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## ATTITUDES OF HIGHER EDUCATION STUDENTS TO NEW VENTURE CREATION: A PRELIMINARY APPROACH TO THE PORTUGUESE CASE

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# Attitudes of Higher Education students to new venture creation: a preliminary approach to the Portuguese case<sup>♦</sup>

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## Abstract

Institutions of higher education have an important role in the generation of high tech ‘entrepreneurial capacity’. Being entrepreneurship in Portugal an emergent phenomenon there is an urgent need to better understand and develop this area not only by analysing the ‘supply side’ (i.e., the courses taught in this field) but also the ‘demand side’, that is, the attitudes of students, future potential entrepreneurs, to new venture creation. Based on 4413 responses of students enrolled in Portuguese higher education institutions, gathered in June-July 2008, we found, using a multivariate model, that students who had already created a firm although, on average, possess larger entrepreneurial experience and knowledge, they do not reveal high risk propensity or creativity. Those students that have taken some steps to create new businesses and, to a larger extent, those foreseeing their future career as owning their business have higher risk and creative profiles. Students who live in an environment which ‘breeds’ entrepreneurship have stronger desire to become entrepreneurs. This supports the contention that entrepreneurship is a learned process and that school, teachers, and other institutions and individuals may encourage entrepreneurial behaviours. ‘Role models’ seem indeed to constitute a key factor fostering entrepreneurship among Portuguese higher education students – in the Portuguese case, the entrepreneur and entrepreneurial company references are, respectively, Belmiro de Azevedo and Sonae. Although in a descriptive analysis students enrolled in non-university (e.g., polytechnics) and private higher education institutions reveal higher effective and potential entrepreneurial propensities, when we (simultaneously) control for a vast number of factors which are likely to affect entrepreneurship propensity, such differences cease to be statistically relevant. Students’ personality (risk, creativity) and demographic traits (gender and age), competencies and familiarity with entrepreneurship (entrepreneurial experience, knowledge, awareness, interest), and contextual factors (professional experience, role models) are important determinants of entrepreneurial propensity, whereas the type of higher education institutions (public vs private, non-university vs university), and, to some extent, the degree (postgraduate vs undergraduate), and the scientific area, fail to emerge as key determinants.

**Keywords:** students; entrepreneurship; attitudes

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Entrepreneurship is a dynamic process of vision, change, and creation. It requires an application of energy and passion towards the creation and implementation of new ideas and creative solutions. Essential ingredients include the willingness to take calculated risks—in terms of time, equity, or career; the ability to formulate an effective venture team; the creative skill to marshal needed resources; and fundamental skill of building solid business plan; and finally, the vision to recognize opportunity where others see chaos, contradiction, and confusion. (Kuratko and Hodgetts, 2004: 30)

## **1. Introduction**

The continued uncertainty about the economy, corporate and government downsizing, and a declining number of corporate recruiters on the education system have been fostering the appeal of self-employment and new business launching (Moore, 2002; Klapper and Léger-Jarniou, 2006).

Entrepreneurship, through the creation of new ventures or taking place within existing firms, has been identified as one of the major engines of economic growth (Wennekers and Thurik, 1999; Carree and Thurik, 2003; Rasmussen and Sørheim, 2006). Back in the nineties, Malecki (1997) pointed that there was an intimate relation between entrepreneurship and regional and local development, while Reynolds et al. (1994) found that high start-up rates were a necessary (although not sufficient) condition for economic growth. Indeed, entrepreneurial firms make two indispensable contributions to the market economies (Kuratko, 2005): first, they are an integral part of the renewal process that pervades and defines market economies, playing a crucial role in the innovations that lead to technological change and productivity growth; second, entrepreneurial firms are the essential mechanism by which millions of individuals (namely disadvantaged groups – women, minorities) access the pursuit of economic success.

As a consequence of the entrepreneurial trend and widespread lay beliefs of the collective and economic efficacy of entrepreneurship, there was an explosion in terms of public and private initiatives to promote entrepreneurial activity, propelled by the hope to accelerate innovation, technology development and job creation (Reynolds et al., 2001). Moreover, in terms of academic and scientific research, the field has acquired a higher profile, more status and more resources than previously (Laukkanen, 2000).

Traditional specialized majors within business schools were frequently designed from the perspective that graduating students would seek employment in specialized departments within large established firms (Levenburg et al., 2006). Increasingly, however, students had

been choosing, or at least desiring to start their own businesses both before and during their undergraduate studies, as well as post graduation (Oakey et al., 2002). Thus, students who are interested in creating new businesses (i.e., entrepreneurship) need to develop an array of skills (McMullan and Long, 1987) that will support their new ventures (e.g., planning, risk taking, market analysis, problem solving and creativity). In fact, successfully launching a new venture requires the mastery and blending of skills that are different from those required to maintain an established business. Higher education courses have their limitations but they can play a role in providing a useful insight to the challenges involved in being an entrepreneur and also in encouraging skill development and self-reliance (Henderson and Robertson, 2000). Impelled by such context, majors and minors in entrepreneurship have emerged on numerous higher education institutions in order to fuel students' entrepreneurial ambitions.

In Portugal, education in entrepreneurship is quite a novelty in the curriculum of higher education institutions, with the majority of the current courses emerging in 2002 and afterwards (Redford, 2006; Redford and Trigo, 2007). At the macroeconomic level, the most recent report from the Global Entrepreneurship Monitor (GEM, 2008) concluded that there was a substantial improvement in the entrepreneurial structural conditions in Portugal between 2004 and 2007, namely as far as access to physical infrastructures and the increasing degree of social and cultural openness to innovation and change are concerned. Data from GEM indicate that Portugal is at the top of the ranking among the 18 participant countries from the EU with 9 out of 100 individuals involved in new business formation, which reflects that the Portuguese 'entrepreneurial capacity' has doubled between 2004 and 2007.

Notwithstanding the apparent swift change, some business and former policy makers cast serious doubts that this entrepreneurial trend is sustainable. For instance, Mira Amaral, former (1987-95) Minister for Industry and Energy, member of the EC Competitiveness Advisory Group and President of the Forum for Competitiveness, recognizes that Portugal is still behind in terms of investment in new ideas and entrepreneurial projects, identifying a deficit of public policies in this domain. According to him, Portuguese government has to make a higher investment in entrepreneurship and risk capital, especially in *technological* projects that foster exports.<sup>1</sup>

Higher education institutions (universities and polytechnic) play an important role in the generation of high tech 'entrepreneurial capacity', more specifically, the entrepreneurial human capital, that is, the creation of skills, incentives and a cultural environment favorable

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<sup>1</sup> Source: Lusa, 18 June 2008.

to the provision of instruments for the commercialization of R&D outcomes by researchers, teachers and students in general. Since entrepreneurship in general, and entrepreneurship education in particular are an emergent phenomenon in Portugal, there is an urgent need to better understand and develop this area, not only by analyzing the supply side (i.e., the courses taught in this field) (in the line of Redford, 2006), but also the ‘demand side’, that is, the attitudes of students, future potential entrepreneurs, to new venture creation.

The impact of entrepreneurship education has been recognized as one of the crucial factors that help youths understand and foster an entrepreneurial attitude (Gorman et al., 1997; Kourilsky and Walstad, 1998). Due to the influence that education could have on the attitudes and aspirations of the youth, there is a need to understand how to develop and nurture potential entrepreneurs even while they are still students in school. Few empirical studies have examined the entrepreneurial propensity of university students as a source of future entrepreneurs (Wang and Wong, 2004). Their attitude and knowledge of entrepreneurship are likely to shape their inclination to start their own businesses in the future. This type of study will also help universities and other higher education institutions develop suitable educational programs to promote entrepreneurship. Obviously, findings from such a study will have certain policy implications in inducing more higher education graduates to start their own businesses.

Thus, the present paper aims at carrying out research on the attitudes of higher education Portuguese students towards new venture creation. In concrete, it seeks to understand what is the students’ perceived image of entrepreneurs/entrepreneurship; how familiar are the students with entrepreneurship and where does the familiarity come from; which factors influence the students’ decision between becoming an entrepreneur or employee; and how can universities foster the students’ interest in entrepreneurship.

The paper is organized as follows: in the following section, we briefly review the literature on entrepreneurship, with particular emphasis on student entrepreneurship, highlighting the main points of the existing research in this emergent field. Then, in Section 3, we describe the methodology and data gathering; after that (Section 4), we present some descriptive results of the current study, and in Section 5 we discuss the determinants of Portuguese students’ entrepreneurial intentions and propensity. Finally, in “Conclusions”, we discuss the results, deriving recommendations on how to improve entrepreneurship education, and point some potential avenues for further research.

Before there can be entrepreneurship there must be a potential for entrepreneurship. For there to be entrepreneurial potential, there must be potential entrepreneurs (Klapper and Léger-Jarniou, 2006: 97)

## 2. Literature review

For developed economies, entrepreneurial activity (new venture formation) is often a means of revitalizing stagnated economies and of coping with unemployment problems by providing new job opportunities (Gürol and Atsan, 2006). At the same time, it is a potential catalyst and incubator for technological progress, product and market innovation (Jack and Anderson, 1999; Mueller and Thomas, 2000). For economies of developing countries, however, it has an even more critical role since entrepreneurship is seen as an engine of economic progress, job creation and social adjustment (Gürol and Atsan, 2006). Thus, small business growth/new business formation is widely encouraged by national economic policies to stimulate economic growth and wealth creation.

According to official data, in Europe around 23 million Small and Medium Enterprises (SMEs) were responsible for the creation of more than 2/3 of employment in the private sector, which corresponds to 75 million jobs (EC, 2006: 3).<sup>2</sup> In Portugal, during the period of 1991-2000, 93% of new firms were very small, with less than 10 workers (Baptista e Thurik, 2007).

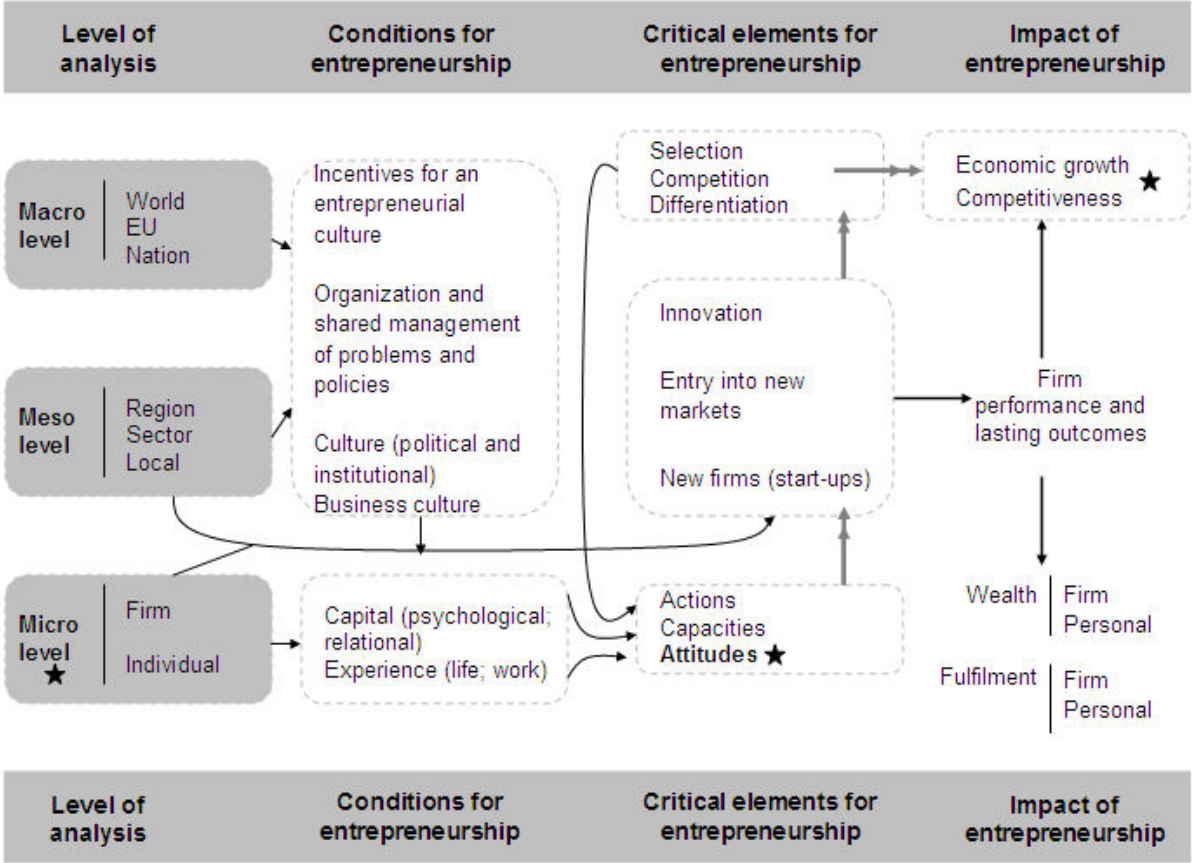
In parallel with developing interest in entrepreneurship throughout the world, Portugal has also witnessed an increasing interest in entrepreneurship fields both among academic scholars, and amongst government policy makers and business leaders (GEM, 2008). Historically, due to lack of qualified entrepreneurs and capital accumulation, during the *Estado Novo*, a state-initiated economic policy was implemented with state-owned enterprises playing a leading role, particularly in the industrial sector (Barreto, 1999). Since the mid 1970s, and in particular after the entry into the European Community in 1985, a major shift in the economic development strategy has taken place in Portugal. The importance of entrepreneurship and small business to the economy is now widely recognized and provided with national incentives by prevailing governments. The meta-narrative concerning a lack of entrepreneurs and entrepreneurial spirit has been translated into a variety of programs and

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<sup>2</sup> According to the Recommendation 96/280 of the European Commission, from 3 April 1996, medium firms are those that employ between 50 and 250 workers and register a turnover that is lower than 40 million Euros; small firms employ between 10 and 49 workers and have a turnover lower than 7 million Euros; very small/micro firms employ less than 10 workers. In Portugal, the European Recommendation is followed. In the US, the concepts are different, which makes it difficult to establish comparisons. Here, small firms may employ a maximum of 40 workers, whereas medium-sized firms may employ a maximum of 500 workers (Storey, 2003: 474).

initiatives designed to create awareness about entrepreneurship and to foster entrepreneurial activity.<sup>3</sup> This is a key element to motivate individuals, namely young people at higher education, to start their own business. A range of organizations and institutions are involved in the delivery of such programs, ranging from government agencies and local enterprise agencies to Chambers of Commerce and professional associations to University business schools.

A central premise of these programs is that entrepreneurship is a learned phenomenon. This means that entrepreneurs are not born, but created by their experience as they grow and learn, being influenced by teachers, parents, mentors and role models throughout their growth process (Volery, 2004). Perhaps those individuals interested in entrepreneurship and current entrepreneurs cannot be taught, but they can be encouraged, rather than discouraged. Thus, entrepreneurship is conceived as learning and learned process, as depicted in Figure 1.



**Figure 1: Entrepreneurship as a learned process**  
 Source: Adapted from Wennekers and Thurik (1999), and Portela (2008: 47)

<sup>3</sup> At the European level, one can mention the Competitiveness and Innovation Framework Programme (CIP) ([http://ec.europa.eu/cip/index\\_en.htm](http://ec.europa.eu/cip/index_en.htm)); at the National level, it is worth mentioning the set of programs managed by IAPMEI, for instance, the FIVE Programme – Fostering Innovation and Entrepreneurial Value promoted by IAPMEI during the period 2002-2005, and the set of programs currently ongoing described in <http://www.iapmei.pt/iapmei-bimindex.php>.

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). The most common values amongst graduates facing the new labor market are linked to those of the self-employed: independence, challenge and self-realization (Lüthje and Franke, 2003).

While there has been significant research on the causes of entrepreneurial propensity (Greenberger and Sexton, 1988; Learned, 1992; Naffziger et al., 1994; Brandstatter, 1997), only a limited number of studies have focused on the entrepreneurial intent among students. Those that exist tend to focus on US and UK cases and are mainly restricted to small samples of business related majors (cf. Table 1).

**Table 1:** Magnitude of entrepreneurial potential among students

Studies/authors	Degree	Courses	Countries	Number of students	Entrepreneurial potential (starting business/self-employment), %
Scott (1988)	Undergraduate	Business	UK, US, Ireland	436	50.0
Hatten and Ruhland (1995)	Undergraduate	Business	US	220	-
Kolvereid and Moen (1997)	Master	Business	Norway	303	-
Ede, Panigrahi, and Calcich (1998)	Undergraduate	Business	US (African-American students)	171	24.5
Kourilsky and Walstad (1998)	Youth: 14-19 years old	Not specified	US	917	66.9
Henderson and Robertson (1999)	Undergraduate and MSc	Business	UK	138	23.2
Oakey, Mukhtar and Kipling (2002)	Undergraduate and MSc	Physics, Biology and Mechanical engineering	UK	247	17.0
Lena and Wong (2003)	Undergraduate	Science, Engineering, Computing and Business	Singapore	11660	6.0 <sup>(1)</sup>
Luthje and Franke (2003)	Undergraduate	Engineering	US	524	54.6
Franke and Luthje (2004)	Undergraduate	Business	Austria	1313	36.0
			Germany		25.0
			US		50.0
Guroi and Atsan (2006)	Undergraduate	Business	Turkey	400	18.0
Klapper and Léger-Jarniou (2006)	Undergraduate	Business and Engineering	France	538	25.0
Levenburg et al. (2006)	Summer course students	9 majors	US	728	23.0 <sup>(2)</sup> - 38.7 <sup>(3)</sup>
Teixeira and Forte (2008)	Undergraduates (final year)	60 majors	Portugal	2430	10.6-45.8
Teixeira (2008a)	Undergraduates (final year)	Chemistry (science and engineering); Pharmacy	Portugal	194	14.8-36.8
Teixeira (2008b)	Undergraduates (final year)	Economics; Business; Engineering	Portugal	985	24.4-25.1

Note: (1) Effectively started a business; (2) starting a business; (3) self-employment

Despite the heterogeneity of sampling methods and target population, the existing studies on the issue (see Table 1) report that, on average, one quarter of students surveyed claimed that



after their graduation they would like to become entrepreneurs (starting their own business or being self-employed). There are nevertheless noticeable differences between US and non – US students as far as this aspect is concerned. In general, we observe a higher entrepreneurial intent among US students. For instance, Franke and Lüthje (2004), analyzing 1313 business undergraduates from Austria, Germany, and the US, found that entrepreneurial intents of the latter was the double of Germany's (50% against 25%) and substantially above that of the Austrian's (36%). In Portugal, for a multiplicity (60) of courses in the largest Portuguese university, Teixeira and Forte (2008) found that around 26% of final year students would see starting a new venture as their future career. Notwithstanding, that percentage considerably varied among majors/courses, from a lowest 11% in Psychology to a highest 47% in Veterinary.

While new venture opportunities exist within nearly all academic disciplines (e.g., graphic arts, nursing, computer science, chemistry and pharmacy), the majority of entrepreneurship initiatives at universities are offered by business schools (Ede et al., 1998; Hisrich, 1988) and for business students (e.g., Roebuck and Brawley, 1996). In fact, most studies that have been conducted to explore entrepreneurial intent among university students have focused on business students (e.g., DeMartino and Barbato, 2002; Ede et al., 1998; Hills and Barnaby, 1977; Hills and Welsch, 1986; Krueger et al., 2000; Lissy, 2000; Sagie and Elizur, 1999; Sexton and Bowman, 1983). However, Hynes (1996) advocated that entrepreneurship education can and should be promoted and fostered among non-business students as well as business students.

Picker et al. (2005) refer that entrepreneurial led measures have been recently implemented, through the establishment of new graduate programs, in the Cambridge-MIT Institute, the Stockholm School of Entrepreneurship, and the International Graduate School of Chemistry (Muenster, Germany). Consequently, if a goal in designing entrepreneurial programs is to assist students within and outside the business school, it is also important to understand students enrolled in other majors other than business.

The research effort implicit in the present paper extends existing research in the area of students' entrepreneurial intents in several ways: it encompasses both under and post graduate students from all scientific areas, enrolled in every schooling years from all Portuguese higher education institutions (universities and polytechnics, public and private). Such extensive sample will allow us to gather a reasonable nation-wide view of the pervasion of the entrepreneurship culture in Portugal. In the next section we further detail our sample.

### 3. Methodology and data gathering

The research described in the present paper is an extension of an international survey of 1st year business students, involving eight universities from eight countries including the University of Porto.<sup>4</sup> The extension was undertaken in several directions. The present empirical contribution targeted *all* students in Portugal enrolled in schools from the higher education institutions. Thus, it encompasses both *undergraduate* and *postgraduate* students, regardless the schooling year, from *public* and *private* polytechnic and university schools from *all scientific areas* (from medicine, sports, and humanities, to name but a few).

This empirical study intends therefore to be part of a wider research project aiming to understand student attitudes towards new venture creation, and to derive recommendations on how to improve entrepreneurship education.

Similarly to the international research project, the research questions for this research component are as follows:

1. What is the student's perceived image of entrepreneurs/entrepreneurship?
2. How familiar are the students with entrepreneurship and where does the familiarity come from? What is the student's level of interest in different entrepreneurship types? Which competencies do the students (think to) have?
3. Which factors influence the student's decision between becoming an entrepreneur or employee?
4. How can universities foster the student's interest in entrepreneurship?

In order to investigate the research questions presented above, a descriptive, quantitative method was applied. While exploratory and causal research explores circumstances, descriptive research pictures specific details of a situation, social setting or relationship. Facing the challenge of illustrating the status quo of student attitudes to new venture creation, a quantitative design was chosen. Reflecting the research questions as well as the multi-school, multi-course approach, an online based survey was identified to be the most appropriate research method.<sup>5</sup>

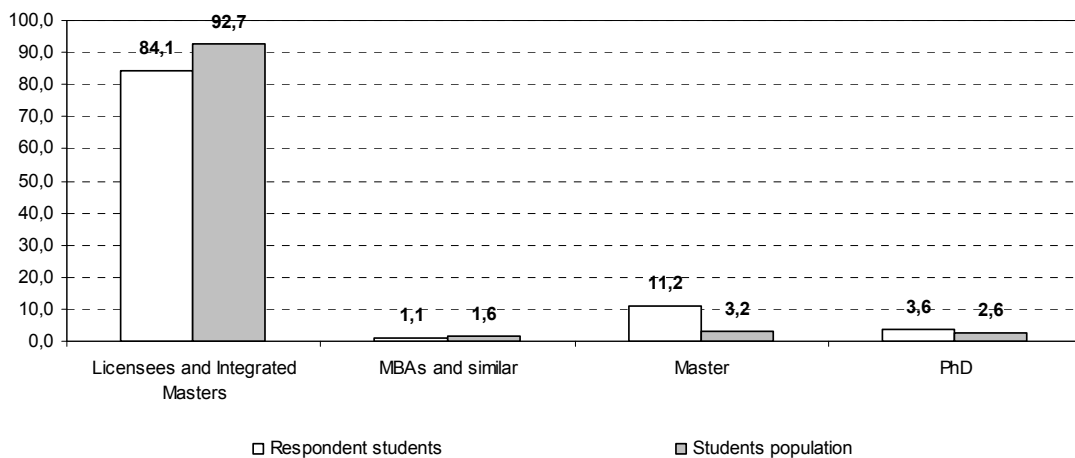
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<sup>4</sup> The other seven universities are the following: Muenster University of Applied Sciences (Germany); University of Adelaide (Australia); Lahti University of Applied Sciences (Finland); University of Maribor (Slovenia); Coventry University (UK); Cracow University of Economics (Poland); Dubai Women's College (UAE).

<sup>5</sup> The questionnaire is available in <http://www.fep.up.pt/inquerito/empreendedorismo/estudantes/index.php>.

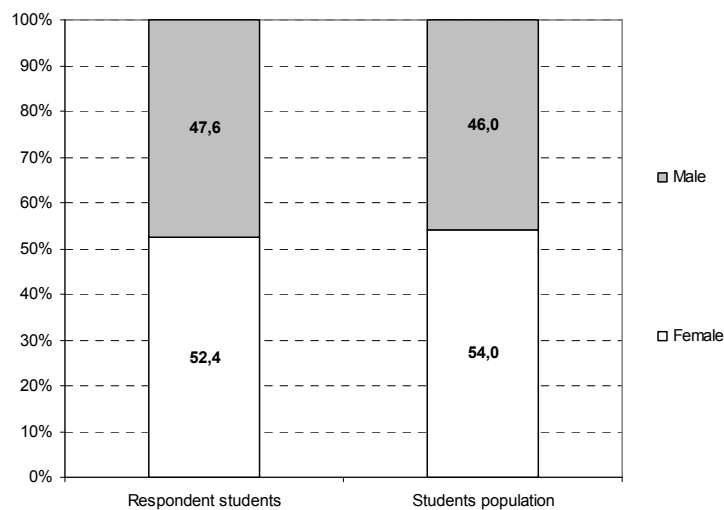
In June 2008, the Rectors and Directors of all Portuguese Higher Education Institutions were contacted and asked to collaborate by sending an email to all their students (under and post graduate) with a message describing the project and asking them to participate in the survey. Some schools also publicized the research and the link to the survey in their home page.

By the end of September 2008, 4413 valid responses were gathered, which represent 1.2% of all students enrolled in Portuguese higher education institutions. The gathered respondent sample is reasonably representative of the whole population of the Portuguese higher students, namely as far as degree (Figure 2) and gender (Figure 3) are concerned.



**Figure 2: Students’ degree: respondent sample (n=4413) and population (N= 366729)**

Note: The population corresponds to the Portuguese students enrolled in higher education in the academic year of 2006/07

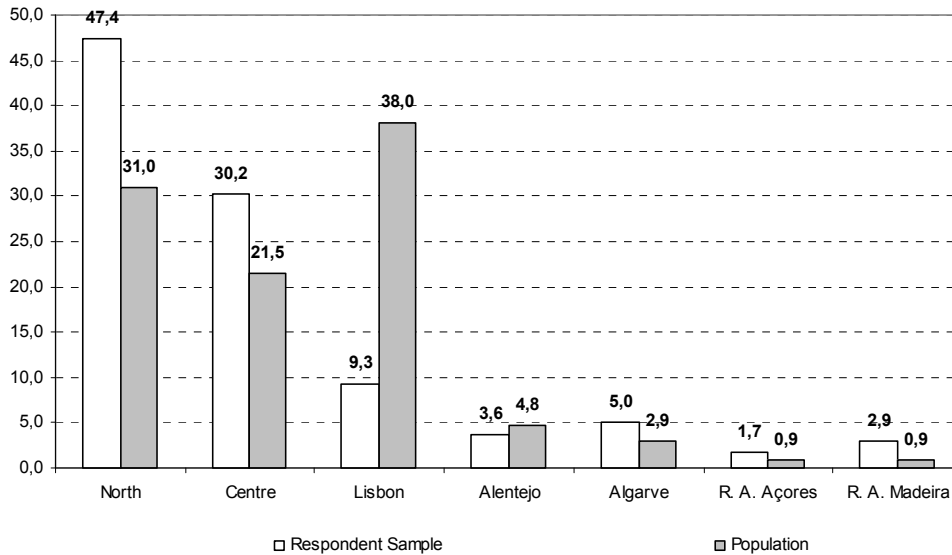


**Figure 3: Students’ gender: respondent sample (n=4413) and population (N= 366729)**

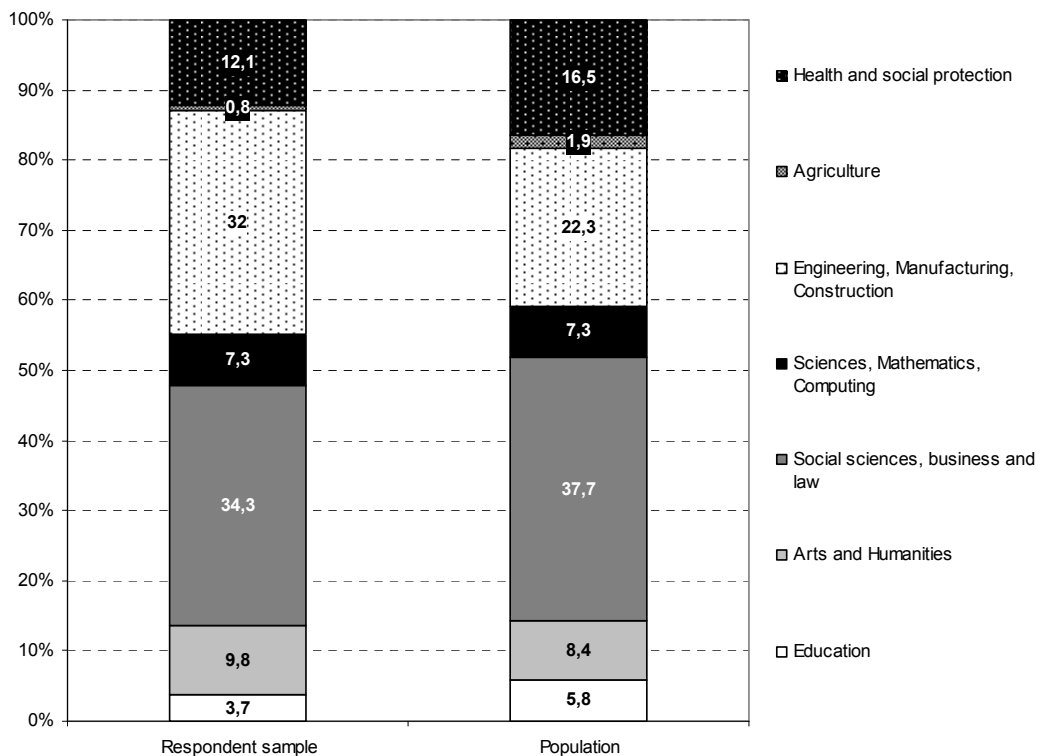
Note: The population corresponds to the Portuguese students enrolled in higher education in the academic year of 2006/07

However, the respondent sample presents a clear bias towards students enrolled in schools located in the North and Centre regions at the expense of those located in the region of Lisbon

(Figure 4). Additionally, technology related areas (i.e., Engineering, Manufacturing and Construction) are overrepresented, while health related scientific areas are underrepresented (Figure 5).



**Figure 4: Distribution of students by region: respondent sample (n=4413) and population (N= 366729)**



**Figure 5: Distribution of students by scientific area: respondent sample (n=4413) and population (N= 366729)**

Note: the classification in scientific areas considered here follows the D.L. 53, 16 March 2005. Notwithstanding, in the main text we will use the classification that is considered by the Ministry for Science and Higher Education (<http://www.acessoensinosuperior.pt/indarea.asp?area=II>)

## 4. Results

### 4.1. Students' perceived image of entrepreneurs/entrepreneurship

According to the respondent students, entrepreneurship contributes to innovation, technological progress, job creation and growth, being essential for economic competitiveness. Notwithstanding, students do not identify entrepreneurship as a contributor to more social goals, namely the increase in the wealth of the poor people (Figure 6).

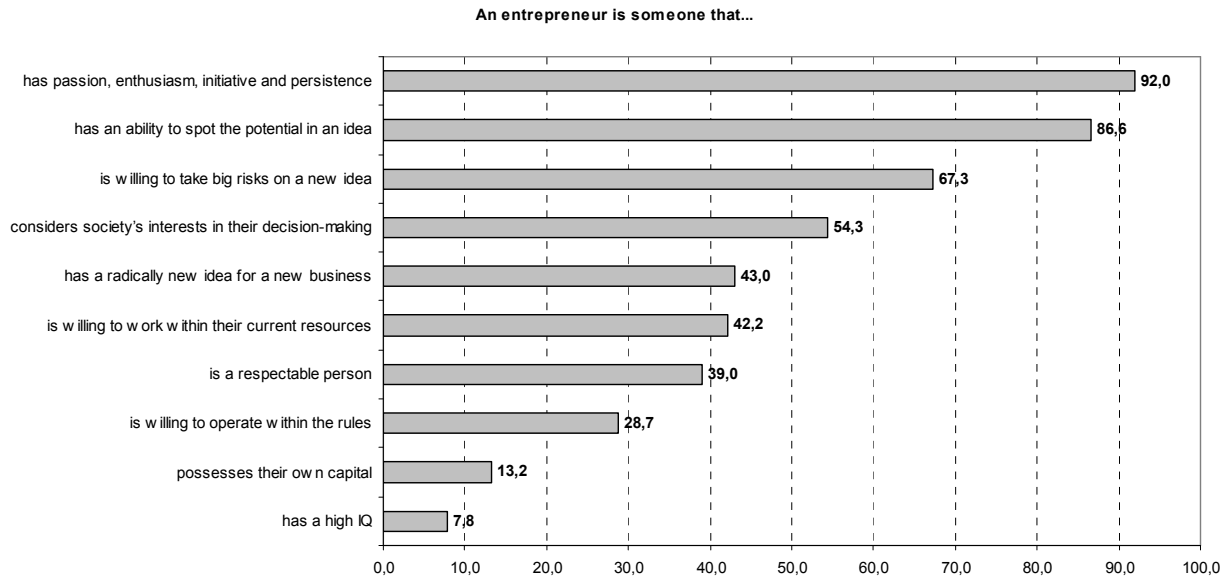


**Figure 6: Students that agree and strongly agree with the statements about entrepreneurship (% total)**

Portuguese higher education students identify the entrepreneur (cf. Figure 7) as someone that has passion, enthusiasm, initiative and persistence, someone with the ability to spot the potential in an idea and who is willing to take big risks on a new idea. This new idea, however, does not need to be radically new – less than half of the students (43%) agree or strongly agree that the entrepreneur has a radically new idea for a new business.

This idea that students have regarding entrepreneurs is quite well reflected on a passionate statement that Bill Gates, former Microsoft CEO, professed in a recent interview for Newsweek (22 June 2008): “There's no year that I didn't love my job”.

Few students (around 8%) recognize superior intelligence in entrepreneurs and only a third considers that entrepreneurs are willing to operate within the rules. Nevertheless, for more than half of the surveyed students, entrepreneurs consider society's interests in their decision-making.



**Figure 7: Students that agree and strongly agree with the statements about the entrepreneur (% total)**

#### **4.2. Familiarity of the students with entrepreneurship**

For 1608 Portuguese students enrolled in higher education, around 36% of the total, when they hear the word ‘entrepreneur’, they think of Belmiro de Azevedo (Figure 8), a well known Portuguese entrepreneur who is currently the President of the Administrative Council of Sonae SGPS, Sonae Indústria, and President and CEO of Sonae Capital.<sup>6</sup> In the second position, but quite far apart (with 13% of total), emerges Bill Gates, former President and CEO of Microsoft.<sup>7</sup>

<sup>6</sup> Belmiro Mendes de Azevedo (born February 17, 1938) is a Portuguese entrepreneur, ranked by Forbes as the 605th richest person in the world (2008), as well as the second richest in Portugal, with an estimated wealth of \$2.0 billion dollars. He owns Sonae SGPS (which he founded in 1959, with only 21 years of age), one of the largest business groups in Portugal, which also operates in Spain, Greece, Germany, Italy and Brazil. Belmiro de Azevedo, a carpenter and a tailor's son, has a degree in chemical engineering from the University of Porto and an MBA from Harvard University.

<sup>7</sup> William Henry Gates III (born October 28, 1955 in Seattle, Washington, USA), is an American business magnate, philanthropist, the world's third richest person (as of 2008), and chairman of Microsoft, the software company he founded (in 1976) with Paul Allen. At the age of 17, Gates formed a venture with Allen, called Traf-O-Data, to make traffic counters based on the Intel 8008 processor. During his career at Microsoft, Gates held the positions of CEO and chief software architect, and remains the largest individual shareholder with more than 8 percent of the common stock. Bill Gates (voluntarily) left his position at Microsoft in the end of June 2008, at 52 years of age. In the beginning of September 2008, the new focus of his life work will be the Bill & Melinda Gates Foundation, the organization he began with his wife in 2000. With a current \$37.3 billion endowment, it's the world's richest philanthropic institution.

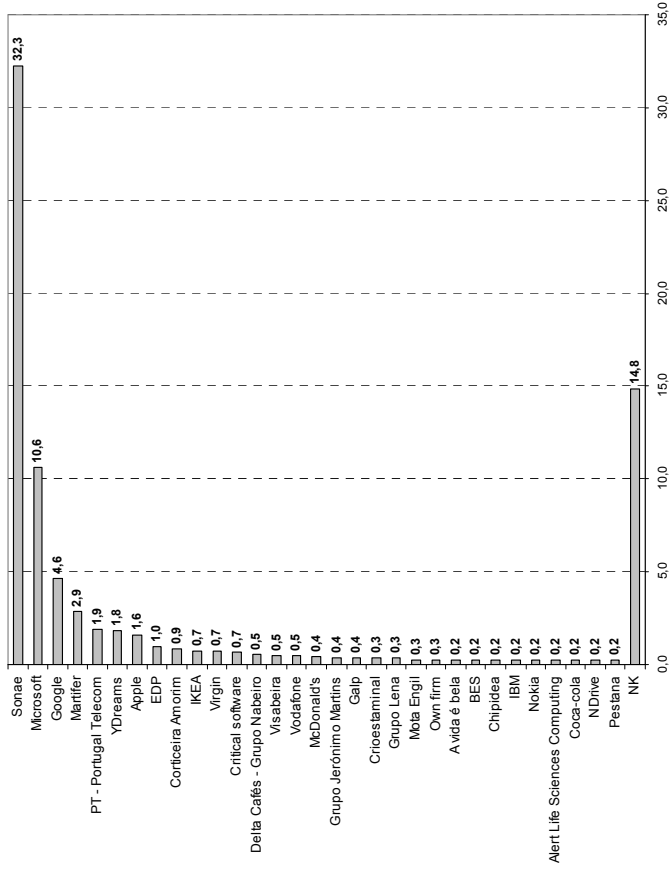
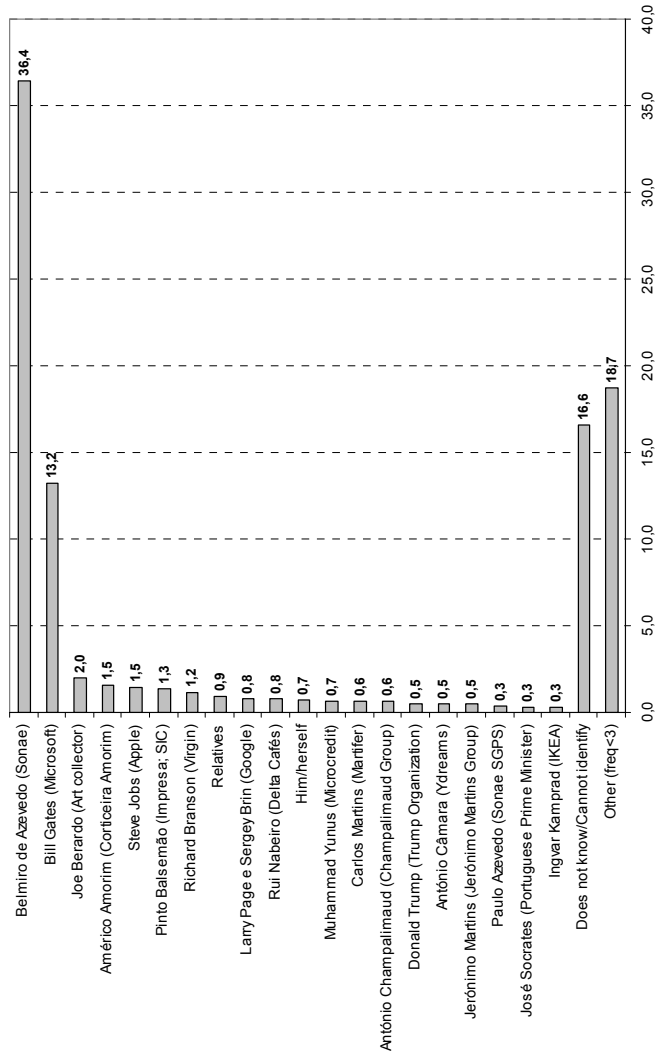


Figure 8: Entrepreneurial 'model' for the Portuguese higher education students (% total)

Among the students' top ranked entrepreneurs stands the Portuguese born, Joe Berardo,<sup>8</sup> Américo Amorim,<sup>9</sup> and Pinto Balsemão,<sup>10</sup> with around of 2% of total responses, and the foreign born, Steve Jobs,<sup>11</sup> Richard Branson,<sup>12</sup> Larry Page e Sergey Brin,<sup>13</sup> and Muhammad Yunus.<sup>14</sup> Less than 20% of higher education Portuguese students were unable to identify an entrepreneur/entrepreneurial firm, which reveals a reasonable familiarity with entrepreneurship related issues.

Following the entrepreneurs' results closely, the most frequently mentioned company names that students indicate are Sonae (32.3%), Microsoft (10.6%), and Google (4.6%). Of the top-30 companies mentioned, 20 are Portuguese, encompassing almost 46% of total responses. The 2<sup>nd</sup> – 4<sup>th</sup> best ranked Portuguese companies (with around 2% of 'votes') are Martifer, PT - Portugal Telecom, and YDreams. Currently, the Martifer Group holds a portfolio of approximately 120 companies that are divided into four core business units: Metallic Construction, Energy Equipment, Advanced fuels and Electricity Generation. Martifer was founded earlier, in 1990, but it has recently experienced a huge dynamics, being one of the fastest growing companies in Europe. Portugal Telecom (PT) is a global telecommunications operator, whose activity covers every segment of the telecommunications sector: fixed, mobile, multimedia, data and corporate solutions.<sup>15</sup> YDreams was founded by António Câmara in 2000 and it "creates interactive experiences and products based on advanced technology and design". The company "has worked with multinationals such as Adidas, Vodafone and Nokia".<sup>16</sup>

Both entrepreneurs and entrepreneurial companies identified by students enrolled in Portuguese higher education reveal a reasonably high familiarity of the students with entrepreneurship. Moreover, when asking about the chances for successfully starting a new

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<sup>8</sup> Businessman, stock investor and art collector; as of 2008 and according to Forbes, he has an estimate of 1.8 billion dollars, making him the third richest person Portugal.

<sup>9</sup> Ranked by Forbes as the 132th richest person in the world (2008), as well as the richest in Portugal with an estimated wealth of \$7.0 billion dollars. He owns Corticeira Amorim, the world's largest producer of cork, with \$650 million (sales). Also has interests in real estate and tourism.

<sup>10</sup> Currently serves as Chairman of the European Publishers Council and as CEO of the Grupo Impresa; in 1992, e founded Sociedade Independente de Comunicação (SIC), the first Portuguese private network.

<sup>11</sup> The co-founder, Chairman, and CEO of Apple Inc and former CEO of Pixar Animation Studios.

<sup>12</sup> English business magnate, best known for his Virgin brand of over 360 companies.

<sup>13</sup> Respectively, American and Soviet Union-born American entrepreneurs who founded the Google web search engine, now Google Inc..

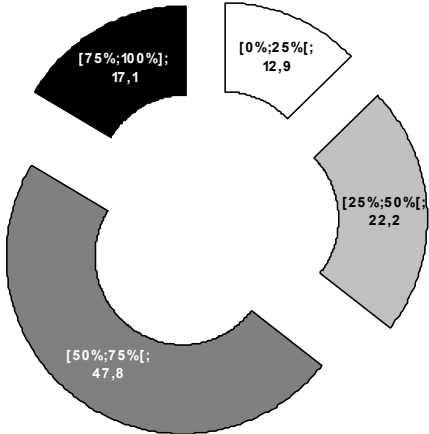
<sup>14</sup> Bangladeshi banker and economist, famous for his successful application of microcredit, founder of Grameen Bank.

<sup>15</sup> In <http://www.telecom.pt/InternetResource/PTSite/UK/Canais/SobreaPT/>.

<sup>16</sup> Information gathered from YDreams web page, [http://www.ydreams.com/ydreams\\_2005/index.php?page=39](http://www.ydreams.com/ydreams_2005/index.php?page=39).



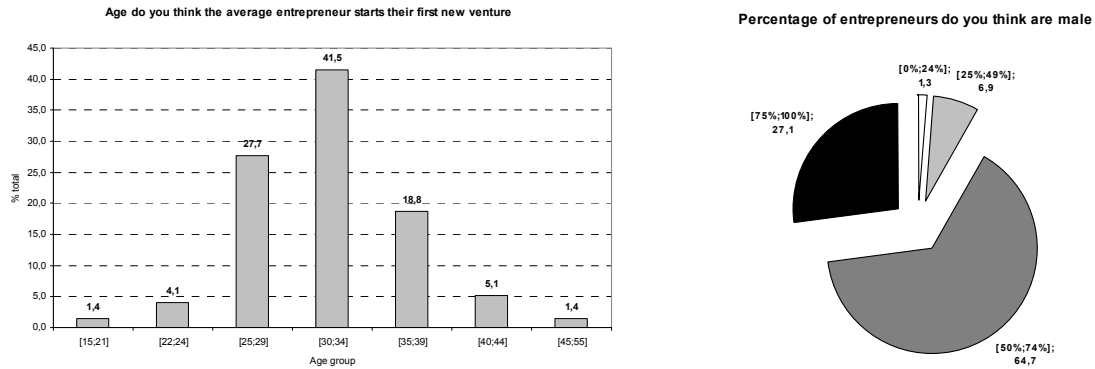
venture (i.e., surviving for >5 years), students respond 50.4% (mean value), which is not very far from the IN+ (2008) figure of 60%.<sup>17</sup> However, Farinha (2005), based on a sample of 6485 Portuguese firms, estimated that 78% of firm exits occur in the first 5 years of business, which reflects a quite low survival rate (beyond 5 years) of 22%. As we observe in Figure 9, Portuguese students enrolled in higher education are much more optimistic, with almost 50% answering that the chances for a new venture to survive for more than 5 years ranged between 50% and 75%.



**Figure 9: Students’ estimate of the chances (in per cent) for a new venture to survive for more than 5 years**

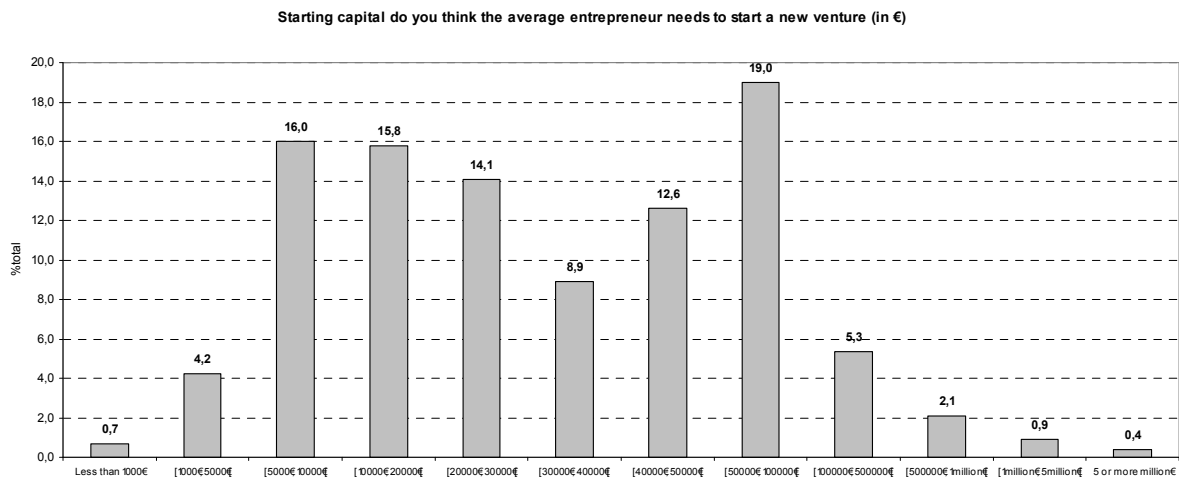
Surveyed students reckon that entrepreneurs create their first business around the age of thirty, which happens to underestimate the real age that an entrepreneur starts his/her business in Portugal, which is around 37 years old, according to the *Observatório de Criação de Empresas 2006* (IAPMEI, 2007), and 38 years of age, according to IN+ (2008). Nevertheless, the former data source (IAPMEI, 2007) indicates that youth is a trait of Portuguese entrepreneurs – over half (52.5%) of the individuals who started a new venture in 2006 were 35 years old or younger. Recall that the most mediated cases of entrepreneurial ventures involve quite young individual entrepreneurs – for instance, Belmiro de Azevedo started his first venture at the age of 21 and Bill Gates at the age of 17 – and the real national figure (38 years old) is an average that encompasses first and non-first business ventures.

<sup>17</sup> Real figures for the Portuguese economy on firm survival, entrepreneurs’ average age and entrepreneurs’ gender distribution were collected from the *Observatório de Criação de Empresas 2006* (IAPMEI, 2007), IN+(2008), and GEM (2008).



**Figure 10: Students' estimate of the age (years) and gender distribution (% of male) of an entrepreneur**

According to IN+ (2008), around 3/4 of the entrepreneurs are male, whereas for the most recent report of the Global Entrepreneurship Monitor (GEM, 2008) on Portugal, that percentage was lower (68%). Students' estimate is quite close to that of the *Observatório de Criação de Empresas 2006* (IAPMEI, 2007), 65.6%. On average, students estimate that 65% of entrepreneurs are male – as we can observe in Figure 10, 64.7% of students think male entrepreneurs represent between 60% and 74% of total entrepreneurs. This evidence indicates that Portuguese students are aware of the male dominance as far as new venture formation is concerned.



**Figure 11: Students' estimate of the starting capital the average entrepreneur needs to start a new venture**

Over seventy per cent of students think that one might start a new venture with less than 50 thousand Euros, the equivalent to five yearly average Portuguese salaries, or approximately 3 new Golf VI (basic line), which will be launched in the European market in October 2008. According to data concerning new ventures created in Portugal in 2006 (IAPMEI, 2007), it

was found that entrepreneurs in their majority (77 per cent) start their business with the minimum legally possible social capital, that is, 5 thousand Euros. Almost 20 per cent of new ventures have a social capital of 10 thousand Euros or more and less than 3 per cent are created with a social capital of 50 thousand Euros or more (the maximum value identified was 1 million Euros). The initial investments of new owner ventures are also relatively small – in more than half of the ventures the investment did not overpass 25 thousand Euros, and in one quarter of the cases, it is lower than five thousand Euros. Therefore, the similarity of the students' figure with the data from the *Observatório de Criação de Empresas* (IAPMEI, 2007) is quite striking.

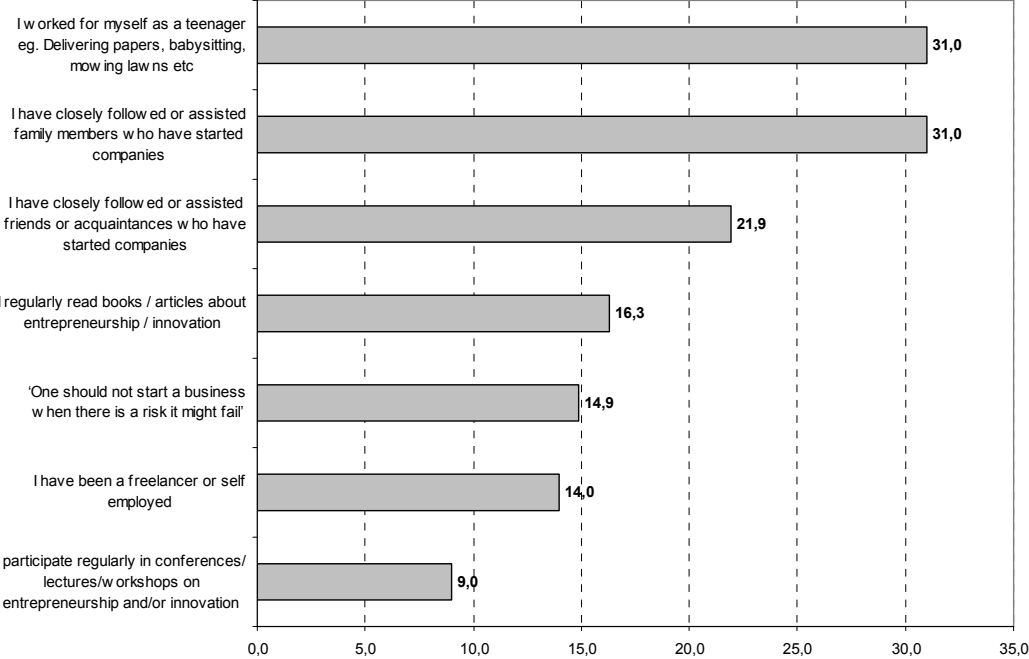
The mode interval indicated by (19 per cent of) the students, 50000€-100000€, is closer to the figure associated with a very recent high tech start-up, Tomorrow Options, which had its genesis in the first edition of the Master in Innovation and Technological Entrepreneurship (MIETE, FEUP, University of Porto). According to its CEO, Paulo Santos, the launching of the new venture required 173 thousand Euros, the equivalent to one year expenses or investment.<sup>18</sup>

Although revealing a high risk propensity (only 15% agree or strongly agree with the statement 'One should not start a business when there is a risk it might fail'), and 14% claim to have been a freelancer or self-employed, few students reveal reasonable experience with new venture formation (Figure 12). Indeed, less than one third was self-employed as a teenager (e.g. delivering papers, babysitting, mowing lawns etc.), or closely followed or assisted family members, friends or acquaintances who have started companies. Given the recent boom of entrepreneurship awareness at the level of higher education in Portugal (Redfort and Trigo, 2007), the percentage of students who regularly read books/articles about entrepreneurship/innovation (16%) seems surprisingly low, as well as the participation in conferences/lectures/workshops on entrepreneurship and/or innovation (9%). What this evidence does not uncover is whether this apparent lack of concern with entrepreneurial

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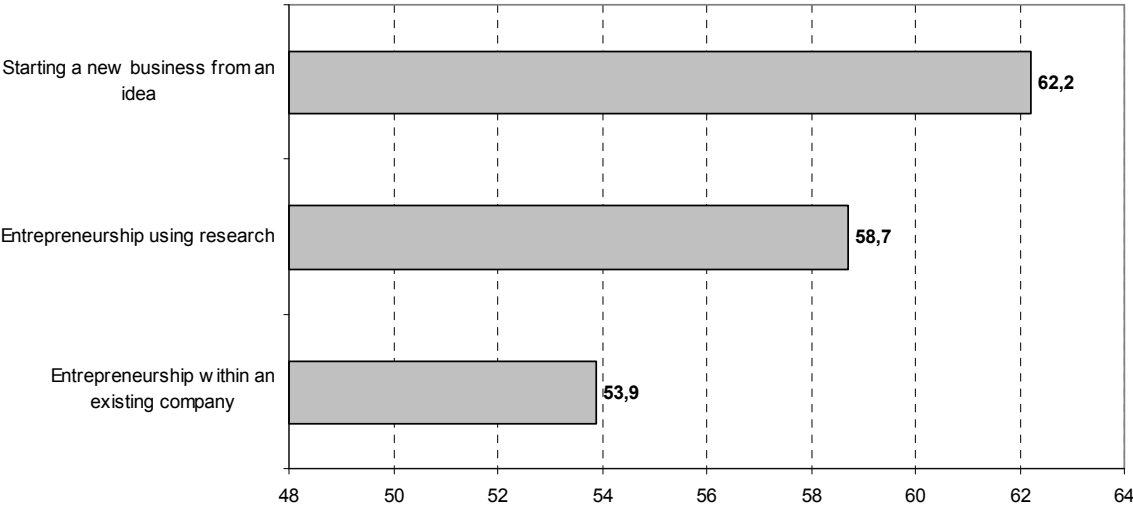
<sup>18</sup> We acknowledge and deeply thank the collaboration of Paulo Santos in providing this information. According to the company history information available in <http://www.tomorrow-options.com/>, "Tomorrow Options Microelectronics S.A. origin was the MSc in Innovation and Technological Entrepreneurship (MIETE), from the Faculty of Engineering of the University of Porto (FEUP). During this MSc two of the promoters - Catarina Aroso Monteiro and Paulo Ferreira dos Santos – completed a valorization process and marketing strategy of a business that involved a technology developed at the Faculty of Engineering (Department of Electrical and Computer Sciences). Catarina and Paulo proposed to Miguel Velhote Correia and Sérgio Reis Cunha, the original developers of this technology, to join them in the new venture. The result of this team work was Tomorrow Options' first product, WalkinSense, an electronic medical device to be used in diabetic foot (affects approximately 15% of all diabetics) prevention and diagnosis".

related information sources and events derives from pure lack of interest by students or from an effective inexistence of guidelines and events in the schools where students are enrolled.



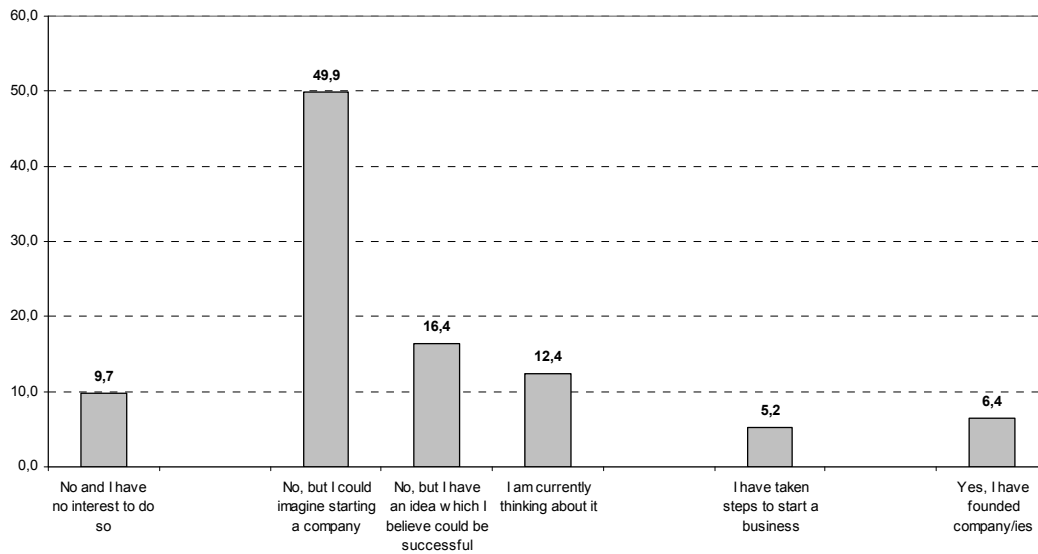
**Figure 12: Sources of students’ familiarity with entrepreneurship – percentage of students who agree and strongly agree with the statements**

Figure 13 seems to indicate that students indeed reveal some reasonable interest in issues related with entrepreneurship – around 60 per cent of the students claimed to be very or extremely interested in the topics of ‘starting a new business from an idea’ and ‘entrepreneurship using research’, and the majority (54%) claimed to be very interested even in the intraentrepreneurship topic (‘entrepreneurship within an existing company’).



**Figure 13: Students’ interest in entrepreneurship topics during their studies (% students who agree/strongly agree)**

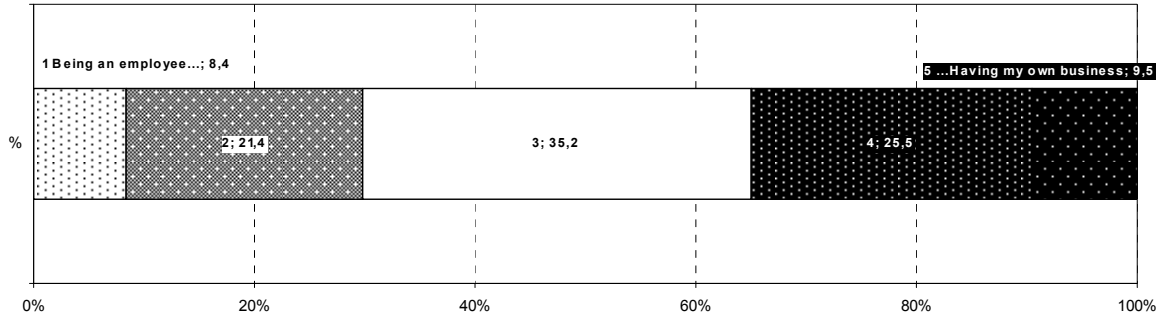
Although a relatively low percentage of students have founded (6.4%) or have taken steps to start a business (5.2%), over seventy per cent seem to be attracted to it. Only 9.1% do not think of starting a business as their career option. Note that the Portuguese students' 'effective' entrepreneurial rate (6.4%) is very similar to the one (6.1%) Lena and Wong (2004) found for 11660 undergraduate students enrolled in Science, Engineering, Computing and Business courses in a University from Singapore, although below the most recent figure for Portuguese early stage entrepreneurial rate (8.8%) found by GEM (2008).<sup>19</sup>



**Figure 14: 'Have you ever started your own company?' (% total of students)**

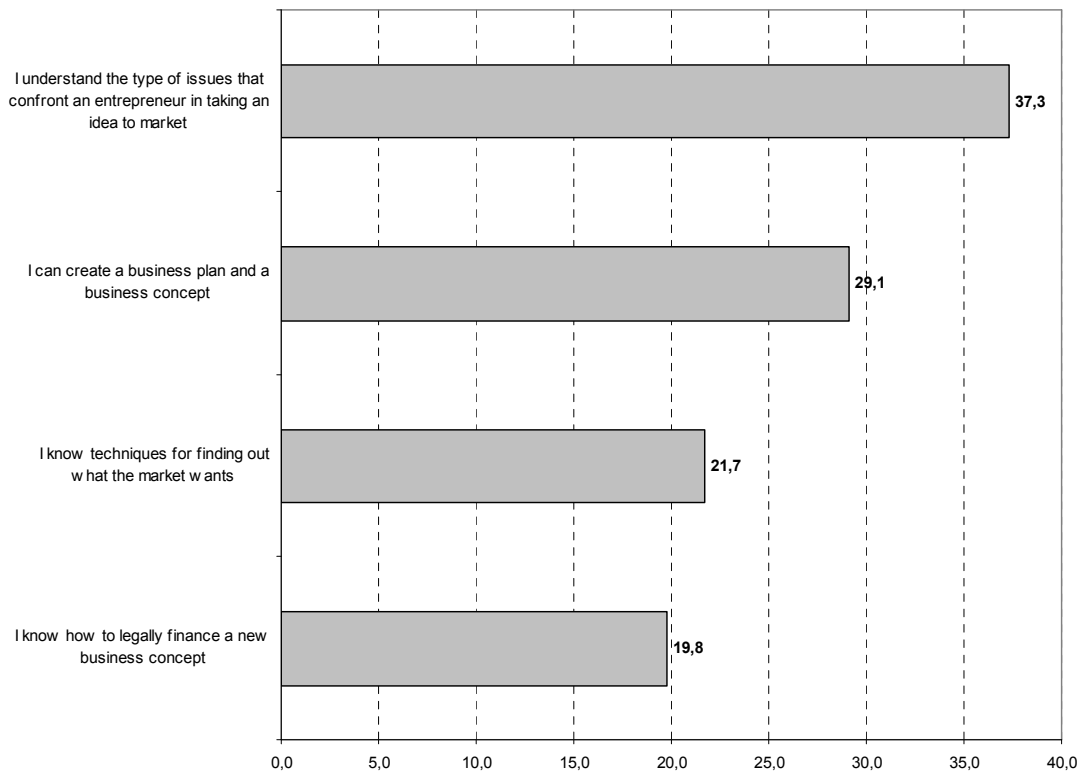
Even if less than 10% of students have started a new venture (effective entrepreneurship) (Figure 14), the potential for entrepreneurship is quite important among Portuguese higher education students (Figure 15). Around 35% of students surveyed regard having their own business as a more plausible future career. This figure is equal to the one found by Franke and Lüthje (2004) for Austrian undergraduate business students, slightly lower than the upper bound range of the US summer course students (38.7%) surveyed by Levenbrug and Léger-Jarniou (2006), but well below the propensity for entrepreneurship of US undergraduate engineering (54.6%) and business (50.0%) students (Lüthje and Franke, 2003; Franke and Lüthje, 2004).

<sup>19</sup> The early stage entrepreneurial rate measures the proportion of adult population (18-64 years old) that were involved in a nascent business (which did not yield money for a period of more than 3 months) or a new business (which did not yield money for a period of more than 42 months). The GEM 2007 survey in Portugal involved 2023 individuals and it was found that 8.8% of those started a nascent or new business. In 2004, the corresponding rate was as low as 4.0%.



**Figure 15: Students' prospects concerning their future career option (% total of students)**

Although 'potential' entrepreneurship rate among Portuguese students enrolled in higher education is considerable, data reveal that they have relatively low understanding of the entrepreneurship process. Indeed, less than forty per cent recognize that they understand the type of issues that an entrepreneur confronts when taking an idea to the market. When it comes to knowledge about more specific issues, namely creation of business plans and business concepts, techniques to find out what the market wants, and to know how to legally finance a new business concept, the percentage of students who reckon to possess such knowledge dramatically falls to respectively 30%, 22% and 20% (Figure 16).



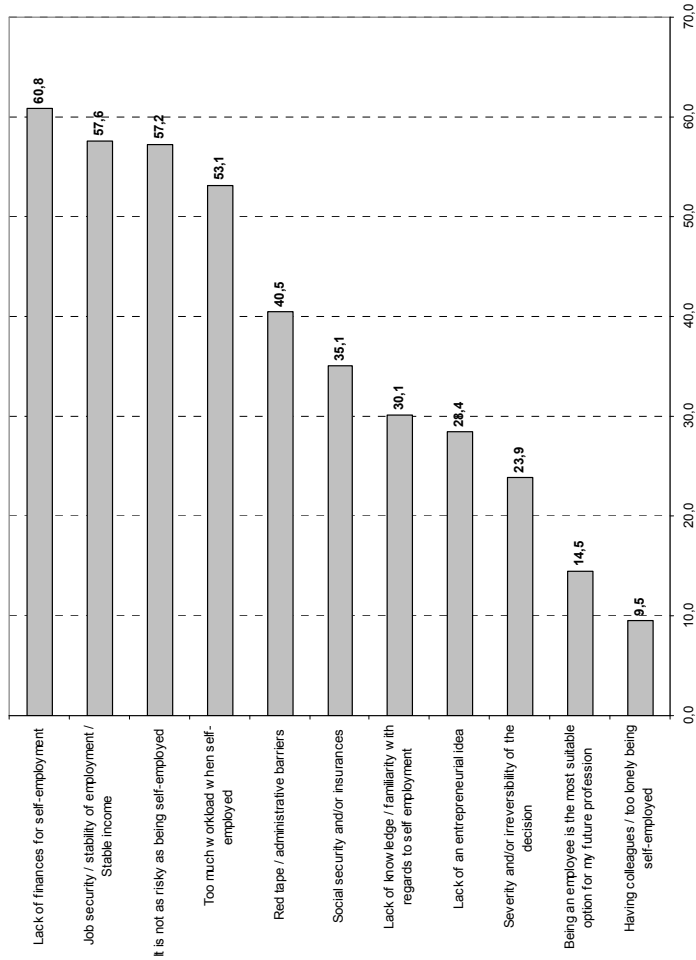
**Figure 16: Students' competencies on entrepreneurship (% students who agree/strongly agree)**

### **4.3. Factors influencing students' decision of becoming an entrepreneur/ employee**

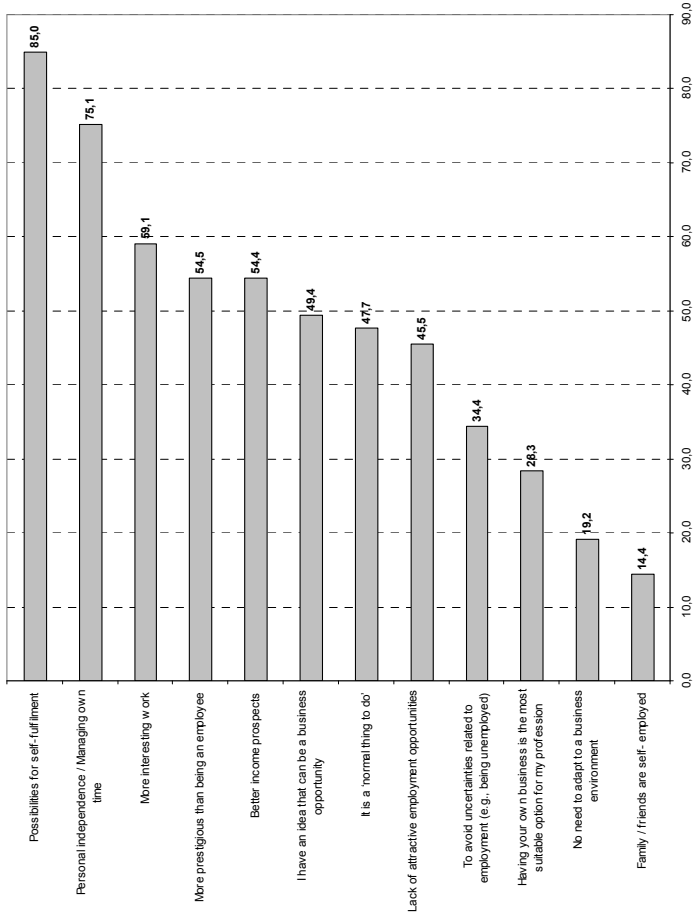
Although only 14% of students reckon that being an employee is the most suitable option for their future profession, 61.1% claim that the lack of finances prevent self-employment and almost 60% would prefer to be an employee rather than self-employed due to job security, stability of employment, stable income, and due to the fact that it is not as risky as being self-employed. Curiously, over half of the students declare to be more inclined to employment rather than self-employment as the latter involves too much workload. Red tape / administrative barriers are important factors for forty per cent of students to choose to be employees. Lack of knowledge/familiarity with regards to self-employment and lack of an entrepreneurial idea seems to be an impediment factor for self-employment only for one third of the students surveyed.

Thus, we may conclude from the evidence that preference for being employees is to a larger extent derived from lack of a risky behavior rather than lack of ideas and knowledge to create a new venture.

The preference for self-employment is essentially attributed to the possibilities for self-fulfilment, personal independence, and managing own time. A high percentage of students also identify self-employment as a preferable career option as it involves a more interesting work and it is more prestigious than being an employee. A reasonable percentage of students see entrepreneurship as necessity driven, that is, as a way to prevent uncertainties related to employment (i.e. being unemployed) (34.4%), an alternative given the lack of attractive employment opportunities (45.5%), and the possibility to achieve better income prospects (54.4%). Exploitation entrepreneurship is also recognized by half of the students surveyed as they claim that being self-employed is preferable because they have an idea that can be a business opportunity. Approximately half of the respondent students argue that being self-employed is a 'normal thing to do' although a relatively lower percentage (28.3%) reckons that having their own business is the most suitable option for their profession. The influence of family and friends does not seem critical for students in their option for a future career path.



**be an employee rather than self-employed**



**be self-employed rather than an employee**

**Figure 17: Reasons for preferring to be an employee (self-employed) rather than self-employed (employee) (% students who agree/strongly agree)**



### 4.3. How can universities foster the student's interest in entrepreneurship?

According to Redfort and Trigo (2007), entrepreneurship education can have three key roles in promoting 'an entrepreneurial society'. It may act as a general advocate for the mindset and type of creativity employed in entrepreneurial endeavors and presenting students with entrepreneurship as a possible career choice. Moreover, it has a skill development role by assisting students in developing the technical and business skill-set necessary to have a successful entrepreneurial career. Finally, it may have a scientific development role by contributing to advance the body of knowledge associated with the entrepreneurial phenomenon.

Besides these abovementioned important jobs, entrepreneurship education in general and higher education institutions in particular may, and advisably should, work as a hub, putting different type of students in contact and helping in the establishment of bridges between potential entrepreneurs and private business organizations, namely those acting as entrepreneurship support organizations, such as incubators, business angels, property rights offices, to name a few. These networking roles may be anchored and diffused through the organization of hand-on seminars and workshops, similarly to what happens in IC2 (University of Texas at Austin)<sup>20</sup> or at the MIT Entrepreneurship Center,<sup>21</sup> by inviting business practitioners and other professionals who, besides transmitting their knowledge, may be the basis for an effective entrepreneurial network.

A very powerful mean for enhancing the strength of an entrepreneurial network would be the formation of both physical and virtual entrepreneurial clubs, which involves students from different schools within an institution and/or inter-institutions, and which could be a place to post important information and contacts for entrepreneurial individuals. A recent exemple is the *Clube de Empreendedorismo da Universidade do Porto* (CEdUP), the first portuguese university entrepreneurship club.<sup>22</sup> Organizations, such as ANJE – *Associação Nacional de Jovens Empresários* (National Association of Young Entrepreneurs), which organizes the Academy of the Entrepreneurs<sup>23</sup> since 1997, COTEC Portugal, which attributes, jointly with

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<sup>20</sup> The IC2 Institute is an international, multi-disciplinary research and education institute at the University of Texas at Austin that links technology, entrepreneurship and education to foster sustainable social and economic development around the world (in <http://www.ic2.utexas.edu/>).

<sup>21</sup> The MIT Entrepreneurship Center is committed to fostering and developing MIT's entrepreneurial activities and interests in three primary areas: Education and Research; Alliances; and Community (In <http://entrepreneurship.mit.edu/>).

<sup>22</sup> [http://www.cedup.up.pt/home\\_en.htm](http://www.cedup.up.pt/home_en.htm), accessed in 19 August 2008.

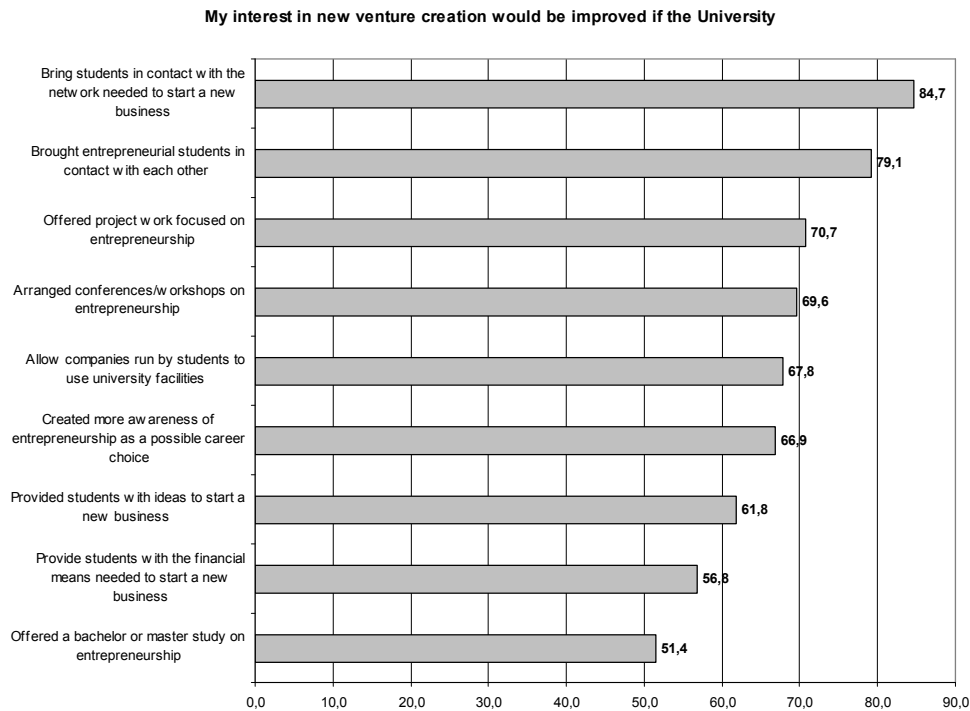
<sup>23</sup> <http://www.anje.pt/academia/default.asp?id=43&mnu=43>, accessed in 19 August 2008.

Fundação Calouste Gulbenkian and Fundação Luso-Americana (FLAD), the National Prize on Promotion of Entrepreneurship in Higher Education,<sup>24</sup> or students' associations such as BEST – Board of European Students of Engineering, AIESEC – Association for the International Exchange Students in Economics and Commerce, JADE Portugal (Portuguese Federation of Junior Enterprises), etc., are important contributors for the dissemination of an entrepreneurship spirit among Portuguese individuals in general, and higher education students, in particular. Also, websites such as <http://www.empreendedorismo.pt/>, are quite important in this regard.

Over eighty per cent of the surveyed students recognized in fact that their interest in new venture creation would be improved if their schools brought students in contact with the network needed to start a new business and put entrepreneurial students in contact with each other (Figure 18). Approximately seventy per cent of students claimed that offering project work focused on entrepreneurship, arranging conferences/workshops on entrepreneurship, allowing companies run by students to use university facilities, and creating more awareness on entrepreneurship as a possible career choice would be important boosters. Idea generation and financial means, although emerging as reasonably relevant for almost sixty per cent of the surveyed students, stand as relatively minor factors. The 'traditional' way that universities in particular have been providing in recent years - offering bachelor or master study on entrepreneurship – does not seem particularly fundamental for the students in analysis.

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<sup>24</sup> This award aims at pushing Portuguese higher education institutions to develop projects and devising innovative strategies to promote entrepreneurship among their students (in <http://www.cotecportugal.pt/>).



**Figure 18: Ways in which universities may foster the students' interest in entrepreneurship (% students that agree/strongly agree)**

## 5. Determinants of students' entrepreneurial intents and propensity

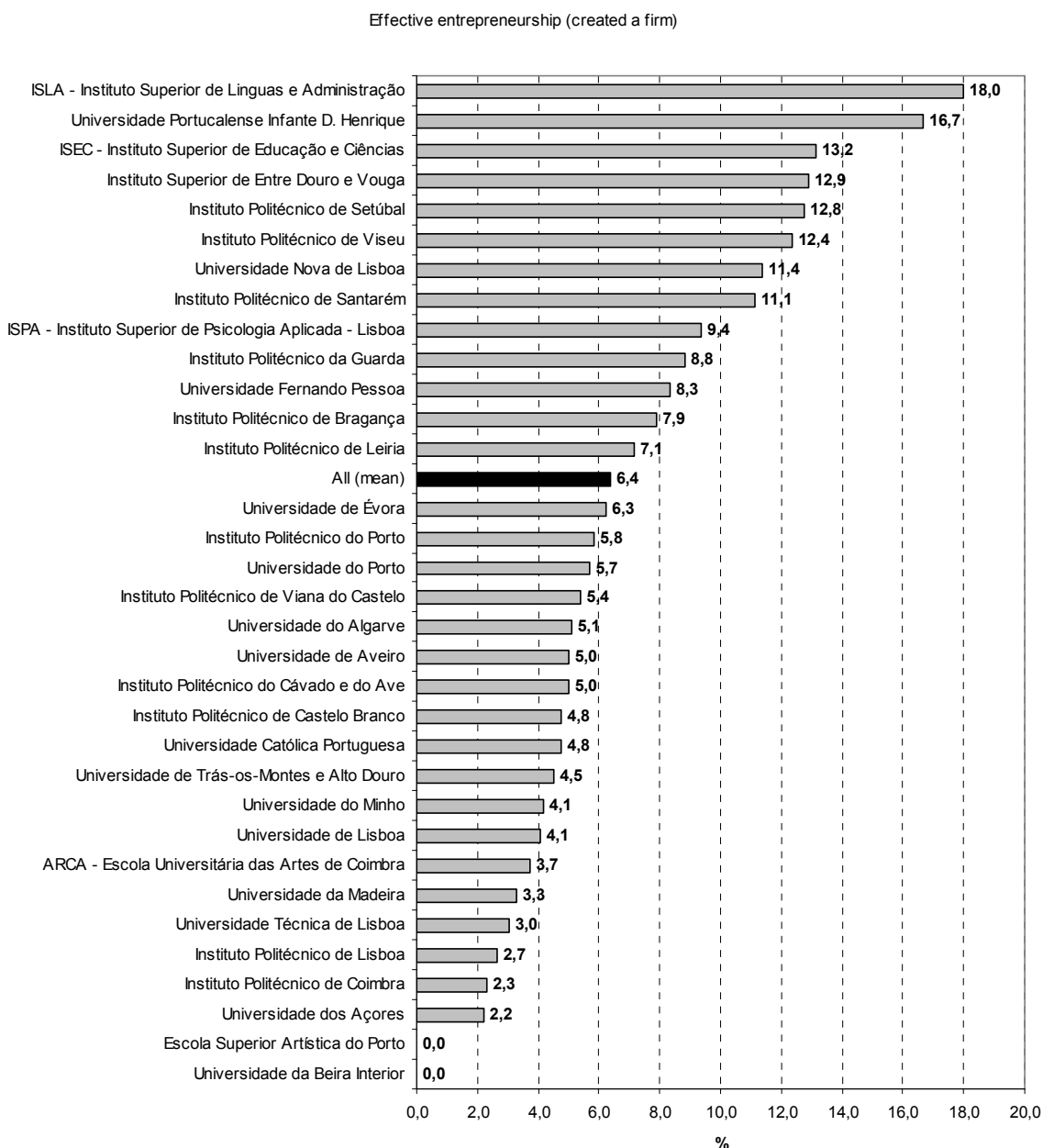
We share Krueger's (2000) view that intentions are constructed, even where they appear to arise spontaneously. As they establish key initial characteristics, entrepreneurial intentions are crucial to understand the overall process of entrepreneurship. Entrepreneurial intentions are directed towards either creating a new venture or creating new values in an existing venture (Bird, 1988).

A relevant body of literature on entrepreneurial activities reveals that there is a consistent interest in identifying the factors that lead an individual to become an entrepreneur (Martínez et al., 2007). Several pieces of evidence show that these factors are similar, with the most frequent analyzed being age, gender, professional background, work experience, and educational and psychological profiles (Delmar and Davidsson, 2000). Broadly, three factors have been used to measure entrepreneurial intents: demographic data, personality traits (Robinson, 1987) and contextual factors (Naffziger et al., 1994). Demographic data (gender, age) can be used to describe entrepreneurs, but most of these characteristics do not enhance the ability to predict whether or not a person is likely to start a business (Hatten and Ruhland, 1995). The second method of assessing entrepreneurial intents is to examine personality traits such as risk taking, creativity and achievement motive (Teixeira, 2008a). However, several

authors (e.g., Naffziger et al., 1994) argue that the decision to behave entrepreneurially is based on more than personal characteristics and individual differences. Accordingly, the interaction of personal characteristics (risk, creativity and need for achievement) with other important perceptions of contextual factors (work/professional experience, region and role model), competencies/familiarity with entrepreneurship (entrepreneurial experience, knowledge, awareness and interest), formal education (schooling year, degree, type of higher education institution), and type of course/area of studies, may be critical to assess the students' entrepreneurial potential.

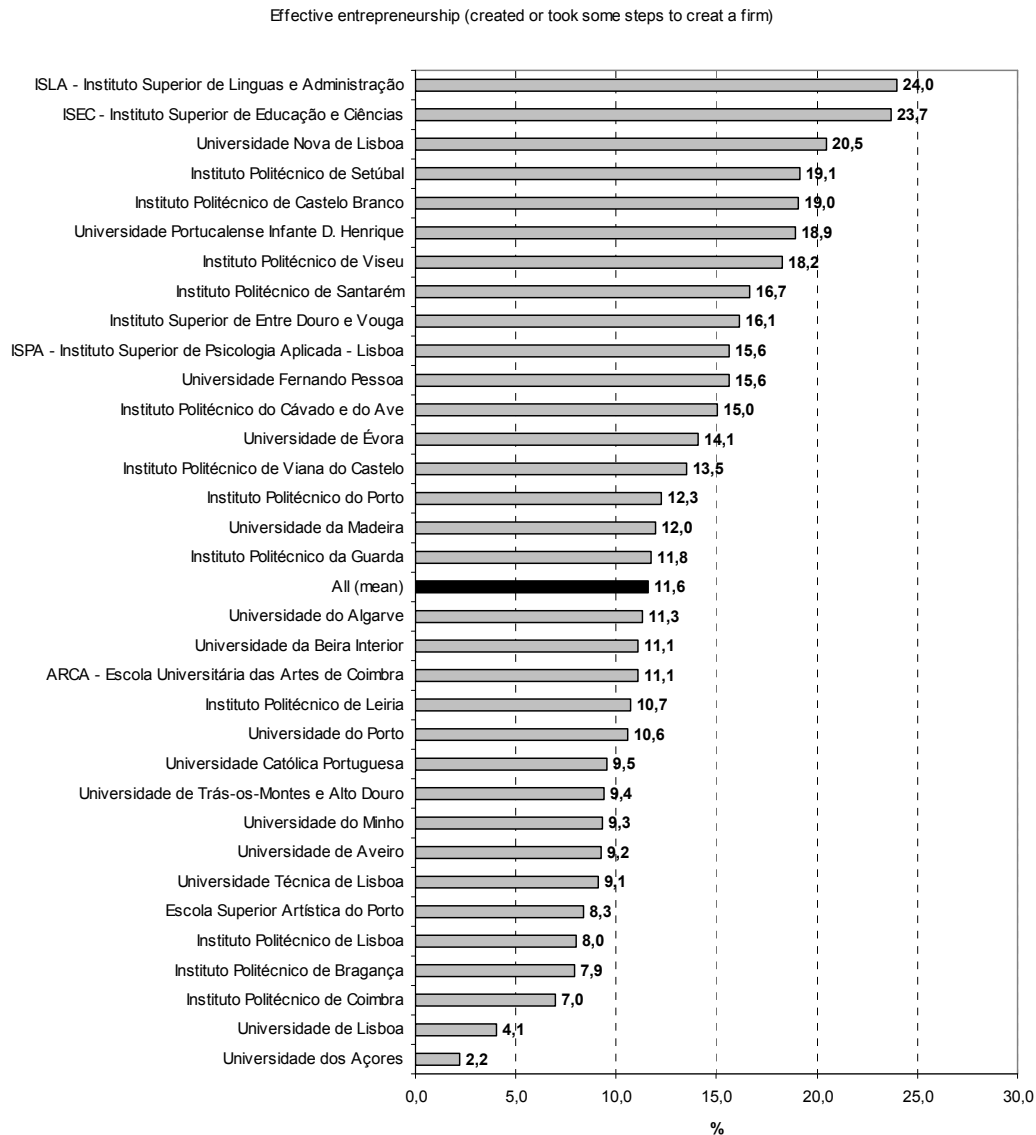
In the present research we compute three measures of students' entrepreneurial potential: two that may be considered as measures of *effective* entrepreneurial *propensity*, and one of entrepreneurial *intent*. The two measures of effective entrepreneurial propensity were computed as dummy variables which, in one case, we assumed the value 1 in the event that the student had already created firms (effective entrepreneurial propensity in *stricto sensu*) and 0 otherwise; in other case we assumed the value 1, in the event that the student had already created firms or taken some steps towards the creation of firms (effective entrepreneurial propensity in *lato sensu*) and 0 otherwise. The variable of entrepreneurial *intent* was directly assessed by asking students, on a scale of 1 – employee ... 5 – having my own business, which was the most likely option for their future career. If the student answered 4 or 5, the entrepreneurial intent variable assumed the value 1 and 0 otherwise.

Considering only the higher education institutions that are ranked in the top 30 (Figure 19), ISLA - *Instituto Superior de Linguas e Administração, Universidade Portucalense Infante D. Henrique* and ISEC - *Instituto Superior de Educação e Ciências* are the best positioned as far as the effective entrepreneurial propensity is concerned. Of the total students surveyed, 6.4% stated that they had created at least one firm (effective entrepreneurship in *stricto sensu*). The corresponding percentage for students enrolled in ISLA is almost three times higher (18.0%), whereas for the *Universidade Portucalense* it is more than double (16.7%). In *Instituto Superior de Educação e Ciências, Instituto Politécnico de Setúbal* and *Instituto Superior de Entre Douro e Vouga*, the effective entrepreneurial rate is twice the global mean (around 13%). Thus, at a first glance, we are inclined to conclude that students enrolled in non-university institutions are more entrepreneurial led.



**Figure 19: Effective entrepreneurship (*stricto sensu*) of Portuguese higher education students, by schools**

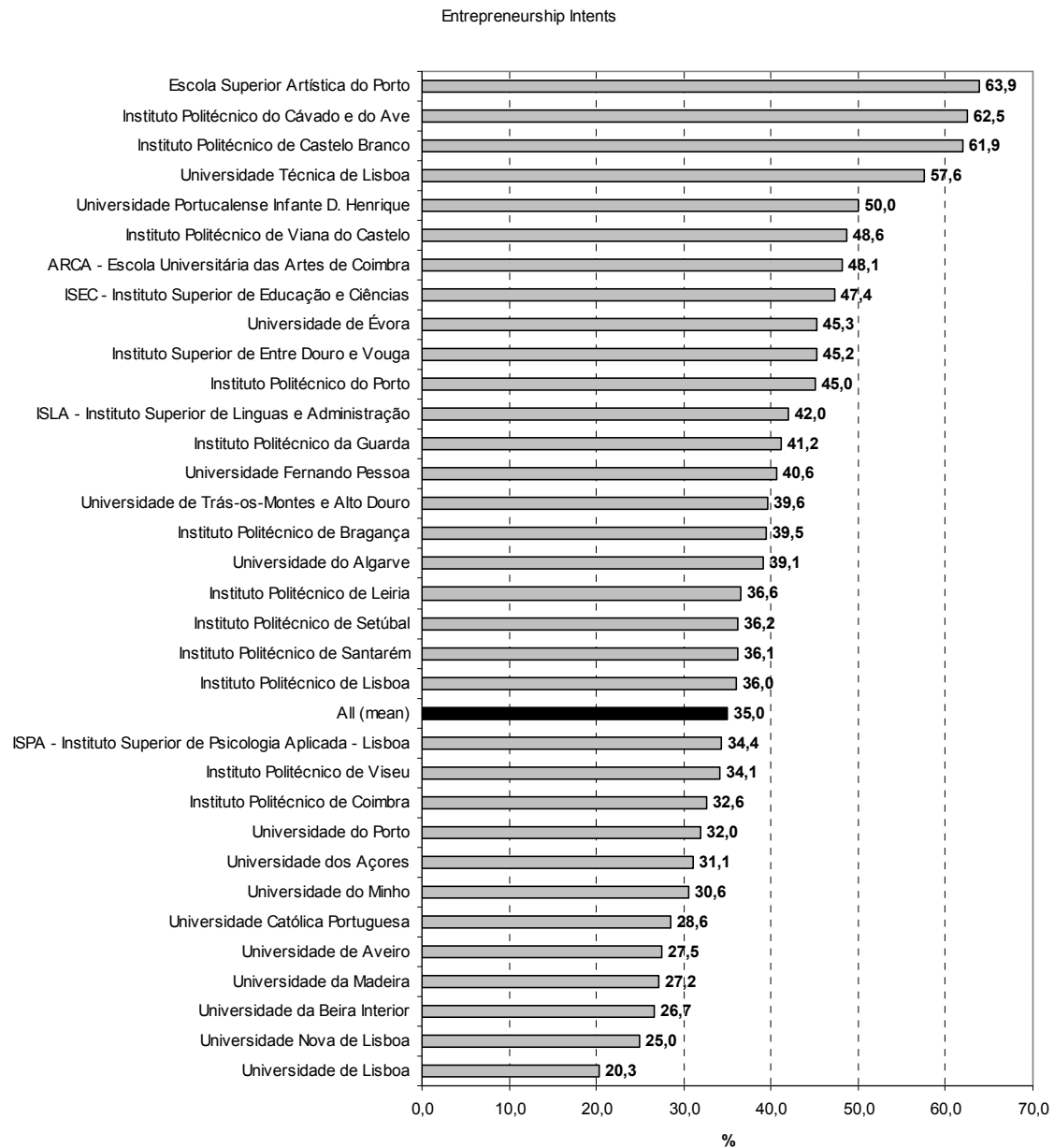
When we enlarge the concept of effective entrepreneurship including, not only the creation of firms in *stricto sensu*, but also the action (having taken some steps) to create new ventures (entrepreneurship in *lato sensu*), *Universidade Nova de Lisboa* enters into the top 3 best ranked institutions (Figure 20), with 21% of its students claiming that they had already created taken some steps to create a new business (well above the global average, 11.6%).



**Figure 20: Effective entrepreneurship (*lato sensu*) of Portuguese higher education students, by schools**

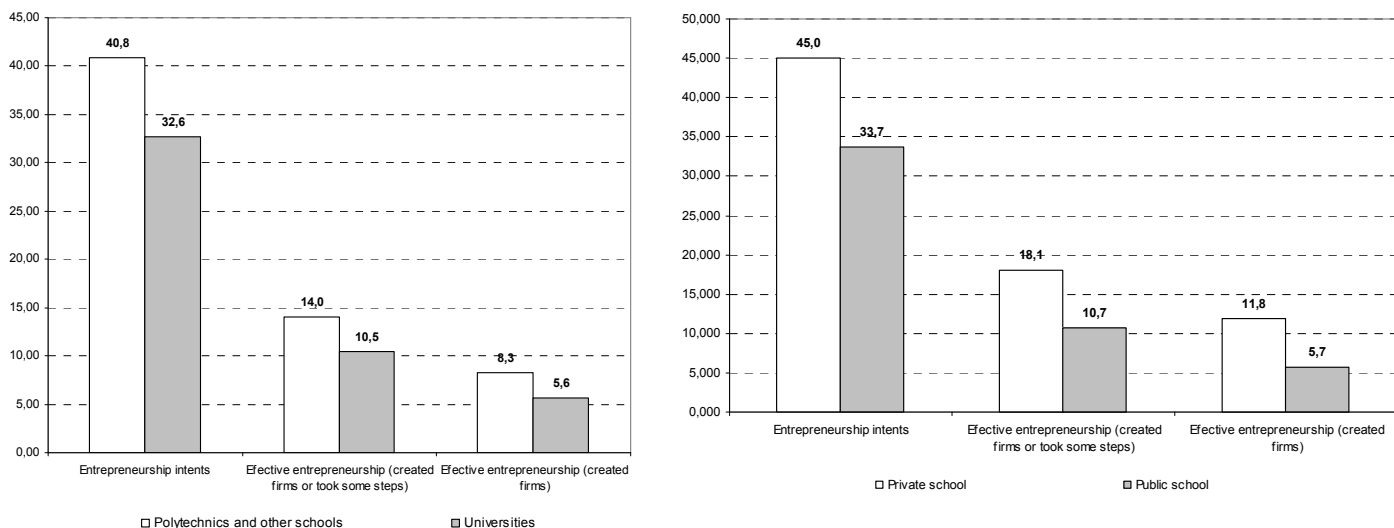
ISLA and *Instituto Superior de Educação e Ciências* emerge again at the forefront in the ranking with 25% of students having created or taken some steps to create a business.

When analyzing the entrepreneurial intents of students (Figure 21), that is, how much students think that their future will pass for having their own business instead of being self-employed, the ranking significantly changes. Although being the worst ranked in terms of effective entrepreneurship (created firms), the *Escola Superior Artística do Porto* emerges as the first in terms of entrepreneurial intents. A similar situation happens in the case of the *Universidade Técnica de Lisboa*, *Instituto Politécnico do Cávado e Ave*, *Instituto Politécnico de Castelo Branco*, and *Universidade Portucalense*, which stand within the top five with regard to entrepreneurial intents.



**Figure 21: Entrepreneurship intents of Portuguese higher education students, by schools**

At a first glance, the previous analysis seems to point that public and private schools, as well as university and non-university institutions, present a rather distinct picture as far as effective entrepreneurship and entrepreneurship intents are concerned. This is clear in Figure 22. Polytechnic and other schools and private higher education institutions systematically present higher average values for potential and effective entrepreneurship when compared to universities and public higher education institutions.

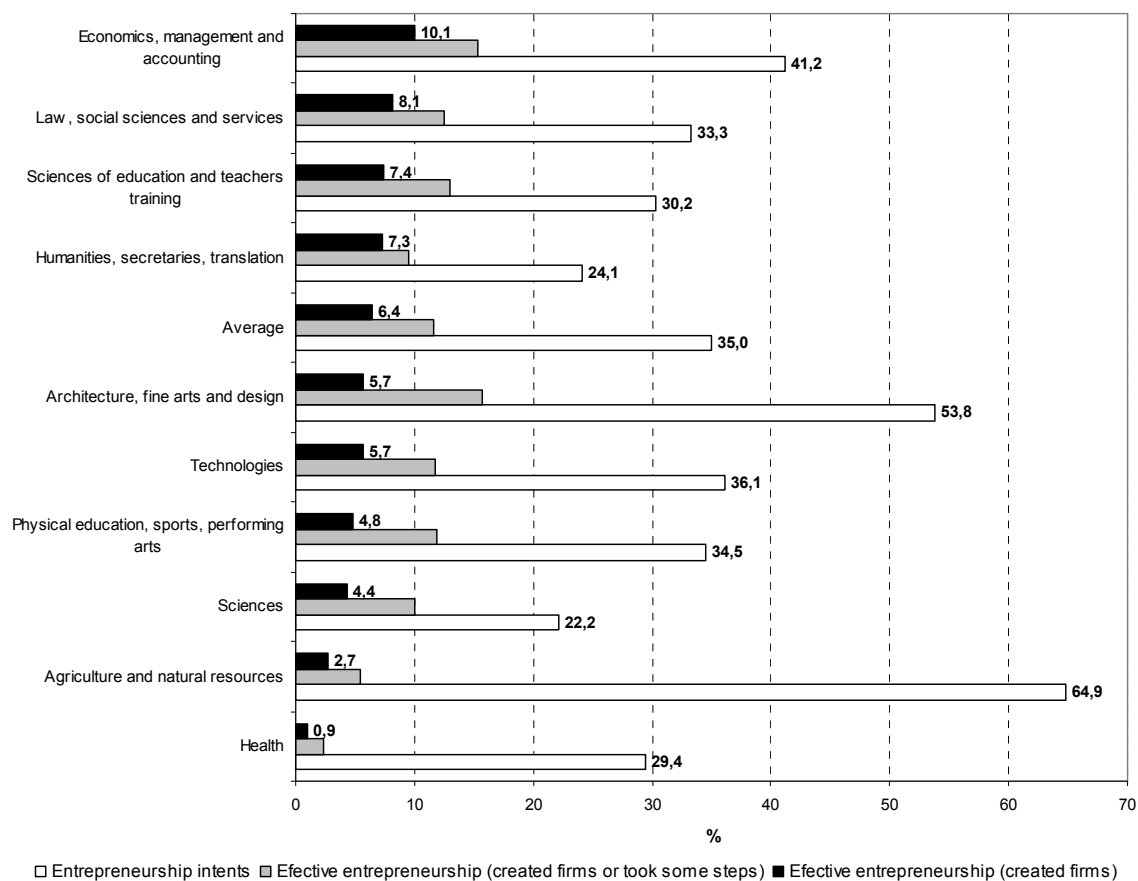


**Figure 22: Entrepreneurship potential of Portuguese higher education students, by type of school (polytechnics vs university; private vs public)**

It is also interesting to analyse whether entrepreneurial attitudes differ among scientific areas. As we can observe in Figure 23, on average, 10% of students enrolled in courses from the ‘Economics, Management and Accounting’ area have already created firms, and an additional 5% have already took some steps towards the creation of a new business. A rather surprising result at a first glimpse is that students enrolled in courses from ‘Sciences of Education’, ‘Humanities’, and ‘Law’ present a rather high effective entrepreneurial propensity, and higher than their counterparts who are enrolled in ‘Technologies’, who have a below average effective entrepreneurship. Such results corroborate the evidence gathered by Teixeira (2008b), and Teixeira and Forte (2008), regarding final year students of the University of Porto.

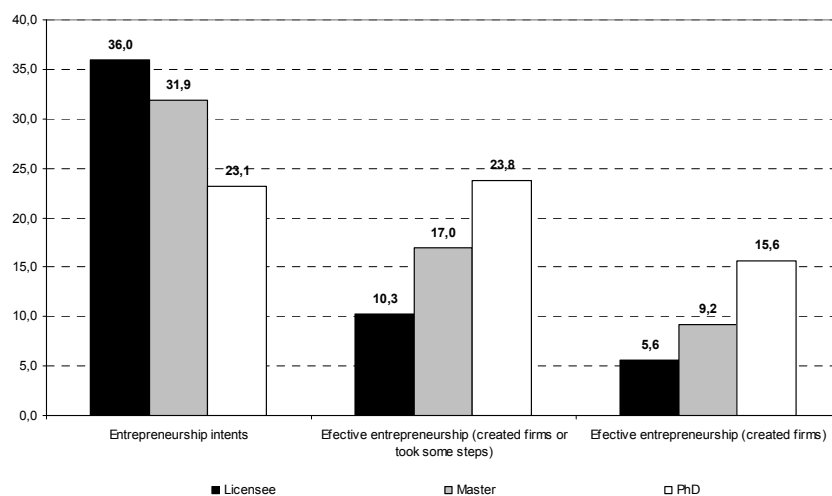
Although presenting a noticeable potential entrepreneurship propensity, with almost 60% of their students seeing the starting of their business as a future career, ‘Architecture, fine arts and design’, and ‘Agriculture and natural resources’ present a rather low effective entrepreneurial propensity. Given the insufficient entrepreneurship experience and awareness and the fact that business skills and competencies might be in short supply, higher education institutions could usefully take some measures to provide non business students with some business and entrepreneurship related courses, information and networks, which could transform potential into effective entrepreneurship propensity.





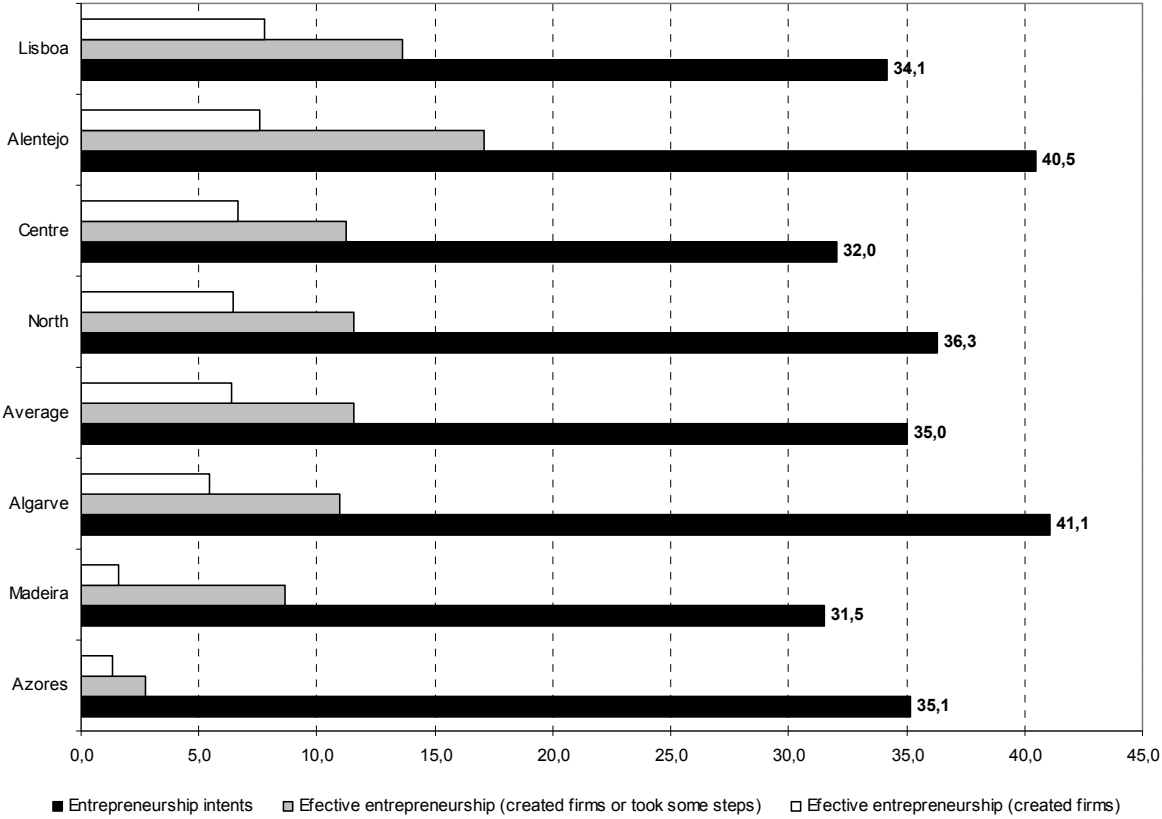
**Figure 23: Entrepreneurship potential of Portuguese higher education students, by scientific areas**

A curious result is that although PhD and Master students present the highest average effective entrepreneurship propensities (cf. Figure 24) – the double and almost the treble of licensees’ *stricto* and *lato* effective entrepreneurship, respectively – whereas the entrepreneurship intents is considerable higher for people holding a degree (36%) compared to that of those with a PhD (23%).



**Figure 24: Entrepreneurship potential of Portuguese higher education students, by degree**

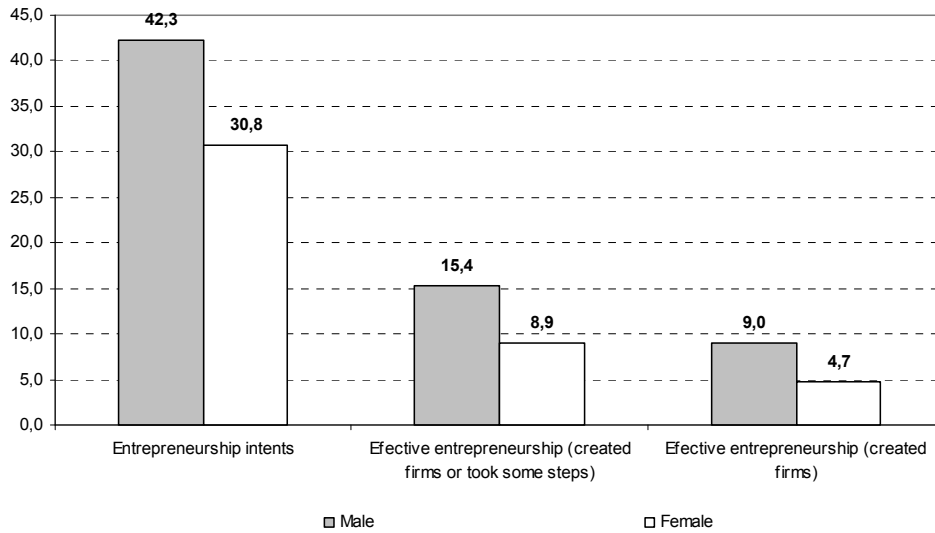
The effective entrepreneurial propensity is higher in students with permanent address in Lisbon, Alentejo and, to a small extent, those from the Center region. Alentejo’s students present, in fact, the highest effective *lato sensu* entrepreneurship and the second highest potential entrepreneurship propensity, right after the Algarve.<sup>25</sup>



**Figure 25: Entrepreneurship potential of Portuguese higher education students, by regions**

Focusing now on demographic characteristics of students, the gender gap widely observed in other studies within the entrepreneurship literature is apparent (Strom, 2007). As we can observe in Figure 26, the effective entrepreneurial propensity of male students is roughly the double of their female counterparts. Stephan and El-Ganainy (2007), focusing also on the academia, found that women are less likely to engage in an entrepreneurial activity or start a company. They propose several explanations for accounting such as gender gap, referring that women are generally more risk adverse than men, women dislike competition, they are less likely to ask than men; women choose to work in “small” areas, with less commercial possibilities and finally, women traditionally have more responsibilities outside the workplace than men (Stephan and El-Ganainy, 2007).

<sup>25</sup> It is important to be cautious in this regard as our sample is not statically representative at the regional level.



**Figure 26: Entrepreneurship potential of Portuguese higher education students, by gender**

All the variables analyzed above are likely to explain (in part) the effective and potential entrepreneurship potential of higher education students. However, in order to rigorously account for their net effect, we need to use a multivariable econometric model. This type of model enables us to assess the individual sign and statistic significance of a given determinant of entrepreneurial attitudes (e.g., risk), controlling all the other determinants (e.g., gender). The empirical assessment of the students' entrepreneurial propensity is based on the estimation of the following general logistic regression, which in turn is based on the existing literature on the determinants of students' propensity to entrepreneurial ventures, surveyed in Section 2:

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

with  $Z = \beta_0 + \underbrace{\beta_1 \text{Risk} + \beta_2 \text{Creativity} + \beta_3 \text{Need for Achievement}}_{\text{Personality traits}} + \underbrace{\beta_4 \text{Experience} + \beta_5 \text{Knowledge} + \beta_6 \text{Awareness} + \beta_7 \text{Interest}}_{\text{Competencies / Familiarity with entrepreneurship}} + \underbrace{\beta_8 \text{Degree}}_{\text{Formal Education}} + \underbrace{\beta_9 \text{Gender} + \beta_{10} \text{Age}}_{\text{Demographic traits}} + \underbrace{\beta_{11} \text{Work Experience} + \beta_{12} \text{Role Model}}_{\text{Contextual factors}} + \beta_{13} \text{Region} + \underbrace{\beta_{14} \text{Public} \_ \text{Private} + \beta_{15} \text{University} \_ \text{Polytechnic}}_{\text{Type of tertiary institution}} + \beta_{16} \text{Course} + \varepsilon_i$

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

$$\log\left(\frac{\text{Pr ob}(\text{entrepreneur})}{\text{Pr ob}(\text{Non} - \text{entrepreneur})}\right) = \beta_0 + \underbrace{\beta_1 \text{Risk} + \beta_2 \text{Creativity} + \beta_3 \text{Need for Achievement}}_{\text{Personality traits}} + \underbrace{\beta_4 \text{Experience} + \beta_5 \text{Knowledge} + \beta_6 \text{Awareness} + \beta_7 \text{Interest}}_{\text{Competencies / Familiarity with entrepreneurship}} + \underbrace{\beta_8 \text{Degree}}_{\text{Formal Education}} + \underbrace{\beta_9 \text{Gender} + \beta_{10} \text{Age}}_{\text{Demographic traits}} + \underbrace{\beta_{11} \text{Work Experience} + \beta_{12} \text{Role Model} + \beta_{13} \text{Region}}_{\text{Contextual factors}} + \underbrace{\beta_{14} \text{Public} - \text{Private} + \beta_{15} \text{University} - \text{Polytechnic}}_{\text{Type of tertiary institution}} + \beta_{16} \text{Course} + \varepsilon_i$$

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  $\beta_i$  is the factor by which the odds change when the  $i^{\text{th}}$  independent variable increases by one unit. If  $\beta_i$  is positive, this factor will be greater than 1, which means that the odds are increased; if  $\beta_i$  is negative, the factor will be less than one, which means that the odds are decreased. When  $\beta_i$  is 0, the factor equals 1, which leaves the odds unchanged. In the case where the estimate of  $\beta_9$  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 higher (log) odds of entrepreneurial potential.

The proxies for the variables used in the model and the matrix of correlation are detailed in Table A1 and A2 in Appendix. The estimates of the  $\beta$ s are given in Table 3 below. In this table we present three different models, which correspond to effective entrepreneurship *stricto sensu* (having created a firm) [Model 1], effective entrepreneurship *lato sensu* (having created a firm or have taken some steps to create a new business) [Model 2], and entrepreneurial intents (seeing self-employment/starting a business as the most likely future career option) [Model 3].

Results schematically documented in Table 3 show that the determinants of effective entrepreneurship and entrepreneurship intents do not match completely. By comparison to their counterparts, Portuguese higher education students that had already created a (some) firm(s) tend, on average, to possess larger entrepreneurial experience and knowledge. All other factors remaining constant, males and older students tend to be more prone to create new ventures than female and younger students, respectively. Controlling for all the potential determinants of effective entrepreneurship propensity, results also evidence that students from Lisbon and from the Islands created, on average, fewer new business than their colleagues from the North region. Regarding the area of studies, we found that students enrolled in the

'Economics and Business' area tend to be more entrepreneurial than those enrolled in 'Technologies', whereas 'Health' students are less entrepreneurial led.

When we consider a more encompassing effective entrepreneurship indicator - created firms or took steps to start a business – similar results to the above (effective entrepreneurship propensity in stricter terms) are obtained concerning entrepreneurial experience, entrepreneurial knowledge, gender, age, work experience and health area of studies. Differently, personal characteristics, namely risk and creativity traits, emerge positively and significantly related to entrepreneurial propensity. This evidence reveals that students who have a higher risk behaviour – i.e., those who argue that they do not agree with the statement 'One should not start a business when there is a risk it might fail', those who tend to under prefer job security/stability of employment/stable income to new venture creation, and do not fear the risk associated with new ventures – are, all things remaining constant, much more likely to have created or taken some steps to create new businesses. These students also reveal higher levels of creativity in the sense they have ideas which are likely to become business opportunities.

Personality traits (risk, creativity, need for achievement), competencies/ familiarity with entrepreneurship (experience, knowledge, awareness and interest), formal education, demographic traits (gender and age), and contextual factors (namely, work experience and family and friends role models) are factors that explain students' entrepreneurial intents. Students who foresee, to a larger extent, their future career as owning their business, are, on average, more prone to risk, they show higher levels of creativity and familiarity with entrepreneurship issues. As in effective entrepreneurship, male, older and more professionally experienced students tend to reveal (other things remaining constant) higher entrepreneurial intents. In contrast with effective entrepreneurship, the role model emerges as an important factor influencing students' entrepreneurial intents. Thus, students who live in an environment which 'breeds' entrepreneurship – family and friends are entrepreneurs – tend, on average, to have stronger desire to become an entrepreneur. This evidence is encouraging in the sense that it goes in line with the central premise of entrepreneurship programs that entrepreneurship is a learned phenomenon. Therefore, entrepreneurs can be created by their experience as they grow and learn, being influenced by teachers, parents, mentors and role models throughout their growth process (Volery, 2004; Van Auken et al., 2006). Following these arguments, even when individuals interested in entrepreneurship and current entrepreneurs cannot be taught in *stricto sensu*, they can be encouraged and influenced.

Although in the descriptive analysis (Section 4) students enrolled in private institutions and polytechnic schools presented higher entrepreneurship propensities than their colleagues enrolled in public institutions and universities, respectively, when we control a large number of factors that are likely to influence entrepreneurial propensity (both effective and intents), the type of higher education fails to constitute a statistically significant determinant. Students enrolled in ‘Agriculture and Natural Resources’ and ‘Architecture, Arts and Design’ reveal higher entrepreneurial intents than those enrolled in ‘Technologies’, whereas the opposite happens for students enrolled in ‘Humanities’.

**Table 3: Determinants of students’ entrepreneurial propensity/intents**

		Effective Entrepreneurial propensity			
		Created firms	Created firms or took steps to start a business	Entrepreneurial intents	
Personality traits	Risky		++	+++	
	Creativity		+++	+++	
	Need for achievement			+++	
Competencies/ familiarity with entrepreneurship	Entrepreneurial experience	+++	+++	+++	
	Entrepreneurial knowledge	+++	+++	+++	
	Entrepreneurial awareness			+++	
	Entrepreneurial interest			+++	
Formal education	Degree	Master+MBA		--	
		PhD		--	
Demographic traits	Gender (Female=1; Male=0)	--	--	--	
	Age	+++	+++	++	
Contextual factors (default region: North)	Work experience	+++	+++	+	
	Role model (family & friends)			+++	
	Region	Center			--
		Lisbon	-		
		Alentejo			
		Algarve		-	
Islands	--		-		
Type of Higher Education	Public vs Private (public=1; private=0)				
	University vs Polytechnic (uni=1; poly=0)				
Area of study (default area: Technologies)	Sciences			-	
	Health	--	---		
	Agriculture and natural resources			+++	
	Architecture, arts and design			+++	
	Education				
	Law, and social sciences				
	Economics and business	++			
	Humanities			-	
	Sports and performing arts				

+++ (---) Statistically significant at 1%; ++ (--) 5%; + (-) 1%

Note: Blank cells mean that the relation is not statistically significant. In Appendix, Table A3, we detail the estimates for each model.

It is important to reflect on why risk and creativity emerge as important personality traits for effective entrepreneurship in *lato sensu* (created firms or took steps to start a business) and entrepreneurial intents (seeing him/her self as an entrepreneur after the end of his/her studies) but failed to determine effective entrepreneurship in *stricto sensu* (created firms). In a rather comprehensive and rich report on micro entrepreneurship in Portugal, Portela and his co-authors (Portela, 2008) point to several situations that are likely to be particularly and that might enlighten the ‘mystery’ of non significance of risk and creativity for effective entrepreneurship propensity. Recall that students who created firms are in general postgraduate students and/or relatively senior individuals. In this vein, entrepreneurial ventures associated with these individuals are likely to suffer from the weaknesses pointed by Portela (see Table 4), namely lack of innovation/creativity and risk aversion. This also might potentially explain the lack of significance of variables, such as entrepreneurial awareness and interest observed in Table 3 for effective entrepreneurship propensity.

**Table 4: Typology of micro entrepreneurship in Portugal**

		<b>Factors leading to new business venturing</b>	<b>Sectors of the new venture</b>	<b>Dangers/weaknesses</b>
Naïve entrepreneurship	Recent graduates from higher education or individuals with high levels of (formal) education	Failure to find a job Stimulus from schools where they graduated	Service sector (activities related with services to firms, culture, tourism, environment or ICTs)	Lack of experience and knowledge of markets
Transitory entrepreneurship	Individuals with professional experience in specialized domains	Unemployment at an advanced age	Sector of the former employment	<b>Lack of innovation/creativity</b>
	Individuals that have substantial difficulties in finding a job	Council, mentoring, and financial help from employment centers	-	Excessive dependency on public institutions <b>Risk aversion</b>
	People without sufficient resources	Microcredit	-	Reduced size of the business Lack of experience of entrepreneurship
Personal achievement seeking entrepreneurship	Individuals who invest their material and relational capital in a new business	Desire of independence Need for achievement	-	Absence of market feasibility studies

Source: Adapted from Portela (2008)

## 6. Conclusions

Regardless of how directly supportive universities are of the commercialization of research, they offer access to a number of unique resources particularly helpful to nascent entrepreneurs. Firstly, universities provide access to a large body of talented and skilled individuals gathered in one location, so building a team within the university ‘ecosystem’ might be much easier than anywhere else. Indeed, the diversity of talent is very important for start-ups. Moreover, bringing new ideas to market requires a large number of skills, including a mix of business and technical expertise. Therefore, teams with members who possess a number of different skills are very valuable.

Portuguese higher education students who responded the survey recognized in fact that their interest in new venture creation would be improved if their schools brought students in contact with the network needed to start a new business and put entrepreneurial students in contact with each other. A vast percentage of these students claimed that arranging conferences/workshops on entrepreneurship and creating more awareness on entrepreneurship as a possible career choice would be important boosters. Additionally, our model estimates revealed that students who live in an environment that “breeds” entrepreneurship tend, on average, to have stronger desire to become entrepreneurs. This corroborates the idea that entrepreneurship is a learned phenomenon and, as such, entrepreneurs can be created by their experience as they grow and learn, being influenced by teachers, parents, mentors and role models throughout their growth process (Volery, 2004; Van Auken et al., 2006).

Thus, entrepreneurship education in general and higher education institutions in particular may, and advisably should, work as a hub, putting different type of students in contact with each other and helping in the establishment of bridges between potential entrepreneurs and private business organizations, namely those acting as entrepreneurship support organizations, such as incubators, business angels, property rights offices, to name a few. These networking roles may be anchored and diffused through the organization of hand-on seminars and workshops, similarly to what happens in IC2 (University of Texas at Austin) or at the MIT Entrepreneurship Center, by inviting business practitioners and other professionals who, besides transmitting their knowledge, may be the basis for an effective entrepreneurial network.

A very powerful mean to enhance the strength of an entrepreneurial network would be the formation of both physical and virtual entrepreneurial clubs, which involve students from



different schools within an institution and/or inter-institutions, and which could be a place to post important information and contacts for entrepreneurial individuals. Audax (ISCTE), or a more recent example, *Clube de Empreendedorismo da Universidade do Porto* (CEdUP), the first Portuguese university entrepreneurship club, and initiatives as E-Day – Entrepreneurship Day at Universidade Nova de Lisboa or GP.UPorto: Aprender a Empreender, are key booster factors to encourage entrepreneurship among our youngest.

Although less than 10% of Portuguese higher education students have started a new venture (effective entrepreneurship), entrepreneurship intents are quite important among these students. Around 35% of students surveyed regard having their own business as a more plausible future career, a similar figure to the one found for Austrian undergraduate business students, but well below the propensity for entrepreneurship of US undergraduate engineering (54.6%) and business (50.0%) students (Lüthje and Franke, 2003; Franke and Lüthje, 2004).

Notwithstanding the reasonable entrepreneurship intents among Portuguese students enrolled in higher education, data reveal that these students have relatively low understanding of the entrepreneurship process, failing to understand the type of issues that an entrepreneur confronts when taking an idea to the market, and not possessing enough knowledge concerning the creation of business plans and business concepts, techniques to find out what the market wants, and how to legally finance a new business concept. Such evidence might in part explain the below average entrepreneurial propensity of students enrolled in ‘Technology’ related areas.

Entrepreneurship club meetings, classes, or lectures by well-known entrepreneurs offer a way of broadening knowledge about entrepreneurship - and connecting with others who are interested in the subject. For instance, engineering students who are wondering how to properly structure a business plan might be encouraged to visit a management and ask for assistance. Those who do not yet have an idea for a venture might spend some time with engineering students or talk to engineering faculty members about ideas that they think are worth commercializing - there are many students and faculty members who might be looking for others to bring an idea to the market. The key concept to bring new ideas to market is collaboration. University resources can also help with access to valuable information for market research. While the Internet is a good first stop, market predictions and trends usually require access to additional reports focused on a target market and specific industry.

From building a team to winning start-up capital, universities offer many unique and valuable resources to those within their community. Even if the venture is not successful, mobilizing the resources within the community provides professional relationships, friendships, knowledge and skills that will last a lifetime, well beyond the academia context.

The present work is rather exploratory attempting to uncover some patterns about Portuguese higher education students' attitudes towards entrepreneurship. It would be quite important and valuable, providing an interesting path for future research, to analyze the measures that each school has developed to foster entrepreneurship among their students and staff. This would bring additional and illuminating evidence concerning the importance and 'quality' of the context as a promoter of new business venturing.

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**Table A1: Definition of the proxies for the relevant variables**

Variable	Definition of the proxy
(1) Effective entrepreneurial propensity - created firms	Dummy variables assumed the value 1 in the event the student had already created firms (effective entrepreneurial propensity in strictu sense) and 0 otherwise.
(2) Effective entrepreneurial propensity - taken steps to start a business/ created firms	Dummy variables assumed the value 1, in the event the student had created firms or had taken some steps to create firms (effective entrepreneurial propensity in latu sense) and 0 otherwise.
(3) Potential entrepreneurial propensity	The variable of entrepreneurial intent was directly assessed by asking students, on a scale of 1 – employee ... 5 – having my own business, which was the most likely option for their future career. If the student answered 4 or 5, the entrepreneurial intent variable assumed the value 1 and 0 otherwise.
(4) Risky (dummy=1)	The variable ‘risky’ is the sum of three dummy variables that were computed based on some answers that students gave in the questionnaire. A first dummy assumed the value 1 when the student answered 1 (strongly disagree) or 2 (disagree) to the statement ‘One should not start a business when there is a risk it might fail’, and 0 otherwise. The second dummy assumed the value 1 when the student answered 1 (strongly disagree) or 2 (disagree) to the statement ‘b) Job security / stability of employment / Stable income’ when questioned ‘Why would you prefer to be an employee rather than self-employed?’. The third dummy assumed the value 1 when the student answered 1 (strongly disagree) or 2 (disagree) to the statement ‘d) It is not as risky as being self-employed’ when questioned ‘Why would you prefer to be an employee rather than self-employed?’. Then we sum up the three dummy variables and re-computed a new dummy variable, which assumed the value 1 when the sum variable assumed values 2 and 3 and 0 otherwise.
(5) Creativity (dummy=1)	The variable ‘creativity’ is a dummy variable that assumed the value 1 when the student answered 4 (agree) or 5 (strongly agree) to the statement ‘c) I have an idea that can be a business opportunity’.
(6) Need for achievement (dummy=1)	The variable ‘need for achievement’ is the sum of two dummy variables which were computed based on some answers that students gave in the questionnaire. A first dummy assumed the value 1 when the student answered 4 (agree) or 5 (strongly agree) to the statement ‘a) Personal independence / Managing own time’, and 0 otherwise. The second dummy assumed the value 1 when the student answered 4 (agree) or 5 (strongly agree) to the statement ‘a) Personal independence / Managing own time’ when questioned ‘Why would you prefer to be self-employed rather than employee?’. Then we summed up the two dummy variables and re-computed a new dummy variable that assumed the value 1 when the sum variable assumed values 2 and 0 otherwise.
(7) Entrepreneurial experience (ln)	Entrepreneurship experience is a numeric variable, computed in logarithm that resulted from the sum of the scores (1...5) obtained in the answers to the following statements: ‘c) I worked for myself as a teenager eg. Delivering papers, babysitting, mowing lawns etc.’; ‘d) I have been a freelancer or self-employed’; ‘e) I have closely followed or assisted family members who have started companies’; ‘f) I have closely followed or assisted friends or acquaintances who have started companies’.
(8) Entrepreneurial knowledge (ln)	Entrepreneurship knowledge is a numeric variable, computed in logarithm that resulted from the sum of the scores (1...5) obtained in the answers to the following statements: ‘a) I know techniques for finding out what the market wants’; ‘b) I understand the type of issues that confront an entrepreneur in taking an idea to market’; ‘c) I can create a business plan and a business concept’; ‘d) I know how to legally finance a new business concept’.
(9) Entrepreneurial awareness (ln)	Entrepreneurship awareness is a numeric variable, computed in logarithm that resulted from the sum of the scores (1...5) obtained in the answers to the following statements: ‘a) I regularly read books / articles about entrepreneurship / innovation’; ‘b) I participate regularly in conferences / lectures /workshops on entrepreneurship and/or innovation’.
(10) Entrepreneurial interest (ln)	Entrepreneurship interest is a numeric variable, computed in logarithm, that resulted from the sum of the scores (1...5) obtained in the following statements: ‘a) Starting a new business from an idea’; ‘b) Entrepreneurship using research’; ‘c) Entrepreneurship within an existing company’, which answered the following question: How interested are you in one of the following topics during your studies?
(11) Schooling year (ln)	Numerical variable in logarithm of students’ schooling year (License and Integrated Master: 1 <sup>st</sup> up to 6 <sup>th</sup> year of schooling; MBA: 7 <sup>th</sup> year of schooling; Master: 8 <sup>th</sup> -9 <sup>th</sup> year of schooling ; PhD: 10 <sup>th</sup> -13 <sup>rd</sup> year of schooling).
(12) Master+MBA	Dummy variable assuming value 1 in case the student is enrolled in a Master or MBA degree, 0 otherwise.
(13) PhD	Dummy variable assuming value 1 in case the student is enrolled in a PhD degree, 0 otherwise.
(14) Gender (Female=1; Male=0)	Dummy variable assuming value 1 in case the student is female, 0 otherwise.
(15) Age (ln)	Numerical variable, in logarithm, of students’ age.
(16) Work experience (ln)	Numerical variable, in logarithm, of students’ work experience.
(17) Role model (family & friends)	
(18) Public vs Private (public=1; private=0)	Dummy variable assuming value 1 in case the student is enrolled in a Public higher education institution, 0 in case the student is enrolled in a private institution.
(19) University vs Polytechnic (uni=1; poly=0)	Dummy variable assuming value 1 in case the student is enrolled in a University, 0 in case the student is enrolled in a Polytechnic or other higher education school.



**Table A2: Descriptive statistics and correlation matrix**

	Mean	St. Deviation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1) Effective entrepreneurial propensity - created firms	0,064	0,244	1,000	0,723	0,137	0,039	0,093	0,023	0,234	0,201	0,116	0,067	0,026	0,045	0,074	-0,082	0,348	0,184	0,015	-0,081	-0,051
(2) Effective entrepreneurial propensity - taken steps to start a business/ created firms	0,115	0,319	1,000	1,000	0,187	0,059	0,144	0,045	0,268	0,238	0,169	0,090	0,048	0,063	0,075	-0,096	0,358	0,202	0,022	-0,072	-0,048
(3) Potential entrepreneurial propensity	0,350	0,477	1,000	0,126	0,282	0,147	0,219	0,237	0,214	0,237	0,214	0,233	-0,027	-0,026	-0,048	-0,116	0,084	0,100	0,131	-0,074	-0,077
(4) Risky (dummy=1)	0,178	0,383	1,000	0,039	-0,021	0,038	0,070	0,076	0,042	0,076	0,042	0,042	-0,024	-0,002	-0,005	-0,025	0,020	0,017	0,040	-0,025	-0,020
(5) Creativity (dummy=1)	0,494	0,500	1,000	0,147	0,237	0,276	0,233	0,317	0,012	0,023	0,023	0,012	0,012	0,023	-0,005	-0,111	0,049	0,078	0,092	-0,044	-0,038
(6) Need for achievement (dummy=1)	0,677	0,468	1,000	0,095	0,123	0,083	0,194	0,032	0,027	0,027	0,027	0,032	0,032	0,027	-0,009	0,001	0,006	0,024	0,088	-0,029	0,000
(7) Entrepreneurial experience (ln)	0,534	0,536	1,000	0,298	0,227	0,212	0,014	0,030	0,007	0,046	0,136	0,240	0,207	0,030	0,007	-0,046	0,136	0,240	0,207	-0,095	-0,063
(8) Entrepreneurial knowledge (ln)	0,551	0,588	1,000	0,375	0,298	0,067	0,056	0,020	0,020	0,056	0,020	0,056	0,020	0,056	0,020	-0,097	0,143	0,128	0,079	-0,043	-0,050
(9) Entrepreneurial awareness (ln)	0,159	0,330	1,000	0,238	0,035	0,030	0,030	0,059	0,059	0,082	0,082	0,096	0,067	0,030	0,059	-0,096	0,082	0,096	0,067	-0,033	-0,046
(10) Entrepreneurial interest (ln)	0,911	0,482	1,000	0,017	0,021	0,021	0,021	0,021	0,021	0,021	0,021	0,021	0,021	0,021	0,021	-0,085	0,030	0,093	0,070	-0,026	-0,017
(11) Schooling year (ln)	1,103	0,692	1,000	0,549	0,367	0,052	0,280	0,113	0,113	0,113	0,113	0,113	0,113	0,113	0,113	0,052	0,280	0,113	-0,022	-0,004	0,226
(12) Master+MBA	0,122	0,328	1,000	0,073	0,058	0,213	0,160	0,160	0,160	0,160	0,160	0,160	0,160	0,160	0,160	0,058	0,213	0,160	-0,021	-0,040	0,142
(13) PhD	0,036	0,187	1,000	0,034	0,196	0,128	0,128	0,128	0,128	0,128	0,128	0,128	0,128	0,128	0,128	0,034	0,196	0,128	-0,021	0,046	0,119
(14) Gender (Female=1; Male=0)	0,525	0,499	1,000	-0,110	0,034	-0,034	0,056	0,165	0,128	0,128	0,128	0,128	0,128	0,128	0,128	1,000	-0,110	-0,077	0,034	-0,034	0,056
(15) Age (ln)	3,193	0,226	1,000	0,465	-0,165	0,128	0,128	0,128	0,128	0,128	0,128	0,128	0,128	0,128	0,128	0,465	0,128	0,128	-0,056	-0,165	-0,128
(16) Work experience (ln)	0,900	0,573	1,000	-0,129	-0,147	0,128	0,128	0,128	0,128	0,128	0,128	0,128	0,128	0,128	0,128	1,000	-0,129	0,128	-0,011	-0,129	-0,147
(17) Role model (family & friends)	0,145	0,352	1,000	-0,033	-0,007	0,128	0,128	0,128	0,128	0,128	0,128	0,128	0,128	0,128	0,128	1,000	-0,033	0,128	0,128	-0,033	-0,007
(18) Public vs Private (public=1; private=0)	0,887	0,317	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	0,223
(19) University vs Polytechnic (un=1; poly=0)	0,717	0,451	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Note: statistically significant at \*\*\* 1%, \*\* 5%, \* 10%

**Table A3:** Determinants of students' entrepreneurial propensity/intents

		Effective Entrepreneurial propensity		Entrepreneurial intents	
		Created firms ( <i>Stricto sensu</i> )	Took steps to start a business/created firms ( <i>Lato sensu</i> )		
Personality traits	(1) Risky (dummy=1)	0,163	0,304**	0,625***	
	(2) Creativity (dummy=1)	0,256	0,466***	0,752***	
	(3) Need for achievement (dummy=1)	0,071	0,194	0,443***	
Competencies/ familiarity with entrepreneurship	(4) Entrepreneurial experience (ln)	1,560***	1,216***	0,338***	
	(5) Entrepreneurial knowledge (ln)	0,845***	0,688***	0,310***	
	(6) Entrepreneurial awareness (ln)	-0,290	0,179	0,510***	
	(7) Entrepreneurial interest (ln)	-0,013	-0,062	0,568***	
Formal education	(8) Schooling year (ln)	-0,252*	-0,155	0,025	
	(9) Degree	Master+MBA	0,068	0,088	-0,430***
		PhD	0,699*	0,351	-0,868***
Demographic traits	(10) Gender (Female=1; Male=0)	-0,342**	-0,236**	-0,304***	
	(11) Age (ln)	4,107***	3,675***	0,458**	
Contextual factors	(12) Work experience (ln)	0,646***	0,358***	0,125*	
	(13) Role model (family & friends)	-0,168	-0,142	0,476***	
	(14) Region	Center	-0,084	-0,160	-0,273***
		Lisbon	-0,439*	-0,258	-0,182
		Alentejo	-0,337	0,136	0,090
		Algarve	-0,516	-0,433*	-0,016
		Islands	-1,262**	-0,457	-0,301*
Type of Higher Education	(15) Public vs Private (public=1; private=0)	-0,200	-0,045	-0,105	
	(16) University vs Polytechnic (uni=1; poly=0)	0,086	0,125	-0,125	
Area of study	Sciences	0,331	0,307	-0,302*	
	Health	-1,118**	-1,127***	0,031	
	Agriculture and natural resources	-0,154	-0,640	1,371***	
	Architecture, arts and design	-0,136	0,265	0,858***	
	Education	0,058	-0,078	0,096	
	Law, and social sciences	0,224	-0,130	-0,056	
	Economics and business	0,384**	0,019	0,147	
	Humanities	0,213	-0,418	-0,380*	
	Sports and performing arts	-0,422	-0,106	0,011	
Constant		-18,517***	-15,887***	-3,675***	
<i>N</i>		4400	4400	4400	
	Entrepreneurs	4120	3894	2862	
	Others	280	506	1538	
<i>Goodness of fit statistics</i>					
	% corrected	94,1	90,0	72,2	
	Hosmer and Lameshow test (p-value)	13,003 (0,111)	5,394 (0,715)	2,540 (0,960)	

\*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%

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