University-supported job search methods and educational mismatch in bachelor's and master's graduates

Cecilia Albert

Departamento de Economía, Universidad de Alcalá, Madrid, Spain, and

Maria A. Davia

Economía Española e Internacional, Econometría e Historia e Instituciones Económicas, Universidad de Castilla-La Mancha, Ciudad Real, Spain

Abstract

Purpose – This paper addresses the relevance of job search methods and strategies in determining vertical mismatch and the risk of underusing skills or knowledge in first jobs amongst graduates from bachelor's and master's programmes in Spain. Support from universities (via internships and career services) is compared to support from public institutions and informal strategies.

Design/methodology/approach – The authors use the 2019 University Graduate Job Placement Survey. The dependent variables are estimated with a bivariate probit model with sample selection on a subsample of graduates who were not working at graduation.

Findings – Internships and university career employment offices significantly improve the quality of first job matches. Job banks and public examinations also contribute to finding well-matched first positions, while for public employment services, results are mixed. When the job search is not supported by institutions, graduates generally do worse finding their first jobs, particularly when temporary employment agencies are involved. There are also large differences in mismatch risks across fields of study.

Practical implications – If more graduates found their first jobs through internships and university job placement services, educational mismatch rates would decrease substantially. Further collaboration between universities and employers for the provision of high-quality internships may foster their conversion into regular, well-matched jobs. Industrial policies addressed to knowledge-based economic activities would enhance the creation of highly skilled positions. Further orientation towards STEM degrees is required to improve imbalances between supply and demand for graduate labour in Spain.

Originality/value – Evidence about education mismatch among master's degree graduates is very scarce. This paper compares them to bachelor's degree graduates. It addresses two complementary types of education mismatch and takes into account potential self-selection into post-graduation job search.

Keywords Vertical mismatch, Underuse of skills or knowledge, Job search methods, Master's programmes, Bachelor's degrees

Paper type Research paper

1. Introduction

The supply of highly qualified workers has increased faster than its demand in Spain and other European countries in recent decades. As a result, more common educational and skill

mismatches are observed in the graduate labour market (Muñoz de Bustillo *et al.* 2018; Green and Henseke, 2021). They are often persistent, even trapping (Meroni and Vera-Toscano, 2017) and result in pay penalties, eroding graduates' job satisfaction, among other outcomes (Sloane and Mavromaras, 2020). To palliate the mismatches, higher education institutions have specific programmes that help graduates to find well-matched positions and acquire relevant skills to meet employers' needs and expectations. Public employment services may also offer intermediation and counselling to recent graduates in the pursuit of adequate positions. Other job strategies cover an array of formal and informal channels to access information about available vacancies and make one visible to prospective employers.

This paper intends to identify job search strategies that improve job match quality in the early stages of bachelor's and master's graduates' professional careers in Spain. We pay particular attention to institutional bridges built by universities and other institutions to support graduates' job search, in line with prior evidence for other countries. Precisely, the effectiveness of universities' internships and placement services will be compared to that of other institutionally supported channels and informal strategies. The former comprise public employment services (PES), job banks and public entry examinations; the latter consist of exploring ads in the mass media, browsing the internet, contacting the employer directly or via personal contacts and self-employment. In this way, we provide a comprehensive picture of the means by which graduates seek their first jobs, what eases transitions into well-matched positions and how universities and other institutions may ease them.

This research contributes to prior evidence by studying both bachelor's and master's graduates. This is quite unusual since most datasets cover only bachelor's degree graduates, but the University Graduate Job Placement Survey (EILU-2019, *Encuesta de Inserción Laboral de los Titulados Universitarios*) allows for such a comparison. This adds interesting results to those obtained in Albert and Davia (2018), Rodríguez-Esteban *et al.* (2019), Di Meglio *et al.* (2022) and Salas-Velasco (2021), who exploit the previous EILU wave in 2014, when master's graduates were not interviewed.

We also contribute to prior literature by addressing both vertical mismatch (overeducation) and the risk of underusing skills or knowledge. The former entails a mismatch concerning the level of education needed to land the job, while the latter is more related to the content of the job and refers to the comparison of the worker's skills and abilities learnt in her degree course with the content of her first job. Overeducation, particularly among the graduate labour force, has been heavily analysed in developed countries (Quintini, 2011; Sloane and Mavromaras, 2020), while underuse of skills or knowledge (surveyed in Somers *et al.*, 2019) is a less-known outcome. By studying both, we hope to contribute to policy-relevant findings if some institutions or job search strategies are found to be more effective than others at reducing the risk of mismatch.

Finally, the analysis of job search methods and strategies for graduates may be blurred as some graduates do not really look for a job upon graduation: they are already employed at graduation and just remain in that job for some time. Our results are nuanced by controlling for potential selection bias in the study of post-graduation job search, one that can effectively be supported by the institutional channels and bridges we focus on.

The content of the paper is as follows: in section 2, we derive working hypotheses from the main theoretical approaches in the study of educational mismatch and the related literature; in section 3, we present the dataset and the definition of our dependent variables, along with the main mismatch risks associated with different job search methods; in section 4, we present our multivariate strategy and discuss our main results. The conclusions aim to guide universities and other institutions in supporting graduates' search for well-matched positions while warning graduates about the risks of using informal channels to find well-matched positions. Our results should also help graduates overcome circumstances that dissuade many of them from studying certain fields of education.

2. Background and hypotheses

Educational mismatch has largely been explained by imperfect information and information asymmetries in the labour market (Stigler, 1962): graduates may overinvest in human capital as a way to demonstrate their abilities to prospective employers. The latter interpret candidates' educational credentials as indicative of their skills, knowledge and productivity when screening the market in search of the best candidates for their vacancies (Doeringer and Piore, 1971; Arrow, 1973; Spence, 1973). They do this regardless of the qualification needed to carry out the tasks comprising the job, as explained in Turmo-Garuz *et al.* (2019). This overinvestment increases graduates' chances of becoming employed when the supply of a qualified labour force is greater than its demand, which perpetuates cycles of education mismatch (Habibi and Arnold, 2021). Educational mismatch is not only costly for students, their families and society as a whole but also inefficient as it implies underuse of skills and knowledge. In ill-matched jobs, graduates' productivity and wages are well below optimal.

In a similar fashion, in job competition theory (Thurow, 1975; Duncan and Hoffman, 1981), employers take education levels as indicators of potential employee training costs. Training highly educated candidates is expected to take less time and fewer resources. Employers will rank candidates for the available positions according to their training costs instead of the qualification required for the job, making overinvestments in education a sensible, though costly, decision. Furthermore, if professional careers rather than specific jobs are considered, recent graduates who accept jobs for which they are overeducated might be following a strategy to acquire specific human capital to later climb the occupational ladder towards well-matched positions (Sicherman and Galor, 1990).

Graduates may reduce their chances of confronting mismatched job offers by deciding how to seek information about available vacancies and to communicate or demonstrate their abilities to prospective employers. For this aim, they can seek support from relevant institutions (their university, public employment services, etc.) or just use informal channels that are available to all types of job seekers. In this paper, the effectiveness of a wide array of strategies will be measured by their ability to reduce overeducation and the underuse of skills or knowledge in graduates' first job. They will be clustered into three main categories: (1) those supported by universities (internships [1] and job placement services); (2) those supported by public institutions other than universities (public employment services (PES), job banks and public examinations); and (3) those in which individuals do not receive support from institutions (ads in media and the internet, contacting the employer directly or indirectly —via personal contacts and using temporary work agencies). Two residual categories, self-employment and being contacted by the employer, are also considered. Finally, some graduates also report "other ways" to access their first job. This last option is considered for the sake of exhaustiveness, but it is not possible to formulate hypotheses about its effectiveness in reducing first job mismatch risks.

The abovementioned job search strategies differ as regards the quality of the information they provide to graduates and employers. This depends, among other things, on how exclusive they are to university graduates and how accessible they are to all sorts of job seekers. They also differ as regards the types of vacancies employers tend to fill through them. The more specific and better targeted the information obtained with a certain method or strategy, the better the expected outcomes for graduates who employ it will be. Accordingly, the easier (less exclusive) access to a certain job search method is, the worse its expected outcomes will be. Also, the more likely employers are to fill vacancies with high qualification requirements through a given channel, the lower their associated mismatch risks will be. From these premises, our hypotheses concerning the effectiveness of job search strategies in reducing mismatch risks may be formulated as follows.

H1. Job search methods supported by universities (via internships and university placement services) will be the most effective for reducing mismatch risks. The quality of the information they provide to both graduates and prospective employers is optimal compared to that of other institutions and job search methods (Carroll and Tani, 2015); moreover, employers often use internships as a way to screen candidates for highly qualified positions (Di Meglio *et al.*, 2022). Also, there is a broad consensus in the international literature on the effectiveness of university careers services in improving graduates' job match quality: see Blázquez and Mora (2010) in Catalonia; Carroll and Tani (2015) in Australia; McGuinness *et al.* (2016) in 11 EU countries; Di Meglio *et al.* (2022) in Spain; Li *et al.* (2018) in Australia and Varshavskaya and Podverbnykh (2021) in Russia.

H2. Public employment services will effectively reduce first job mismatch risks but to a lesser extent than universities; they are not specialised in the graduate labour market, and their awareness about graduates' abilities and knowledge can never be as good as in higher education institutions. Moreover, some employers may avoid using this job search channel for highly qualified positions if they fear that low-ability graduates will use public services rather than universities. Some empirical evidence grounds this claim: Kucel and Byrne (2008) found that state employment offices —and informal networks —in the UK were more related to poor-quality matches than advertisements and even private employment agencies.

H3a and H3b. Other job search strategies linked to public institutions (job banks and public entry examinations) rank graduates according to their skills and abilities in order to fill a limited number of (usually highly qualified and stable) positions with the best ranked candidates. Inasmuch they cream the most able graduates, they are expected to reduce overeducation risks (H3a). Sometimes the content of the jobs channelled by job banks and public exams is not related to the graduate's specialisation, but some graduates are happy to accept a job mismatch in exchange for stable employment. Therefore, these job search strategies might increase the risk of underusing skills or knowledge (H3b). Evidence does not always support this hypothesis: Blázquez and Mora (2010) find the greatest overeducation risks in the first years after graduation for graduates entering their first job via public entry examinations in Catalonia. However, Albert and Davia (2018) found that public employment services contributed to reducing both overeducation and knowledge underutilisation risks in a sample of graduates from EILU-2014 that was representative of the whole Spanish university system.

H4. Job search methods not supported by institutions are expected to increase graduates' mismatch risks because of the poor quality of the information they channel to both candidates and prospective employers. This applies to posting ads in the media and the internet and contacting the employer directly or via personal contacts. Still, empirical evidence does not always support this assumption: Blázquez and Mora (2010) found that using personal networks and advertisements were related to lower overeducation risks in Catalonia. In Switzerland, Franzen and Hangartner (2006) found better matches in graduates who used contact networks or contacted employers directly than in those who used formal search methods, and in Australia, approaching the employer directly and through networks helped to avoid mismatch (Li *et al.*, 2018). A similar outcome has recently been found in Russia for contacting the employer, but not so much for social networks (Varshavskaya and

Podverbnykh, 2021). Moreover, since employers often use temporary work agencies (TWA) to fill vacancies with low qualification requirements, TWAs are particularly likely to drive graduates into the poorest matches. The evidence corroborates it in Catalonia (Blázquez and Mora, 2010), Australia (Li *et al.*, 2018) and in a set of EU countries drawn from the REFLEX (Flexible Professional in the Knowledge Society) (McGuinness *et al.*, 2016).

H5. Because employers often use university placement offices and employment-related institutions to cherry-pick the best candidates (McGuinness *et al.*, 2016), those who are approached by employers may be considered very good candidates who will be offered well-matched positions after having been screened via university-related channels. We can therefore expect graduates who report having accessed their first job by being contacted by their employer to be well sheltered from any kind of mismatch.

H6. Self-employed workers are expected to suffer less educational mismatch since they aim to provide themselves, whenever possible, with a proper first job, for which they need quite varied or transversal skills (Shevchuk *et al.*, 2015). However, self-employment can also be a shelter from unemployment for graduates who were not able to find a dependent job (Dvouletý and Lukeš, 2016). We expect self-employment to be related to higher mismatch risks —in line with Bender and Roche (2013) —under the premise that self-employment in recent graduates will be driven by necessity rather than by opportunity: they probably lack experience and resources to launch a successful entrepreneurial project and just use self-employment to shelter against unemployment.

Regardless of the strategy used to look for the first job upon graduation, information asymmetries in the graduate labour market will vary across fields of study (Kucel and Byrne, 2008). University certificates in STEM (Science, including Health, Technology, Engineering and Maths) fields provide more reliable indicators of knowledge and skills than social sciences, humanities and arts. The latter are less occupational specific, as most evidence confirms (among others, Verhaest and Omey, 2010). Graduates from certain fields of education may also be particularly affected by mismatch if there is an oversupply of the labour force in those fields, like humanities and arts and also—to a lesser extent—social sciences and law (Salas-Velasco, 2021).

3. Data, indicators and statistic model

(1) Dataset and sample selection

In this paper, we use quantitative information from the most current data provided by the University Graduate Job Placement Survey, EILU-2019. This is the second wave of a quadrennial survey conducted by the Spanish National Institute of Statistics, designed mainly to determine the employment situation of university graduates and the various aspects of their access to the labour market. EILU-2019 provides academic and labour market-related information from individuals who graduated from all Spanish universities in 2014. Two separate random samples of graduates were analysed: Bachelor's degrees (31,651 observations representing nearly 233,000 graduates) and Master's programmes (11,483 observations representing nearly 60,000 graduates), all of them fully framed in the new European Higher Education Area (EHEA). These graduates entered the labour market after the Great Recession and their observed average mismatch levels are somewhat lower than those for students who graduated in 2010 (for a comparison of both EILU waves, see

Pérez Navarro, 2021). A detailed description of the dataset is displayed in the methodological guidelines provided by the National Statistical Office (INE, 2020).

We keep observations of graduates who report at least one job since graduation —around 98% of each subsample. To refine our target population, in the mismatch equations, we eliminate observations which correspond to interviewees who declared that in their first job as graduates they just continued, for at least six months, in the position they already held at graduation. They account for 28 and 42% of the sample in bachelor's and master's programmes, respectively. We believe these graduates did not really need to look for a first job and the job search methods they report [2] were not necessarily intended to find an adequate position. Since these graduates are not a random subsample of the initial one, we control for potential sample selection in our multivariate analysis.

After selecting observations with valid values in all variables involved in the multivariate analysis, the final samples retain 94% of the original observations. They consist of 28,826 observations of bachelor's graduates —22,525 of whom were not employed or did not continue working at the job they held at graduation —and 10,588 observations of master's graduates (with 6,588 selected as effective job seekers upon graduation).

(2) The incidence of job mismatch across job search methods

Based on graduates' own perception about the quality of their first job match [3], we identify two varieties of mismatch: vertical mismatch (overeducation) and underuse of skills or knowledge, which are complementary (McGuinness *et al.*, 2018). The first one refers to the level of qualification interviewees consider adequate to perform the tasks of their jobs, while the second refers to whether the interviewees believe the content of their programme was not useful in their job; i.e., it refers to the design of the contents of the bachelor's and master's degree programmes. We estimate both dimensions of mismatch in a simultaneous framework, aiming to find nuances in the profile of job mismatch risks that just one dimension would not detect.

The two types of mismatch risk are defined as follows in the EILU-2019.

(1) *Vertical mismatch (Overeducation)*: interviewees were asked: "In your opinion, what is the most appropriate level of qualifications for this (first) job?" In their answer, they could choose seven educational levels ranging from compulsory studies to PhD. *Vertical mismatch* was identified when graduates reported the required level for their first job was below their own. This held true for 34.8% of bachelor's and 68.4% of master's graduates.

(2) *Underuse of skills or knowledge* is identified when interviewees replied affirmatively to the question "Did this (first) job make use of the knowledge and skills acquired in your (bachelor's/master's) studies?" They accounted for 30.7% of bachelor's and 42.2% of master's graduates and are considered to *underuse* their knowledge and skills in their first job. This definition is more specific than the one commonly used in the literature about underskilling, where workers compare their jobs with all their skills and abilities (acquired in a classroom or in a work environment). It is also more focused than the definition of horizontal mismatch**,** which occurs when graduates are employed in occupations that are not related to their main field of study (for a further review of the concept and measures of skills mismatch**,** see McGuinness *et al.*, 2018).

Table 1 shows the incidence of all the job search methods and strategies explained above and the distribution of graduates by broad fields of study and their corresponding incidence of both types of first job mismatch.

The most widespread methods graduates use to find their first jobs are not supported by institutions: about one-third of them declared having contacted their employer directly or via

Subsample of those who had to effectively look for a job	Share (%)	Bachelor Vertical mismatch	Skills/ knowledge	Share (%)	Master Vertical mismatch	Skills/ knowledge
All interviewees	*100*	0.348	0.684	*100*	0.307	0.422
(1) University internships and job placement services						
Remained in the internship held at graduation	*9.0*	0.212	0.498	*7.8*	0.160	0.165
University job placement service	*11.1*	0.222	0.545	*10.8*	0.199	0.256
(2) Other institutional support						
Public employment services	*9.3*	0.358	0.736	*10.6*	0.295	0.455
Job banks	*9.4*	0.277	0.689	*9.6*	0.257	0.376
Prepared a public examination	*11.9*	0.256	0.719	*10.4*	0.242	0.364
(3) Individual job search methods						
Advertisements in newspapers and the internet	*33.1*	0.410	0.740	*31.0*	0.361	0.491
Temporary work agencies	*5.5*	0.616	0.906	*4.0*	0.525	0.641
Contacting employer directly or via relatives, friends, etc.	*37.7*	0.404	0.719	*32.6*	0.343	0.468
Residual categories						
Contacted by the employer	*19.4*	0.328	0.668	*15.8*	0.276	0.370
Self-employment	*3.8*	0.288	0.648	*3.4*	0.248	0.391
Other methods	*2.5*	0.289	0.486	*4.1*	0.293	0.287
Fields of study						
Education	*17.79*	0.462	0.679	*27.60*	0.377	0.448
Humanities and Arts	*8.48*	0.487	0.688	*7.24*	0.434	0.548
Social and Behavioural Sciences	*9.09*	0.439	0.773	*11.65*	0.436	0.519
Business Administration and Law	*20.22*	0.365	0.698	*15.82*	0.331	0.340
Sciences	*5.24*	0.368	0.520	*7.59*	0.358	0.367
IC Technologies	*2.98*	0.339	0.647	*1.66*	0.134	0.283
Engineering and Architecture	*16.76*	0.263	0.688	*9.02*	0.262	0.362
Agriculture and VETs	*1.74*	0.298	0.696	*0.95*	0.236	0.426
Health and Social Sciences	*14.37*	0.140	0.696	*10.55*	0.120	0.367
Other services	*3.34*	0.563	0.748	*7.90*	0.351	0.433
Observations		22,525			6,588	

Source(s): 2019 University Graduate Job Placement Survey (INE)

family or friends or having browsed job offers in the newspapers or the internet. These methods register very high values in mismatch risks, with top mismatch rates for those who had found their first job through a TWA. Fortunately, the latter is a very minoritarian subgroup of graduates.

Job search methods related to universities are linked with the lowest incidence of vertical mismatch and underuse of skills or knowledge, but their incidence is quite low: less than one-

tenth of graduates declared their first job was a continuation of the internships in which they were immersed at the moment of graduation, and a similar proportion found their first job through their university job placement services. Public institutions (job banks and public exams) are key to a similar share of graduates (around 10%) and are associated with mismatch risks lower than the average, while a similar proportion of graduates who declared having found their first job through PES were not featured by levels of mismatch lower than the average.

Interestingly, a non-negligible proportion of graduates (19.4% of bachelor's and 15.8% of master's) reported being contacted directly by their first employer. Presumably, this would happen as a result of other job search strategies, which can be either supported by institutions or informal. Still, graduates contacted by employers seem not to be particularly protected from mismatch. Furthermore, the very small share of graduates (less than 4%) who set up their own business to start their professional careers reported a slightly lower incidence of vertical mismatch and underuse of skills or knowledge than the average in the bachelor's subsample only.

There are very relevant differences in the extension of mismatch across fields of education, with peak values in arts and humanities, followed by social sciences and law. The latter happens to be the majoritarian group in both bachelor's and master's graduates. STEM disciplines register better outcomes, though not so much amongst master's graduates, with bachelor's graduates in health sciences particularly protected against mismatch risks.

(3) Multivariate analysis

Our multivariate strategy consists of a bivariate probit model with control for sample selection. In a fashion similar to Li *et al.* (2018), both risks of mismatch are jointly estimated to take into account the potential presence of unobserved features —in employers, jobs or graduates —that influence both risks. However, since the bivariate probit is estimated on a particular subsample, a binary probit is estimated first to take into account the potential non-randomness in that selection. The subsample is defined by interviewees who were not employed or their first job after graduation did not consist merely of continuing for at least six months in the job they held at graduation.

The system is therefore made up of three equations: one selection equation (equation # 1) and two main equations that predict vertical mismatch (equation # 2) and underuse of skills or knowledge (equation # 3), which are the focus of this paper. The estimated outcomes are assumed to follow a multivariate normal distribution. The three error terms in the equation system described above would be intercorrelated if mismatch risks and the likelihood of looking for a job upon graduation were affected by common non-observed forces. Cross-correlation across the errors in the bivariate probit is identified as ρ_{23}, whereas cross-correlation between the selection equation and the equations that comprise the bivariate probit will be ρ_{12} and ρ_{13}, respectively. If significant, the multi-equational approach would produce consistent and efficient estimators for all structural parameters, overcoming those from two independent binary probit models. We perform our estimations with the Stata module to implement the conditional (recursive) mixed process estimator, **cmp** (Roodman, 2011).

As regards the specification, in the selection equation (equation # 1), the set of explanatory variables includes both personal and academic features that explain the proneness to effectively look for a job upon graduation: gender, age, foreign-born interviewees or their parents, parental educational attainment, the interviewee's holding a bachelor's or master's degree previous to the one she was being interviewed about and the motivation to study that bachelor's or master's programme. We expect older graduates and those with previous degrees along with those who studied just for personal motivations to be more likely to be already at work upon graduation. We also expect graduates from a migrant or low qualified background to be more in need of work while studying.

The main covariates in the mismatch equations (# 2 and # 3) are the 11 dummy variables that identify job search methods/strategies. We also display the field of education to show how relevant this is and to explain job mismatch risks. The results for an exhaustive set of control variables will not be displayed for reasons of space: demographic and interviewee family characteristics (gender and age); academic characteristics (type of university, geographical mobility during studies, scholarships and internships held); characteristics of the first job after graduation (professional status and type of contract; full-time/part-time) and other features of the job search (time elapsed between graduation and the first job and whether the job search started before or after graduation).

Table A1 in the Annex displays the average values of all these explanatory variables in selection and mismatch equations.

4. Results and discussion

The results for the multivariate analysis, expressed as average marginal effects, are displayed in Table 2. (results for equation #1, sample selection) and in Table 3 (mismatch equations, #2 and #3).

Table 2 describes the profile of graduates whose first job was not just a continuation of the one they held at that moment, either because they did not have a job at that moment or because it came to an end at graduation. Women are more likely to belong to this group in the bachelor's degree subsample, while there are no relevant differences across genders in master's graduates. As expected, younger graduates are more likely to be selected in both subsamples, along with those who obtained their first bachelor's or master's degree in 2014. Similarly, those whose motivations to pursue the degree were not employment-related had

	Bachelor	Master
Gender (ref: male)		
Female	−0.0186***	−0.0094
Age at graduation (ref: over 30 years old)		
Under 25 years old	0.3658***	0.4303***
25–29 years old	0.2511***	0.2673***
First-time graduate (ref: yes)		
NO: the graduate had a previous degree	−0.0975***	−0.0047
Graduate's main motivation for pursuing her degree (ref: improving her possibilities in the labour market)		
Personal ambition/increasing one's knowledge	−0.0299***	−0.1325***
Other motivations	−0.0121	−0.1027***
Graduate's and her parents' country of birth (ref: all Spanish-born)		
Graduate born in Spain from non-Spanish-born parents	−0.0029	−0.0170
Graduate and parents born abroad	0.0319**	0.0427***
Parents' higher education attainment (ref: neither of the parents achieved compulsory education)		
Compulsory	0.0189**	0.0434***
General secondary education	0.0163*	0.0622***
Vocational training	0.0191**	0.0209
Higher education	0.0561***	0.0560***
Observations (selection equation)	28,826	10,588

Note(s): The indicators of quality of fit for the whole system of equations are displayed in Table 3
Bivariate *probit* models with sample selection (eq # 1)
Source(s): 2019 University Graduate Job Placement Survey (INE)

Table 2.
Marginal effects for determinants of not being employed at graduation (or not remaining in the job held at graduation)

	Bachelor		Master	
	Vertical mismatch	Skills/ knowledge	Vertical mismatch	Skills/ knowledge
(1) University internships and employment services				
Remained in the internship held at graduation	−0.0950***	−0.1238***	−0.1586***	−0.2183***
University job placement service	−0.0712***	−0.0666***	−0.1064***	−0.1343***
(2) Supported by other institutions				
Public employment services	−0.0067	−0.0303***	0.0415**	0.0091
Job banks	−0.0775***	−0.0475***	−0.0195	−0.0728***
Prepared a public examination	−0.0720***	−0.0433***	0.0344*	−0.0968***
(3) Individual job search methods				
Ads in newspapers and the internet	0.0571***	0.0458***	0.0442***	0.0628***
Temporary work agencies	0.1586***	0.1275***	0.2450***	0.1907***
Contacting employer directly or via contacts	0.0500***	0.0287***	0.0324**	0.0354**
Residual categories				
Directly contacted by employer	−0.0267***	−0.0241***	−0.0261*	−0.0536***
Self-employment	−0.0077	−0.0255	−0.0140	−0.0628*
Other methods	−0.0347*	−0.0128	−0.1373***	−0.1230***
Field of Study (ref: Education)				
Humanities and Arts	0.0420***	0.0547***	0.0641**	0.0562**
Social and Behavioural Sciences	0.0349**	0.0978***	0.1450***	0.0801***
Business Administration and Law	0.0089	0.0316***	0.1219***	−0.0005
Sciences	−0.0312**	0.0124	−0.0393	−0.0420**
IC Technologies	−0.0176	−0.1663***	0.1066**	−0.0794
Engineering and Architecture	−0.0843***	−0.0366***	0.1290***	−0.0230
Agriculture and VETs	−0.0930***	−0.0986***	0.1051**	0.0046
Health and Social Sciences	−0.2396***	−0.2014***	0.0697***	−0.0407*
Other services	0.1024***	−0.0024	0.1238***	0.0248

Quality of fit	Value	Prob > χ^2	Value	Prob > χ^2
Wald χ^2(102)	10376.19	0.0000	2852.53	0.0000
Log likelihood	−35031.55		−13579.37	

Correlations across errors	Value	St. error	Value	St. error
ρ_{31}	−0.1499	0.0503	0.0252	0.0735
ρ_{12}	−0.1872	0.0545	−0.0123	0.0789
ρ_{13}	0.7573	0.0069	0.5630	0.0175
Observations (mismatch equations, # 2 and 3)	22,525		6,588	
Observations (selection equation, # 1)	28,826		10,588	

Note(s): Bivariate probit models with sample selection (equations #2 and #3)
Source(s): 2019 University Graduate Job Placement Survey (INE). The list of control variables in educational mismatch equations are displayed in Section 3.c

Table 3.
Marginal effects for job search methods on vertical mismatch and underuse of skills or knowledge

lower chances of being in the selected sample (they were more likely to already have a job or further pursue their education just for personal reasons). As regards demographic and family characteristics, foreign-born graduates with foreign-born parents were also more likely to be in this group than Spanish-born graduates. Still, the really determining feature is parental

education, which is a proxy for family income: the probability of being in the selected subsample increases with parents' education attainment; family income contributes to graduates' postponing their job search until the moment of graduation.

Table 3 displays the average marginal effects of job search methods and fields of study on vertical mismatch and underuse of skills or knowledge in both subsamples of graduates. They describe the impact —in percentage points —of job search methods/strategies and fields of education on the average expected mismatch risks in the presence of the array of covariates enumerated in Section 3. The latter are not shown for reasons of space but are available upon request. In the following paragraphs, the most relevant findings will be discussed following the order of the hypotheses presented in Section 2.

H1. (job search methods supported by universities will reduce mismatch risks more than the other two groups of search strategies) is confirmed in both mismatch risks and both subsamples. First jobs derived from internships pose the lowest mismatch risks, followed by the ones obtained via career employment services. These results are in line with Blázquez and Mora (2010), McGuinness *et al.* (2016) and Albert and Davia (2018) for bachelor's graduates. Here they are extended to master's graduates.

H2. (Public institutions are expected to contribute to the quality of the first job match, but not as much as universities) is confirmed: finding the first job via PES is modestly effective at reducing the underuse of skills or knowledge in bachelor's graduates only and is associated with an increase in vertical mismatch among master's graduates. Maybe employers do not use PES to cover positions that require graduate education, but PES can be useful to cover vacancies with specific content where the specialisation of candidates is very relevant.

H3. (Using screening methods to access public sector jobs like job banks and preparing a public examination may reduce vertical educational mismatch risks at the expense of increasing the risks of underusing skills or knowledge) does not hold true. Both strategies contribute to reducing vertical mismatch and the underuse of skills or knowledge in bachelor's graduates while reducing only the latter risk in master's graduates. The result for overeducation is consistent with these methods, which rank candidates for positions for which bachelor's degrees are commonly required. In posts offered via job banks, candidates with master's degrees achieve higher positions in the ranking and are therefore more successful in getting the posts offered, although they might not need graduate education to carry out those jobs. The result for the second outcome may be explained by the fact that job banks and public entry exams are occupation-specific when channelling candidates into graduate jobs (examples would be positions in the public treasury and the judiciary system). In such contexts, they contribute to reducing underuse of skills or knowledge rather than increasing it.

H4. (Individual-driven job search methods are expected to increase mismatch risks) is confirmed for both mismatch risks and both subsamples. In line with McGuinness *et al.* (2016), the most scarring way to land one's first job is through TWA. Answering advertisements in newspapers and the internet is also related to higher mismatch risks, in line with part of the literature (see Blázquez and Mora, 2010; Carroll and Tani, 2015; Kucel and Byrne, 2008; McGuinness *et al.*, 2016 and Albert and Davia, 2018). Contacting the employer directly or via personal contacts is also correlated with higher mismatch rates than institutionally-supported methods/strategies but to a lesser extent than browsing ads and the internet. The information candidates get from (and exchange with) employers may be of higher quality than what they would obtain from ads in mass and social media.

H5. (Graduates contacted by employers will be well protected against mismatch) is partially confirmed. Being contacted by the employer is related to only a slight decrease in mismatch risks. Indeed, interviewees who were contacted by their employers did not always declare having used internships and career university services, which would have helped employers to identify them. Instead, they often declared having contacted prospective employers themselves and sometimes even having used public employment services. Employers may also screen candidates informally, through personal and professional contacts, to cover vacancies that do not require higher education but soft skills that some university graduates may lack (Hernández-March *et al.*, 2009; Osmani *et al.*, 2015). As a result, having been contacted by one's first employer is not a clear sign of either one's abilities or the quality of the posts offered and is not necessarily linked to significantly lower mismatch risks.

H6. (Self-employment —by setting up one's own business —is expected to increase educational mismatch risks) is not confirmed as the corresponding marginal effects are not significant. This result challenges our view that recent graduates become entrepreneurs by necessity rather than by opportunity. They might be supported by their families or obtain public resources or loans to launch their activity. Also, many professional activities do not require a large initial investment, just a computer and an Internet connection. This result calls for further analysis in future research.

The table also displays the results for fields of education, which are consistent with Salas-Velasco (2021), Rodríguez-Esteban *et al.* (2019) and Di Meglio *et al.* (2022) for bachelors: taking education as a reference, only bachelors from arts and humanities and social and behavioural sciences are more likely to be mismatched in their first job, while those from business administration and law also more likely to underuse their skills or knowledge. Most graduates in STEM fields are more protected against both mismatches. Those from health sciences, followed by graduates in engineering and architecture, are much less exposed to both risks than the rest. For master's graduates, the patterns of risks across fields of study are quite different, with many fields marked by higher overeducation risks than the reference category. This is because master's degrees in education are required to become a secondary school teacher. Interestingly, with the exception of arts and humanities and social and behavioural sciences, there are no particular differences in the risk of underusing skills or knowledge across fields of education. This result suggests that master's programmes are a useful tool for specialisation in a field of knowledge, although the market does not adequately value higher levels of skills.

5. Conclusions
This paper estimates the efficacy of a broad array of job search strategies for reducing vertical mismatch and the underuse of skills or knowledge in the first job for bachelor's and master's graduates in Spain. Our results contribute to previous evidence on the returns to university-supported job search strategies, which are shown to be the most effective at palliating education mismatch in the graduate labour market. Universities' knowledge about their graduates' level of competences and accumulated experience contribute to mitigating the asymmetry of information between candidates and prospective employers, improving the educational adjustment of both bachelor's and master's graduates. Still, despite the effectiveness of these strategies, only about 10% of graduates accessed their first position directly from internships, well below the overall share of those who undertake internships (80% of bachelor's and 75% of master's graduates in the selected subsamples). This result calls for further collaboration between universities and firms to engage firms in the training of graduates so that they later naturally "absorb" interns into their payroll as employees.

Other institutions also contribute to reducing first job mismatch, but with uneven results: PES provide protection only against the underuse of skills or knowledge, not against overeducation. As such, further analysis is needed to determine whether employers use PES to fill vacancies based on specific qualifications rather than a high academic level of skills/ knowledge. Should that be the case, PES should connect employers to vocational training graduates rather than to university graduates.

The public sector uses public entry examinations and job pools to rank and screen candidates. Both systems tend to effectively reduce first job mismatch risks in bachelor's graduates and the underuse of skills or knowledge for master's graduates. This result illustrates the gap between the quality of jobs in the public sector and private employers. In the private sector, employers may use degrees as credentials for recent graduates' personal abilities and knowledge and offer them jobs where no degree is required. If those positions were just steppingstones towards better ones suitable for graduates, we could frame this result in the occupational career theory and see it as a temporary mismatch. Otherwise, it would imply permanent inefficiencies in the graduate labour market and the need for industrial policies that favour sectors that create high skilled jobs.

In this paper, we have determined the average outcomes of different ports of entry into the graduate labour market. It would be very interesting to expand this research by analysing the user profiles of job search methods and strategies. Ascertaining whether they are related to the graduates' field of study, personal features or family background would contribute to disentangling the genuine influence of job search methods/strategies on initial mismatches in the labour market.

Regardless of the job search methods or strategies the graduates use, there are strong differences among fields of study. Certainly, and given the relative imbalance between supply and demand for the diverse skills the university system provides, choosing certain fields of education may be considered a job search strategy in itself. Still, and despite the observable outcomes highlighted in this study, there is a persistent undersupply of graduates in STEM fields. The problem originates in earlier phases of the education system, with Spanish students struggling particularly with maths and science at school. Part of this deficit in skills is explained by gender segregation in higher education, with too few women studying STEM disciplines outside of health fields. The lack of role models and traditional gender roles still affect young women's choice of educational and career paths. This has long-term consequences for the efficiency of the labour market, the distribution of primary income across genders and the competitiveness of the Spanish economy. Further steps need to be taken to reduce this imbalance as well.

Notes

1. The wording for this job search method/strategy is "(for my first job) I remained in the internship I held at the moment of graduation". It therefore implies an extension of the internship after graduation or its conversion to an employment contract.

2. When asked how they had found their first job, all interviewees were shown 11 non-mutually exclusive job search methods and were asked to tick the one(s) that helped them to find their first job after graduation.

3. Despite being affected by misperception of one's own level of skills or job requirements, subjective definitions are the most common strategy for measuring educational mismatch.

References

Albert, C. and Davia, M.A. (2018), "Job search strategies and underemployment in recent graduates first jobs in Spain", *Revista de Economía Aplicada*, Vol. 26 No. 78, pp. 21-41.

Arrow, K. (1973), "Higher education as a filter", *Journal of Public Economics*, Vol. 2 No. 3, pp. 193-216.

Bender, K.A. and Roche, K. (2013), "Educational mismatch and self-employment", *Economics of Education Review*, Vol. 34 No. 3, pp. 85-95, doi: 10.1016/j.econedurev.2013.01.010.

Blázquez, M. and Mora, T. (2010), "Overeducation and job mobility: evidence from young recent graduates in Catalonia", *Revista de Economía Laboral*, Vol. 7 No. 1, pp. 63-83.

Carroll, D. and Tani, M. (2015), "Job search as a determinant of graduate over-education: evidence from Australia", *Education Economics*, Vol. 23 No. 5, pp. 631-644, doi: 10.1080/09645292.2014. 908164.

Di Meglio, G.A., Barge, A., Camiña, E. and Moreno, L. (2022), "Knocking on Employment's door: internships and job attainment", *Higher Education*, Vol. 83 No. 1, pp. 137-161, doi: 10.1007/ s10734-020-00643-x.

Doeringer, P. and Piore, M.J. (1971), *Internal Labor Markets and Manpower Adjustment*, DC Heath and Company, New York.

Duncan, G.J. and Hoffman, S.D. (1981), "The incidence and wage effects of overeducation", *Economics of Education Review*, Vol. 1 No. 1, pp. 75-86.

Dvouletý, O. and Lukeš, M. (2016), "Review of empirical studies on self-employment out of unemployment: do self-employment policies make a positive impact?", *International Review of Entrepreneurship*, Vol. 14 No. 3, pp. 361-376.

Franzen, A. and Hangartner, D. (2006), "Social networks and labour market outcomes: the non-monetary benefits of social capital", *European Sociological Review*, Vol. 22 No. 4, pp. 353-368, doi: 10.1093/esr/jcl001.

Green, F. and Henseke, G. (2021), "Europe's evolving graduate labour markets: supply, demand, underemployment and pay", *Journal for Labour Market Research*, Vol. 55 No. 1, pp. 1-13, doi: 10. 1186/s12651-021-00288-y.

Habibi, Nader and Arnold, Kamis (2021), "Reaching for the stars and settling for the moon: recent trends in overeducation of US workers 2002-2016", *Journal of Education and Work*, Vol. 34 No. 2, pp. 1-15, doi: 10.1080/13639080.2021.1897551.

Hernández-March, J., Martin del Peso, M. and Leguey, S. (2009), "Graduates' skills and higher education: the employers' perspective", *Tertiary Education and Management*, Vol. 15 No. 1, pp. 1-16.

INE (2020), "Encuesta de Inserción Laboral de los Titulados Universitarios EILU-2019. Metodología", INE, available at: https://www.ine.es/daco/daco42/eilu/metodologia_2019.pdf

Kucel, A. and Byrne, D. (2008), "Are over-educated people insiders or outsiders? A case of job search methods and over-education in UK", working paper WP258, Economic and Social Research Institute (ESRI).

Li, I.W., Harris, M. and Sloane, P.J. (2018), "Vertical, horizontal and residual skills mismatch in the Australian graduate labour market", *Economic Record*, Vol. 94 No. 306, pp. 301-315, doi: 10. 1111/1475-4932.12413.

McGuinness, S., Whelan, A. and Bergin, A. (2016), "Is there a role for higher education institutions in improving the quality of first employment?", *The BE Journal of Economic Analysis and Policy*, Vol. 16 No. 4, doi: 10.1515/bejeap-2016-0174.

McGuinness, S., Pouliakas, K. and Redmond, P. (2018), "Skills mismatch: concepts, measurement and policy approaches", *Journal of Economic Surveys*, Vol. 32 No. 4, pp. 985-1015.

Meroni, E.C. and Vera-Toscano, E. (2017), "The persistence of overeducation among recent graduates", *Labour Economics*, Vol. 48 No. 5, pp. 120-143, doi: 10.1016/j.labeco.2017.07.002.

Muñoz de Bustillo, R., Sarkar, S., Sebastian, R. and Antón, J.I. (2018), "Educational mismatch in Europe at the turn of the century: measurement, intensity and evolution", *International Journal of Manpower*, Vol. 39 No. 8, pp. 977-995, doi: 10.1108/IJM-10-2018-0327.

Osmani, M., Weerakkody, V., Hindi, N.M., Al-Esmail, R., Eldabi, T., Kapoor, K. and Irani, Z. (2015), "Identifying the trends and impact of graduate attributes on employability: a literature review", *Tertiary Education and Management*, Vol. 21 No. 4, pp. 367-379, doi: 10.1080/13583883.2015.1114139.

Pérez Navarro, M.A. (2021), "University graduates' job-education mismatches in the Spanish labour market", MPRA Paper No. 109881.

Quintini, G. (2011), "Over-qualified or under-skilled: a review of the existing literature", OECD Social, Employment and Migration, working papers No. 121.

Rodríguez-Esteban, A., Vidal, J. and Vieira, M.J. (2019), "Un análisis de la empleabilidad de los universitarios en España a través del ajuste horizontal", *Revista de Educación*, Vol. 384 No. 2, pp. 229-245, doi: 10.4438/1988-592X-RE-2019-384-41.

Roodman, D. (2011), "Fitting fully observed recursive mixed-process models with cmp", *The Stata Journal*, Vol. 11 No. 2, pp. 159-206, doi: 10.1177/1536867X1101100202.

Salas-Velasco, M. (2021), "Mapping the (mis) match of university degrees in the graduate labor market", *Journal for Labour Market Research*, Vol. 55 No. 1, pp. 1-23, doi: 10.1186/s12651-021-00297-x.

Shevchuk, A., Strebkov, D. and Davis, S.N. (2015), "Educational mismatch, gender, and satisfaction in self-employment: the case of Russian-language internet freelancers", *Research in Social Stratification and Mobility*, Vol. 40 No. 3, pp. 16-28, doi: 10.1016/j.rssm.2015.02.004.

Sicherman, N. and Galor, O. (1990), "A theory of career mobility", *Journal of Political Economy*, Vol. 98 No. 1, pp. 169-192.

Sloane, P. and Mavromaras, K. (2020), "Overeducation, skill mismatches, and labor market outcomes for college graduates", IZA World of Labor, No. 88, doi: 10.15185/izawol.88.v2.

Somers, M.A., Cabus, S.J., Groot, W. and van den Brink, H.M. (2019), "Horizontal mismatch between employment and field of education: evidence from a systematic literature review", *Journal of Economic Surveys*, Vol. 33 No. 2, pp. 567-603, doi: 10.1111/joes.12271.

Spence, M. (1973), "Job market signalling", *The Quarterly Journal of Economics*, Vol. 87 No. 3, pp. 355-374.

Stigler, G.J. (1962), "Information in the labor market", *Journal of Political Economy*, Vol. 70 Nos 5-2, pp. 94-105.

Thurow, L.C. (1975), *Generating inequality: Mechanisms of Distribution in the U.S. Economy*, Basic Books, New York.

Turmo-Garuz, J., Bartual-Figueras, M.T. and Sierra-Martinez, F.J. (2019), "Factors associated with overeducation among recent graduates during labour market integration: the case of Catalonia (Spain)", *Social Indicators Research*, Vol. 144 No. 3, pp. 1273-1301, doi: 10.1007/s11205-019-02086-z.

Varshavskaya, E. and Podverbnykh, U. (2021), "Job search strategies of recent university graduates: prevalence and effectiveness", *Education + Training*, Vol. 63 No. 1, pp. 135-149, doi: 10.1108/ET-02-2020-0029.

Verhaest, D. and Omey, E. (2010), "The determinants of overeducation: different measures, different outcomes?", *International Journal of Manpower*, Vol. 31 No. 6, pp. 608-625, doi: 10.1108/01437721011073337.

(The Appendix follows overleaf)

Appendix

		Mismatch equations		Selection equation	
		Bachelor	Master	Bachelor	Master
Gender	Men	0.411	0.422	0.415	0.434
	Women	0.589	0.578	0.585	0.566
Age group on 31 Dec 2019	Under 30 years old	0.598	0.338	0.494	0.242
	30–34 years old	0.298	0.449	0.290	0.397
	35 years old and over	0.105	0.213	0.215	0.361
Interviewee and her parents foreign-born	Both parents are Spanish-born			0.929	0.893
	At least one parent not born in Spain			0.036	0.033
	Neither parents nor interviewee born in Spain			0.035	0.074
Parents' higher education attainment	Less than compulsory			0.163	0.169
	Compulsory			0.136	0.123
	Baccalaureate			0.114	0.111
	Intermediate vocational training			0.104	0.095
	Higher education			0.483	0.501
First-time graduate	Yes: This was the graduate's first degree			0.790	0.824
	No: The graduate already held a previous degree			0.210	0.176
Reasons for studying that particular programme	Training for one's future employment			0.768	0.788
	Training for personal purposes			0.144	0.136
	Other reasons			0.089	0.076
Type of University	Public *on-site*	0.855	0.787	0.809	0.697
	Public distance learning	0.010	0.014	0.028	0.028
	Private on-site	0.125	0.140	0.136	0.168
	Private distance learning	0.010	0.058	0.027	0.106
Grants	General study grant	0.410	0.292		
	Excellence award or grant	0.055	0.024		
Geographical mobility during studies	The degree was earned at only one university	0.730	0.869		
	Partly at another Spanish university	0.061	0.073		
	Partly abroad	0.194	0.051		
	Partly at another Spanish university and abroad	0.015	0.007		
Internships in companies, institutions or similar entities	None	0.206	0.248		
	Internship as part of the curriculum	0.491	0.542		
	Internship outside the curriculum	0.138	0.108		
	Both types of internships	0.165	0.102		

Table A1.
Average values of independent variables in the multivariate analyses

(*continued*)

		Mismatch equations		Selection equation	
		Bachelor	Master	Bachelor	Master
Employment status in the first job	Trainee. training contract or internship	0.232	0.200		
	Employee with temporary contract	0.433	0.472		
	Employee with permanent contract	0.008	0.005		
	Employer with employees	0.049	0.050		
	Employer without employees	0.012	0.007		
	Family aid	0.232	0.200		
Length of working day	Full-time	0.676	0.669		
	Part-time	0.324	0.331		
Time elapsed between graduation and the first job	Less than three months	0.319	0.354		
	3–6 months	0.157	0.181		
	6 months to one year	0.165	0.166		
	One year or more	0.360	0.299		
When job search started	Before graduating	0.340	0.493		
	After graduating	0.660	0.507		
Observations		22,525	6,588	28,826	10,588

Note(s): Average values for job search methods/strategies and fields of education are displayed in Table 1
Source(s): 2019 University Graduate Job Placement Survey (INE)

Table A1.

Corresponding author
Maria A. Davia can be contacted at: MAngeles.Davia@uclm.es