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University Program Characteristics and Education-Job Mismatch

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Abstract:

Over-education has been demonstrated to be frequent and persistent across countries. It often goes together with working in a job not related to the field of study (horizontal mismatch) or in a job that requires lower skills than acquired (skill mismatch). We study which program characteristics help university graduates to obtain a good job match. We do the analysis for Spain since the presence of over-education is strong in this country. We analyze the three types of mismatch: over-education, horizontal mismatch, and over-skills. We focus on the role of program characteristics in avoiding over-education in the first job after graduation, and in exiting over-education in the early career. We find that those programs that are academically prestigious and those that promote entrepreneurial skills help avoid being mismatched in the first job and, in case of being mismatched in the first job, they help exit this situation. Overall, our results give support to policies promoting the development of entrepreneurial skills in the Spanish education system.

Keywords: over-education, horizontal mismatch, over-skills, entrepreneurial program, entrepreneurial skills, higher education

JEL classification: J24, I23

DOI: 10.1515/bejeap-2019-0083

1 Introduction

Over-education has been demonstrated to be frequent and persistent across countries (Chevalier 2003; Rubb 2003b; McGuinness 2006b; Budría and Moro Egado 2009; Verhaest and Omeij 2010; Wen and Maani 2019). It has also been revealed that remaining over-educated may leave a scarring effect on future wages (Scherer 2004) and is detrimental to workers' cognitive capacity (de Grip et al. 2008). Given the persistence of over-education (Alba-Ramirez 1993; Battu, Belfield, and Sloane 1999; Sloane, Battu, and Seaman 1999; Dolton and Vignoles 2000; Rubb 2003b; Frenette 2004; Rubb 2005; Frei and Sousa-Poza 2012), various international organizations, and primarily the OECD, call for new solutions to tackle the education-job mismatch problem (Quintini 2011; McGowan and Andrews 2015).

Over-education is strongly related to over-skilling and horizontal mismatch. These other types of mismatch have also been found to be associated with a wage penalty (Di Pietro and Urwin 2006; McGuinness and Sloane 2011; Sánchez-Sánchez and McGuinness 2015).

We evaluate which program characteristics at tertiary education help avoid and exit education mismatch in Spain. We concentrate on Spain because it is one of the countries with the highest indices of occurrence and persistence of over-education in the OECD (Verhaest and Van Der Velden 2013). García Montalvo and Peiró (2009) show that more than 45 % of tertiary graduates were over-educated in 2005 and that more than 25 % of them persisted over-educated 2 years later. García-Aracil and Van Der Velden (2008) demonstrate that Spanish graduates seem to be mismatched in the majority of their competences in their first jobs. Our results demonstrate that the program being entrepreneurial and academically prestigious are the most important program characteristics to reduce education mismatch.

Other papers that study a similar question are Levels, van der Velden, and Di Stasio (2014) and Verhaest and Van Der Velden (2013) to name a few. A main difference in our paper is that we add as a characteristic of the study program its role in developing entrepreneurial skills of individuals. This characteristic is nowadays very important in the policy debate. It is therefore relevant to include it in the analysis. There are other differences too. First, we use the Bayes prediction to estimate the program characteristics; second, we analyze three types

of mismatch: over-education, horizontal mismatch, and over-skilling; and, third, we study the role of program characteristics in exiting mismatch.

The paper is organized as follows. In next section, we present the theoretical background. In Section 3, we describe the REFLEX survey used in this paper and the econometric methods applied to data analysis. We provide the results in Section 4 and conclude in Section 5, forming some policy recommendations.

2 Literature Review

Since the seminal works of Freeman (1976) and Rumberger (1981, 1984) much has been discovered and explained about over-education and its consequences for workers (Groot and Massen van Den Brink 2000; Chevalier 2003; Rubb 2003a; McGuinness 2006a; Verhaest and Omeij 2010). This large literature points to variables such as job experience (Sicherman and Galor 1990; Hersch 1991, 1995; Sicherman 1991), fields of study (Finnie and Frenette 2003; McGuinness 2003; Frenette 2004; Ortiz and Kucel 2008), vocational orientation of education (Büchel and Mertens 2004), gender (Renes and Ridder 1995; McGoldrick and Robst 1996), immigrant status (Green, Kler, and Leeves 2007; Nielsen 2011) and non-academic skills (Chevalier and Lindley 2009) as factors explaining over-education.

Several theories explain the occurrence and persistence of over-education. The neo-classical model sees over-education as a market friction where workers should achieve good matches within short periods of time (Sicherman and Galor 1990; Sicherman 1991). In their theory of career mobility, Sicherman and Galor (1990) propose that workers may become over-educated at the beginning of their career because they may lack the adequate skills required in the matching jobs. As they acquire those skills through on-the-job learning they move towards more matching jobs and so the over-education spell becomes just a stepping stone (Büchel 2002; Büchel and Mertens 2004). Over-educated workers are thus more mobile than their matched peers pointing towards possible productivity gains in the long run (Verhaest and Omeij 2006). Contrary to that, the assignment models described by Sattinger (1993) view the over-education as a more permanent friction which may require either a significant upgrading of job matching processes or some well-targeted policy intervention. In Sattinger's view, over-educated workers may choose to stay over-educated due to market rigidities such as high relocation costs or high signaling/screening costs. In such circumstances, workers may choose to be over-educated and not relocate, while firms may choose workers with more than needed educational level in order to secure high potential productivity instead of employing a much more refined and costly screening process (Kampelmann and Rycx 2012; Cabus and Somers 2018). Both theories intend to explain the aggregate persistent existence of over-education in the labor market. The theory of career mobility places workers in a situation where over-education serves to achieve the required skills, while the assignment model takes advantage of search and matching costs to explain workers' choices (Sattinger and Hartog 2013). Nonetheless, there is abundant evidence that over-education is not temporary (Dolton and Vignoles 2000; Frei and Sousa-Poza 2011; Meroni and Vera-Toscano 2017) and neither are its consequences for workers' wages (Korpi and Tåhlin 2009; Congregado et al. 2016).

In contrast to those theories, Leuven and Oosterbeek (2011) provide microeconomic arguments why workers might prefer to be over-educated. While over-educated, workers may experience more leisure on the workplace at the cost of mismatch. Some workers may prefer such jobs and enjoy higher leisure time at work despite being over-educated or over-skilled. Such workers should be more satisfied with their jobs and probably more productive (Büchel 2002; Mahy, Rycx, and Vermeylen 2015; Kampelmann, Mahy, and Rycx 2019). Contrary to that, however, there is evidence indicating a decreased satisfaction with the job among the over-educated (Hersch 1991; Korpi and Tåhlin 2009; Verhaest and Omeij 2010) showing that over-education is not a preferred outcome to workers.

Evidence across the OECD countries demonstrates considerable levels of educational mismatches (Quintini 2011; McGowan and Andrews 2015). Verhaest and Van Der Velden (2013) compare persistence of over-education across several European countries and Japan. They find that persistence of over-education is particularly present in Spain: more than 26 % of Spanish university graduates remain over-educated 5 years later. Considering the evidence brought by de Grip et al. (2008), who show a steady cognitive decline in workers employed in over-educated jobs, we are facing a sizable loss of human capital in countries like Spain.

Our analysis concentrates on university graduates from Spain who became mismatched in their first jobs and those who subsequently remained in this state 5 years later. The relative novelty of our approach is the introduction of the entrepreneurial program characteristic as an explanatory factor for first, avoidance of and then, subsequently exit from the mismatch. A program is considered entrepreneurial if, according to the respondents, it was a good basis for the development of entrepreneurial skills.

A growing body of literature studies the effectiveness of entrepreneurial education in promoting self-employment (von Graevenitz, Harhoff, and Weber 2010; von Graevenitz and Weber 2011; Rideout and Gray

2013). Following the Ajzen's psychological theory of planned behavior, most studies check how a program changes the individual's intention to become an entrepreneur (Obschonka, Hakkarainen, and Lonka 2017). According to this theory, exogenous influences – entrepreneurial education among them – can affect the attitudes that shape the entrepreneurial intention of individuals. Having an entrepreneurial intention is a necessary step before actually acting and becoming self-employed (Souitaris, Zerbinati, and Al-Laham 2007). Souitaris, Zerbinati, and Al-Laham (2007), among others, also argue that entrepreneurship education influences attitudes and intention. They propose three individual benefits derived from the program: learning, inspiration, and incubation resources. They find that the largest benefit goes through inspiration. Therefore, it changes the attitude of individuals in the labor market.

Several studies find that entrepreneurial education has a positive effect on graduates' entrepreneurial skills levels (Martin, McNally, and Kay 2013), which in turn, as we propose, prove important for matching in the labor market.

Among the entrepreneurial competences analyzed in the literature (Morris et al. 2013; Rideout and Gray 2013), we distinguish opportunity recognition (Kirzner 1999) and self-efficacy (Bandura 1986). We hypothesize that they influence positively the job matching process. Individuals with the capacity to identify opportunities (opportunity recognition) and those with an individual belief in their personal capability to accomplish a job (self-efficacy) are found to be more likely to become entrepreneurs (Newman et al. 2019; Tegmeier, Kurczewska, and Halberstadt 2016). Another entrepreneurial attitude usually promoted in entrepreneurial education is self-confidence. This is closely related to having an internal locus of control (believing that personal actions directly affect the outcome of an event). Several studies do not find significant differences between firm founders and managers in locus of control (Babb and Babb 1992; Begley 1995), while there are significant differences between firm founders and the general population. Self-confidence is also related to self-efficacy (Shane et al. 2003). An individual with high self-efficacy in some task will be more persistent and ambitious and will develop better plans for achieving the task. These attributes are important in the entrepreneurial process as well as in other aspects of life, such as the labor market outcomes. In line with recent research around the concept 'career entrepreneurship' (Korotov, Khapova, and Arthur 2011; Uy et al. 2015), we argue that individuals with entrepreneurial attitudes should be more aware of job opportunities and eager to search for a job adequate to their education level. In consequence, it should translate into a lower likelihood of mismatch in the first jobs after graduation. Furthermore, entrepreneurial graduates should also be more prone to look for matching jobs even if they happened to get mismatched in their first jobs after graduation. This, in turn, should be reflected by a higher likelihood of exiting over-education for those with entrepreneurial skills. Therefore, if graduates consider that a university program helped develop their entrepreneurial skills, it should facilitate individuals' matching in the labor market.

3 Data Description and Methodology

We base our analysis on the REFLEX data, a survey of tertiary graduates from the year 2000 that were interviewed 5 years later. Data contain, apart from a rich battery of questions on the present job market situation and competences, several questions that gather retrospective information on the respondents' tertiary study program and their first job experiences. We know their matching situation in their first job (6 months after graduation) as well as their job match quality 5 years after graduation.

We test two hypotheses. First, we analyze which program characteristics help avoid mismatch in the first job. Second, we check whether they help exit mismatch 5 years after graduation. To this end, we study the probability of being over-educated, horizontally mismatched, or over-skilled in the first job after studies, and the probability of exiting over-education, horizontal mismatch, or over-skilling 5 years after graduation if the individual started in a mismatched position. Our main variables of interest are the program characteristics, which include the level of academic prestige, whether it was regarded as demanding, whether employers are familiar with its content, whether there was freedom composing the program, whether it had a broad focus, whether it was vocationally oriented, or whether it was a good basis for developing entrepreneurial skills. Ideally, we would like to have an objective measure for these characteristics. However, the measure that is available is self-reported. All these characteristics are evaluated by the respondent in a 5-points scale 5 years after graduating.

As a robustness check, we cluster the programs according to the institution, field of study, and length of the program, and estimate the cluster-mean value of the program characteristics with an ordered logit random-intercept model. The Empirical Bayes Prediction gives us a measure of the program characteristics much less sensitive to the subjective individual evaluation. The institution, field of study, and length of the program define homogeneous groups of programs in terms of their characteristics. Table 1 shows the correlations between

the original variable (self-reported) and the empirical Bayes prediction for each program characteristic. The correlations are positive and significant, but far from 1, which means that there is a significant correction of the subjective evaluation.

Table 1: Correlations between program characteristic and its EBP measure.

Program characteristic	Correlation
Demanding program	0.5736
Employer familiar with content	0.3773
Freedom composing program	0.5182
Broad focus	0.3253
Vocationally oriented	0.3579
Academically prestigious	0.6386
Entrepreneurial	0.2756

Correlations measured using the sample of the mismatch in the first job analysis.

We have six dependent variables: (1) being over-educated in the first job, (2) being horizontally mismatch in the first job, (3) being over-skilled in the first job, (4) exit over-education 5 years later, (5) exit horizontal mismatch 5 years later, and (6) exit being over-skilled 5 years later. All these variables are based on workers' self-assessment.¹ Workers are over-educated if they responded that their job requires less education than they possess. Similarly, workers are horizontally mismatched if their job is not related to their field of study, and over-skilled, if their job requires less skills than they have. The three variables measuring whether the individual exited mismatch are coded as 1 if the person was mismatched in their first job and managed to get matched in their consecutive job 5 years after graduation. This variable is computed for over-educated, horizontally mismatched, and over-skilled mismatch separately. The reference category coded 0 entails those individuals who were mismatched in their first jobs and persisted mismatched 5 years later. Therefore, in the first part of the analysis, our sample consists of those individuals that got a first job after graduation (being them mismatched or not), while in the second analysis we restrict our sample to those individuals that were mismatched in the first job and are employed (matched or mismatched) 5 years after graduation. We do not study other transitions (matched to mismatched) since they represent a small part of the sample (less than 8 % of the total sample).

We restrict the sample to individuals below 46 years of age who got a first job and are not self-employed. The sample sizes are 2780 individuals when analyzing mismatch in the first job, 1026 individuals when analyzing exit from over-education, 669 individuals when analyzing exit from horizontal mismatch, and 756 individuals when analyzing exit from over-skilling.

Table 2 provides the descriptive statistics of all samples. The first two columns refer to the whole sample. All individuals with a first job are included there. Among them, close to 45 % of graduates were over-educated in the first job, while around 30 % were horizontally mismatched, and a similar number were over-skilled. The different types of mismatch in the first job are positively correlated although far from perfectly (correlation values lie between 0.50 and 0.59). While 20 % of the sample suffered the three types of mismatch in the first job, 47 % reported being matched in all three dimensions. The age ranges between 26 and 45 years old, with an average close to 30 years old. Around 65 % of this sample is female and close to 70 % studied a long program (licenciatura). The average grade in secondary education ranges between 1 and 5, and the average is close to 3. All program characteristics are evaluated between 1 and 5. The average program has an evaluation above 3 in the demanding program, employer familiar with content and broad focus characteristics, around 3 in freedom to compose program and academic prestige of the program, and below 3 in vocationally oriented and entrepreneurial program.

Table 2: Descriptive statistics.

Variable	All sample		Overeducated in first job		H-mismatched in first job		Over-skilled in first job	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Over-educated in first job	0.446	0.497	1	0	0.898	0.303	0.805	0.396
H-mismatched in first job	0.293	0.455	0.583	0.493	1	0	0.672	0.469
Over-skilled in first job	0.327	0.469	0.593	0.492	0.759	0.428	1	0

Exit overeducation	–	–	0.487	0.500	–	–	–	–
Exit h-mismatch	–	–	–	–	0.513	0.500	–	–
Exit over-skilling	–	–	–	–	–	–	0.653	0.476
Education	0.114	0.317	0.137	0.344	0.155	0.363	0.149	0.357
Humanities and arts	0.083	0.277	0.091	0.287	0.106	0.308	0.077	0.266
Social sciences	0.327	0.469	0.418	0.493	0.414	0.493	0.409	0.492
Science, Math, computing	0.149	0.356	0.164	0.370	0.154	0.361	0.152	0.359
Engineering	0.149	0.356	0.104	0.306	0.072	0.258	0.123	0.329
Agriculture & Vet	0.039	0.193	0.028	0.166	0.036	0.186	0.033	0.179
Health and welfare	0.130	0.337	0.044	0.205	0.055	0.229	0.048	0.213
Services	0.008	0.089	0.014	0.116	0.007	0.086	0.009	0.096
Age (range 26 to 45)	29.669	2.593	29.825	2.672	29.789	2.729	29.648	2.437
Female	0.644	0.479	0.646	0.478	0.674	0.469	0.627	0.484
Long program (licenciatura)	0.697	0.459	0.738	0.440	0.707	0.455	0.704	0.457
Avg. grade secondary educ*	2.880	0.925	2.744	0.868	2.638	0.839	2.745	0.881
Work experience during studies	0.232	0.422	0.197	0.398	0.145	0.352	0.156	0.363
Father w/ secondary educ	0.226	0.418	0.213	0.410	0.214	0.410	0.206	0.405
Father w/ tertiary educ	0.255	0.436	0.208	0.406	0.209	0.407	0.222	0.416
Demanding program*	3.689	0.860	3.596	0.846	3.513	0.796	3.565	0.841
Employer familiar with content*	3.183	1.003	3.104	1.021	3.109	1.055	3.098	1.029
Freedom to compose program*	2.912	1.137	3.006	1.105	2.990	1.080	2.970	1.090
Program w/ broad focus*	3.543	0.988	3.597	1.001	3.568	1.015	3.643	1.010
Vocationally oriented*	2.699	1.040	2.624	1.034	2.629	1.055	2.561	1.040
Academically prestigious*	3.017	1.147	2.835	1.151	2.689	1.132	2.813	1.149
Entrepreneurial program*	2.717	1.193	2.626	1.194	2.580	1.211	2.534	1.198
N. Observations	2780	–	1026	–	669	–	756	–

All variables are dummies, except age and those marked with *, which are measured between 1 and 5.

Table 2 also reports the descriptive statistics of the individuals that were mismatched in the first job (over-educated, horizontally mismatched, or over-skilled) reporting each category in a separate column. We can see that among those over-educated, around 60% were also horizontally mismatched and over-skilled. Close to 50% manage to exit over-education after 5 years. Among those individuals that were horizontally mismatched in the first job, 90% were also over-educated, while 76% were over-skilled. About 51% of the horizontally mismatched individuals exit this situation after 5 years. Finally, the sample of over-skilled individuals has an 80% of individuals that are over-educated, and 67% are horizontally mismatched. After 5 years of graduation, 65% of those individuals that were over-skilled stop being so.

We use a probit specification to investigate both, the probability of being mismatched in the first job after graduation, and the probability to exit mismatch.

$$\Pr(y = 1 | x) = x\beta + \varepsilon.$$

The vector x includes the program characteristics described above, and the controls such as gender, age, average grade in secondary education, whether it was a long program (licenciatura), work experience during the studies, education level of the father, and fields of study.

4 Results

4.1 Mismatch in the First Job

Table 3 reports the marginal effects of the estimation of the probability to get mismatched in the first job in Spain. We evaluate three types of mismatch: over-education, horizontal mismatch and over-skills. The first three estimations use the program characteristics as reported by the respondents. Instead, the last three estimations use the empirical Bayes prediction as program characteristics. In all cases the program characteristics have been standardized with zero mean and variance equal to 1. This way we can compare the value of the marginal effects across estimations.

Table 3: Probit marginal effects. Dependent variable: Mismatch in the first job (OE: over-education, HM: horizontal mismatch, OS: over-skilled).

	OE1	HM1	OS1	OE2	HM2	OS2
Demanding program	−0.002 (0.011)	−0.014 (0.010)	−0.007 (0.010)	0.011 (0.021)	−0.029 (0.019)	−0.018 (0.020)
Employers familiar with it	−0.006 (0.010)	0.002 (0.009)	−0.007 (0.009)	0.015 (0.014)	0.015 (0.010)	0.017 (0.011)
Free to choose path	0.006 (0.009)	−0.000 (0.009)	−0.000 (0.009)	0.018 (0.012)	−0.002 (0.011)	0.006 (0.011)
Broadly oriented	0.016 (0.012)	0.010 (0.011)	0.015 (0.012)	0.033 (0.021)	0.026 (0.019)	0.051*** (0.017)
Vocationally oriented	−0.001 (0.013)	0.006 (0.012)	−0.011 (0.012)	0.010 (0.023)	0.032 (0.020)	0.025 (0.019)
Prestigious program	−0.024** (0.011)	−0.038*** (0.011)	−0.022** (0.011)	−0.043* (0.025)	−0.040* (0.021)	−0.032 (0.021)
Entrepreneurial program	−0.009 (0.009)	−0.017** (0.009)	−0.032*** (0.009)	−0.008 (0.013)	−0.035*** (0.011)	−0.025** (0.011)
Age	0.012*** (0.004)	0.010*** (0.003)	0.001 (0.004)	0.013*** (0.004)	0.011*** (0.003)	0.003 (0.004)
Female	0.025 (0.020)	0.029 (0.018)	−0.000 (0.019)	0.020 (0.018)	0.020 (0.018)	−0.010 (0.021)
Long program	0.058** (0.023)	0.004 (0.021)	0.001 (0.022)	0.055* (0.028)	0.013 (0.023)	−0.003 (0.024)
Grade secondary education	−0.059*** (0.010)	−0.058*** (0.010)	−0.041*** (0.010)	−0.058*** (0.010)	−0.057*** (0.010)	−0.037*** (0.010)
Previous work experience	−0.087*** (0.021)	−0.145*** (0.021)	−0.127*** (0.021)	−0.094*** (0.022)	−0.147*** (0.021)	−0.135*** (0.021)
Education	−0.021 (0.033)	0.004 (0.029)	0.003 (0.031)	−0.034 (0.045)	−0.020 (0.033)	−0.012 (0.036)
Humanities	−0.018 (0.034)	0.032 (0.030)	−0.049 (0.033)	−0.027 (0.050)	−0.008 (0.039)	−0.053 (0.043)
Science & Math	−0.048* (0.028)	−0.031 (0.025)	−0.058** (0.027)	−0.041 (0.035)	−0.031 (0.034)	−0.042 (0.033)
Engineering	−0.181*** (0.031)	−0.170*** (0.031)	−0.083*** (0.031)	−0.160*** (0.047)	−0.124*** (0.043)	−0.041 (0.043)
Agriculture & Vet	−0.175*** (0.047)	−0.053 (0.044)	−0.103** (0.047)	−0.178*** (0.057)	−0.046 (0.059)	−0.087 (0.058)
Health	−0.377*** (0.032)	−0.231*** (0.031)	−0.298*** (0.034)	−0.358*** (0.054)	−0.200*** (0.049)	−0.264*** (0.046)
Services	0.056 (0.102)	−0.122 (0.096)	−0.089 (0.095)	0.080 (0.093)	−0.122 (0.078)	−0.061 (0.104)
Father with secondary education	−0.064*** (0.022)	−0.020 (0.021)	−0.032 (0.022)	−0.061*** (0.021)	−0.020 (0.021)	−0.027 (0.023)
Father with tertiary education	−0.103*** (0.022)	−0.031 (0.020)	−0.043** (0.021)	−0.100*** (0.023)	−0.030 (0.020)	−0.038 (0.023)

Observations	2780	2780	2780	2780	2780	2780
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Cluster robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Reference category: Social Sciences. Columns (4) to (6) use empirical Bayes prediction for program characteristics.

Results reveal that having studied in a prestigious program reduces the probability to be over-educated and horizontally mismatched. The marginal effect increases when using the Bayes prediction. Although the prestigious program reduces the probability to be over-skilled in estimation (OS1), the effect is not significant when we use the Bayes prediction (OS2). Being in an entrepreneurial program does not change the likelihood of becoming over-educated in the first job, but it reduces the probability to be horizontally mismatched and over-skilled. These results hold when we use the Bayes prediction values, since the coefficients keep negative and significant.

The rest of variables have the expected sign. The average grade in secondary education reduces the likelihood of mismatch and more affluent parental background improves the graduate's entry in the labor market. With regards to the fields of study, Engineering, Agriculture and Health lead to less mismatch than Social Sciences. Finally, having had some work experience during the studies decreases the probability of mismatch.

For completeness, one could assume some causal relationship between the different types of mismatch. In particular, one could argue that being over-educated implies necessarily having too many skills for the job. Therefore, we include being over-educated as an explanatory variable in the skill-mismatch equation. Results are provided in Table 4. Having studied a prestigious program is not significant once we control for being over-educated. However, the effect of having studied in an entrepreneurial program keeps negative and significant.

Table 4: Probit marginal effects. Dependent variable: Over-skilled in the first job. Additional control: over-educated in the first job.

	Over-skilled	Over-skilled
Over-educated in 1st job	0.370*** (0.011)	0.372*** (0.012)
Demanding program	-0.005 (0.009)	-0.023 (0.017)
Employers familiar with it	-0.004 (0.008)	0.011 (0.009)
Free to choose path	-0.002 (0.008)	-0.001 (0.009)
Broadly oriented	0.008 (0.010)	0.034** (0.016)
Vocationally oriented	-0.011 (0.011)	0.019 (0.018)
Prestigious program	-0.013 (0.010)	-0.015 (0.017)
Entrepreneurial program	-0.028*** (0.008)	-0.022** (0.009)
Age	-0.004 (0.003)	-0.003 (0.003)
Female	-0.013 (0.017)	-0.021 (0.019)
Long program	-0.021 (0.020)	-0.023 (0.021)
Grade secondary education	-0.015* (0.009)	-0.012 (0.010)
Previous work experience	-0.083*** (0.019)	-0.089*** (0.019)
Father with secondary education	-0.002 (0.019)	0.002 (0.021)
Father with tertiary education	0.005 (0.019)	0.008 (0.020)
Observations	2780	2780

Cluster robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Column (2) uses empirical Bayes prediction for program characteristics. Other controls: Fields of study.

4.2 Exit Mismatch 5 Years Later

Table 5 reports the results of the second analysis of the paper. We study here the probability to exit mismatch. The dependent variable takes value 1 if the individual is not mismatched 5 years after graduation, and 0 if s/he keeps mismatched. As before, the first three estimations use the program characteristics as reported by the respondents, while the last three estimations use the empirical Bayes prediction instead. Again, we standardize all the program characteristics so that the marginal effects are comparable across estimations.

Table 5: Probit marginal effects. Dependent variable: Exit mismatch (OE: over-education, HM: horizontal mismatch, OS: over-skilled).

	OE1	HM1	OS1	OE2	HM2	OS2
Demanding program	-0.005 (0.019)	0.033 (0.024)	-0.015 (0.021)	-0.045* (0.026)	-0.085*** (0.032)	-0.082** (0.034)
Employers familiar with it	-0.000 (0.016)	0.025 (0.019)	-0.017 (0.018)	-0.035** (0.014)	-0.020 (0.018)	-0.030* (0.017)
Free to choose path	0.023 (0.016)	-0.037* (0.020)	0.014 (0.018)	-0.018 (0.016)	-0.082*** (0.020)	-0.036* (0.019)
Broadly oriented	-0.010 (0.021)	0.003 (0.027)	0.011 (0.025)	0.030 (0.025)	0.009 (0.033)	-0.016 (0.029)
Vocationally oriented	-0.041* (0.022)	-0.055** (0.027)	-0.025 (0.026)	0.041 (0.029)	0.034 (0.035)	-0.003 (0.032)
Prestigious program	0.036* (0.019)	0.025 (0.023)	0.035 (0.022)	0.076** (0.030)	0.089** (0.037)	0.033 (0.033)
Entrepreneurial	0.025 (0.016)	0.030 (0.019)	0.057*** (0.018)	0.011 (0.015)	0.031* (0.018)	0.056*** (0.019)
Age	-0.007 (0.006)	-0.010 (0.007)	-0.009 (0.007)	-0.009 (0.006)	-0.011 (0.007)	-0.011 (0.007)
Female	-0.122*** (0.034)	-0.045 (0.043)	-0.038 (0.039)	-0.126*** (0.032)	-0.036 (0.042)	-0.046 (0.036)
Long program	-0.119*** (0.039)	0.061 (0.049)	0.016 (0.043)	-0.129*** (0.038)	0.083* (0.050)	0.054 (0.048)
Grade secondary education	0.016 (0.019)	-0.022 (0.024)	-0.006 (0.022)	0.019 (0.018)	-0.019 (0.026)	-0.001 (0.023)
Previous work experience	0.121*** (0.038)	0.163*** (0.055)	0.074 (0.049)	0.133*** (0.038)	0.185*** (0.051)	0.096** (0.047)
Education	-0.037 (0.053)	-0.002 (0.064)	-0.040 (0.057)	-0.029 (0.053)	-0.008 (0.070)	-0.081 (0.068)
Humanities	0.037 (0.058)	-0.143** (0.068)	-0.011 (0.069)	0.063 (0.058)	-0.125* (0.073)	-0.023 (0.077)
Science & Math	0.129*** (0.047)	-0.034 (0.058)	0.031 (0.053)	0.128** (0.053)	-0.022 (0.055)	0.077 (0.057)
Engineering	0.150** (0.060)	0.185** (0.083)	0.027 (0.065)	0.098 (0.077)	0.119 (0.087)	0.094 (0.084)
Agriculture & Vet	0.169* (0.095)	-0.062 (0.105)	0.053 (0.101)	0.185** (0.087)	-0.011 (0.079)	0.124 (0.097)
Health	-0.039 (0.077)	-0.072 (0.087)	0.015 (0.085)	-0.045 (0.091)	-0.090 (0.103)	-0.027 (0.084)
Services	-0.313** (0.145)	0.000 (.)	-0.550*** (0.208)	-0.334*** (0.114)	0.000 (.)	-0.561*** (0.209)
Father with Secondary education	0.046 (0.039)	-0.000 (0.049)	0.034 (0.044)	0.042 (0.039)	0.006 (0.056)	0.027 (0.048)
Father with tertiary education	0.049 (0.040)	0.069 (0.049)	0.071 (0.045)	0.045 (0.041)	0.049 (0.042)	0.059 (0.041)
Observations	1026	664	756	1026	664	756

Cluster robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; Reference category: Social Sciences. Columns (4) to (6) use empirical Bayes prediction for program characteristics.

The only program characteristics with a positive and significant coefficient are the prestige of the program and its entrepreneurial character. If we look at the Bayes prediction results, individuals that became over-educated or horizontally mismatched in the first job after graduation are more likely to get a matching job after 5 years if they studied in a prestigious program. Similarly, having studied in an entrepreneurial program helps exit horizontal mismatch and an over-skilled job in Spain. Note that in the regressions that use the program characteristic as reported by the respondent (estimations OE1, HM1 and OS1) the significance of the variables is much lower than when we use the Bayes prediction. In all these regressions we use subsamples of individuals that were mismatched in the first job, so their evaluations of the programs will be more biased than in the general sample. This can explain the differences between using the reported measure or the Bayes prediction.

While prestige of the program and its entrepreneurial character are good to exit a mismatch situation, other program characteristics, such as demanding program, employer's familiarity with the content, and freedom to choose path in the university studies, all decrease the probability to exit a mismatched situation.

Apart from program characteristics, labor market experience and graduating from Science and Mathematics, Engineering or Agriculture helps exit over-education. Moreover, women are less likely to change from an over-educated to a matched position. The other types of mismatch (horizontal and skill mismatch) are not affected by gender or fields of study.

One could wonder how exiting one mismatch dimension affects the other two dimensions of mismatch. In Table 6 we provide descriptive statistics to show that exiting one mismatch dimension goes often together with exiting other mismatch dimensions. We also show that only a small fraction of the sample that exits some mismatch becomes mismatched in a different dimension. This suggests that exiting some mismatch leads in general a better outcome in all dimensions. Only finding a job where individuals are horizontally matched or with the right skills might worsen their situation in terms of over-education for some cases (10–15 % of cases).

Table 6: Destinations of those that exit mismatch.

		Among those that exit ...		
		Over-education	Horizontal mismatch	Over-skilling
also exit:	Over-education	100 %	74.76 %	66.24 %
	Horizontal mismatch	86.84 %	100 %	73.95 %
	Over-skilling	66.24 %	88.12 %	100 %
become ...	Over-educated	0 %	10 %	15.15 %
	Horizontally mismatched	2.56 %	0 %	5 %
	Over-skilled	4.61 %	2.53 %	0 %

5 Conclusions

The determinants and effects of education-labor mismatch have been largely studied in the literature. A current debate in higher education is to define which competences should be developed during studies. In addition, entrepreneurial skills have been analyzed in relation to the likelihood of enterprising and creating new businesses. In this paper, we study the relationship between the entrepreneurial program and education-job mismatch. We argue that those university programs that develop entrepreneurial skills help individuals find a good job match. Our results confirm this hypothesis.

We contribute to the literature on mismatch by analyzing the effect of graduating from an entrepreneurial program on the likelihood of being over-educated, horizontally mismatched or over-skilled in the first job in Spain. We also demonstrate the importance of these skills in helping individuals exit this situation. Results show that having studied an entrepreneurial program is important to avoid being mismatched in the first job and contributes to individuals' propensity to find a matching job once mismatched in the first job.

We add an additional motive to promote entrepreneurial skills in the population that goes beyond the entrepreneurial activity by itself. Therefore, our results reinforce the support for policies devoted to the introduction of entrepreneurial education. An important question that we do not address in this paper is which type of entrepreneurial education is more effective in improving the labor market match of individuals.

Our results have potentially far-reaching consequences given the high level of mismatch in Spain (42 % in our sample) for both, human capital's productivity opportunity cost, as well as for workers' individual careers. Education-labor mismatch also affects negatively the labor productivity (McGowan and Andrews 2017). Introduction of entrepreneurial skills into higher education curricula should help diminish the mismatch problem in Spain and perhaps other countries with similar education-job market setups.

Recent policy recommendations include lowering relocation costs, improving flexibility in wage bargaining, and enhancing life-long learning as possible remedies to long-lasting labor mismatch (McGowan and Andrews 2015). We find evidence in favor of fostering entrepreneurial skills within the education system.

From the point of view of policy analysis, we provide evidence that when assessing the impact of entrepreneurial education programs on individuals labor market outcomes, one must consider a broad set of outcomes, not all of them directly related to the entrepreneurial activity.

Notes

1 Verhaest and Omeij (2006, 2010) provide a comparison across different definitions and measurements of mismatch (job analysis, self-assessment, and statistical measure). According to their findings, when overeducation is self-assessed, it might reflect skill mismatch or the expectations and ambitions of individuals apart from objective over-education.

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