Fine Arts&Design	Fine Arts	0,216	0,667	0,314	0,125	0,293	0,000	0,000	0,364
	Architecture	0,257	0,571	0,228	0,346	0,267	0,750	0,400	0,273
	Design and Communication	0,279	1,000	0,311	0,267	0,286	0,667	0,600	0,279
	Education Sciences	0,265	0,000	0,250	0,261	0,353	0,167	0,250	0,333
Law and Social Sciences	Psychology	0,107	-	0,188	0,057	0,124	0,050	0,081	0,273
	Journalism and Communication Sciences	0,180	0,500	0,241	0,154	0,190	0,231	0,262	0,000
	Sociology, Philosophy and similars	0,250	0,200	0,382	0,074	0,235	0,259	0,222	0,429
	Law	0,370	0,111	0,408	0,315	0,333	0,455	0,361	0,333
Econ.& Manag.	Management	0,245	0,286	0,303	0,164	0,333	0,234	0,247	0,250
	Economics	0,244	0,333	0,244	0,257	0,208	0,259	0,238	0,636
Humanities	History	0,321	0,556	0,339	0,323	0,295	0,406	0,300	0,500
	Languages	0,330	0,600	0,306	0,381	0,356	0,290	0,321	0,400
Sports		0,329	0,250	0,310	0,385	0,356	0,240	0,324	0,308
All courses		0,251	0,412	0,279	0,251	0,257	0,278	0,257	0,311

Legend:
significant at 1%
significant at 5%
significant at 10%

Regarding the differences by courses, and considering the risk taking behaviour, they are particularly sharp in Chemical and Electro-technic Engineering, Pharmacy, Biology, Civil Engineering and Architecture courses: on average, students that present higher risk behaviour also present higher entrepreneurial potential. The differences reported in the remaining courses are not statistically significant. Concerning innovativeness, statistically significant differences emerge only in Sociology, Management and Psychology courses: innovative students present a smaller entrepreneurial propensity than non innovative students. In Dentistry, Computing Sciences and Architecture, leadership traits are associated with potential entrepreneurs, whereas creativity is positively associated with entrepreneurial

potential in Fine Arts, Psychology and economics and negatively associated with entrepreneurial potential en Journalism and Communication Sciences.

Table 2: Entrepreneurial propensity by student's international and professional experience and family background (having close relatives as entrepreneurs)

		International Experience		Professional Experience		Entrepreneurial context	
		No	Yes	No	Yes	No	Yes
Sciences	Biology, Chemistry and similar	31,0	20,0	29,3	29,3	34,6	25,4
	Physics and Mathematics	27,2	33,3	27,3	26,9	25,6	28,8
	All Sciences courses	**29,5**	**23,1**	**28,6**	**28,3**	**31,5**	**26,8**
Health	Nutrition	11,4	100,0	16,7	8,3	13,3	14,3
	Dentistry	31,3	0,0	30,8	25,0	35,7	25,0
	Pharmacy	36,5	38,5	31,1	52,0	46,2	29,8
	Medicine	21,2	13,0	13,4	36,4	14,3	25,6
	Other (incl. Veterinary)	57,9	0,0	55,6	40,0	45,5	46,2
	All Health courses	**29,2**	**20,5**	**24,1**	**36,6**	**28,9**	**27,1**
Technologies	Computing Sciences	26,8	33,3	35,7	27,3	25,0	27,3
	Technology and Environmental Sciences and Agricultural Eng.	21,2	0,0	12,5	25,0	30,8	13,0
	Civil Eng.	27,0	5,3	24,4	19,5	17,8	27,0
	Electrotechnic Eng.	26,2	5,3	22,2	20,8	22,2	20,5
	Computing and Software Eng.	26,1	0,0	12,5	30,5	23,4	21,7
	Mechanical Eng.	28,2	23,1	29,6	23,7	23,8	27,3
	Metallurgy Eng.	27,3	37,5	0,0	44,4	28,6	29,6
	Chemical Eng.	19,5	0,0	11,8	20,0	3,7	25,9
	Industrial and Mangement Eng	18,8	42,9	29,4	30,2	24,0	34,3
	All Technology courses	**25,1**	**17,9**	**18,1**	**27,5**	**21,5**	**25,0**
Architecture, Fine Arts and Design	Architecture	27,7	32,0	23,8	31,8	25,5	31,0
	Fine arts	33,3	10,0	11,1	32,4	30,8	23,5
	Design and communications	26,5	37,5	25,0	32,7	29,7	30,6
	All Architecture, Fine Arts and Design courses	28,5	30,5	22,7	32,2	28,1	29,7
	Education Sciences	27,3	0,0	37,5	15,8	18,8	27,8
Law and Social Sciences	Law	34,4	50,0	38,5	34,0	40,8	32,1
	Journalism and Communication Sciences	23,3	8,3	25,0	16,1	23,3	16,0
	Psychology	11,0	0,0	4,9	16,3	7,5	14,0
	Sociology, Philosophy and similars	26,4	12,5	22,2	25,6	33,3	17,6
	All Law and Social Sciences courses	24,0	21,9	23,7	24,0	26,7	21,3
Economics and Management Sciences	Economics	24,7	28,2	25,3	25,0	22,5	26,5
	Management	25,8	20,0	25,0	24,4	22,0	25,7
	All Economics and Management courses	25,0	24,6	25,2	24,8	22,4	26,3
Humanities	History	33,3	33,3	41,7	28,1	34,7	31,8
	Languages	36,7	14,3	43,5	25,9	40,4	25,5
	All Humanities courses	**35,1**	**24,1**	**42,7**	**27,0**	**37,6**	**28,4**
	Sports	36,4	24,1	40,0	30,4	36,2	23,1
	All courses	**27,3**	**22,4**	**25,1**	**27,7**	**27,2**	**25,9**

Legend:
significant at 1%
significant at 5%
significant at 10%

The role of experience at the level of associations, and other extra curricula activities, having international experiences, and professional activity experience is mixed with regard to entrepreneurial potential. In general, there are not significant differences, and these differences are only statistically significant in the case of international experience: on average, students with international experience present a smaller entrepreneurial propensity than those with no international experience (cf. Table 2).

By course, and analysing only the differences statistically significant, only in Nutrition and Management Engineering is the entrepreneurial propensity positively correlated with students' international experience. In courses such as Civil Engineering, Computing and Software Engineering and Languages, entrepreneurial propensity is negatively correlated with students' international experience. Regarding the professional experience, those students that claimed to have (had) a paid job tend to be more entrepreneurial led in Metallurgy Engineering, Computing and Software Engineering, Medicine and Pharmacy courses. Again, in Languages, entrepreneurial propensity is negatively correlated with professional experience. Family models (to have close relatives entrepreneurs) are particularly important, that is, seems to be highly (positively) correlated with students entrepreneurial potential only in Chemistry Engineering course.

4. Estimation model and results

The aim here is to assess which are the main determinants of the student's entrepreneurial intents. The nature of the data observed relative to the dependent variable [Opt to start a business after graduation? (1) Yes; (0) No] dictates the choice of the estimation model. Conventional estimation techniques (e.g., multiple regression analysis), in the context of a discrete dependent variable, are not a valid option. First, the assumptions needed for hypothesis testing in conventional regression analysis are necessarily violated – it is unreasonable to assume, for instance, that the distribution of errors is normal. Second, in multiple regression analysis, predicted values cannot be interpreted as probabilities – they are not constrained to fall in the interval between 0 and 1.

According to the literature (*cf.* Section 2) there are a set of factors, such as student's demographic descriptors (gender, age), psychological traits (risk, leadership, innovative and creative focus, and commitment), and contextual factors (participation in extra curricula activities, international experience, professional experience, family background, and region of residence), and university course. We add a set of other factors related to students' perceived

obstacles to new venturing creation, which are likely to influence students' entrepreneurial intents, namely Business Clima, Lack of financial and institutional support for new venture creation, Complex administrative procedures for new venture creation, and Scarcity of information for new venture creation.

The empirical assessment of the entrepreneurial intents is based on the estimation of the following general logistic regression:

$$P(entrepreneur) = \frac{1}{1+e^{-Z}};$$

$$with\ Z = \beta_0 + \underbrace{\beta_1 Gender + \beta_2 Age}_{Student's\ demographic\ descriptors} +$$

$$+ \underbrace{\beta_3 Risk + \beta_4 Innovativeness + \beta_5 Leadership + \beta_6 Creativeness + \beta_7 Commitment}_{Student's\ psychological\ traits} +$$

$$+ \underbrace{\beta_8 Extra-schoolling\_act + \beta_9 International\_exp + \beta_{10} Professional\_exp + \beta_{11} Role\_models + \beta_{12} Region}_{Contextual\ factors} +$$

$$+ \underbrace{\beta_{13} Business\_climate + \beta_{14} Lack\_finance + \beta_{15} Lack\_institutional + \beta_{16} Complex\_adm + \beta_{17} Scarcity\_inf}_{Perceived\ Obstacles} +$$

$$\boldsymbol{\beta}_{18}\mathbf{Area/Course} + \varepsilon_i$$

In order to have a more straightforward interpretation of the logistic coefficients, it is convenient to consider a rearrangement of the equation for the logistic model, in which the logistic model is rewritten in terms of the odds of an event occurring. Writing the logistic model in terms of the odds, we obtain the *logit* model

$$\log\left(\frac{Prob(entrepreneur)}{Prob(Non-entrepreneur)}\right) = \beta_0 + \underbrace{\beta_1 Gender + \beta_2 Age}_{Student's\ demographic\ descriptors} +$$

$$+ \underbrace{\beta_3 Risk + \beta_4 Innovativeness + \beta_5 Leadership + \beta_6 Creativeness + \beta_7 Commitment}_{Student's\ psychological\ traits} +$$

$$+ \underbrace{\beta_8 Extra-schoolling\_act + \beta_9 International\_exp + \beta_{10} Professional\_exp + \beta_{11} Role\_models + \beta_{12} Region}_{Contextual\ factors} +$$

$$+ \underbrace{\beta_{13} Business\_climate + \beta_{14} Lack\_finance + \beta_{15} Lack\_institutional + \beta_{16} Complex\_adm + \beta_{17} Scarcity\_inf}_{Perceived\ Obstacles} +$$

$$\boldsymbol{\beta}_{18}\mathbf{Area/Course} + \varepsilon_i$$

The logistic coefficient can be interpreted as the change in the log odds associated with a one-unit change in the independent variable.

Then, *e* raised to the power β_i is the factor by which the odds change when the i^{th} independent variable increases by one unit. If β_i is positive, this factor will be greater than 1, which means that the odds are increased; if β_i is negative, the factor will be less than one, which means that the odds are decreased. When β_i is 0, the factor equals 1, which leaves the odds unchanged. In the case where the estimate of β_1 emerges as positive and significant for the conventional

levels of statistical significance (that is, 1%, 5% or 10%), this means that, on average, all other factors being held constant, female students would have a higher (log) odds of entrepreneurial potential.

The estimates of the βs are given in Table 4 below. In this table we present two different models. The first model illustrates the estimated econometric specification relative to students of all (60) courses, grouping them into 29 courses (e.g., Law, Journalism and Communication Sciences, Psychology, Sociology, Philosophy and similar, Economics – the default course -, and Management). The second model instead of courses considers 9 areas of study (Sciences, Health, Technologies, Architecture, Fine Arts and Design, Education Sciences, Law and Social Sciences, Economics and Management Sciences – the default area -, Humanities, and Sports).

In Table 3, some descriptive statistics of the variables involved in the estimation procedure, as well their bivariate linear correlations estimates, are presented. Considering all valid (2431) final year students' responses, on average, 26.4% stated that after graduation they would like to start their own business (or be exclusively self-employed). Around 56% are female and have an average age of 23. Regarding the psychological traits, a small percentage of students (8%) may be classified as risk prone (no or little fear of employment instability, uncertainty in remuneration, and failure). Over a third (36%) presents a leadership conduct, admitting that if they could choose an occupation, they would like to be firm or other organization's directors/CEOs. Although 52% would invest in high-tech or high knowledge intensive industries in the event of starting a new business, only 14% would invest in creative industries/occupations. The average course mark is 13 out of 20 which indicates a reasonable commitment (effort) in their academic life.

Around one third of the final year students are/were involved in extra-schooling curriculum activities, and the majority already possess some professional experience. Less than 20% claimed to have international experience, that is, were involved in some international mobility program (e.g., Erasmus). Quite surprisingly, a substantial percentage of students (55%) have close relatives that own some sort of firms/businesses. The vast majority (over 80%) live in the North region.

The lack of financial support for new venture creation, the complexity associated with administrative procedures for new venture creation, and the unfavourable business clima are

seen by a vast percentage of students (respectively, 63%, 55% and 54%) as important or very important obstacles for the creation of new ventures.

Table A1 in Appendix presents the descriptive statistics for the course/area-related variables, where the mean refers to the weight each area/course has on the valid sample.

It is important to note that although a reasonable number of variables present statistical significant bivariate correlations (for conventional levels of significance), most of the estimates of the Pearson coefficient are quite low ($\rho<0.15$) and none is higher than 0.36, which indicates that multicollinarity is not an acute problem for our model estimation.

The models (Model I and II) presented in Table 4, which include 2331 students from 29 (9) distinct courses (areas) (with Economics/Economics and Management as default categories, respectively), depict quite consistent results. The models present a good fit as indicated by the Hosmer and Lameshow Test (the null hypothesis is accepted, which reveal that the 'model represents the reality well'). Demographic factors (gender and age) emerge as quite significant determinants of students' entrepreneurial intents. More precisely, females reveal a much lower propensity for entrepreneurship than their male colleagues. Such result ties in with other studies (e.g., Martínez et al., 2007), which indicate that entrepreneurship activities are more related to males, although it contrasts with the earlier study of Ede et al. (1998), who found no difference between male and female African American students in their attitudes toward entrepreneurship education. Similarly to Ede et al. (1998), more senior students are more likely to be potential entrepreneurs. Psychologically related factors, such as risk propensity, leadership behaviour and creativity focus, emerge in both models as critical for explaining students' entrepreneurial intents. Indeed, students that have a riskier profile (that is, do not value a lot employment stability, do not fear too much the prospect of uncertainty in remuneration; possibility to fail personally, or the possibility of bankruptcy) tend, other factors remaining constant, to have higher entrepreneurial intents (i.e., to foresee their future professional career as entrepreneurs). These three psychological factors – propensity for taking risks, leadership and creativeness – are indeed associated to Kuratko and Hodgetts' (2004: 30) definition of entrepreneurship – "… a dynamic process of vision, change, and creation". According to these authors, entrepreneurship requires an application of energy and passion (which is associated with leadership capacity) towards the creation and implementation of new ideas and creative solutions (that is requires creativity). The willingness to take ('calculated') risks - in terms of time, equity, or career – is point as a key factor in this process.

Table 3: Descriptive statistics of the variables included in the model

		Mean	Minimum	Maximum	Std. Deviation	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Dependent variable	**(0) Entrepreneurial Intents**	0,264	0	1	0,441	1,000	-0,090	0,111	0,105	-0,032	0,024	0,052	-0,032	**-0,040**	-0,046	**0,036**	-0,016	-0,004	-0,063	0,002	-0,018	**-0,037**	-0,004
Demographic descriptors	(1) Gender (Female=1; Male=0)	0,564	0	1	0,496		1,000	-0,127	-0,114	-0,031	**-0,040**	0,020	0,007	-0,057	-0,039	-0,075	-0,045	-0,025	0,153	0,060	0,078	0,136	0,017
	(2) Age (ln)	3,156	2,944	4,143	0,143			1,000	0,069	**0,037**	-0,063	0,076	-0,110	-0,045	-0,027	0,267	0,011	-0,025	0,002	0,022	0,064	0,009	-0,003
Psychological characteristics	(3) Risky (Yes=1; No=0)	0,079	0	1	0,269				1,000	-0,026	0,022	-0,003	0,006	**0,036**	0,013	0,044	0,017	-0,061	-0,126	-0,064	-0,031	-0,072	-0,098
	(4) Innovativeness (Yes=1; No=0)	0,513	0	1	0,500					1,000	-0,055	-0,159	**0,038**	0,031	-0,019	-0,056	**0,038**	-0,007	0,002	0,014	0,017	-0,005	**0,038**
	(5) Leadership (Yes=1; No=0)	0,357	0	1	0,479						1,000	-0,305	-0,195	0,066	0,012	-0,008	0,109	0,018	-0,070	**-0,036**	-0,047	-0,075	-0,049
	(6) Creativeness (Yes=1; No=0)	0,142	0	1	0,349							1,000	0,072	**-0,040**	0,061	0,104	-0,060	-0,029	0,043	0,005	0,028	**0,037**	0,019
	(7) Commitment (ln of average course mark)	2,591	2,303	2,996	0,106								1,000	0,076	0,079	0,047	-0,058	0,042	0,004	0,004	-0,026	-0,008	0,000
Contextual characteristics	(8) Extra-schooling curriculum activities (Yes=1; No=0)	0,294	0	1	0,456									1,000	0,103	0,083	0,065	0,018	**-0,035**	-0,043	-0,031	-0,049	-0,022
	(9) International experience (Yes=1; No=0)	0,170	0	1	0,375										1,000	0,091	0,029	-0,010	-0,024	0,000	-0,008	-0,014	-0,002
	(10) Professional experience (Yes=1; No=0)	0,533	0	1	0,499											1,000	0,059	0,032	-0,023	0,003	**0,038**	0,018	0,003
	(11) Role models (Close relatives own firms=1; Other=0)	0,545	0	1	0,498												1,000	-0,002	-0,031	-0,033	-0,014	-0,042	**-0,040**
	(12) Region (North=1; Other regions=0)	0,884	0	1	0,321													1,000	-0,026	0,010	0,011	**-0,037**	-0,014
Perceived obstacles to new venture creation	(13) Business Clima (Perceived as not favourable=1; Other=0)	0,543	0	1	0,498														1,000	0,152	0,158	0,135	0,108
	(14) Lack of financial support for new venture creation (Important&Very Important=1; Other=0)	0,630	0	1	0,483															1,000	0,359	0,222	0,146
	(15) Lack of institutional support for new venture creation (Important&Very Important=1; Other=0)	0,537	0	1	0,499																1,000	0,258	0,219
	(16) Complex administrative procedures for new venture creation (Important&Very Important=1; Other=0)	0,550	0	1	0,498																	1,000	0,312
	(17) Scarcity of information for new venture creation (Important&Very Important=1; Other=0)	0,503	0	1	0,500																		1,000

Legend:

statistically significant at 1%
statistically significant at 5%
statistically significant at 10%

Table 4: Determinants of the entrepreneurial intents of final year students: logit model estimates

			Model I	Model II
Demographic descriptors		(1) Gender (Female=1; Male=0)	-0,391	-0,424
		(2) Age (ln)	1,181	1,091
Psychological characteristics		(3) Risky (Yes=1; No=0)	0,607	0,640
		(4) Innovativeness (Yes=1; No=0)	-0,106	-0,102
		(5) Leadership (Yes=1; No=0)	0,297	0,306
		(6) Creativeness (Yes=1; No=0)	0,439	0,439
		(7) Commitment (ln of average course mark)	-0,446	**-0,857**
Contextual characteristics		(8) Extra-schooling curriculum activities (Yes=1; No=0)	**-0,190**	**-0,187**
		(9) International experience (Yes=1; No=0)	-0,348	-0,308
		(10) Professional experience (Yes=1; No=0)	0,051	0,072
		(11) Role models (Close relatives own firms=1; Other=0)	-0,066	-0,066
		(12) Region (North=1; Other regions=0)	0,032	0,039
Perceived obstacles to new venture creation		(13) Business Clima (Perceived as not favourable=1; Other=0)	-0,246	-0,253
		(14) Lack of financial support for new venture creation (Important&Very Important=1; Other=0)	0,148	0,132
		(15) Lack of institutional support for new venture creation (Important&Very Important=1; Other=0)	-0,101	-0,095
		(16) Complex administrative procedures for new venture creation (Important&Very Important=1; Other=0)	-0,141	-0,147
		(17) Scarcity of information for new venture creation (Important&Very Important=1; Other=0)	0,099	0,084
(18) Areas/ Courses	Sciences	Biology, Chemistry and similar	0,489	
		Physics and Mathematics	0,354	
		All Sciences		0,440
	Health	Nutrition	-0,207	
		Dentistry	**0,730**	
		Pharmacy	1,066	
		Medicine	0,165	
		Other (Incl. Veterinary)	1,139	
		All Health		0,629
	Technologies	Computing Sciences	0,194	
		Technology and Environmental Sciences and Agricultural Eng.	-0,069	
		Civil Eng.	-0,063	
		Electrotechnic Eng.	0,061	
		Computing and Software Eng.	-0,044	
		Mechanical Eng.	0,223	
		Metallurgy Eng.	-0,251	
		Chemical Eng.	0,363	
		Industrial and Mangement Eng.	0,128	
		All Technologies		-0,023
	Architecture, Fine Arts and Design	Architecture	-0,001	
		Fine Arts	0,399	
		Design and Communication	0,297	
		All Architecture, Fine Arts and Design		0,184
	Education Sciences		**0,493**	0,334
	Law and Social Sciences	Law		
		Journalism and Communication Sciences	0,125	
		Psychology	-0,585	
		Sociology, Philosophy and similars	0,031	
		All Law and Other Social Sciences		0,083
	Economics and Management Sciences (default)	Economics (default)		
		Management	0,064	
		All Economics and Business		
	Humanities	History, History of the Arts and Archaeology	0,527	
		Languages	0,660	
		All Humanities		0,605
	Sports		0,578	0,570
Constant			-3,587	-2,219
N			**2331**	**2331**
Entrepreneurs			619	619
Others			1712	1712
Goodness of fit statistics				
% corrected			74,0	73,6
Hosmer and Lameshow test (p-value)			9,291 (0,318)	7,923 (0,441)

Legend:

statistically significant at 1%

statistically significant at 5%

statistically significant at 10%

Commitment (that is, effort in current study activities), proxied by the expected average grade, does not seem to 'explain' entrepreneurial intents of students. In fact, when we consider areas (Model II) instead of courses (Model I), estimated results point that students with better expected average grades tend to reveal lower entrepreneurial potential. This might be in part explained by the fact that in some courses (e.g., economics and management) students with better academic performance tend to receive job offers by companies even before they finish their studies.

Surprisingly, almost none of the contextual factors turn out to be relevant. In contrast to some previous evidence (e.g., Martínez et al., 2007), potential entrepreneurs do not differ from other students in the time they spend on other activities. Controlling for individual and psychological factors, potential entrepreneurs and others spend a similar amount of time working to acquire professional experience, and on extra curricula activities. Moreover, the role model stressed by the literature concerning the importance of family and contextual background does not prove to be important in this study. We do not confirm, therefore, the results of other entrepreneurship studies (Brockhaus and Horwitz, 1986; Brush, 1992; Cooper, 1986; Krueger, 1993), which found that students from families with entrepreneurs have a more favourable attitude toward entrepreneurship than those from non-entrepreneurial backgrounds. Regional origin of the student also does not seem to impact on the entrepreneurial intents. This last result, however, is likely to be at least in part explained by the fact that the vast majority (almost 90%) live in the North (the region where the University of Porto is located).

The perception (by students) of the importance of some obstacles to the creation of new ventures does not discriminate in general entrepreneurial led students from those less entrepreneurial driven. The only exception is regarding the business clima. Our results show that students that perceive unfavourable business clima as an important or very important obstacle to venture creation tend to be those less motivated for entrepreneurial activities, which corroborates Kuratko and Hodgetts' (2004: 30) argumentation that entrepreneurs (or in this case potential entrepreneurs) are those individuals that have the "vision to recognize opportunity where others see chaos, contradiction, and confusion".

The results based on our estimated models demonstrate that the course or area of study matters for assessing entrepreneurial intents. In concrete, final year students enrolled in courses such as Pharmacy, Other Health related courses (including Veterinary), Biology, Chemistry and similar, History, History of the Arts and Archaeology, Languages, Sports and Dentistry, present (controlling for all the other factors likely to influence the entrepreneurial intents) a higher likelihood for creating new ventures than their counterparts from Economics.

The same happens in the case of Health, Humanities, Sports and Sciences when compared to Economics and Management areas. This result proves to be quite unfortunate given the focus that previous studies on entrepreneurship placed on business-related majors, and the fact that a substantial part of entrepreneurial education is undertaken in business schools (Levenburg et al. 2006).

5. Conclusions

In this paper, the entrepreneurial intentions of final year undergraduates in a wide set of courses and areas of study are examined along with their related factors. The findings have insightful implications for researchers, university educators and administrators as well as government policy makers. First, the entrepreneurial intents of final year undergraduates are to a larger extent, and regardless their age, gender and course (area) in which they are enrolled, 'explained' by psychological traits/attitudes rather than contextual factors. Second, we demonstrate that the course or area of study matters for assessing entrepreneurial intents. This highlights the limitation of existing works of the area which tend to focus essentially business or engineering/technology related areas. The neglecting of areas such as Health, Sports or Humanities, which present significantly higher entrepreneurial potential than that business related areas might conduct to ill conceived policy measures in the (higher) education arena and to the failure in capturing the highly motivated, creative and 'smart' talents for new venture creation.

We do agree with Hatten and Ruhland (1995) and Kent (1990) when they claim that more people could become successful entrepreneurs if more potential entrepreneurs were identified and nurtured throughout the education process. They demonstrate that students were more likely to become entrepreneurs after participation in an entrepreneurially related program. In this context, and as Kolvereid and Moen (1997) suggest, entrepreneurship, at least to some extent, might be a function of factors which can be altered through education. This argumentation is supported by our data. The areas where students reveal higher entrepreneurial intents – Sciences, Humanities and Sports -, are to a large extent those where students identify need for further training. Less than 13% of students enrolled in these areas of studies agree or completely agree that their courses provide them with the required skills for creating a business. Almost 60% of students surveyed which are enrolled in areas such as Education Sciences, Economics and Management Sciences, Humanities and Sports recognize to lack technical skills for starting a new business venturing, and a much larger percentage admits to lack management skills, namely in areas such as Architecture, Fine Arts and Design, Humanities, and Health.

Table 5: Course adequacy and entrepreneurial (postgraduate) education prospects of students, by area (% of students that agree and strongly agree with the statement)

	Sciences	Health	Technologies	Architecture, Fine Arts and Design	Education Sciences	Law and Social Sciences	Economics and Management Sciences	Humanities	Sports	All courses
My **course has supplied me the tools and knowledge required** for starting a business	**8,1%**	29,5%	**30,1%**	20,5%	17,1%	16,4%	23,3%	**12,8%**	**9,5%**	**21,5%**
I feel that I lack **technical** knowledge for starting a business	44,1%	47,4%	**36,5%**	52,2%	**57,1%**	45,9%	**56,9%**	**55,8%**	**54,8%**	**47,8%**
I feel that I lack **management** knowledge for starting a business	**60,1%**	**63,4%**	43,6%	**76,2%**	**57,1%**	**57,4%**	**39,6%**	**65,1%**	**59,5%**	**53,9%**
I'll like to attend a **post graduate course** (less than 1 year of duration) in innovation and entrepreneurship	54,4%	56,5%	53,5%	**60,4%**	**62,9%**	54,6%	56,5%	**65,8%**	53,6%	**56,5%**
I'll like to attend a **master** (over 1 year of duration) in innovation and entrepreneurship	39,5%	36,5%	33,6%	41,3%	**54,3%**	36,5%	38,2%	**54,4%**	50,6%	**39,1%**
I'll like to attend **further training** (post graduate course and/or master) in innovation and entrepreneuship	61,8%	62,9%	61,0%	68,4%	**71,4%**	62,5%	63,3%	**72,1%**	65,5%	**63,8%**

Humanities, Education Sciences, Architecture, Fine Arts and Design, and Sports are the areas of study where a larger percentage of final year students would like to obtain training (especially short-term post graduate courses) in innovation and entrepreneurship.

Given the above results, we sustain that more attention by policy makers and higher education authorities should be attribute to fostering 'hands-on', short-term entrepreneurship program offering to students in rather neglected areas of studies in terms of entrepreneurial activities and research, namely Health, Sports, Humanities, and Sciences. We share Hartog et al.'s (2008) claim that the 'elite of the (potential) workforce', especially in terms of science oriented and social abilities (and education), should be stimulated to become entrepreneurs. To neglect the 'hidden potential' (Teixeira, 2007a) of students in non-business or non-technology areas is a mistake that we are not allowed to commit.

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Appendix

Table A1: Descriptive statistics of the variables related with areas/courses included in the model

			Mean	Minimum	Maximum	Std. Deviation
(18) Areas/ Courses	Sciences	Biology, Chemistry and similar	0,063	0	1	0,242
		Physics and Mathematics	0,040	0	1	0,196
		All Sciences	**0,102**	0	1	0,303
	Health	Nutrition	0,015	0	1	0,121
		Dentistry	0,014	0	1	0,119
		Pharmacy	0,036	0	1	0,186
		Medicine	0,037	0	1	0,188
		Other (Incl. Veterinary)	0,010	0	1	0,101
		All Health	**0,112**	0	1	0,315
	Technologies	Computing Sciences	0,018	0	1	0,133
		Technology and Environmental Sciences and Agricultural Eng.	0,015	0	1	0,121
		Civil Eng.	0,034	0	1	0,181
		Electrotechnic Eng.	0,027	0	1	0,161
		Computing and Software Eng.	0,044	0	1	0,206
		Mechanical Eng.	0,027	0	1	0,161
		Metallurgy Eng.	0,017	0	1	0,129
		Chemical Eng.	0,022	0	1	0,147
		Industrial and Mangement Eng.	0,025	0	1	0,155
		All Technologies	**0,237**	0	1	0,425
	Architecture, Fine Arts and Design	Architecture	0,045	0	1	0,207
		Fine Arts	0,018	0	1	0,132
		Design and Communication	0,030	0	1	0,171
		All Architecture, Fine Arts and Design	**0,093**	0	1	0,290
	Education Sciences		**0,014**	0	1	0,119
	Law and Social Sciences	Law	0,042	0	1	0,201
		Journalism and Communication Sciences	0,023	0	1	0,149
		Psychology	0,035	0	1	0,184
		Sociology, Philosophy and similars	0,025	0	1	0,156
		All Law and Other Social Sciences	**0,125**	0	1	0,331
	Economics and Management Sciences	Economics	0,140	0	1	0,347
		Management	0,062	0	1	0,241
		All Economics and Business	**0,202**	0	1	0,401
	Humanities	History, History of the Arts and Archaeology	0,038	0	1	0,192
		Languages	0,043	0	1	0,202
		All Humanities	**0,081**	0	1	0,273
	Sports		**0,035**	0	1	0,183

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