University Students and Entrepreneurship. Some insights from a population-based survey

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20 February 2017

University Students and Entrepreneurship

Some insights from a population-based survey[§]

February 2016

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Abstract

Start-ups founded by university students and graduates play a substantial role in bringing new knowledge to the market and in employment creation; a role that appears to be even more important than the one played by the typical technology transfer activities carried out by universities, i.e. patenting and licensing activities, or spin-offs founded by academic staff. Indeed, robust empirical evidence suggests that entrepreneurs' education is a good predictor of firms' performance. Unfortunately, data show that the share of Italian entrepreneurs with tertiary educations is quite small, and this is especially the case of the younger generation. In this paper, we use a population-based approach to explore entrepreneurship among 61,115 graduates, alumni of the 64 Italian universities that belong to the AlmaLaurea consortium, in the second half of 2014, at the time when they completed their academic experience. We detect various levels of engagement and intentions to be involved in entrepreneurship, and we assess which factors appear to weigh more in a positive or negative manner. The bad news is that also our analysis finds that the share of Italian graduates who have started a business after their enrolment at university (1.3%) or who have taken concrete actions to start a business (4.5%) is quite small. The good news is that the number of intentional, i.e. potential highly educated, entrepreneurs among university students is much larger (at least 23%). On the basis of our results, we argue that the provision by universities of entrepreneurial education and training, internships, and ICT skills can be effective tools with which to cultivate entrepreneurial attitudes and skills, thereby fostering entrepreneurship and intrapreneurship among university graduates and enhancing their employability.

Keywords: entrepreneurship, university, start up, students, education

JEL classification: J21, J24, L26, I23

[§] This paper is part of a joint research project on Students' and Graduates' Entrepreneurship carried out by AlmaLaurea, ImprendiLab (University of Cassino and Southern Lazio), and the University of Bologna. The first Report based on the survey provides information on the project and the survey and was released in December 2015 (Fini et al., 2016).

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1. Introduction

Entrepreneurship is recognized to be one of the main drivers of innovation and sustainable growth (Wennekers and Thurik, 1999; Iyigun and Owen, 1999) and it is seen as a means to provide better opportunities for labour-market entry to those social groups that may encounter obstacles in finding good jobs as employees, i.e. women, young people and immigrants. More recently, entrepreneurship among students and graduates has captured the interest of many scholars (Fini and Grimaldi, 2016; Dahlander and McFarland, 2013; Perkmann et al., 2015) in connection with the empirical evidence that start-ups founded by university students and graduates play a substantial role in bringing new knowledge to the market and in employment creation. This contribution appears, at least on quantitative grounds, to be even more important than the one made by the typical technology transfer activities carried out by universities, i.e. patenting and licencing activities, or spin-offs founded by academic staff (Roberts and Eesley, 2011; Roberts et al., 2015; Astebro et al. 2012).

Besides these motivations, the decision to investigate entrepreneurship among Italian university students stems from the recognition that, according to previous studies (Ferrante and Sabatini, 2007), the share of Italian entrepreneurs with tertiary educations is quite small, and this is especially the case of the younger generation (GEM, 2015). Robust empirical evidence suggests that education is an important and positive factor in entrepreneurial performance (Bates, 1990; Ferrante, 2005; Otani, 1996, Vander Shuis and al., 2005; 2008). According to some studies (Bugamelli et al., 2012; Schivardi and Torrini, 2011; Federici and Ferrante, 2014), the poor economic performance of the Italian economy, in the past 15 years or so, can be partly ascribed to entrepreneurial styles and strategies determined by a poor endowment of human capital.

Occupational choices and the decision to become an entrepreneur are driven by intrinsic and extrinsic motivations. A number of microeconomic models have been proposed to represent the individual decision to become an entrepreneur rather than an employee.

In his seminal paper, Lucas (1978) traces the roots of this decision to personal characteristics of individuals: each member of the workforce is endowed with a specific entrepreneurial talent, which varies from one individual to another. In equilibrium, the talent level required to become an entrepreneur determines the distinction between wage-earners and the entrepreneurs who hire them.

Entrepreneurial talent has in most cases been modelled as depending on a generic ‘human capital variable’ including highly assorted concepts like on-the-job knowledge and

accumulated experience, educational qualification, family background, optimism, risk aversion, and the extent of social networks. Besides some notable exceptions, the multidimensional nature of entrepreneurial talent has generally been undervalued, and the distinction between tacit and codified sources of cognitive abilities has been unduly stressed.

Parker (2004) summarizes a great number of studies in which age, labour market experience, marital status, having self-employed parents, and earnings differential have the most robust positive association with the probability of being or becoming an entrepreneur. The general result emerging from the empirical evidence on the characteristics of self-employment in different countries (Blanchflower and Oswald 1998; Cowling, 2000) is that technological and institutional country-specific factors shape the nature of entrepreneurial talent and the explicit role of education. These elements are the drivers of occupational choices insofar as they influence the risk-adjusted returns to education in different occupations[1] (Kanbur, 1979). From this it follows that, in our view, *entrepreneurial human capital consists of those cognitive abilities and non-cognitive traits[2] required to generate social value, within a given economic environment, through the discovery and successful exploitation of market opportunities*.

As regards education, the most recent study offering support for the context-dependent nature of entrepreneurial human capital is a meta-analysis by van Sluis, van Praag and Vijverberg (2005). The authors show that (a) entrepreneurial selection is not significantly affected by education; (b) performance, i.e. returns to education for entrepreneurs, varies substantially across countries and (c) returns to education for entrepreneurs may or may not be higher than returns to education for employees.

Entrepreneurs' cognitive abilities are either innate or acquired, and they stem from tacit knowledge, i.e. ? idiosyncratic knowledge, or codified knowledge, i.e. education and training

[1] For instance, an enforced entry regulation can reduce entry and income risk and thus create rents for incumbents in some occupations (thereby increasing returns to education); conversely, entry regulations that are not enforced owing to bribery may simply affect the type of entrepreneurial selection, with zero or even positive effects on entry (Klapper, Leaven, and Rajan, 2004).

[2] The empirical evidence on the effects of cognitive and non-cognitive abilities on an individual's life is impressive. In particular, a remarkably long list of characteristics and socioeconomic outcomes of an individual are correlated with the standard measurement tests of cognitive abilities (Kuncel, Hezzlet and Ones, 2004; Schmidt, 2002). Such abilities include analytical style, memory, reaction time, reading, creativity (craftwork, musical ability), health and fitness, interests (breadth and depth of interest, sports participation), morality? (delinquency, lie scores, racial prejudice, values), occupational status and income, perceptual (ability to perceive brief stimuli, field-independence, myopia), personality (achievement motivation, altruism, dogmatism), practical skills (practical knowledge, social skills). Indeed, they are all characteristics that may be expected to affect the intrinsic and extrinsic reward of different occupational choices and, therefore, the incentive to make them.
Psychology and neuroscience furnish strong evidence that most cognitive and non-cognitive skills are acquired up to a person's twenties, an age bracket below, which the prefrontal cortex is still malleable (Cunha and Heckman, 2007).

(De Bruin and Ferrante, 2011). Why is this distinction important? Codified knowledge is systematic and formal. It is describable and transformable into standardized processes; hence, it is not primarily personal and individual but may be used and distributed through time and space. By contrast, tacit knowledge is an individual asset based on personal experience and interaction, and it reflects the potential and capabilities of human capital in an economic area (Federici, Ferrante and Vistocco, 2008).

The above conjectures have clear implications concerning the level and type of human capital required of entrepreneurs to deal with the complexity of the competitive environment and the organization of the firm. They also provide an explanation of why analytical skills acquired through vocational curricula as well as tertiary education are positively associated with entrepreneurial performance (Van Praag and Cramer, 2001).

Families are a major source of the tacit knowledge that generates the sort of cognitive and non-cognitive abilities required to discover and exploit entrepreneurial opportunities. Individuals whose parents are entrepreneurs are more familiar with entrepreneurial decision-making, and in particular, with the process of taking risky decisions. They are constantly exposed to the manner in which the information necessary to take decisions is selected and processed. Hence, they develop more confidence about the effective outcomes of their decisions and actions. Of course, this may result in overconfidence and in excessive optimism in entry decisions (Fraser and Greene, 2006). The empirical evidence on the effects of the family background on occupational choices is quite clear. It shows that belonging to a family of entrepreneurs enhances entrepreneurial talent and can make the difference.

The recognition, pursuit, and development of opportunities constitute the core of the entrepreneur's task (Ardichvili, Cardozo, & Ray, 2003; Shane and Venkataraman 2000; Venkataraman, 1997). Once opportunities are discovered, the successful entrepreneur must select, organize and adopt solutions and strategies to develop those opportunities. The link between aspects of knowledge and human capital of the entrepreneur in this opportunity discovery as well as exploitation process, has been a popular area of entrepreneurship study (e.g. Davidsson and Honig, 2003; Dimov and Shepherd 2005; Shane 2000; Ferrante 2005). Knowledge asymmetries and prior experience have been shown to play an important role in the opportunity recognition process (Shane 2000). Other scholars have focused on aspects of entrepreneurial cognition that should be coupled with knowledge in order for opportunities to be identified (Mitchell et al. 2002; Shane and Venkataraman 2000). More recently, the learning/entrepreneurship interface has been probed (Corbett 2005, 2007; Dimov 2003, Minniti and Bygrave 2001). For instance, learning antecedents have been examined to explain

why some individuals identify entrepreneurial opportunities while others do not (Corbett 2007). Prior knowledge is also strongly correlated with recurring or serial opportunity recognition and re-entry into entrepreneurship (Stam, Audretsch, Meijaard 2008).

Education or, in general, codified knowledge, enhances entrepreneurial skills in many ways. It mostly fosters those planning and coordination abilities, i.e. managerial skills, which are needed to exploit market opportunities. By so doing, codified knowledge helps to compress the uncertainty surrounding a given business venture. Moreover, the enhancement of managerial ability helps to reduce subjective uncertainty about one's entrepreneurial talent (van Praag and Cramer, 2001).

In this paper, we argue that entrepreneurial education and training should be designed and developed more systematically, in both curricula and extracurricular activities. In this regard, the propensity to engage in a business venture as an occupational option and the capacity to run it successfully should be related not only to the development of the appropriate interdisciplinary skills (Lazear, 2005) but also to the improvement of those non-cognitive traits and attitudes, i.e. soft skills, that can be cultivated through entrepreneurial education.

The benefits of entrepreneurial education are not confined to its contribution to the creation of new ventures by graduates; they also derive from the cultivation of an entrepreneurial spirit that can foster university graduates' employability and their contribution to *intrapreneurship* (European Commission, 2012; Ferrante and Supino, 2016).

In this paper, we use a population-based survey to explore entrepreneurship among 61,115 graduates, alumni of the 64 Italian universities belonging to the AlmaLaurea consortium, in the second half of 2014, at the time when they completed their academic experience. We identify various levels of involvement in entrepreneurship and of entrepreneurial intentions, and we assess which factors weighed more on the decision or intention to engage in entrepreneurship. In order to investigate the specific role played by the university, we focus on those graduates whose involvement was posterior to enrolment at university.

We decided to extend the analysis to entrepreneurial intentions because we wanted to assess the potential supply of highly-educated entrepreneurs in Italy in light of the evidence – provided by the AlmaLaurea surveys – that, five years after graduation, although graduates who have opted for entrepreneurship are more satisfied with their jobs than other graduates, the number of those choosing this career is small (Federici and Ferrante, 2014).

We stress that our conclusions are based on a perhaps unique population-based survey of university students at the time of graduation, run at country level with a very high response

rate (94%). Also for this reason, we believe that the relevance of the information that we provide here is not limited to the case of Italy.

The paper is organized as follows. In the first Section, we introduce the topic and the reasons for writing this paper. In the second Section, we present the data and some preliminary descriptive evidence on the characterization of the different groups of graduates distinguished by level of involvement in entrepreneurship. In the third Section, we illustrate the econometric strategy followed to evaluate the role played by various factors in fostering the intention to engage in entrepreneurship as a career option, and we discuss the main results. The final Section presents the main conclusions and policy implications.

2. University Student Entrepreneurship in Italy

A growing number of university students and graduates consider entrepreneurship to be a viable career option (Lindholm Dahlstrand and Berggren, 2010). Italy records a comparatively low share of entrepreneurs with a university degree (Ferrante and Supino, 2016; Ferrante and Sabatini, 2007; Federici and Ferrante, 2015) also if one considers the younger cohorts of entrepreneurs. In 2014, the share of new entrepreneurs surveyed by the General Entrepreneurship Monitor[3] (GEM) and holding a tertiary degree was 21 (33 had completed compulsory schooling; GEM, 2015). By way of comparison, in 2010, 31 of German and 48 of UK new entrepreneurs surveyed by GEM had a tertiary degree against 19 in Italy (GEM, 2011). This picture is confirmed by the "*2015 AlmaLaurea survey on graduates' occupational status five years after graduation"*, which shows a very low share of graduates (1.3%) actively engaged in entrepreneurship[4].

Indeed, the comparatively low general educational attainment of entrepreneurs in Italy has much to do with the low level of educational attainment of the Italian population as a whole: in 2015, the share of the population with at most compulsory education was 51% against a share of 13% with a university degree (ISTAT website).

A good reason to be concerned about this finding is that entrepreneurial human capital, and in particular the education of entrepreneurs, appears to be a predictor of firms' performance (Parker, 2009; Bates, 1990). This conclusion seems established, for the case of Italy, by

[3] The total entrepreneurial activity index (TEA) computed by GEM is given by the percentage of the working age population starting an entrepreneurial activity and those running a new business which is less than 3 and a half years old.

[4] A share, which varies greatly according to the field of study, with a minimum of 0.3 for medicine and a maximum of 4.4 for agricultural studies.

studies showing[5] that entrepreneurs' education is a predictor of entrepreneurial and managerial styles, in particular in HRM, and that the latter explains the incentive to invest in R&D, to go abroad and, finally, firms' profitability (Bugamelli et al., 2012).

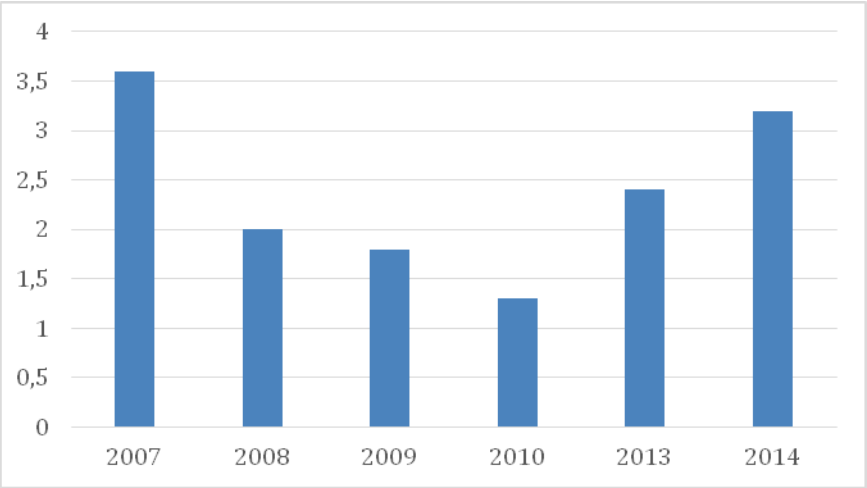
Future scenarios will be characterized by more complex business environments and decision settings and, accordingly, by an even more crucial role of formal education, i.e. codified knowledge, in entrepreneurship. The waves of technological, organizational and financial innovations that started 40 or so years ago with the ICT revolution brought about an acceleration in the pace of economic and social change (Nordhaus, 2015) that has entailed a compression of the knowledge life cycle. Consequently, the value of tacit knowledge acquired through experience has decreased with respect to the value of codified knowledge acquired through formal education (De Bruin and Ferrante, 2011, Schultz, 1990).

The long recession may have affected the relative value of occupational options (e.g. being an employee rather than a self-employed worker) in particular in Italy, which has suffered from high unemployment rates (in 2015, 12.1% for the 15-64 age bracket) especially among young people (18-29, 29.6%) even if they hold a university diploma (25-34, 16.2%). Indeed, although the outside option of becoming an entrepreneur has been negatively affected by the recession, also entrepreneurial opportunities have been negatively affected by the bad macroeconomic climate.

The GEM study shows that between 2007 and 2010, when the recession hit hardest, nascent entrepreneurship in Italy decreased steadily and thereafter increased (Fig. 1). Yet, Italy's TEA index in 2014 placed it lowest in the ranking of the *Innovation Driven Countries*, i.e. the most advanced countries, with a modest 4.4%. New venture creation has been mostly driven by opportunity motivations (78.4%); nevertheless, the perceived opportunity indicator computed by GEM is comparatively low (26.6%), suggesting that the reason for such a low TEA in 2014 was that Italians did not perceive the existence of opportunities to develop (GEM, 2015). Hence, because entrepreneurial opportunities were lacking during the recession, few Italians decided to start a business even though they faced poor occupational opportunities as employees. As a result, the share of necessity-driven new ventures was relatively small.

[5] Torrini and Schivardi (2011) show that the propensity of Italian firms to hire graduates is three times greater for entrepreneurs with a university diploma than for other entrepreneurs. Bugamelli et al. (2014) argue that the adoption by firms of more efficient organizational settings and human resources strategies (e.g. decentralized organizational settings, incentive-based wage schemes, etc.) is positively affected by entrepreneurs' education.

Fig. 1 - Nascent entrepreneurship in Italy.



Source: GEM (2015)

Indeed, there are various reasons to investigate entrepreneurship among university students and graduates in general, and specifically in Italy. In particular, our aim is to determine (a) the factors that weigh more on the decision by Italian university students to engage in entrepreneurship; (b) the potential supply of highly-educated entrepreneurs in different fields (c) what universities can do to increase the value of this career option. In this regard, it is interesting that the AlmaLaurea surveys systematically show that those graduates who have opted for entrepreneurship are more satisfied with their jobs than their colleagues: on a scale from 1 to 10, the job satisfaction of entrepreneurs is 8.4 compared with an average of 7.5 for employees (7.7 for the other self-employed; AlmaLaurea, 2015). For these reasons, we decided to assess the potential supply of highly-educated entrepreneurs by investigating intentional entrepreneurship among university students.

Preliminary evidence shown in the first Report drawn from the survey on Students Entrepreneurship (Fini et al. 2016), and on which this paper is based, suggests that, in addition to those discussed above, there may be other benefits from fostering graduates' entrepreneurship. They stem from its contribution to the improvement of equal opportunity and social mobility: among young graduates, the relative propensity of women to engage in entrepreneurship is higher than in the population at large, and entrepreneurship does not appear to be particularly affected by the social backgrounds of graduates.

3. The Survey

The purpose of the survey was to investigate nascent entrepreneurs (Reynolds and White, 1992) among university students by looking at the various steps of the *entrepreneurial process* as defined by GEM (GEM, 2015), i.e. the process that extends from recognition of opportunities to the actual setting up of a firm to exploit them. Since we were also interested in assessing the *potential supply of highly educated entrepreneurs*, we included entrepreneurial intentions in this set of features characterizing *entrepreneurship* among university students.

Two approaches can be followed in a context of this kind. The first aims to detect the characteristics of nascent entrepreneurs at various stages of the process; the second, to investigate the actual behaviours of nascent entrepreneurs in the *process of emergence* (Davidsson, 2006; Gartner and Cartner, 2003) through the repeated observation of the individuals. Since, at this stage of the project, panel data were not yet available[6], we followed the first approach. In Table 1 we report the variables' descriptive statistics.

Table 1 - Summary statistics of the variables used in the empirical analysis (*whole sample, year 2015*)

Gender			*Cultural motivations to enroll*		
Female	25880	40.0	Yes	60779	93.9
Male	38830	60.0	No	3931	6.1
Area of birth			*Professional motivations to enroll*		
North	16448	25.4	Yes	53523	82.7
Centre	20364	31.5	No	11187	17.3
South	25165	38.9	*Past work experience*		
Abroad	2733	4.2	Yes	36815	56.9
Area of study			*No*	25341	39.2
North	17610	27.2	Not applicable	2554	3.9
Centre	28413	43.9	*Current work experience*		
South	18687	28.9	Yes	48226	74.5
High school diploma			*No*	14052	21.7
Lyceum	47939	74.1	Not applicable	2432	3.8
Technical	13984	21.6	*Trust in others*		
Vocational	1379	2.1	Yes	25285	39.1
Abroad	1408	2.2	No	39425	60.9
Master level			*Father entrepreneur*		
3 years	40448	62.5	Yes	11285	17.4
3+2 years	2546	3.9	No	53425	82.6
5 years	21716	33.6	Mother entrepreneur		

[6] Students will be followed after graduation through a survey on their occupational status (1, 3 and 5 years after graduation).

Field of study		
Science	9283	14.3
Medicine	12613	19.5
Engineering	8136	12.6
Architecture	2472	3.8
Economics	9104	14.1
Law	3257	5.0
Humanities	18460	28.5
Not applicable	1385	2.1
Erasmus		
Yes	170	0.3
No	62379	96.4
Not applicable	2161	3.3
Internship		
Yes	36855	57.0
No	25694	39.7
Not applicable	2161	3.3
ICT skills		
Yes	60976	94.2
No	3734	5.8
Social class		
Bourgeoisie	13660	21.1
Middle class	17361	26.8
Petite bourgeoisie	13310	20.6
Working class	16743	25.9
Not applicable	3636	5.6
Total	**64710**	**100.0**

Yes	3599	5.6
No	61111	94.4
Father qualifications		
No qualifications	553	0.9
Primary school	3603	5.6
Middle school	17288	26.7
High school	26910	41.6
University	12891	19.9
Not applicable	3465	5.4
Mother qualifications		
No qualifications	513	0.8
Primary school	3483	5.4
Middle school	16110	24.9
High school	29229	45.2
University	11742	18.1
Not applicable	3633	5.6
Job security important		
Yes	60259	93.1
No	4451	6.9
Autonomy important		
Yes	56859	87.9
No	7851	12.1
Attitudinal factors		
Yes	57547	88.9
No	7163	11.1
Total	**64710**	**100.0**

Students performance indicators (mean values)	
High school diploma mark	82.0
Exams average mark	26.3
Degree grade	103.0
Age at graduation	25.8

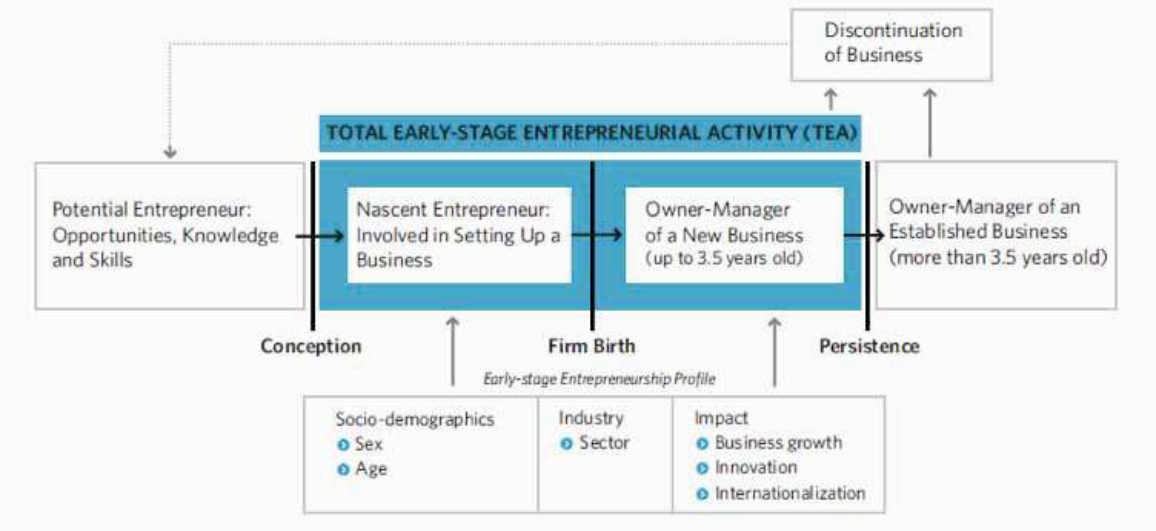
Respondents were 61,115 undergraduate (bachelor degree, three years) and graduate (master degree: *laurea magistrale, two years after the BA*, and *laurea a ciclo unico, five years degree*) students who graduated between September and December 2014[7] from the 64 Italian universities belonging to the AlmaLaurea consortium[8], and who completed the "*Student*

[7] We verified that there were no observable differences among graduates at different times of the year which might affect our estimation results.

[2]AlmaLaurea is an inter-university consortium set up in Italy in 1994. Today it involves 73 universities and approximately 91 of Italian graduates. The Consortium is supported by the universities taking part in it, by the Italian Ministry of Education, University and Research (MIUR) and by all companies and institutions using the

Entrepreneurship Survey". We distinguished between those graduates who started their business respectively before and after enrolment at university. In addition, we considered various levels of early-stage engagement in the *entrepreneurial process (Fig. 2)*. They ranged from 'pure' entrepreneurial intentions, to which the potential supply of entrepreneurs should be related, to the 'actual' setting up of a business (Fig. 3). Instead, we were not interested in assessing the process and the causes of discontinuation. The several measures of entrepreneurial intention that we adopted differed mainly according to whether the individuals involved had or had not already identified an opportunity to exploit. In our investigation, we did not set a time limit for the life span of the active firms as in the GEM project (3.5 years).

Fig. 2 - The entrepreneurial process. Source: GEM



The data show that 1,100 (1.69) of respondents were entrepreneurs who had started a new venture during their university study; 564 (0.87) were entrepreneurs who had started their business before enrolling at university; 2,232 (3.8) were nascent entrepreneurs (i.e. students who were currently engaged in some entrepreneurial activities); and 57,219 (93.7) were non-entrepreneurs (i.e. students who re not engaged in any entrepreneurial activity).[9] Among the latter, there were also the *intentional entrepreneurs*. In order to detect them we used different indicators by looking at respondents who agreed with the following sentences to various extents (on a scale from 1to 7):

databank and the services offered by AlmaLaurea. AlmaLaurea engages in three core activities*: Graduates' profile*: an annual survey and report on the internal efficiency of the higher education system; *Graduates' employment conditions*: an annual survey and report on the external efficiency of the higher education system; *Online graduates' databank*: a tool intended to improve the match between supply and demand of graduates and their transnational mobility. The members of the AlmaLaurea consortium amounted to 64 at the time of the survey (2014) and 72 in 2015 (see the Appendix for the list of universities included in the sample).

[9] The population size was 64,710, and the response rate was 94.

(a) "*I thought I would start a business based on an idea I had*";

(b) "*I will do whatever it takes to become an entrepreneur*"

(c) "*My professional objective is to become an entrepreneur"*

(d) "*I will do whatever it takes to start and manage a firm"*

(e) *"I seriously intend to start a firm in the future"*

Fig. 3 - The entrepreneurial process detected through the AlmaLaurea survey

In particular, we considered two measures: a) in the ordinal probit estimation, a continuous one based on the scores assigned by all respondents within the entire scale; and b) in the probit estimation, a binary one based on those respondents who indicated a score larger than 4 (5 -> 7). For reasons of space, we do not provide a detailed description of the Survey, which can be found in Fini et al. (2016).

We start by distinguishing the various groups of individuals in terms of their involvement in entrepreneurship, and we provide some descriptive analysis on the characteristics of the different groups. The first group (G1) included all those graduates who had started a business while at university.[10] The assumption here was that this was the group of actual entrepreneurs whose choices had been most affected by their condition of university students. The second group (G2) included all those students who had taken concrete actions to start a business while at university. Unfortunately, due to data limitations, we could not analyse the first two groups in depth. The 3rd to 7th groups (G3-G7) included students who expressed *entrepreneurial intentions* to different extents and in different ways.

Finally, we aggregated the previous groups in order to obtain a bigger group (G8), including all those individuals who were engaged in the entrepreneurial process at different stages and

[10] We were less interested in the group of students who had started a business before enrolling at university because it was reasonable to expect that their choices were independent from their subsequent academic experience unless we made the strong assumption that their decision to start the business was linked to their decision to enroll at university in the future.

whose choices might have been affected by their status of university students. We then computed a measure of the degree of entrepreneurial involvement (DEI) by assigning a value of 4 if the student belonged to G1, a value of 3 if the student belonged to G2, a value of 2 if he/she belonged to G4[11] and, finally, a value of 1 in all the other cases. We also computed a group (G9) including all the individuals belonging to G1, G2 and G4 (tab. 2).

Table 2 - Student groups by involvement in the entrepreneurial process ()

Group	*Definition*	*(%)*
G1	Students who started a business after enrolment at university	1.8
G2	Students who had taken concrete actions to start a business	4.5
G3	Students who gave a score > 4 to sentence (a)	27.1
G4	Students who gave a score > 4 to sentence (b)	26.9
G5	Students who gave a score > 4 to sentence (c)	31.6
G6	Students who gave a score > 4 to sentence (d)	32.5
G7	Students who gave a score > 4 to sentence (e)	30.1
G8	Students at different stages of the entrepreneurial process (non entrepreneurs=1, intentional entrepreneurs (sentence (a) > 4) = 2, students who had taken concrete actions to become entrepreneurs = 3; students who started a business after enrolment = 4)	
G9	Students at different stages of the entrepreneurial process including intentional entrepreneurs G1+G2 + G4=1, others = 0)	33.2

The share of students engaged in entrepreneurship by entrepreneurial group, field of study, gender, region of birth/study, is shown in Tables 3-5. Table 6 displays the incidence of various types of entrepreneurship among foreign students.

4. Empirical strategy and results

The assumption here is that the decision to start a business and to become an entrepreneur belongs to the realm of occupational choices: individuals compare the values of different occupational options and choose accordingly. The values of the different career options are determined by the actual match between the individuals and their innate and acquired characteristics (skills, personality traits, etc,) and the environment in which they are embedded (Fig. 4).

[11] We selected just one of the sentences contained in the survey and providing proxies to detect entrepreneurial intentions because of the very high correlation among them (82-84)

Hence, the decision to become an entrepreneur is determined by the environmental and subjective factors affecting the values attached by individuals to different occupational options. It is likely that also the mere intention to become an entrepreneur is driven by the same logic.

Table 3 - Share of students engaged in entrepreneurship by entrepreneurial group (G1, G2, G4, and G9) and field of study (%)

	(a) G1 Actual entrepreneurs	*(b) G2 Took concrete actions to set up a firm*	*(c) = (a)+ (b)*	*(d) G4 Intention to become (score (a) > 4)*	*(e) G9 = G1+G2+G4*	*(f) G4 Strong intention to become (score (a) >5)*
SCIENCE	1.5	3.5	4.8	39.0	44	24.2
MEDICINE	0.8	2.1	2.9	31.8	35	18.8
ENGINEERING	1.8	3.9	4.7	43.4	49	26.2
ARCHITECTURE	2.5	4.6	7.1	52.2	59	32.5
ECONOMICS	2.7	5.7	8.4	44.6	53	26.9
LAW	2.9	3.6	6.5	37.1	44	23.0
HUMANITIES	1.6	3.6	5.2	35.4	41	21.3
TOTAL	1.8	4.5	6.3	38.3	45	23.2

Table 4 - The distribution of the students by entrepreneurial group and gender.

	Men	*Women*	*Total*	*Men*	*Women*
Non entrepreneurs	34	66	100	52.5	67.9
Intentional (G4)	48	52	100	39.8	28.6
Nascent entrepreneurs (took concrete actions to start a business)	59	41	100	5.1	2.4
Actual entrepreneurs (after enrolment)	61	39	100	2.6	1.1
Total	40	60	100	100	100

Table 5 – Students' involvement in entrepreneurial activities by region of birth and place of study (% shares)

	Non entrepreneurs	*Intentional (G4)*	*Nascent entrepreneurs (took concrete actions to start a business)*	*Actual entrepreneurs (after enrolment)*	*Total*
NN	14.77	6.6	0.65	0.27	22.3
NC	1.74	0.84	0.09	0.05	2.73
NS	0.24	0.13	0.01	0.01	0.4
CC	18.96	9.7	0.93	0.52	30.11
CN	0.63	0.32	0.03	0.01	0.99
CS	0.21	0.13	0.02	0.01	0.36
SS	16.08	9.88	1.09	0.58	27.63
SC	5.22	3.18	0.31	0.11	8.82
SN	1.44	0.87	0.1	0.03	2.44
AN	0.84	0.54	0.08	0.03	1.49
AC	1.3	0.77	0.11	0.06	2.25
AS	0.3	0.15	0.02	0.01	0.49
Total	61.73	33.11	3.44	1.69	100.0

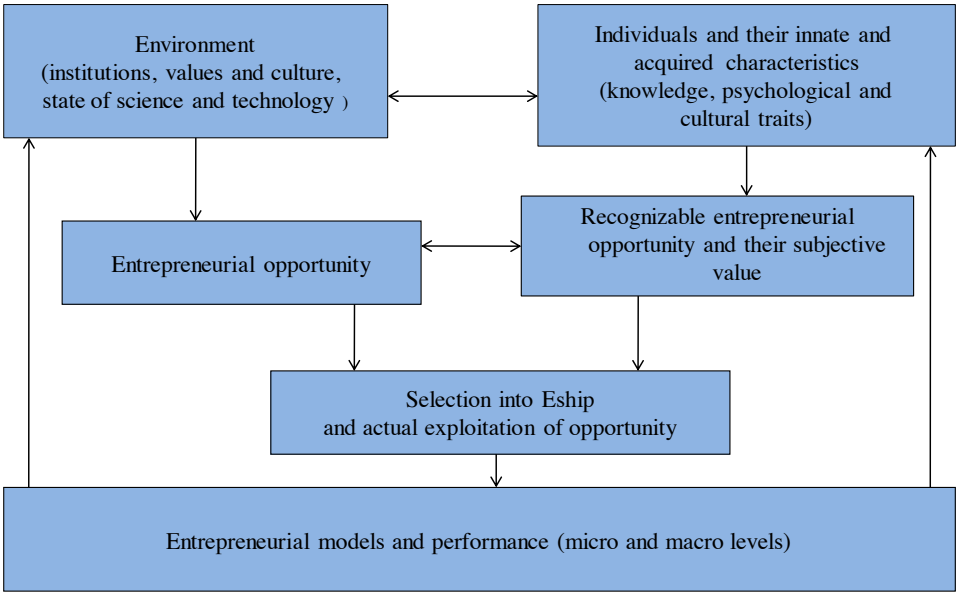
Tab. 6 - The share of the foreign students by entrepreneurial group (%).

	Share
Intentional (G4)	4.68
Nascent entrepreneurs (took concrete actions to start a business)	7.80
Actual entrepreneurs (after enrolment)	6.36
Total	4.22

Indeed, environmental and subjective factors are the main ingredients of the occupational choice because opportunities, like both employees and entrepreneurs, are shaped by the environment in which people are embedded, and they are assessed by different individuals according to their knowledge, skills, personality traits and beliefs, i.e. entrepreneurial human capital (Shane, 2000; Shane et al., 2003). This idiosyncratic matching process implies that only those individuals who attach a higher value to being entrepreneurs will choose to be engaged, at various stages, in the entrepreneurial process. The main difference between the choices of the population at large, on the one hand, and students and graduates on the other, is

that (a) the environment in which the latter are embedded includes also the university, and (b) the entrepreneurial human capital is at least partially affected by their condition as graduates and students. For instance, they may have taken a course in management or marketing, or they may have participated in a meeting organized by the Technology Transfer Office.

Fig. 4 - Selection into entrepreneurship. Source: De Bruin and Ferrante, 2011.



Psychological and cultural traits are an important part of the story. They may affect the decision to become an entrepreneur but also make the difference between being an intentional rather than an active entrepreneur. For instance, individuals with different degrees of overconfidence or trust in others may attach different values to the same business idea.

Therefore, in our effort to detect the role of university in entrepreneurship, the natural dependent variable on which to focus was the level of involvement in entrepreneurship of the university students; and our explanatory variables were all those environmental and subjective factors, generated externally and or internally to academia, which might affect the *subjective* value of the occupational options.

Our specific concern was to assess the extent to which the probability of belonging to the various groups identified above was affected by environmental and subjective factors that can be linked to the university experience: field of study, internships, and specific soft skills learned at university, etc. The AlmaLaurea survey contains many variables that are suitable for playing the latter role.

In an attempt to detect all the different channels through which entrepreneurial human capital is generated, we selected the following variables: parents' education, social background and occupation; high school diploma (lyceum vs. vocational education) and diploma grade; university course (graduate, undergraduate); curricular experiences: work experience during university, participation in internships or student exchange programmes (Erasmus); university performance: regularity, average mark and graduation grade; activities related to the acquisition of entrepreneurial skills and attitudes: having attended university curricular or non-curricular courses on entrepreneurship; having done an internship; university stimuli to engage in entrepreneurship; ICT skills including a wide set of digital skills; regional (region of study and region of residence) and university fixed affects. As regards geographic factors, given the large existing territorial differences, we constructed 12 dummies to account for the role of occupational and entrepreneurial opportunities in both the region of birth and the region of study.

One of the problems with this approach is that there may be unobservable characteristics explaining the propensity to engage in entrepreneurship and correlated with the observable ones (Davidsson, 2006). For this reason, we also included various controls for unobservable personality traits, attitudes and beliefs: trust in others, motivations to enroll at university (cultural vs. career motivations); importance of job security and autonomy in job search; the degree of agreement, in a range 1-7, with the following sentences:

i. *I am an impulsive person*
ii. *What is important in life is enjoying yourself*
iii. *Taking risks allows you to avoid boredom*
iv. *My life is controlled by forces that I cannot influence*
v. *There is no point in being worried about the future because we cannot do anything about it*
vi. *When I want to do something, I start by identifying my targets and the specific actions I need to take to achieve them*
vii. *Tomorrow's commitments and duties are more important than today's pleasures*
viii. *I accomplish my projects on time and I prefer to progress constantly*

We are quite confident that the rich set of variables on which we rely means that we can control for all those unobservable abilities and individual attitudes that may affect the value of entrepreneurship as a career option and the decision to engage, at various stages, in entrepreneurial activities, and that, we can limit endogeneity problems to an acceptable level.

The standard approach to the analysis of the decision to become an entrepreneur, which we adopt here, is based on the probit estimator and, in the case of the degree of involvement in entrepreneurship, the ordinal probit (Parker, 2009).

Unfortunately, the questions on whether students had attended courses on entrepreneurship or if they had received stimuli from the university were put only to those students who had started a business or who had taken concrete actions do so. Therefore, we cannot detect the specific impact of those university factors on both the decisions.

4.1 Probit and Ordered Probit Models

As mentioned in the previous section, the first research question that we consider is how to establish factors affecting the decision to become an entrepreneur. In this case, we estimate a probit equation where the response y_i is binary, taking value one if, it turn out they are entrepreneurs and zero otherwise. The variable y_i is a realization of a random variable Y_i that can take the values one and zero with probabilities π_i and $1-\pi_i$, respectively. The expected value and variance of Y_i are $E(Y_i)=\mu_i=\pi_i$, and $Var(Y_i)=\sigma_i^2=\pi_i(1-\pi_i)$.

For the case of the degree of involvement in entrepreneurship, we employ the standard ordered probit model. Formally, let the ordered categorical outcome y be coded, without loss of generality, in a rank preserving manner, i.e. $y\in\{1,2,...J\}$ where J denotes the total number of distinct categories.

In standard ordered response models, the cumulative probabilities of the discrete outcome are related to a single index of explanatory variables in the following way:

$$\Pr[y\le j|x]=F(k_j-x'\beta), j=1,.....J$$

where k_j and $\beta_{(k\times 1)}$ denote unknown model parameters, and F can be any monotonic increasing function mapping the real line onto the unit interval. Although no further restrictions are imposed *a priori* on the transformation *F,* it is standard practice to replace F with a distribution function, the most commonly used ones being the standard normal which yields the ordered probit, and the logistic distribution associated with the ordered logit model.

In order to ensure well-defined probabilities, it is required that $k_j>k_{j-1},\forall j,$ and it is understood that $k_J=\infty$ such that $F(\infty)=1$ as well $k_0=-\infty$ and $F(-\infty)=0$.

An underlying continuous but latent process usually motivates ordered response models y^* together with a response mechanism of the form:

$$y=j \text{ if and only if } k_{j-1}\le y^*=x'\beta+\mu<k_j, j=1,....J$$

where $k_0,...k_J$ are introduced as threshold parameters, discretizing the real line, represented by y^* into *J* categories. In our case, y^* can be thought of as an unobserved willingness to *be*(*come*) an entrepreneur. The latent variable y^* is related linearly to observable and unobservable factors and the latter have a fully specified distribution function $F(\mu)$ with zero mean and constant variance.

Differently from this latent variable, we observe the variable Y_i (the engagement level to which individual *i* belongs) with outcomes y_i where $y_i = 1,2,....J$ and *J* is the number of engagement levels.

The focus in the analysis of ordered data should be put on the conditional cell probabilities: that is, for *j = 2,...J-1* each probability of belonging to engagement level *j* for individual *I* is given by:

$$\Pr\left[y = j|x\right] = F\left(k_j + x'\beta\right) - F\left(k_{j-1} + x'\beta\right).$$

4.2 Estimation results

We estimated several models by looking at different stages and degrees of students' involvement in entrepreneurship. After a few exploratory exercises, we decided to present the results of models G1, G2, G4, G8 and G9 and to focus our discussion on G4, G8 and G9 since they provide the most inclusive definition of *potential supply of highly educated entrepreneurs*.[12] Moreover, given the number of observations, they provide results that are more reliable.

In all our estimations, we obtain quite robust evidence on the effects of several explanatory factors, which are in line with the expectations and the results obtained in the literature (Davidsson and Honig, 2003; Delmar and Davidsson, 2000; Wagner 2006; Fairlie and Robb, 2007). Gender (female -), father occupation (entrepreneur +), university average mark (-), past and current work experience[13] (+), importance of autonomy in life (+), having taken part in a business plan competition (+) are all significant at 99 (Table 5). We find that several explanatory variables are significant to different extents, and they sometimes display different signs in the different estimated models. A signal that the factors determining the actual rather

[12] G3 and G5-G7, as one would expect, provide similar results on the factors affecting entrepreneurial intentionality.

[13] On the impact of experience on optimism see Fraser and Green, 2006

than the potential participation in entrepreneurial activities are different.[14] Most of the controls for attitudinal factors are also significant.

As expected, individuals for whom autonomy is important are keener to start a business (99 sign.) whereas the opposite holds for individuals looking for security (95 and 90 sign.).

If one focuses on those students who started their own business after enrolment or who took concrete actions to start one (G1 and G2), area dummies confirm that the northern area of the country is the one most favorable to starting a business for natives and students coming from other areas, including abroad. This is not surprising and suggests that since the northern part of the country provides both better employment and *self-employment* opportunities to young people, the net effect is favorable to entrepreneurship. Instead, area dummies do not appear to play any role in the other models. The field of study (default = Science) shows consistent results for all the models as far as Medicine (-) and Economics (+) are concerned.

Models G4, G8 and G9 provide very consistent results. Students more willing to engage in entrepreneurship do not appear to be the best performers at school and university (lower high school diploma grade and as well as average university mark). One may wonder if schools and universities assessment systems are appropriate to reveal entrepreneurial skills.

The possession of ICT skills and having done an internship show a positive sign with the coefficient significant at 99. Good news since our aim is also to detect those factors on which one may act to foster entrepreneurship among graduates. Assuming that one can rank different social classes, the social background has *nonlinear* effects that probably depend also on the definition of social class adopted in the survey. Coming from the *petite bourgeoisie* class is more favorable to entrepreneurship than belonging just to the bourgeoisie class (99 sign) whereas coming from the working class has a negative effect (99 sign).

The field of study shows consistent results across the three models: Medicine (-), Engineering (+), Architecture (+), Humanities (-) and Economics (+) in line with expectations (default= Sciences).

The extent to which students trust in others has a positive and significant effect both on the degree of involvement in entrepreneurship and on the intention. This result confirms that a cultural trait like trust in others is one of the main ingredients of economic activity (Guiso et al., 2007) and entrepreneurship (Ferrante and Ruiu, 2014)

[14] Another reason is the large difference in the number of observations.

Table 7 - Estimates (*robust standard errors*)

	Probit (G1)	*Probit (G2)*	*Ordinal probit (G8)*	*Probit (G9)*	*Probit (G4)*
Gender (male)	-0.289***	-0.287***	-0.337***	-0.347***	-0.182***
HS diploma grade	-0.000334	-0.00292**	-0.00344***	-0.00396***	-0.00736***
HS diploma	0.00465	0.0849***	0.0435***	0.0448***	0.0700***
University average mark	-0.0499*	-0.0240	-0.0136	-0.00770	-0.0355**
Graduation grade	0.00189	-0.000535	-0.00154	-0.00200	-0.00282
Age at graduation	0.0151***	0.0144***	0.00925***	0.00618***	-0.00874***
Field of study: Science (default)					
Medicine	-0.180**	-0.113**	-0.151***	-0.159***	-0.225***
Engineering	0.00934	-0.0788	-0.00311	0.00449	0.109***
Architecture	0.144	0.0383	0.212***	0.258***	0.192***
Economics	0.110*	0.102*	0.0778***	0.0670**	0.228***
Law	0.131	-0.130*	-0.0518	-0.0701*	-0.0930*
Humanities	0.0512	0.0198	-0.00468	-0.0151	-0.135***
Erasmus (yes)	0.0514	-0.0305	0.124	0.148	0.111
Internship (yes)	0.0228	0.0624**	0.0679***	0.0727***	0.0607***
Participation in business plan competition	0.766***	1.126***	0.924***	0.730***	0.328***
ICT skills	0.0154	0.120*	0.150***	0.161***	0.0529
Social class: Bourgeoisie (default)					
Middle class	-0.0769	-0.0345	-0.0370	-0.0358	-0.0313
Petite bourgeoisie	0.0919	0.00416	0.0804***	0.0859***	0.101***
Working class	-0.153**	-0.106*	-0.104***	-0.103***	-0.101***
Cultural motivations to enroll	-0.127	-0.0646	-0.0797*	-0.0636	-0.0325
Professional motivations to enroll	-0.118**	-0.0503	-0.0389*	-0.0244	0.0886***
Past work experience	0.329***	0.271***	0.200***	0.188***	0.0671***
Current work experience	0.469***	0.149***	0.163***	0.101***	0.0977***
Trust in others	0.00467	-0.0136	0.0715***	0.0958***	0.0366**
Father entrepreneur	0.253***	0.0853*	0.121***	0.101***	0.151***
Mother entrepreneur	0.108*	0.00372	0.0820***	0.0866***	0.137***
Father education	0.0249	0.0170	0.0250***	0.0254***	-0.0165
Mother education	0.0436*	-0.000153	0.00887	0.00570	-0.0272**
Master level 1 (3+2 years default= BA, 3 years)	0.0109	-0.0263	-0.00809	-0.00113	-0.00352
Master level 2 (5 years default=BA, 3 years)	0.0965*	0.136***	0.0205	-0.00177	0.0219
Job security important	-0.129**	-0.248***	-0.148***	-0.125***	-0.0882**
Autonomy important	0.143**	0.168***	0.293***	0.314***	0.306***
University controls					
Dummy for the region of birth					
Combined dummies for the area of birth and the area of study (N=North, C=Centre, S=South, A=Abroad)					
NN	4.102***	-3.059***	0.681**	0.675*	0.473
NC	3.682***	0.392	0.179	0.0832	0.110
NS	0.0523	0.141	0.110	0.107	0.0487
CC	3.649***	0.385	0.181	0.0912	0.0468
CN	4.052***	-3.033***	0.713**	0.721**	0.459
CS	-0.0672	0.201	0.102	0.0977	-0.115
SS	0.148	0.280	0.166	0.149	-0.0547
SC	3.618***	0.474	0.279	0.206	0.182
SN	4.035***	-2.925***	0.818***	0.831**	0.599
AN	4.291***	-2.925***	0.828***	0.812**	0.817**
AC	3.825***	0.461	0.305	0.220	0.131
AS (default)					
Control for attitudinal factors (see i-vii)	Yes	Yes	Yes	Yes	Yes
Obs.	56786	58318	58318	58318	58318
Wald $chi^2(51)$	1139.84	7038.87	7052.54	6416.56	7477.55
Prob > chi^2	0.0000	0.0000	0.0000	0.0000	0.0000
Pseudo R^2	0.1542	0.1066	0.0779	0.0909	0.1669

4.3 Marginal probability effects

Additional information can be gained by computing the marginal probability effects, i.e. the shift of the predicted discrete ordered outcome distribution as one or more of the regressors change. These partial effects give the impacts on the specific probabilities per unit change in the variables. In general, the magnitude of these probability changes depends on the specific values of the i_{th} observation's covariates.

Table 8 reports the calculated change in the respective probabilities due to a change in the regressors that are found to be statistically significant. We interpret the signs of the partial effects as follows, where we consider a variable with a positive coefficient (like trust, ICT, etc.), increases in that variable will increase the probability in the higher levels of entrepreneurship involvement groups and decrease the probability in the lowest level (*non-entrepreneurs*). These are reversed for a variable with a negative coefficient.

Our results show that men are more interested in entrepreneurial activities, implying a negative sign of the marginal effect for *non-entrepreneurs* switching into the positive as interest in entrepreneurship appears. Though the absolute value of probability change is rather small, the marginal effect for Economics and Architecture graduates mainly support the presence of a positive university field effect. Results suggest that ICT competences, internship experiences and participation to a business competition strongly influence graduates entrepreneurial intentions.

A positive marginal probability effect for *Trust in others* variable provides further insights, for our analysis, into the relationship between trust and the formation of entrepreneurial preferences. Though the marginal effects are not big, they are statistically significant.

5. Conclusions and policy implications

Entrepreneurship is recognized to be one of the main drivers of innovation and sustainable growth, and it is seen as a means to provide better opportunities for labour-market entry to some social groups that may encounter obstacles in finding jobs as employees, i.e. women, young people and immigrants.

The motivation of this paper on student entrepreneurship is threefold. First, there is clear evidence that start-ups founded by university students and graduates play a substantial role in bringing new knowledge to the market and in fostering employment creation. Second, robust empirical evidence suggests that education is an important positive determinant of entrepreneurial performance. Third, the waves of technological, organizational and financial

innovations that started 40 years or so ago with the ICT revolution brought about an acceleration in the pace of economic and social change that has implied a compression of the knowledge life cycle. Analysis of technological revolutions and of the diffusion pattern of the major technological breakthroughs seems to show that, since the Second Industrial Revolution, the typical technology life cycle has shrunk; i.e. the process of 'creative destruction' (Schumpeter 1942) has become more intense. It is evident that the faster technology and the competitive environment change, the faster the value of specific knowledge acquired through experience decays, while that acquired through formal education and training does not, or it declines at a slower rate.

Table 8 - Marginal effects

	Non entrepreneurs	*Intentional*	*Nascent entrepreneurs (made concrete actions to start a business)*	*Actual entrepreneurs (after enrolment)*
Gender (male)	.1276***	-.1015***	-.0178***	-.0083***
Field of study (science default):				
Medicine	.0559***	-.0454***	-.0073***	-.0032***
Engineering	.0012	-.0009	-.0002	-.0001
Architecture	-.0828***	.0624***	.0134***	.0069***
Economics	-.0299***	.0232***	.0045***	.0022***
Law	.0195	-.0156	-.0027	-.0012
Humanities	.0018	-.0014	-.0003	-.0001
Erasmus (yes)	-.0469	.0373	.0065	.0031
Internship (yes)	-.0257***	.0204***	.0036***	.0017***
Participation in business plan competition	-.3498***	.2782***	.0488***	.0228***
ICT skills	-.0568***	.0451***	.0079***	.0037***
Social class (Bourgoise default):				
Middle class	.0140	-.0111	-.0019	-.0009
Petite bourgoise	-.0309***	.0240***	.0047***	.0023***
Working class	.0391***	-.0314***	-.0053***	-.0024***
Past work experience	-.0757***	.0602***	.0106***	.0049***
Trust in others	-.0271***	.0215***	.0038***	.0018***
Father entrepreneur	-.0457***	.0364***	.0064***	.0030***
Master level 1 (3+2 years default= BA, 3 years)	.0030	-.0024	-.0004	-.0002
Master level 2 (5 years default=BA, 3 years)	-.0078	.0062	.0011	.0005
Job security important	.0559***	-.0445***	-.0078***	-.0036***
Autonomy important	-.1108***	.0881***	.0155***	.0072***

In short, the change in entrepreneurial human capital resulting from a more intense process of 'creative destruction' can be described as (a) an increase in the minimum amount of codified knowledge necessary to generate a unit of entrepreneurial human capital and (b) a reduction in the degree of substitutability between codified and tacit knowledge. Another consequence is that future economic scenarios will be characterized by more turbulent business environments and decision settings and, consequently, by an even more crucial role of formal education in entrepreneurship. Robert Lucas (2009) has more recently stated that the Industrial Revolution was prompted by the growth of 'a class of educated people'. He relates schooling to the idea-processing rate, and thereby to growth. His new growth model presents endogenous technical change in terms of the product of a general class of problem-solving producers, '… a formulation that emphasizes individual contributions of large numbers of people' (Lucas 2009: 22). From this, it intuitively follows that policies should be adopted to increase the codified human capital of entrepreneurs although entrepreneurs are a particular, albeit a very important, class of problem solvers.

The bad news is that the share of Italian entrepreneurs with tertiary educations is quite low, and this is especially the case of the younger generation of entrepreneurs. Our study also confirms that the share of Italian graduates who started a business before (0.87%) or after their enrolment at university (1.8%) is quite small. The good news is that the number of university students who took concrete actions to set up a business is not small (4.5%) and that there is a large potential supply of entrepreneurs consisting of those students who can be considered *intentional entrepreneurs* (at least 23%, according to our calculations based on the stricter notion of *intention*, see Table 3). Moreover, the share of intentional entrepreneurs is substantial also in study fields such as Science (24%) and Humanities (21%).

Previous analyses based on the AlmaLaurea surveys on the occupational status of graduates, monitored five years after graduation, show that those graduates that have embraced entrepreneurship as a career choice are more satisfied with their jobs than their colleagues. On the other hand, they declare that the skills acquired at university are not as effective as declared by their colleagues doing other jobs. Surprisingly, graduates who opted for entrepreneurship and holding a degree in economics are not very satisfied with their skills. This suggests that there is a need to improve the entrepreneurial skills of graduates also in economics-related fields of study.

Among *intentional entrepreneurs,* there may be many individuals who could be induced to start a business venture if the barriers limiting their incentive to do so were lowered. In this regard, universities can play an important role that, at least in Italy, so far they have neglected.

Curricular and extra-curricular entrepreneurship courses, based on the concepts of interdisciplinary contamination and lateral thinking, appear to be effective tools with which not only to provide the appropriate entrepreneurial skills but also to lower the psychological and cultural barriers, often related to the socioeconomic background, which may limit access to entrepreneurship.

The large group of *intentional entrepreneurs*, if appropriately trained, may develop a propensity to act in an entrepreneurial way even though they do not start their own businesses; and people's employability is positively affected by this attitude (European Commission, 2011). Moreover, *intrapreneurship* can benefit from this behavioural attitude or *soft skill*, which is very much appreciated by employers. Indeed, most graduates find jobs as employees, and their endowment with an entrepreneurial spirit can contribute substantially to fostering the innovation and competitiveness of the organizations for which they work.

Hence, the benefits of all those measures implemented by universities to foster an entrepreneurial attitude are not confined to the creation of new, innovative ventures; they include also the contribution to graduates' employability and to the innovative activity of those firms that employ them.

The need for university action stems also from the recognition that only a small percentage of student entrepreneurs have attended an entrepreneurship course or participated in a business competition, and that they have indicated the importance of these instruments. However, among those who had no chance to be take these opportunities, about 80% would have liked to do so. According to our estimations, other tools to cultivate an entrepreneurial attitude among university students are internships and ICT skills. Indeed, The Fourth Industrial Revolution, i.e. Industry 4.0, is generating entrepreneurial opportunities whose recognition and exploitation will require stronger ICT skills than in the past.

Our data show that entrepreneurial education programs should include business plan competitions not necessarily based on real business ideas developed by the students. Indeed, the participation of students in these competitions exposes them to an intense experience that may motivate some of them to become more engaged in a real entrepreneurial venture.

These results suggest also that support for student entrepreneurship can contribute to equalizing work opportunities for the weaker social groups. The share of women engaged in the entrepreneurial process, at various stages, is larger than in the Italian population at large. The social background does not appear to exert a significant impact on the incentive to engage in entrepreneurial activities. We find the standard result that the probability of engaging in entrepreneurship is strongly affected by having a father entrepreneur, but we do

not find strong evidence on the role of parents' education and their social class. Foreign students are more represented in the groups engaged, at various levels, in entrepreneurship than in the student population at large (4.2%). In particular, the share engaged in starting new ventures (7.8%) and in active entrepreneurship (6.4%) are relatively high (Table 4). This confirms the findings of previous studies on entrepreneurship among immigrants (Fairlie and Lofstrom, 2014; Schuetze, and Antecol, 2007).

The Italian geographical divide emerges also in regard to entrepreneurship; although, owing to the very high unemployment rate among the young, the outside option of becoming an entrepreneur in the South is very small. The Northern and Central parts of the country appear to be the best places in which to set up a firm also for students from the South. Finally, perhaps some time in the future, a share of the *intentional entrepreneurs* from the South will 'cross the Rubicon' and become active entrepreneurs or they will be employed by firms located in the South.

Finally, it should be clear that, at least in the case of Italy, we do not share the view that there are not good reasons to actively sustain entrepreneurship (Shane, 2009).

References

AlmaLaurea, 2015. *Condizione occupazionale dei laureati 2014. Rapporto 2015*. Bologna: Consorzio Interuniversitario AlmaLaurea.

Ardichvili. A., Cardozo R., Ray S., 2003. A Theory of Entrepreneurial Opportunity Identification and Development, *Journal of Business Venturing.* 18(1), 105-123.

Astebro, T., Bazzazian, N., Braguinsky, S., 2012. Startups by recent university graduates and their faculty: Implications for university entrepreneurship policy. *Research Policy*, 41, 663-667.

Bates T., 1990. Entrepreneur Human Capital Inputs and Small Business Longevity, *Review of Economics and Statistics*, 72(4), 551-559.

Blanchflower D. G., Oswald A., 1998. What makes an entrepreneur? *Journal of Labor Economics* 16 (1), 29-60.

Bugamelli M., Cannari L., Lotti L., Magri S., 2012. The innovation gap of Italy's production system: roots and possible solutions, Bank of Italy, QEF n.12, April.

Bugamelli M., Amatori F., Colli A., 2011. Italian Firms in History: Size, Technology and Entrepreneurship, Economic History Working Papers 13, Bank of Italy.

Commissione Europea, 2012. Building Entrepreneurial mind-sets and skills in the EU, Guidebook series, How to support SME policy from Structural Funds.

Corbet A.C. 2007. Learning asymmetries and the discovery of entrepreneurial opportunities, *Journal of Business Venturing* 22(1), 97–118.

Corbet A.C. 2005, Experiential Learning Within the Process of Opportunity Identification and Exploitation, *Entrepreneurship Theory and Practice* 29(4), 473–491.

Corduras Martinez, A., Levie, J., Kelley, D.J., Saemundsson, R.J., Schott, T., 2010. *A Global Perspective on Entrepreneurship Education and Training*, GERA, Babson College, Babson Park, MA.

Cotoi, E., Bodoasca, T., Catana, L., Cotoi, I., 2011. *Entrepreneurship European development strategy in the field of education*, *Procedia – Social and Behavioral Sciences*, 15, 3490-4.

Cowling, M. 2000. Are entrepreneurs different across countries?, *Applied Economics Letters*, 7(12), 785-789.

Cramer J.S., Hartog J., Jonker N., Praag C.M. van, 2002. Low risk aversion encourages the choice for entrepreneurship: an empirical test of a truism, *Journal of Economic Behavior and Organization* 48(1), 29-36.

Cunha, F., Heckman J.J., 2007. The Technology of Skill Formation, *American Economic Review* 97, 31-47.

Dahlander, L., McFarland, D.A. 2013. Ties that last tie formation and persistence in research collaborations over time. *Administrative science quarterly*, 58(1), 69-110.

Damiani, M., A. Ricci, 2013. An Entrepreneurs' education and different variable pay schemes in Italian firms, MPRA WP 46163.

Davidsson, P., 2006. Nascent entrepreneurship: empirical studies and developments. *Foundations and Trends in Entrepreneurship*, 2(1), 1-76.

Davidsson, P., Honig, B., 2003. The role of social and human capital among nascent entrepreneurs, *Journal of Business Venturing* 18 (3), 301–331.

De Bruin A., Ferrante F. 2011. Bounded Opportunity: A Knowledge-Based Approach to Opportunity Recognition and Development, *Entrepreneurship Research Journal* 11, 1-21.

Delmar, F., Davidsson, P.m 2000. Where do they come from? Prevalence and characteristics of nascent Entrepreneurs, *Entrepreneurship & Regional Development* 12(1), 1-23.

Dimov D.P., 2003. The Nexus of Individual and Opportunity: Opportunity Recognition as a Learning Process, *Frontiers of Entrepreneurship Research.*

Dimov D.P., Sheperd D.A., 2005. Human capital theory and venture capital firms: exploring "home runs" and "strike outs", Journal of Business Venturing 20, 1–21.

Eesley, C.E., Roberts E.B., Yang, D., 2009. *Entrepreneurial Ventures from Technology-Based Universities: A Cross-National Comparison*. Working Paper. Stanford University.

European Commission, 2008. *Entrepreneurship in Higher Education, Especially within Non-Business Studies. Final Report of the Expert Group*, Enterprise and Industry, Bruxelles.

European Commission, 2013. *Entrepreneurship 2020 Action Plan. Rethinking the entrepreneurial spirit in Europe.* Brussels, COM (2012).

European Parliament, 2015. *Women's Entrepreneurship: closing the gender gap in access to financial and other services and in social entrepreneurship.* Brussels: European Parliament.

Eurostat. 2013. *European Social Statistics. 2013 Edition. Eurostat European Commission*. Luxemburg: Publication Office of the European Union.

Fairlie, R.W., Robb A., 2007. Families, Human Capital, and Small Business: Evidence from the Characteristics of Business Owners Survey, *ILR Review* 60(2), 225-245

Fairlie, R.W., Lofstrom, M., 2014. *Immigration and Entrepreneurship*. In Chiswick, B.R. and Miller, P.W. (eds.) Handbook on the Economics of International Migration, Elsevier.

Federici, D., Ferrante, F., 2014. Ristrutturazione industriale e capital umano imprenditoriale. *Economia dei Servizi*, n.3, 233-258.

Federici, D. Ferrante F., Vistocco D., 2007. On the Sources of Entrepreneurial Talent in Italy: Tacit vs. Codified Knowledge. Available at SSRN: https://ssrn.com/abstract=1002864

Ferrante, F and Sabatini, F. 2007. Education, Social Capital and Entrepreneurial Selection in Italy. MPRA WP 2451.

Ferrante, F., 2005. Revealing Entrepreneurial Talent. *Small Business Economics* 2, 159-174.

Ferrante F., Ruiu G.m 2014. Entrepreneurship. How important are institutions and culturally-based prior beliefs? MPRA WP 41915

Ferrante, F. e Supino, S., 2016. *Supporting Early-stage Entrepreneurship*. Le misure di sostegno alla *nuova imprenditorialità.* Le buone pratiche su scala europea, con particolare riferimento all'*educazione imprenditoriale. MPRA WP 68930.*

Fini R., and Grimaldi R., 2016. Process approach to academic entrepreneurship: evidence from the globe, *World Scientific Publishing*. ISBN 978-981-4733-42-7 (v4).

Fini, R., Grimaldi, R., Marzocchi, G. L., Sobrero, M., 2012. The determinants of corporate entrepreneurial intention within small and newly established firms. *Entrepreneurship Theory and Practice*, *36*(2), 387-414.

Fini, R., Meoli, A., Sobrero, M., Ghiselli, S. and Ferrante, F., Student Entrepreneurship: Demographics, Competences and Obstacles (2016). Technical Report - Almalaurea Consortium, February. Available at SSRN: https://ssrn.com/abstract=2740541

Fraser S., Green F., 2006. The Effects of Experience on Entrepreneurial Optimism and Uncertainty, *Economica* 73, 169-192.

GEM (2015), Rapporto sull'Italia.

Grimaldi, R., Kenney, M., Siegel, D.S., Wright, M., 2011. 30 years after Bayh–Dole: Reassessing academic entrepreneurship, *Research Policy*, 40(8), 1045-1057.

Guiso, L., Sapienza P., Zingales, L., 2006. Does culture affect economic outcomes? *Journal of Economic Perspectives* 20(2), 23–48.

Hart, M., Levie, J., Shasul, M. K., 2015. *Closing the Generational Start-up Gap*. London: RBS Group.

Iyigun, M.F., Owen A.L. 1999. Entrepreneurs, professionals, and growth, *Journal of Economic Growth* 4(2), 213-232.

Istituto Nazionale di Statistica (ISTAT). 2015. *Tasso di disoccupazione*. http://dati.istat.it, Viewed 28 January 2016.

Johannisson, B., 1991. University training for entrepreneurship: a Swedish approach, *Entrepreneurship & Regional Development* 3(1), 67-82.

Kanbur R. (1979), "Of Risk Taking and the Personal Distribution of Income", *Journal of Political Economy*, vol. 87(4): 769-97.

Katz, J.A. (2003). The chronology and intellectual trajectory of American entrepreneurship education, *Journal of Business Venturing* 18(2), 283-300.

Kauffman Foundation. 2013. *Entrepreneurship Education Comes of Age on Campus*. Kansas City: Ewing Marion Kauffman Foundation.

Kauffman Foundation. 2015. *Entrepreneurship Policy Digest. Women Entrepreneurs are key to Accelerating Growth.* Kansas City: Ewing Marion Kauffman Foundation.

Klapper, L., Laeven, L., Rajan, R., 2006. Entry regulation as a barrier to entrepreneurship. J. Financ. Econ. 82, 591-629.

Kuncel N. R., Hezzlet S. A. and Ones D. S., 2004. Academic Performance, Career Potential, Creativity, and Job Performance: Can One Construct Predict Them All? *Journal of Personality and Social Psychology* 86(1), 148–161.

Kuratko, D.F., 2005. The emergence of entrepreneurship education; development, trends and challenges, *Entrepreneurship Theory & Practice* 29(5), 577-98.

Lazear, E.P., 2005. Entrepreneurship, *Journal of Labor Economics*, 23, 649-680.

Lindholm Dahlstrand, Å., Berggren, E., 2010. Linking innovation and entrepreneurship in higher education: a study of Swedish schools of entrepreneurship. In R. Oakey, A. Groen, G. Cook, P. Sijde (eds.) *New Technology-Based Firms in the New Millennium,* Emerald Group Publishing Limited, Chapter 4: 35 – 50.

Lucas, R.E. 1978. On the Size Distribution of Business Firms, *Bell Journal of Economics* 9, 508-523.

Lucas, R.E. 2009. Ideas and Growth, *Economica* 76(301), 1-19.

Mason, C., 2011, Entrepreneurship education and research: emerging trends and concerns, *Journal of Global Entrepreneurship* 1(1), 13-25.

Matlay, H., 2008. The impact of entrepreneurship education on entrepreneurial outcomes, *Journal of Small Business and Enterprise Development* 15(2), 382-96.

Menzies, T.V., Paradi, J.C., 2003. Entrepreneurship education and engineering students – career path and business performance, *The International Journal of Entrepreneurship and Innovation* 4(2), 121-32.

Minniti, M., Bygrave, W. 2001. A dynamic model of entrepreneurial learning, *Entrepreneurship Theory and Practice* 25(3), 5–16.

Mitra, J., Matlay, H. 2004. Entrepreneurial and vocational education and training: lessons from Eastern and Central Europe, *Industry and Higher Education* 18(1), 53-62.

Nabi, G., Holden, R., 2008. Graduate entrepreneurship: intention, education and training, *Education + Training*, 50(7), 545-51.

Nordhaus, W.D. 2015. Are we approaching and economic singularity? Information technology and the future of economic growth, NBER WP n. 21547.

OECD. 2015a. *Entrepreneurship at Glance 2015*. OECD Publishing, Paris.

OECD. 2015b. *Education at a Glance 2015: OECD Indicators*. OECD Publishing, Paris.

Otani, K. 1996. A Human Capital Approach to Entrepreneurial Capacity, *Economica* 63, 273-289.

Parker, S. 2004. *The Economics of Self-Employment and Entrepreneurship*, Cambridge: Cambridge University Press.

Packham, G., Jones, P., Miller, C., Pickernell, D., Thomas, B., 2010. Attitudes towards entrepreneurship education: a comparative analysis, *Education + Training* 52(8/9), 568-86.

Parker, S.C. (2009), *The Economics of Entrepreneurship*, Cambridge University Press: Cambridge

Perkmann, M., Fini, R., Ross, J. M., Salter, A., Silvestri, C., Tartari, V., 2015. Accounting for universities' impact: using augmented data to measure academic engagement and commercialization by academic scientists. *Research Evaluation*, 24(4), 380-391.

Reynolds, P.D., S.B. White 1992. Finding the Nascent Entrepreneur: Network Sampling and Entrepreneurship Gestation, in *Frontiers of Entrepreneurship Research* (N.C. Churchill, S. Birley, W.D. Bygrave, C. Wahlbin, and W.E.J. Wetzel, eds.), 199-208, Wellesley, MA: Babson College

Roberts, E.B, Eesley, C.E., 2011. Entrepreneurial Impact: The Role of MIT. *Foundations and Trends in Entrepreneurship*, 7(1), 1-149.

Roberts, E.B., Murray, F., Kim, D., 2015. *Entrepreneurship and Innovation at MIT. Continuing Global Growth and Impact.* MIT Sloan School of Management.

Schivardi F., Torrini R. (2011). Structural change and human capital in Italy's productive economy, Questioni di Economia e Finanza (Occasional Papers) 108, Bank of Italy.

Schmidt F.L., 2002. The Role of General Cognitive Ability and Job Performance: Why There Cannot Be a Debate, *Journal of Human Performance* 15, 187-210

Schultz, T.W., 1990). *Restoring Economic Equilibrium: Human Capital in the Modernizing Economy,* Basil Blackwell, Cambridge, Mass.

Schuetze, H.J., Antecol, H., (2007). Immigration, Entrepreneurship and the Venture Start-Up Process. The Life Cycle of Entrepreneurial Ventures. In Parker, S. (ed.) *International Handbook Series on Entrepreneurship*, Vol. 3, Springer, New York.

Shane S. 2009. Why encouraging more people to become entrepreneurs is bad public policy, *Small Business Economics* 33, 141-149

Shane, S. 2000. *A General Theory of Entrepreneurship: The Individual-Opportunity Nexus*. Cheltenham: Edward.

Shane S., 2000, Prior Knowledge and the Discovery of Entrepreneurial Opportunities, *Organization Science* 11(4), 448-469.

Shane, S., Venkataraman, S., 2000. The Promise of Entrepreneurship as a Field of Research, *The Academy of Management Review* 25(1), 217-226.

Shane, S., Locke, E. A., Collins, C. J., 2003. Entrepreneurial motivation. *Human resource management review*, 13(2), 257-279.

Sieger, P., Fueglistaller, U., Zellweger, T., 2014. *Student Entrepreneurship across the Globe: A Look at Intentions and Activities*. St.Gallen: Swiss Research Institute of Small Business and Entrepreneurship at the University of St.Gallen (KMU-HSG).

Solomon, G., 2007. An examination of entrepreneurship education in the United States, *Journal of Small Business and Enterprise Development* 14(2), 168-82.

Stam, E., Audretsch, D.B., Meijaard, J. 2008. Renascent entrepreneurship. *Journal of Evolutionary Economics* 18(3), 493-507.

Torrini R. and Schivardi F. 2011. Structural change and human capital in Italy's productive economy, Questioni di Economia e Finanza (Occasional Papers) 108, Bank of Italy.

Ucbasaran, D., Westhead, P., Wright, M., (2001), The focus of entrepreneurial research: contextual and process issues, *Entrepreneurship Theory and Practice* 25(4), 57-80.

Van Der Sluis J, Van Praag M., Vijverberg W., 2005. Entrepreneurial selection and performance. A meta-analysis of the impact of education in Industrialized Countries, *World Bank Economic Review* 19(2), 225-261.

Van Der Sluis, J., Van Praag, M., Vijverberg, W., 2008. Education and Entrepreneurship Selection and Performance: A Review of the Empirical Literature, *Journal of Economic Surveys* 22(5), 795-841.

Van Praag, C. M., Cramer J.S., 2001. The roots of entrepreneurship and labour demand: individual ability and low risk aversion, *Economica* 68, 45–62.

Venkataraman, S., Shane, S., 2000. The Promise of Entrepreneurship as a Field of Research. *Academy of Management Review*, 25(1), 217–226.

Wagner, J., 2006. Nascent entrepreneurs. In: S. C. Parker (Eds), *The Life Cycle of Entrepreneurial Ventures (International Handbook Series on Entrepreneurship),* vol. 3: 15–37. New York: Springer Verlag.

Wennekers, S..Thurik, A.R. 1999. Linking entrepreneurship and economic growth, *Small Business Economics* 13(1), 27-56.

Wennekers, A.R.M., Van Stel, A., Thurik, A.R., Reynolds, P.D., 2005. Nascent entrepreneurship and the level of economic development *Small Business Economics* 24 (3), 293-309.

Westhead, P., Ucbasaran, D., Wright, M., Binks, M., 2005. Novice, Serial and Portfolio Entrepreneur Behaviour and Contributions. *Small Business Economics* 25, 109-132.

Appendix

University	Share of actual entrepreneurs (after enrolment)
Libera Università Mediterranea "JEAN MONNET" - CASAMASSIMA (BA)	9.6
Università Italiana per Stranieri di PERUGIA	8.3
Università degli Studi Internazionali di Roma - UNINT	6.5
Università degli Studi di REGGIO CALABRIA	5.8
Università Carlo Cattaneo – LIUC	5.5
Università degli Studi del SANNIO di BENEVENTO	3.6
Politecnico di BARI	3.2
Libera Università di BOLZANO	3.1
Università degli studi di Napoli "Parthenope"	3.0
Libera Università di Lingue e Comunicazione IULM (MI)	3.0
Università degli Studi di ROMA 'Tor Vergata'	3.0
Università degli Studi di Napoli 'L'Orientale'	2.7
Università degli Studi di CATANIA	2.6
Università della CALABRIA	2.5
Università degli Studi di CASSINO e del Lazio Meridionale	2.5
Università degli Studi di SALERNO	2.5
Seconda Università degli Studi di NAPOLI	2.4
Università degli Studi di TERAMO	2.4
Università degli Studi di URBINO 'Carlo Bo'	2.4
Università Campus Bio-Medico di ROMA	2.3
Università degli Studi della TUSCIA (VT)	2.3
Università degli Studi di CAGLIARI	2.2
Libera Università degli studi 'Maria SS. Assunta' di ROMA	2.1
Università Politecnica delle Marche	2.0
Università degli Studi di ROMA 'La Sapienza'	2.0
Università degli Studi 'ROMA Tre'	2.0
Università degli Studi del MOLISE (CB)	2.0
Università degli Studi di NAPOLI 'Federico II'	2.0
Libera Università della Sicilia Centrale "Kore" di Enna	1.9
Università degli Studi di MESSINA	1.9
Università degli Studi di TORINO	1.9
Università degli Studi di FERRARA	1.8
Università degli Studi di CAMERINO	1.8
Università degli Studi di SASSARI	1.8
Università degli Studi di TRENTO	1.8
Università degli Studi di PERUGIA	1.7
Università degli Studi di GENOVA	1.7
Università degli Studi di BARI	1.7
Politecnico di TORINO	1.7
Università degli Studi di Roma 'Foro Italico'	1.6
Alma Mater Studiorum – Università di Bologna	1.6
Università degli Studi del PIEMONTE ORIENTALE 'Amedeo Avogadro'	1.6

Università degli Studi 'G. d'Annunzio' di CHIETI-PESCARA	1.4
Università degli Studi dell'AQUILA	1.4
Università degli Studi di SIENA	1.3
Università degli Studi di PARMA	1.3
Università degli Studi di FOGGIA	1.3
Università degli Studi 'Magna Graecia' di CATANZARO	1.1
Università del SALENTO	1.0
Università IUAV di VENEZIA	1.0
Università degli Studi di PADOVA	0.9
Università degli Studi di UDINE	0.8
Università degli Studi di VERONA	0.7
Università degli Studi di MODENA e REGGIO EMILIA	0.7
Università degli Studi di FIRENZE	0.7
Università degli Studi INSUBRIA VARESE-COMO	0.7
Università degli Studi della BASILICATA (PZ)	0.7
Università degli Studi di TRIESTE	0.5
Università Ca' Foscari VENEZIA	0.4
Libera Università 'Vita-Salute S. Raffaele' di MILANO	0.4
Università degli Studi di MACERATA	0.3
Università per Stranieri di SIENA	0.0
Università della Valle d'Aosta - AOSTA	0.0
Università degli Studi di Scienze Gastronomiche	0.0
Total	1.8