

Overeducation: Incidence, Persistence and Institutional Differences across countries

The influence of field of study and social origin on graduates' overeducation risk

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Als meus Avis Joan i Josep,
als que trobo a faltar.

I a tots els *overeducated*,
de tot camp d'estudi i origen social.

«You can never be overdressed or overeducated », Oscar Wilde

Agraïments

El juliol de l'any 1999 el vaig passar a Londres amb una família britànica per aprendre anglès. Va ser el meu primer gran viatge i experiència “sola”. Amb prou feines havia sortit de Manresa quan amb 14 anys em vaig haver d'espavilar amb el meu anglès macarrònic per Londres. Allà vaig descobrir que m'agradava viatjar, conèixer nova gent, veure com vivien i entendre altres formes d'encarar la vida més enllà del que coneixia. Bàsicament vaig descobrir que m'agradava sortir de la zona de confort i atrevir-me a fer coses que no em semblaven fàcils d'aconseguir, però que són possibles. I des de llavors ja no he pogut parar.

A aquest primer viatge d'iniciació en varen seguir molts d'altres i, entre ells, va començar el “viatge” doctoral. La formació com a investigadora m'ha traslladat físicament a diversos punts del planeta però, més enllà dels viatges físics experimentats durant el procés d'escriure la tesis, la formació com a investigadora també m'ha comportat adoptar noves perspectives, formes d'entendre els problemes i maneres de solucionar-los. I afegiria, sobretot, el no tenir por d'equivocar-se i entendre que no hi ha un únic camí a seguir, sinó que cadascú ha de trobar al seu.

Vaig iniciar el doctorat gràcies a la supervisió del Luís, el qual va mostrar interès pel meu tema d'investigació quan pocs ho feien. Des de llavors sempre em va fer costat i em va animar a seguir endavant, fent-me sentir que era capaç de fer el que em proposava i que el que plantejava era interessant. No només m'ha iniciat en la investigació acadèmica, sinó que també m'ha donat suport moralment i psicològicament. No menteixo si dic que ha estat un director de tesis exemplar, així que en aquest sentit em sento una privilegiada. Ha estat un honor tenir-lo de *sparring*. Sense ell potser hauria començat però, segurament, no hauria acabat. I encara menys amb la complicada situació econòmica que he experimentat durant els últims anys.

Una part important d'un viatge és el pressupost i més encara per una catalana. El pressupost per a portar a terme el meu viatge doctoral no ha estat sempre fàcil d'aconseguir. Vaig decidir embarcar-me en aquesta aventura sense un finançament estable, com ara una beca predoctoral o un contracte d'investigació de llarga durada.

Conscientment no sóc pas una persona de reptes però, no sé per què, sempre m'embolico a fer coses difícils... i aquesta vegada no va ser diferent.

Vaig iniciar el doctorat quan encara estava treballant al Consell Comarcal del Baix Llobregat. Un cop se'm va acabar el contracte vaig començar a fer classes de Sociologia i Estadística als graus de Ciències Polítiques i de Criminologia. Recordo que van ser mesos difícils: donar classe a la universitat per primera vegada alhora que em barallava amb el projecte de tesis i les classes de disseny d'investigació.

Seguidament, vaig poder gaudir d'un intens i meravellós any a París, treballant al Departament d'Educació de l'OCDE, gràcies a la beca de la Fundació Jaume Bofill que liderava l'Anna Jolonch, i de la què tant he après. Tot i que la meva tasca allà no era com a investigadora, sinó com a analista de polítiques educatives, vaig tenir l'oportunitat d'aprendre moltes coses, conèixer molta gent i, fins i tot, esmorzar al Palácio de la Moneda en companyia del President Sebastián Piñera (on eres Bachelet?). No obstant tot això, allà també em vaig adonar que realment m'agradava investigar i, en especial, allò que m'interessava i no allò que em manaven.

Així que vaig decidir tornar cap a Barcelona, gràcies al suport econòmic per participar en un projecte del Ministerio de Educación y Ciencia liderat per Gösta Esping-Andersen. Després d'aquell any de projecte vaig seguir en un altre projecte finançat pel Recercaixa liderat pel Sebastià Sarasa, compaginant-ho amb algunes classes de pràctiques de grau. Les beques de l'European Consortium for Sociological Research (ECSR), de la Societat Econòmica Barcelonesa d'Amics del País (SEBAP) i de la Fundació Banc Sabadell em van donar l'empenta econòmica per a les estades a la UvA (Amsterdam) amb el Thijs Bol i el Herman van der Werfhorst i a l'ESRI (Dublín) amb el Seamus McGuinness. I tot això amb el suport institucional i logístic del DemoSoc i del Departament de Ciències Polítiques i Socials de la UPF i el finançament per a anar a algunes conferències acadèmiques.

En la darrera etapa del doctorat la meva participació com a tècnica superior del projecte Ocupadors a l'AQU Catalunya em va permetre no només finançar-me, sinó també aprendre molt de les companyes – especialment de l'Anna Prades - i fer-ho des d'altres visions. No ha estat un camí fàcil ni planer, però gràcies a tot aquest divers suport econòmic i institucional he pogut tirar endavant durant aquests darrers anys, així com

aprendre i conèixer professionals de diferents àmbits i nivells. N'estic molt orgullosa d'haver arribat fins aquí. Però si hagués de tornar a començar, no sé aps si ho faria.

En els viatges sols conèixer molta gent. N'hi ha que segurament no els recordo (capricis de la memòria!), n'hi ha que desitjo no tornar-me a trobar i d'altres que han esdevingut amics, bons amics i amigues, tant de dins com de fora de "l'acadèmia". Sense ells el camí no hauria estat tan agradable i m'hauria semblat més llarg. A París la Cate em va obrir les portes de casa seva i dels seus amics. Mai li podré agrair prou tot el que va fer per mi! La Carolina va ser una troballa genial, una de les amigues més boges i alhora divertides que he tingut mai; la Silvina, més que una *coloc*, una amiga de l'ànima. I el retrobament amb la Mariana: del París del sud al del nord vivint la *vie en rose* a la ciutat més bonica del món! I tot el grup de la "Mafia Española", un grup heterogeni, irrepetible i increïble.

A Amsterdam el Pablo Gracia no només em va deixar una bici per sentir-me com una holandesa de primera, sinó que sempre tenia temps per xerrar, cafès o cerveses. I la Chiara em va regalar eternes converses filosòfiques al menjador de casa.

A Dublín m'hi vaig sentir com a casa, si no fos pel temps, és clar. La Trini va passar de veïna a amiga, i tota la gent de l'ESRI, en especial l'Adele, la Yota i l'Abián, em van fer l'estada molt més agradable. A Irlanda pots aprendre que la productivitat acadèmica no és incompatible amb les pintes del pub.

Però no tot són flors i violes en el viatge doctoral. Hi ha moments molt difícils en els què et plantejges per què estàs fent allò i no saps d'on treure les forces per continuar endavant. Quan et sents que res del que fas és interessant i l'única cosa que tens ganas de fer és plantar-te i plorar. En moments com aquests tenir companys i amics que han passat pel mateix i entenen el que estàs passant t'obre una nova finestra d'esperança. En la primera etapa del doctorat el Pablo Simón, la Ceci, la Ixchel, la Mariña, la Núria i la Sílvia em van servir de guies, l'Anto, la Fra, la Lisa, el Juan Carlos i l'Iñigo de companys de viatge. A ells s'hi han afegit durant la darrera etapa predoctoral a Barcelona la Roberta, la Léa, el Fra, la Daniela i el Bruno. Em queda pendent aprendre italià... Espero que m'ho puguin perdonar i que valguin més els milers de cafès, sopars i tómboles que hem compartit i gaudit que les meves limitacions idiomàtiques!

Els viatges et porten a experimentar un món paral·lel que, moltes vegades, t'abstreuen de la realitat. És per això que durant aquest viatge "acadèmic" he intentat mantenir el contacte amb la "realitat" a través de les amistats de fora de la universitat. Els dijous de Blai amb la Flora, l'Esteve, la Núria i la Silvia han marcat una època: converses i moments irrepetibles en els què les penes es convertien en acudits i rialles gràcies a la ironia i al sarcasme del grup; els "Domingos familiars" amb la Rosa i l'Ana i la resta de la colla barcelonina, gaudint de vermutos musicals, de les Igurtzis o qualsevol esdeveniment que em mantingués en contacte amb el "món real", tot i el surrealisme imperant de moltes de les trobades.

I les amigues manresanes de tota la vida, la Senda, la Mireia i la Torra que sempre segueixen aquí, amb mi, passi el que passi, sigui on sigui, i espero que sempre sigui així.

Per suposat, no puc acabar aquests agraïments sense dir que tot això ho he pogut fer en bona part gràcies als meus pares i al meu germà els quals, encara que probablement no saben gaire de què va aquesta tesis (tot i que prometo que els hi explico en diverses ocasions), sempre m'han donat suport i m'han fet costat. Sense ells no seria qui sóc ara i no hauria pogut començar ni finalitzar el viatge doctoral ni cap altre com ara el postdoctoral, el qual ja inicio des de la verda i plujosa Escòcia mentre escric aquestes línies.

Glasgow, agost del 2016

Abstract

This dissertation studies overeducation incidence and persistence among graduates from different fields of study and social origin from a social stratification standpoint. Empirical research has shown that overeducation probability varies across graduates from different fields of study and social origin, but the relevance of social background in predicting overeducation might differ depending on the field of study of graduation. This research explores the (in)existence of the unevenly distributed effect of social origin on overeducation probability across fields of study from a cross-sectional, cross-national and longitudinal perspective. The dissertation is structured in three empirical articles, preceded by an introduction and a methodological chapter discussing overeducation measurement. The first empirical article focuses on the overeducation incidence of a sample of Italian graduates from different fields of study and social origin. The second article assesses the different strengths of field of study and social origin in predicting overeducation risk across countries with different arrangements in their national education systems. Finally, the third article addresses overeducation persistence and the variation in graduates' likelihood of exiting overeducation across fields of study and social origin.

Resum

Aquesta tesis doctoral estudia la incidència i la persistència en la sobreeducació entre els graduats universitaris de diferents camps d'estudi i origen social des de la perspectiva de l'estratificació social. La recerca empírica ha mostrat que la probabilitat de sobreeducació varia en funció del camp d'estudi i l'origen social, però la rellevància de l'origen social a l'hora de predir la sobreeducació pot variar en funció del camp d'estudi de graduació. La present investigació explora la possible existència d'aquest efecte diferenciat de l'origen social segons el camp d'estudi en la probabilitat de sobreeducació des d'una perspectiva transversal, longitudinal i comparada entre països. Aquesta tesis doctoral està estructurada en tres articles empírics, precedits per una introducció i un capítol metodològic on es discuteixen les diferents formes de mesurar la sobreeducació. El primer article empíric es centra en la incidència de la sobreeducació utilitzant una mostra representativa de graduats universitaris italians de diferents camps d'estudi i origen social. El segon article aborda la variació en la capacitat predictiva que el camp d'estudi i l'origen social tenen en la sobreeducació en diferents tipus de sistemes educatius. Finalment, el tercer article estudia la persistència en la sobreeducació i les diferents probabilitats de sortir-ne segons el camp d'estudi i origen social del graduat universitari.

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INTRODUCTION

Since the publication of Freeman's seminal work *The Overeducated American*, overeducation has been a contested term. The debate on the economic returns to extra years of education posed several questions on the desired extent of higher education expansion and the capability of the labour market to provide high-skilled jobs to fully utilise individuals' and societal educational investment.

So far, overeducation has been mainly addressed from an economic perspective, focusing on the profitability of an extra year of education and its consequences in terms of productivity and job satisfaction. Fewer efforts have been made to understand overeducation as a social phenomenon affecting individuals' social-class position in society and the role of education as a social mobility mechanism. This is the reason why this dissertation addresses the overeducation phenomenon from a sociological perspective, understanding it as a disadvantageous form of employment.

The intention of this introduction is to present an overview of the state-of-the-art on the general topic and to provide information common to the empirical articles. The chapter is organised in four parts: the first part defines the concept of overeducation and its occurrence; the second discusses the theoretical approaches to overeducation and revises the empirical literature on the topic. Thirdly, the theoretical framework and the contribution of the research are presented. Finally, the structure of the dissertation, the case selection and the databases used are outlined.

1. Overeducation: what is it and how does it appear

Overeducation is a controversial term. Even if its definition and main consequences have been extensively discussed in the labour economics literature, there is still an ongoing debate and a lack of consensus in most of them. Therefore, it is necessary to dedicate some space to identify the different approaches.

In this section, the conceptualisation of overeducation is presented, as well as its currently most accepted definition. Afterwards, the differences between overeducation,

overqualification and overskilling are discussed. Finally, overeducation occurrence and its relevance across countries are outlined.

1.1. What do we mean by overeducation?

Generally speaking, the term ‘overeducation’ can be misleading. One could actually wonder if an individual can get too much education in his/her life. The upgrade in knowledge and skills brought by the educational expansion in most countries has been regarded as intrinsically good, not only promoting a knowledge society but also positive effects on economic, social, political and health life domains (Hout, 2012; OECD, 2012). However, from an economic perspective a sub-optimal return to human capital investment is a problem both at the individual and the social level; from a sociological perspective, it may deprive education from its value as a mechanism for social mobility. Strictly focusing on educational returns in the labour market, some have argued that the benefits of educational expansion reaches its ceiling when it outpaces the demand for high-skilled positions (Hartog, 2000). Therefore, one’s education can be excessive in relation to the job performed.

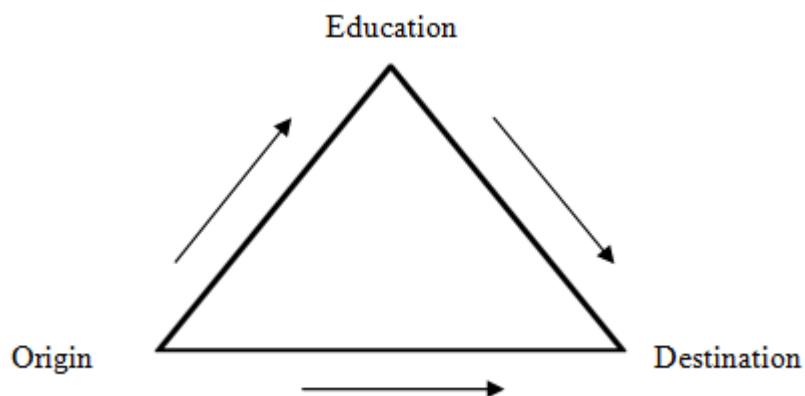
Even if the exact wording slightly changes from one article to another, a worker is considered to be overeducated when the education he/she brings exceeds that required for the occupation or job. Recent academic research sticks to this conceptualisation. Thus, overeducation is basically a mismatch between an individual’s education and the educational requirements to successfully perform the job. This is regarded as an inefficient situation in terms of knowledge and skills utilisation. This definition easily adapts to new working environments and conditions, such as the increase in job qualification requirements, which has been a trend experienced over recent past decades in most advanced countries.

Although this is currently the most accepted definition, there has been substantial debate on what else overeducation might mean. Firstly, economic studies (Freeman, 1976; Rumberger, 1981) addressed the phenomenon from a human capital perspective, focusing on one of the possible consequences of overeducation, namely, declining returns to education and relative wages. However, empirical results failed to report general declines in higher education value and relative wages (Smith, J. & Welch, 1978).

Overeducation has also been understood as the inflation of credentials. Some authors have argued that educational requirements to get a job are not rooted in increased technical needs, but in the fact that socialization into the dominant higher-educated culture is a hiring criterion (Burris, 1983). Nevertheless, this conceptualisation has also been criticised for not considering education as the main source of skills upgrading. Some others have argued that entry to most desirable jobs is restricted to those who attained very specific academic grades, suggesting that overeducation can be a consequence of professional social closure (Collins, 1979).

Aiming to contribute to this conceptualisation debate from a sociological perspective, I would add that overeducation can be understood as another form of social stratification. One of the cornerstones of social stratification research is the OED triangle (see Figure 0.1). If we take into account individuals coming from different social origins who attain the same education results but present different labour market outcomes (i.e. overeducated vs. adequately matched), this is to be considered as a way of social stratification. Origin still has some influence on the final destination in the labour market structure, with education being able to partly mediate social origin influence.

Figure 0.1: Origin, Education, Destination (OED) triangle



So far, overeducation has been understood as a form of underemployment (Jensen, L. & Slack, 2003). Similarly to fixed-term employment, part-time employment or unemployment, overeducation is to be considered as a disadvantageous situation in reference to adequately matched workers. From an economic perspective, individuals invest in a given amount of education based on the expected labour market returns,

mainly, economic returns. However, from a sociological approach, educational investments are not only based on the expected future earnings, but also on the expected social position, type of work and lifestyle. Occupational status is part of individuals' prestige and social position. If some individuals attain a lower position than their peers with similar educational attainment, this is to be understood as a disadvantageous position. These are the main reasons to conceptualise overeducation as a form of social stratification in the labour market.

1.2. Concepts similar to overeducation

Some concepts are closely related to overeducation. They are often used interchangeably as synonymous terms because they are broadly tackling a similar phenomenon. Strictly speaking, though, they do not refer to the same situation. The most similar concepts are overqualification and overskilling.

Overeducation and overqualification are tackling the same phenomenon: the situation in which an individual is working in a position for which he/she has more education than required. Even if very close, the main difference between these two concepts is that overeducation is conceptualised as an excess of educational skills gained in formal education, whereas overqualification sticks to educational credentials. Initial overeducation studies run by economists have usually measured overeducation in terms of years of education, while more recently qualifications or educational levels attained have been used. Nowadays, overeducation and overqualification are usually used interchangeably, regardless of the way they are measured.

Overskilling refers to the situation in which workers possess more skills than the ones required to perform the job tasks. The main difference with overeducation is that the focus is on the skills possessed by the individual, regardless of the way they are acquired and the educational credentials. This concept appeared because of the suspicion that individuals with the same educational attainment may differ in their skills levels and types. Therefore, an individual could be overeducated, but not overskilled. This would partly justify overeducation from an economic perspective, as individuals' skills would be fully utilised. However, from a sociological perspective, it is still unclear why people with the same educational level present different skills levels,

strengthening the hypothesis that labour market relevant skills might be also gained in other life domains other than schooling, such as family or work experience.

Empirical studies with regard to overskilling have increased over the past few years thanks to the release of new databases with standardised skills measurements (e.g. PIAAC, PISA; NEPS). These have made possible the comparison between overeducation and overskilling. There are four possible situations shown in Table 0.1 below. The first one is that someone can be overeducated and overskilled at the same time, which would actually be the most common situation if educational credentials are regarded as the main source of skills gain and certification. The same applies to the situation in which an individual would be neither overeducated nor overskilled. The most unlikely situation is when considering an overskilled individual who is not overeducated. This would only make sense in contexts and/or cohorts who did not experience the educational expansion and who have relevant working experience as a source of skills gain, but no formal qualification to certify it. Last but not least, an individual could be overeducated, but not overskilled. This would probably mean that the individual managed to attend an educational certification, but he/she did not actually acquired the skills level which it certifies. Therefore, he/she is employed in a job that matches his/her skills, but not the formal qualification shown. It might be the case that the individual has weakened his/her skills because he/she has not been using them for some time, or it might simply be that he/she never got them.

Table 0.1: Correspondence between overeducation and overskilling

		Overskilled	
		Yes	No
Overeducated	Yes	Matched	Mismatch
	No	Mismatch	Matched

Source: own elaboration.

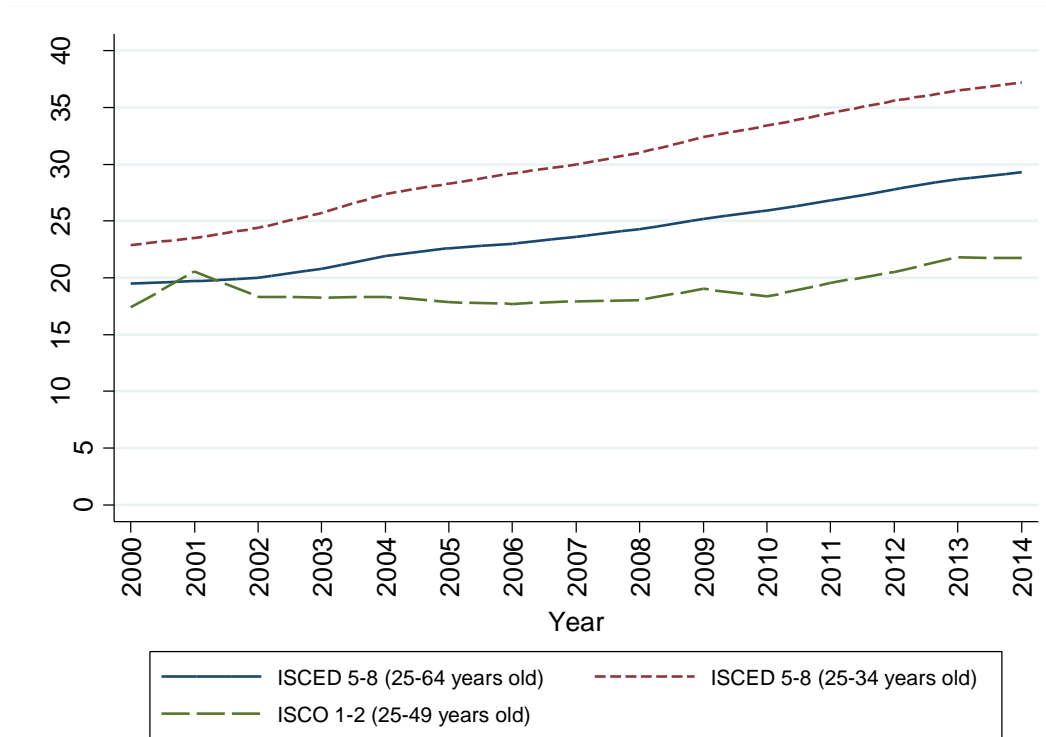
Occupational mismatch, overtraining and underemployment are also closely related terms. The common feature to all of them is that they focus on demand features (occupation, training and employment). Thus, it could be argued that these terms tend to make the demand side (employers and firms) responsible for this mismatch, rather than the supply side (workers and educational institutions). The concept of overeducation has come under scrutiny as it indirectly blames individuals for investing too much in education. The underemployment literature questions firms for underutilising workers' skills and/or hiring workers for a position they know they are overeducated for, instead of upgrading job tasks to fully utilize them. However, the common use of workers' survey responses – instead of employers' responses or analyses based on information coming from the jobs or occupations within firms - partly explains why it makes more sense to use the term overeducation over underemployment.

1.3. Overeducation occurrence

Overeducation was first discussed in the U.S. in the 1970's. Since the end of World War II, the U.S. experienced an expansion in education intensive industries and occupations, followed by an educational upgrade of the population. During the 70's it became clear that the pace of individuals' educational upgrading surpassed that of occupations available (Halaby, 1994). Obviously, this caught the attention and concerns of economists, policy makers, politicians and the younger cohorts who had to balance their educational investments. The new situation questioned the positive effect of education on earnings, pointing out that educational attainment had a ceiling in terms of productivity and wage returns (Freeman, 1976).

Educational expansion, especially at the tertiary educational level, is still taking place in most advanced economies. For the past 15 years, European countries have experienced a dramatic increase in the percentage of young workers holding tertiary degrees (see Figure 0.2). Concerns about the possible imbalance between supply and demand sides have regained importance given the lower pace of workers employed in high-skilled positions (ISCO1-2).

Figure 0.2: Evolution of working population and young workers with tertiary educational attainment, EU-27



Source: own elaboration, from Eurostat (2015).

However, educational expansion does not necessarily translate into overeducation incidence. Countries not only differ in their supply of educated individuals, but also in the demand for highly educated workers. Larger shares of higher educated graduates entering the labour force might increase overeducation figures (Berg, 1970; Livingstone, 2004), but it has also been argued that skills supply (Acemoglu, 1998) and technical progress (Autor, D., Levy, F. & Murnane, 2003) help to sustain the demand for high skills. Therefore, overeducation incidence does not only depend on higher educated graduates' supply, but also on labour market demands.

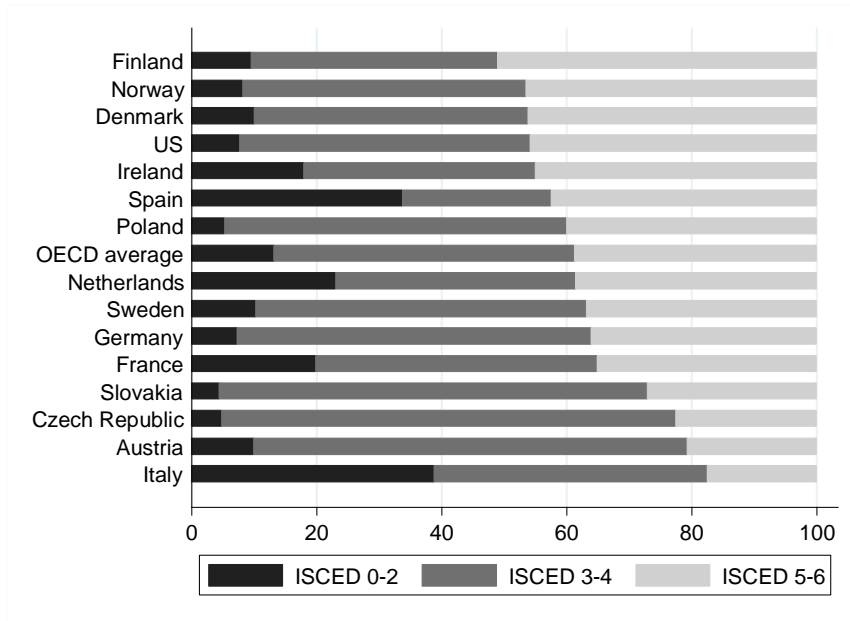
Figures 0.3 and 0.4 below show the educational attainment of employed individuals and the share of workers employed in high and low skilled jobs by country¹. This allows us

¹ Data is displayed for the adult working population (25-64 year-olds). Although it would be more advisable to show it for young workers (approximately 25-35 year-olds) there are too few cases by educational level, skill level job and country in order to show representative cross-national figures.

to compare supply and demand sides across countries which differ in their skills strategy. Finland, Norway, Denmark and the U.S. combine above average figures of higher educated workers with a high share of individuals employed in high-skilled jobs. Similarly, Sweden and the Netherlands display close to average figures of higher educated workers with a large share of individuals employed in high-skilled jobs. It has been argued that this high-skilled strategy is possible when the welfare state takes an active role as an employer (Esping-Andersen, 1999), although in the U.S. some argue that it is due to skills polarisation (Autor, DH., Katz, LF. & Kearney, 2006).

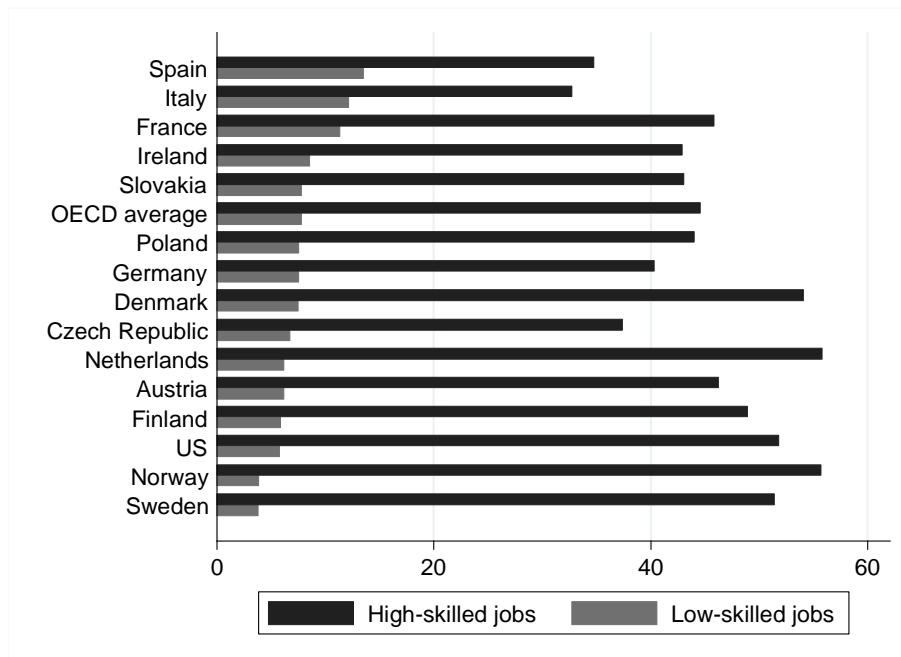
Other countries, such as Spain and Ireland, present above average figures in the percentage of higher educated workers, but their share of workers employed in high-skilled jobs is comparatively lower, which in turn facilitates overeducation occurrence. Conversely, the Czech Republic and Germany present below average percentages of higher educated workers with below average share of workers employed in high-skilled jobs, promoting skills match among medium skilled-level workers. Finally, Austria's situation suggests an example of skills shortage: it displays below average figures on higher educated workers, but above average figures on workers employed in high-skilled jobs.

Figure 0.3: Educational attainment of employed individuals (25-64 years old) by country, 2013



Note: Countries ordered in descending order by the percentage of employed workers with ISCED5/6. Source: own elaboration, from PIAAC (OECD).

Figure 0.4: Percentage of workers employed in high and low skilled jobs by country, 2013



Note: Percentages do not add up to 100% because only high- and low-skilled jobs are shown. Countries ordered in descending order by percentage of workers employed in low-skilled jobs. High-skilled jobs include skilled professions at skill level 4 (ISCED 5-6 required), while low-skilled jobs include elementary occupations at skill level 1 (ISCED 1 required). See tables 0.3 and 0.4 in the Appendix for the detailed ILO classification.

Source: own elaboration, from PIAAC (OECD).

Although imperfect, the combination of the overall educational level of employed workers with the percentage of workers employed in high and low-skilled positions is the best available way to show overall overeducation chances across countries. So far, individuals' educational level has been established as a good proxy for human capital, indicating both the quantity and quality of the supply side of the labour market. However, one of the shortcomings of the data displayed is that it includes different cohorts, which have been affected to a different extent by educational expansion depending on the country.

There are more concerns regarding how to measure the demand side. Here I am showing the percentage of workers employed in high- and low-skilled jobs, but there are other possibilities, such as the number of job openings and unfilled vacancies, which I have considered less appropriate for a number of reasons. Job openings and hires by occupational level are highly affected by the economic context and the hiring culture of the country. In some countries, especially those with high unemployment rates, some job openings are never published. Positions are filled via internal promotions, informal networks or harvesting from the list of individuals who had previously sent their CV, even if there was no job position available. The magnitude of this phenomenon is likely to change by country, making this indicator even more biased when addressing cross-country comparisons. Another possibility is using the number of current job vacancies. However, this indicator is more likely to show skills shortages rather than overeducation. Unfilled vacancies are usually displayed in comparison with unemployment rates (Beveridge curve) to show that even where there are unemployed individuals' it is possible that employers might still be unable to find someone suitable to fill the job vacancy.

2. Literature review on overeducation

The following sections review the main theoretical approaches to overeducation and outline the empirical research undergone by economists and sociologists. Economists started research on overeducation and the initial focus was on wage returns to educational investments. In fact, in most economic papers, overeducation is used as an independent variable, assessing what is the earnings premium to an extra year of

education. However, from a sociological perspective, overeducation is usually addressed as a dependent variable and the focus is on identifying individual and structural characteristics promoting overeducation and understanding it as an incomplete form of occupational attainment. Status and prestige gained via the occupation are also relevant factors to take into account in addition to economic returns.

2.1. Theoretical approaches to overeducation

Neoclassical economic theories are framed in perfectly competitive labour markets, which do not lead to mismatches and/or wage changes. However, real labour markets are far from the ideal type and are full of imperfections such as wage rigidities, imperfect information on workers' skills and job requirements, different individual preferences, matching frictions or limited geographical mobility. Some of these imperfections can partly explain overeducation (Quintini, 2011b).

At the moment, there is no widely accepted and unified theory on overeducation. In fact, theoretical perspectives attempting to explain overeducation occurrence have framed it within existing views of the labour market (McGuinness, 2006). Therefore, it seems that the overeducation literature has served as a way to broaden the human capital framework through the debate on job characteristics to determine wages (Sloane, 2003).

Up to now, four approaches have theoretically driven overeducation research: 1) Human Capital Theory; 2) Job Competition Model; 3) Assignment Theory and 4) Career/Job Mobility Theory. They have traditionally been classified in two groups based on the duration of overeducation: those who look at it as a short-term phenomenon and those who understand that it may become a more persistent situation. So far, temporary and persistent terms remain quite vague, as no one has argued about what should be considered as a short or long period in overeducation. However, overeducation duration is only one of the characteristics that differentiate these theories. As summarised in Table 0.2 below, I remark that there are other features of these theoretical approaches worth considering: competition with other workers and firms (yes/no), who is responsible or can solve the mismatch (individual/firm) and individuals' preferences (homogeneity/heterogeneity). The core idea and characteristics of each of these theories are outlined as follows.

1. Human Capital Theory (HCT) (Becker, 1964). Becker's theory understands overeducation appearance as a temporary and negligible mismatch due to imperfect information between workers' skills and firms' needs during individuals' job searches. The situation quickly changes because the worker will look for a matched job or the firm will adapt to the worker's education to fully utilize his/her skills and knowledge. Broadly speaking, HCT assumes that individuals make investments in education in order to use them in the labour market and maximize their utility and wages, while firms are willing to fully utilize workers' skills and knowledge to get the maximum productivity from them. This perspective assumes that both individuals and firms are choosing the best option to get a satisfactory match and no heterogeneity in preferences is contemplated. An extension of HCT is the Matching Theory (Pissarides, 2000), which has the same argumentation as HCT but takes firms into consideration in the search process, also making them responsible for the mismatch.

2. Job Competition Model (JCM) (Thurow, 1975). Thurow's approach presents the labour market as constituted by two queues - job vacancies and workers - that organise the allocation process. On the one hand, jobs are ranked hierarchically given the educational level required and other job characteristics. On the other hand, workers' position in the queue depends on their education level in relative terms to the rest of the workers. Thus, individuals always have more incentives to invest in education, since they are in a permanent competition for jobs, promoting credential inflation. Individuals with more education get the best jobs. Even workers in the highest positions might be overeducated if there are no jobs left in the queue that matches their education level. Overeducation can become quite a permanent state if no new high-skilled jobs are on offer. Thus, the "choice" to have overeducated workers remains as a firm issue, because job characteristics determine workers' job allocation. One of the underlying assumptions of this model is that all individuals have the same preferences for jobs; and jobs can only be ranked hierarchically in one form, which is actually one of the main differences with the following theoretical approach.

3. Assignment Theory (Sattinger, 1993). In a middle way between HCT and JCM, the assignment approach stresses that both workers' and firms' characteristics play a role in allocating individuals to jobs. As a first step, individuals choose a sector/occupation/job type based on their preferences on wage maximization. After this intermediate step, individuals are allocated to jobs based on their educational level, among other personal characteristics. Thus, contrary to HCT and JCM, allocation is based on a non-random distribution of workers in sectors/occupation/job types. Overeducation appears when workers' education exceeds the one required for the job. The mismatch can be solved via individuals' or firms' adjustment. Some individuals might be willing to stay in an overeducated position if it maximises firms' and individuals' wage and utility. This approach takes into consideration different preferences among workers on their wage maximization, as well as cross-sector and cross-occupation differences in job characteristics, as opposed to both HCT and JCM.

4. Career/Job Mobility Theory (Sicherman, N. & Galor, 1990). In line with Spence's Signalling Theory (Spence, 1973), this approach argues that workers become overeducated because they are not able to clearly signal their knowledge and skills, or they are lacking work experience and/or work-specific skills. Overeducated workers may remain in this position shorter or longer, depending on their capacity to clearly signal their skills to employers and/or get their occupation and firm specific skills. So, this approach makes individuals responsible for the mismatch, ignoring the role of job characteristics in the overeducation phenomenon. It also ignores competition among workers. Thus, it is hard to say if it considers that individuals might have different preferences – for instance for showing or not showing their skills potential – given different individual situations and strategies of wage and utilisation maximisation.

Table 0.2: Summary of the main features of overeducation theories

	Authors	Competition with other workers	Nature of the phenomenon	Responsible for mismatch	Individuals' preferences	Main characteristic
Human Capital Theory	Becker (1964)	No	Temporary	Individual (supply side)	Homogeneity assumed	The mismatch can easily be solved via individuals' or firms' adjustment
Matching Theory	Pissarides (2000)	No	Temporary	Individual and firm (supply and demand side)	Homogeneity assumed	Both individuals and firms look for matches
Job Competition Model	Thurow (1975)	Yes	Persistent	Firm (demand side)	Homogeneity assumed	Labour market allocation based on hierarchy of workers and jobs' education level
Assignment Theory	Sattinger (1993)	No	Temporary or Persistent	Individual and firm (supply and demand side)	Heterogeneity assumed	Takes into account individuals' preferences on job/sector/wage maximization
Career/Job Mobility Theory	Sicherman & Galor (1990)	No	Temporary or persistent	Individual (supply side)	No clear assumptions	Individuals unable to properly signal their skills become overeducated

Source: own elaboration, based on (Kucel, 2011; McGuinness, 2006; Quintini, 2011a).

But not all individuals think and/or act the same way. Reality is far more complex and it does not entirely match with any of these ideal models, but it is rather a mix of them. Depending on the individual preferences, point of view and the institutional context, one theory might be closer to reality than another. However, from a conceptual perspective, some scholars have argued that Assignment Theory is the closest model to reality because it takes into consideration job characteristics to understand overeducation occurrence (Kucel, 2011; McGuinness, 2006), while at the same time assuming heterogeneity of preferences among individuals and competition across workers and firms.

2.2. Empirical research on overeducation

Empirical research on overeducation initially focused on its economic consequences, given the concerns in terms of wage returns to extra years of education. Simultaneously, scholars also provided basic statistics on overeducation incidence and persistence, in order to measure the extent of the phenomenon. Further efforts were addressed to identify overeducated workers based on individuals' social and demographic characteristics. More recently, the mediating role of educational and labour market institutions on overeducation incidence and persistence across countries has been explored. In the following subsections, the main research findings addressing these issues are outlined.

Overeducation consequences: wage returns and job satisfaction

The Overeducated American (Freeman, 1976) is considered as the seminal work of overeducation academic literature. From a macro-level perspective, Freeman examined the decreasing wage returns to college graduates in the U.S. during the period of higher education expansion (data included from 1967-1976). He found that the increasing number of college graduates translated into a surplus of educated workers with regards to the labour market demand. Consequently, wage returns to college graduates decreased.

Although he predicted further declines in graduates wage returns, his projections were proven wrong by a number of subsequent studies (Katz, L.F. & Murphy, 1992; Levy, F. & Murnane, 1992; Smith, J. & Welch, 1978). Actually, most of the reduction in wage

returns experienced by U.S. college graduates during the 70-80s was due to an increase in the number of individuals in the youth cohorts and the slow pace of the labour market to create new jobs (Smith, 1986).

Other American labour economists later addressed wage returns to overeducation from an individual perspective (Duncan, G. & Hoffman, 1981; Rumberger, 1981; Sicherman, 1991), followed by other studies providing evidence for Spain (Alba-Ramírez, 1993), Portugal (Kiker, B.F. & Santos, 1991), the Netherlands (Hartog, J. & Oosterbeek, 1988) and the United Kingdom (Groot, W. & van den Brink, 1997; Sloane, P.J., Battu, H. & Seaman, 1999a). Common results to all these studies using the ORU function² are that wage returns to overeducation are positive, but smaller than to required education. Each year of overeducation provides from one-half to two-thirds of the economic value of one required year of education (Hartog, 2000). The wage penalty is apparently larger for graduates compared to individuals with vocational education and training (Mavromaras, K., Mcguinness, S. & Fok, 2009), for women (Frank, 1978) and for immigrants (Lindley, 2009).

Besides lower wage returns, overeducation has been associated with lower productivity and lower job satisfaction (Allen, J. & van der Velden, 2001; Fleming, C.M. & Kler, 2008; Green, F. & Zhu, 2010; Verhaest, D. & Omey, 2010). Based on the negative consequences and disadvantages brought by overeducation, further interest in the magnitude of the phenomenon and the identification of individuals and groups more prone to experience this situation increased.

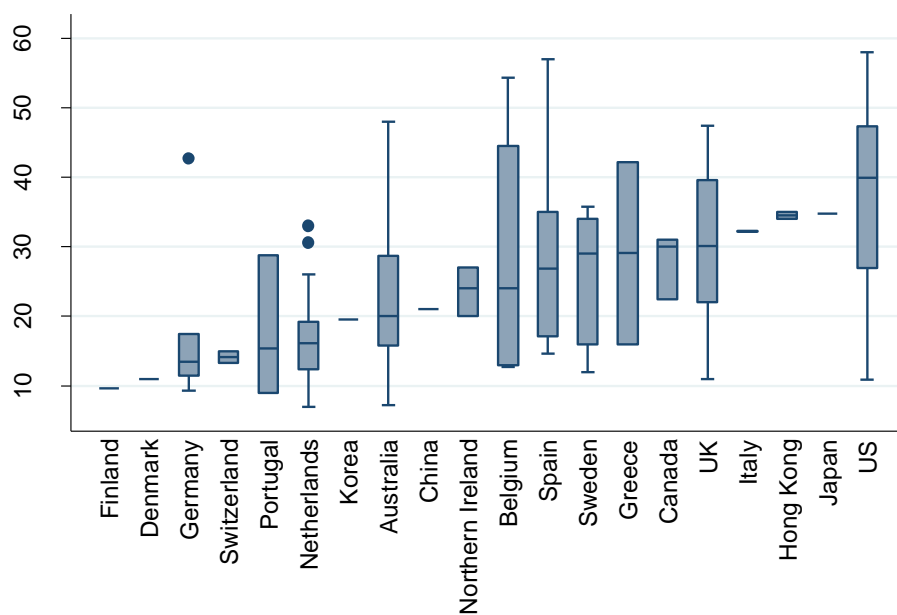
Overeducation incidence and factors influencing it

Neither Freeman nor Rumberger could demonstrate that wage returns to individuals who attained college degrees were systematically declining, but both showed relevant overeducation incidence figures, especially among graduates. Since then, several studies have shown that overeducation is a non-negligible phenomenon affecting several countries. In Figure 0.5 below, I compare the incidence of overeducation drawn from different studies at the national level. Although part of the ‘within’ and ‘between’

² Earnings function separately containing required years of education, extra years of education and lacking years of education (required, over and undereducation).

countries variation can be surely attributed to differences in the time period analysed, the targeted group (either all workers or graduates) and the overeducation measurement employed³, the graph shows the relevance and incidence of the phenomenon across countries. The average overeducation incidence including all cases is around 26.5%, ranging from a minimum of 9.6% in Finland to a maximum of 37.5% in the U.S., when focusing on country averages. However, the lowest overeducation incidence reported is in the Netherlands (7.0%), while the highest remains in the U.S. (58.0%). Countries like Australia, Belgium, the United Kingdom and the U.S. present a considerable number of empirical studies showing dramatic differences in their overeducation incidence. Part of this variation might be due to different methodological approximations, but part of the variation might also be attributed to contextual and institutional changes in these countries. All these issues are further discussed in the following chapter, being Figure 0.5 an overall illustration of the overeducation incidence relevance across countries.

Figure 0.5: Overeducation incidence by country



Note: N=108

Source: own elaboration, based on 108 results from 78 studies on overeducation (Groot, W. & van den Brink, 2000; Kucel, 2011; Quintini, 2011a) from different time periods.

³ Overeducation measurement is extensively discussed in Chapter 1.

Given the relevance of the phenomenon across countries, the question that derives is what characterises overeducated individuals? There is evidence of individual differences based on sociodemographic characteristics such as gender, ethnicity, age, level and type of education and social background.

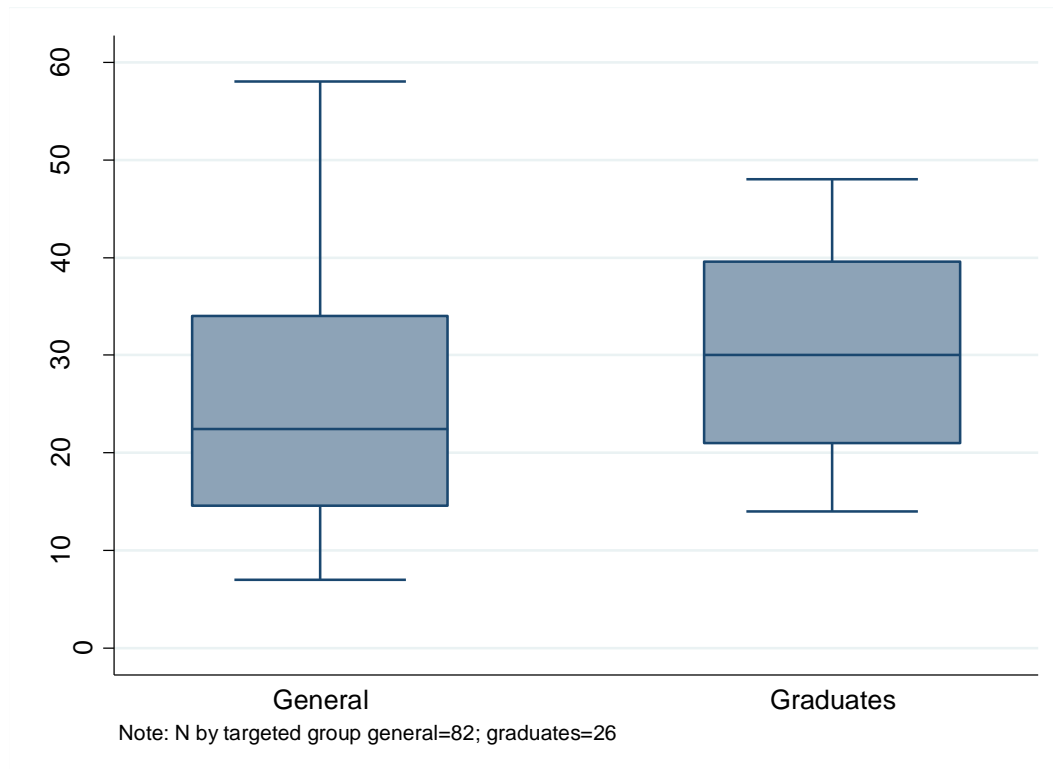
In theory, married women would be more prone to be overeducated because they would have to look for a job in a locally restricted labour market based on their husbands labour allocation (Frank, 1978). Certainly, there is evidence of more overeducation incidence among married women compared to their husbands, regardless of the size of the labour market (McGoldrick, Ki. & Robst, 1996). Recent research also shows gender differences in overeducation incidence when controlling for the possibility to commute, being women with children more prone to be overeducated (Büchel, F. & van Ham, 2003).

Individuals with an immigrant background show larger overeducation incidence (Kler, 2006; Lindley, 2009; OECD, 2008; Storen, L.A. & Wiers-Jenssen, 2009). The main explanations are labour market discrimination, lack or limited home-country language skills and barriers to educational certificate recognition and transferability.

Evidence also supports that overeducation incidence is more common among young workers (Dekker, R., de Grip, A. & Heijke, 2002; Frei, C. & Sousa-Poza, 2012; Vahey, 2000). Limited working experience and more difficulties in clearly signalling to employers what they are able to do are also part of the explanation.

Initial overeducation studies focused on higher educated graduates for two main reasons: they are first-entry workers and they have the highest educational level. Thus, they are one of the groups more likely to experience overeducation. Based on the average overeducation incidence of a relevant number of studies, Figure 0.6 below shows that the median overeducation incidence is larger for higher educated graduates, compared to the whole working population. Again, the large variation showed within groups is explained because empirical studies included have been conducted in different countries, time periods and using different overeducation measurements.

Figure 0.6: Overeducation incidence by target group



Source: own elaboration, based on 108 results from 78 studies on overeducation (Groot, W. & van den Brink, 2000; Kucel, 2011; Quintini, 2011a) from different time periods.

Differences in overeducation incidence have also been observed among higher educated graduates based on different fields of study and institution of graduation. Fields of study have been shown as consistent overeducation predictors in several countries (Barone, C. & Ortiz, 2011; Ortiz, L. & Kucel, 2008; Reimer, D., Noelke, C. & Kucel, 2008). Scientific and technical fields are the ones experiencing lower overeducation figures, while humanistic and social sciences fields present the larger ones. From a human capital perspective, it has been argued that scientific and technical fields provide higher level and occupation-specific skills, while humanistic and social sciences fields provide general skills not directly targeted to specific occupations. Similarly, individuals with vocational education and training experience overeducation to a lesser extent than higher educated graduates (Mavromaras, K. & McGuinness, 2012). Credentialism and social closure approaches argue that some fields of study, such as medicine or law, are more protected from overeducation because stakeholder groups can regulate the supply

of higher educated graduates, keeping it lower to the demand for that occupation and, consequently, reducing overeducation incidence.

With regard to higher education institutions, empirical evidence supports the fact that those individuals who graduated from higher quality institutions are less prone to be overeducated (Di Pietro, G. & Cutillo, 2006; McGuinness, 2003; Robst, 1995b). American results present a negative relationship between institution quality and overeducation likelihood. Evidence for Italy supports the idea that higher educated graduates from research-prestigious institutions are less likely to be overeducated, while no effect is found by teaching quality. Results for Northern Ireland suggest that higher educated graduates from the most prestigious institutions are less likely to be overeducated compared to their counterparts with similar grades. The main explanations are that employers take institutions' quality and prestige as a proxy for higher educated graduates' productivity, based on skills and knowledge gained through schooling, but also because of selection criteria.

Finally, social background has also been pointed to as a factor predicting overeducation probabilities among higher educated graduates (Barone, C. & Ortiz, 2011; Mavromaras, K. & McGuinness, 2012; Mavromaras, K., McGuinness, S. & Fok, 2009). Higher educated graduates with also higher educated fathers are less likely to be overeducated. Additionally, higher educated graduates whose father is a professional are less prone to fall into overeducation. The main explanations are cultural capital, social networks and information attached to their progenitors that facilitates educational job matches.

Educational institutions and labour market characteristics influencing overeducation

One of the main sociological contributions to the overeducation literature is introducing the role of educational and labour market institutions to address cross-national differences in overeducation (Barone, C. & Ortiz, 2011; Di Stasio, V., Bol, T. & van de Werfhorst, 2015; Levels, M., van der Velden, R. & Di Stasio, 2014; Scherer, 2004; Verhaest, D. & van der Velden, 2013). Barone and Ortiz (2011) show within and between country differences based on the prestige of higher education branches. In sequential systems, higher educated graduates with a bachelor's degree are more exposed to overeducation than those who attained a master's degree. This effect is

especially accentuated in countries with large numbers of higher educated graduates (i.e. the Czech Republic, Norway and Spain). Graduates from vocational colleges are more likely to be overeducated compared to those from universities in countries where the binary system has been recently implemented and does not fully recognise vocational colleges as tertiary-level courses (i.e. Austria and Finland).

The quality and orientation of the university programme have also been pointed out as relevant predictors of within and between country differences in higher educated graduates' overeducation probability (Verhaest, D. & van der Velden, 2013). In line with previous single-case studies, higher educated graduates from countries with higher quality programmes and/or more oriented to labour market occupations are less likely to be overeducated.

Cross-country variation has also been reported on the basis of the vocational orientation of the educational system (Di Stasio, V., Bol, T. & van de Werfhorst, 2015). Countries with a higher degree of vocational orientation of the education system present lower overeducation figures. Education provides specific skills that direct towards an occupation and, thus, reduce overeducation prevalence.

Last but not least, labour market characteristics have also been found to be partly associated with the between country variation in higher educated graduates overeducation (Di Pietro, 2002; Verhaest, D. & van der Velden, 2013). The business cycle and the oversupply of higher educated graduates explain some of the cross-country differences in overeducation incidence: entering the labour market during a recession decreases graduate probabilities of finding a good match. More inconclusive are results with regard to employment protection laws (EPL): while some argue that strict EPL reduce labour opportunities and, thus, increases overeducation probability (Di Pietro, 2002), others have shown that they have no effect on higher educated graduates' overeducation likelihood (Verhaest, D. & van der Velden, 2013).

Overeducation duration

Theoretical approaches to overeducation differ in their conception of it as a temporary or a permanent situation. Empirical evidence provides support for both the temporary (Robst, 1995b; Sicherman, 1991) and the persistent approach (Büchel, F. & Mertens,

2004; Frenette, 2004; McGuinness, S. & Wooden, 2007). Overeducation theories have been empirically tested by a variety of authors who have provided mixed results (Battu, H., Belfield, C.R. & Sloane, 2000; Di Stasio, V., Bol, T. & van de Werfhorst, 2015; Dolton, P. & Vignoles, 2000; Duncan, G. & Hoffman, 1981; Groot, W. & van den Brink, 1997; Sloane, P.J., Battu, H. & Seaman, 1999b). Thus, no theory has been stated as prevalent to the others and the debate remains open.

Given these mixed results, some authors have pointed out the possibility that overeducation might be a temporary situation for some individuals, but a long-lasting for others (Rubb, 2003). Actually, there is not even a consensus on what is to be considered as a short or long period in overeducation, which in part has driven the debate around the discussion as to whether overeducation is a stepping stone to a better job or a trap. The stepping-stone hypothesis has been empirically supported by Frei & Sousa-Poza (2012), who showed that half of overqualified workers in Switzerland move to a matched job within a year. Challenging the career mobility approaches, evidence has also been reported supporting the entrapment hypothesis (Baert, S., Cockx, B. & Verhaest, 2013; Scherer, 2004). In general terms, entering the labour market through an underqualified position has a negative influence on subsequent jobs, becoming a trap rather than a stepping stone to more prestigious jobs (Scherer, 2004). Results are also consistent for first-entry labour seekers who have experienced long-unemployment spells (Baert, S., Cockx, B. & Verhaest, 2013).

Further contributions to the overeducation duration debate including educational covariates are still limited (Mavromaras, K. & McGuinness, 2012; Verhaest, D. & van der Velden, 2013). Differences have been pointed out by educational pathways in Australia: overskilling is more likely to be a short-term situation for individuals with vocational education and training, but a long-term situation for higher educated graduates who fell into an overskilled position (Mavromaras, K. & McGuinness, 2012). On average, higher educated graduates experience a 10% reduction in overeducation incidence five years after graduation. Those who graduated from general programmes are more likely to fall into overeducation –compared to those from occupation specific fields– but they are also more likely to use it as a stepping stone to a matched job (Verhaest, D. & van der Velden, 2013).

Evidence also suggests that overeducation duration varies across countries with different labour market institutions (Scherer, 2004) and university features (Verhaest, D. & van der Velden, 2013). Overeducation limits occupational attainment to a larger extent in Germany and Italy than in Great Britain (Scherer, 2004). The flexibility of the British labour market facilitates job mobility to better positions, but the segmented labour markets in Italy and Germany limit the probability to move to a matched job.

Cross-national differences in overeducation persistence are also present when focusing on higher educated graduates (Verhaest & Van Der Velden, 2013). Countries with high overeducation incidences experience the highest drop (e.g. United Kingdom), whereas those with initially low figures experience a more limited reduction (e.g. Germany). In comparative terms, higher educated graduates in Japan, Germany and Switzerland experience longer overeducation spells: a high percentage of those that fall into overeducation after graduation remain there five years later. Conversely, Czech, French and Dutch higher educated graduates experience shorter overeducation periods. Part of the between and within country variation is explained by the quality and orientation of the university programme.

3. Theoretical framework and contribution of the dissertation

The literature on labour market stratification has paid a lot of attention to earnings, but fewer efforts have been made on researching other labour market outcomes, such as overeducation. A range of working conditions, which employees may value in their jobs, defines labour market success and prestige. The utility workers draw from their jobs does not only lie in earnings, but also in other aspects of their work (e.g. autonomy, working conditions and prestige). Although some studies show that overeducation has positive results on earnings (Groot & Maassen van den Brink, 2000) it does not have such a positive effect on motivation and productivity (Allen & van der Velden, 2001). Overeducated workers may have a lower motivation towards work, which would have negative consequences for their productivity. Besides, recent evidence supports the hypothesis that unused skills are more likely to atrophy and depreciate (OECD, 2012). The effect of social origin across fields of study has already been researched for earnings (Hansen, 1996), but it has not received the same attention for overeducation.

These are good reasons to explore the influence of social origin across various fields of study – and also for overeducation.

All labour market theories reviewed above lack a clear understanding of the role of social inequality in overeducation. One of the contributions of this dissertation is in establishing some bridges between the economic and the sociological academic literature. To address some of the limitations of previous research, this dissertation aims to contribute to the literature on overeducation from a sociological perspective, understanding overeducation as a new form of labour market stratification, which places overeducated workers in a disadvantaged position in relation to individuals with the same educational level employed in an adequately matched job. My perspective assumes that in a meritocratic society economically active higher educated graduates are looking for a job that matches their education. So, from an individual perspective - and assuming that social background and other individual characteristics are not affecting labour market results – higher education should lead to a non-overeducated position. The aim is not to attain a job beyond one's educational level (an undereducated position), as in a meritocratic society this situation might have negative connotations: people would think that that person is not in that job in the grounds of merit (academic merit) but because of other non-meritocratic reasons.

Throughout the dissertation, I am assessing the roles of fields of study and social origin on overeducation incidence and persistence, and in explaining cross-national differences based on these two covariates. Empirical research has shown that overeducation probability varies across higher educated graduates from different fields of study and social background, but the relevance of social background in predicting overeducation might also differ across fields of study. Incorporating fields of study into the overeducation discussion helps to address skills heterogeneity across individuals with high educational attainment. Including social origin incorporates another source of skills gain, in addition to schooling. Assessing them jointly helps us understand how social origin differently affects overeducation probabilities across higher educated graduates from different fields of study. So far, this has neither been assessed in the economic nor in the sociological research.

I am concentrating in recent higher educated graduates for three main reasons: first, they are the ones attaining the highest educational level and, subsequently, supposed to attain successful occupational attainment, regardless individuals' social background. Economic and educational expansion may diminish inequalities in the first educational stages of higher education, but it has been argued that the influence of social origin might regain strength in the upper echelons of higher education and/or later transition to the labour market (Torche, 2013). Therefore, assessing the role of social origin and field of study on overeducation probability for a group of individuals with the highest educational attainment fits in the long-standing debate questioning 'higher education as the greater equalizer' (Bernardi, F. & Ballarino, 2016; Hout, 1988), at the same time that follows up on the economic literature concentrated on economic returns to those that invested the most in education.

Second, university studies can be clearly divided in different fields of study which provide different types of skills, but that are theoretically at the same (high) level. One of the criticisms of overeducation studies is that they assume skills homogeneity across individuals with the same educational level. Introducing fields of study in the discussion – as already done by other scholars (Barone, C. & Ortiz, 2011; Ortiz, L. & Kucel, 2008)– is a good way to cope with skills heterogeneity across individuals with the same educational level. Higher educated graduates are an interesting group to do so because the field of study of graduation generates and signals different types of skills that are relevant for different jobs and labour market sectors. The amount and adequacy of ready-to-use skills widely varies across fields of study, while this is not the case of vocational education programmes, where all fields mainly provide work-related skills.

The third reason addresses another of the criticism to overeducation research, which is that formal education is understood as the main source of skills gain among individuals. Differences across individuals are assumed to be based on natural talent-ability (Halaby, 1994), while working experience and on-the-job training also provide skills relevant to the labour market, but they imply employment. Focusing on recent higher educated graduates' transition from university to the labour market keeps working-related skills and experience fairly similar, as most of them lack or have limited working experience. This facilitates the use of educational attainment as the main source of knowledge and

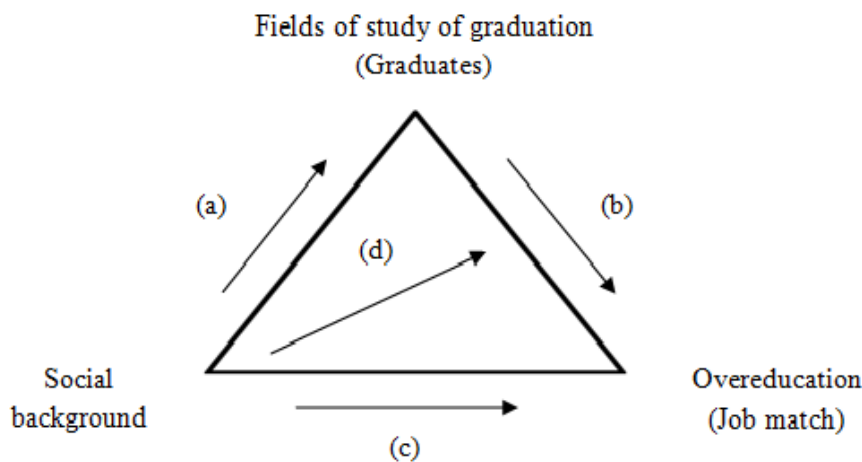
skills gain, being easier to attribute the rest to innate talent and family socialisation. This assumption is a bit more complicated to do when focusing on individuals who attained vocational education and training courses, as they combine formal education with on-the-job training and other forms of practical training.

3.1. Overeducation incidence

In the following sections I draw on the main argument as to why we should expect the magnitude of the effect of social background on overeducation likelihood to differ across fields of study, as presented in the conceptual framework in Figure 0.7 below.

With educational expansion, the relationship between origin and education (OE) has weakened in general terms: all individuals have to invest in education to avoid downward mobility. Inequality in access to higher education has decreased, but it has been achieved by channelling more disadvantaged students to less prestigious programmes and institutions (Thomsen, 2015; Torche, 2013). According to the ‘effectively maintained inequality’ thesis, privileged individuals look for qualitative forms to differentiate themselves from the rest with the same educational level (Lucas, 2001). Among higher educated graduates, one of these forms of horizontal differentiation is field of study of graduation. So, origin is not only influencing the educational level, but also the type of education, as suggested by the (a) relationship in Figure 0.7 below.

Figure 0.7: Conceptual framework



Source: own elaboration.

Study choices have a lot to do with social background: to avoid downward social mobility individuals invest in the field of education where they have an advantage based on their father's occupation (van de Werfhorst, 2002). Children from manual-working backgrounds tend to prefer technical fields; children of self-employed and small employers focus on financial and commercial fields, offspring of farming backgrounds are more likely to enrol in agricultural fields, while children of service-class are more prone to enrol in traditionally prestigious fields with social closure like medicine or law (van de Werfhorst, H. G., Sullivan, A. & Yi Cheung, 2003). Therefore, fields of study are influenced by social selectivity and this means that graduation from different higher education programmes signal different skills in the labour market, as suggested by the (a) relationship in Figure 0.7 above.

From a sociological perspective, it has been argued that some of the skills that are relevant in the labour market can also be gained through family socialization (Jackson, M., Goldthorpe, J.H. & Mills, 2005). Evidence provided by employers' surveys shows that some of the most valued skills by employers are non-cognitive ones, such as personal commitment, team working and communication skills (AQU Catalunya, 2015; Gallup, 2010). Speaking in public, verbal discussion and argumentation are skills that might be learnt at university, influencing the relationship between education and destination (ED) and, thus, overeducation probability, such as the relationship (b) in Figure 0.7 above. But non-cognitive skills might be also – and more easily developed and improved - in the family environment than at university. So, this source of skills gain would be influencing the relationship between social origin and occupation and the likelihood to be overeducated, which is relationship (c) in Figure 0.7 above. Therefore, offspring of advantaged families with high educational and occupational attainment might more easily gain this kind of skills, compared to their counterparts from more disadvantaged social backgrounds (Breen, R. & Goldthorpe, 2001).

However, the labour market relevance of this kind of skills might vary across fields of study. Higher educated graduates from more advantageous families perform better than those from more disadvantaged families, but these differences are particularly important in cultural and professional fields of study (Hansen, M.N. & Mastekaasa, 2006). Offspring from the upper and upper-middle classes are found to earn more compared to

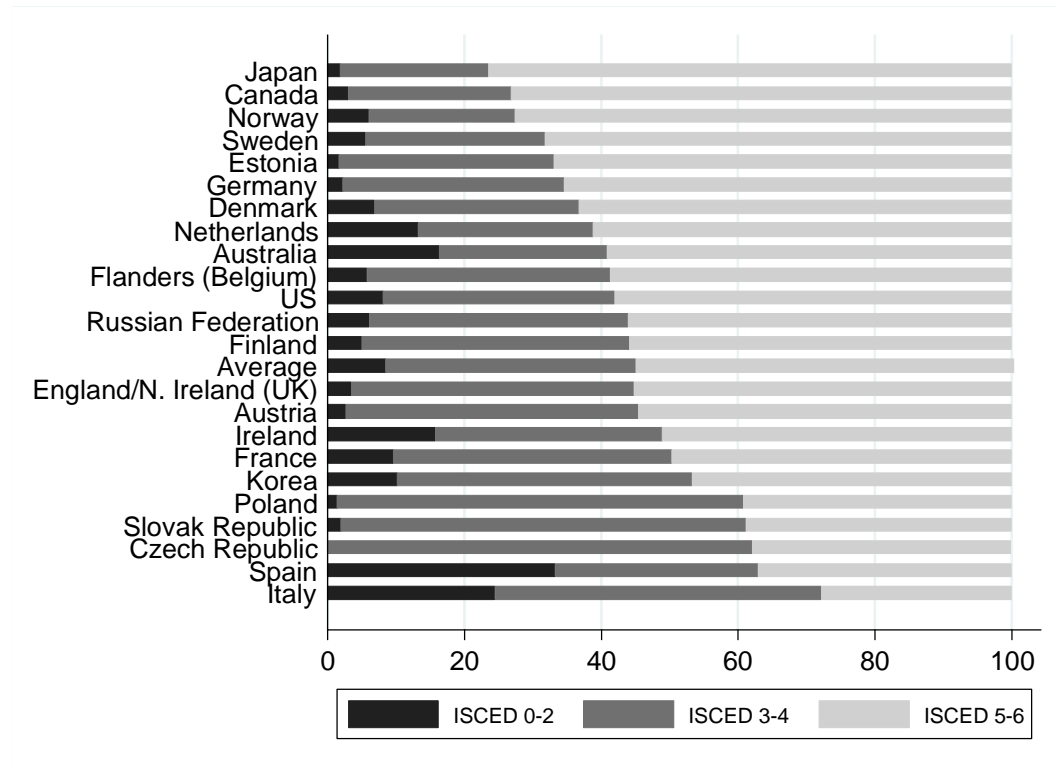
their counterparts from more disadvantaged families but, again, these differences are especially important when the market sector matches that of their father (Hansen, 1996). Therefore, cultural and social capitals have been disentangled as advantageous mechanisms for privileged individuals to earn more, with the effect size being smaller or larger depending on the field of study.

Following this line of research, I argue that skills gained through family socialisation – and especially non-cognitive skills - might not have the same importance and utility to avoid overeducation across university graduates from different fields of study. Framed in the social stratification theory, the contribution of this research is in assessing this moderating effect of social background on the relationship between field of study of graduation and overeducation likelihood, which refers to the relationship (d) in Figure 0.7 above.

3.2. Educational institutions and cross-national variation in overeducation

Sociological research addressing the role of educational institutions on overeducation has mainly concentrated on higher education institutions (Barone, C. & Ortiz, 2011; Verhaest, D. & van der Velden, 2013). Some have pointed out cross-country differences in overeducation incidence based on different arrangements of the vocational system (Di Stasio, V., Bol, T. & van de Werfhorst, 2015). The way field of study and social origin influence overeducation likelihood is assumed to work similarly across countries with different educational systems. However, the magnitude of the effect of field of study and social origin as signals for avoiding overeducation is likely to differ across countries due to differences in the educational system (Ortiz, L. & Kucel, 2008). Different educational arrangements select students based on their social origin to a wider extent than others, making the distribution of higher educated graduates' social background vary widely across countries (see Figure 0.8 below). Thus, it is likely that the knowledge and skills signalled –and attained– by higher educated graduates from different fields also differ across countries. So far, this issue has not yet been addressed.

Figure 0.8: Proportion of 20-34 year-olds in tertiary education, by parents' educational attainment, 2012



Note: Countries ordered in descending order by percentage of parents with ISCED 5/6.

Source: Education at a Glance 2014, OECD.

3.3. Overeducation persistence

It might be argued that differences in overeducation incidence across fields of study and social origin are not so relevant if overeducation is a short-term phenomenon. Therefore, overeducation persistence across fields of study and social origin should also be explored. Up to now, the role of fields of study on overeducation persistence has only been addressed from a general perspective, broadly distinguishing between specific and general programmes (Verhaest, D. & van der Velden, 2013). The role of social origin from a longitudinal perspective has been explored for other labour market outcomes (Härkönen, J. & Bihagen, 2011; Jacob, M., Klein, M. & Iannelli, 2015), but not specifically for overeducation. Studying the differences in overeducation duration across detailed fields of study in combination with social origin might shed some light on the mixed results on overeducation duration. Skills gained through family

socialisation might not only be an advantage in avoiding overeducation incidence, but also to escape from it.

4. Thesis structure, case selection and databases

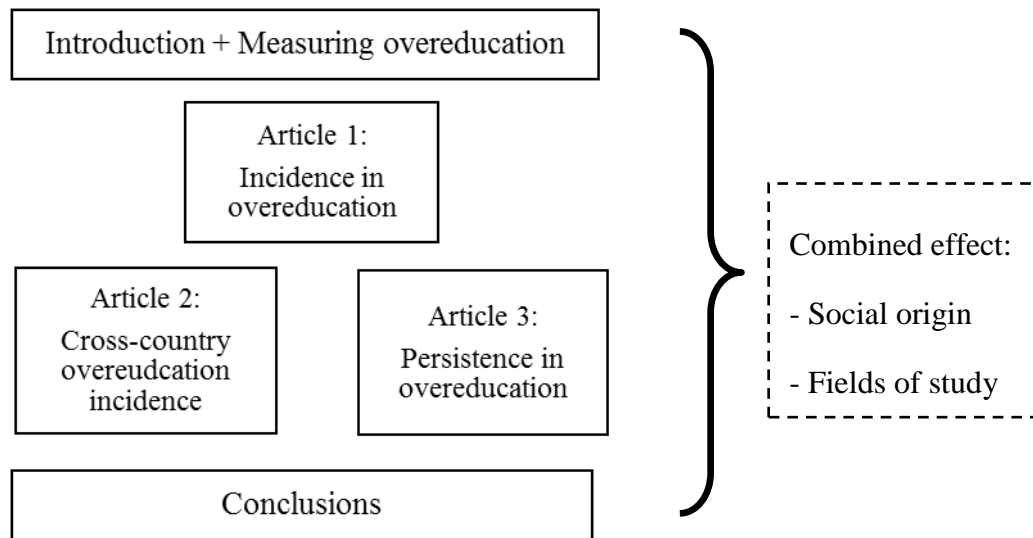
This section firstly presents the structure of the dissertation; secondly, it justifies the cases of study selected and the correspondent databases used to provide empirical evidence on the (in)existence of the unevenly distributed effect of social origin on overeducation from a cross-sectional, cross-national and longitudinal perspective. Additionally, a brief discussion on other databases explored related to the dissertation topic ends the section.

4.1. Structure of the thesis

This doctoral dissertation is structured as a compendium of three empirical articles focusing on overeducation among higher educated graduates, understanding the phenomenon as a form of labour market stratification. A general introduction presents the concept and reviews the academic literature. A methodological chapter on overeducation measurement follows, providing empirical evidence to discuss the different types of overeducation measurement. The three empirical articles are then presented, and a conclusive chapter summarises and brings together the main findings of the empirical articles and highlights their joint contribution to the literature on the field, as well as discussing the limitations of the present research that point to further research lines.

The first article focuses on overeducation incidence and the distribution of the effect of social origin across fields of study. The two following articles of the dissertation are based on the findings of this initial one. The second article addresses overeducation incidence from a cross-national perspective, based on education system differences across countries. The third article moves the attention to persistence in overeducation. The three articles provide empirical evidence to answer the research questions aiming to fill the existing gaps in the academic literature. The common link between them is the unevenly distributed effect of social origin on overeducation by field of study. A brief summary of each article follows.

Figure 0.9: Structure of the dissertation



Source: own elaboration.

Article 1: Incidence in overeducation

Aiming to fill the detected gaps in the literature, the first article of the thesis explores if the influence of social origin on overeducation varies across fields of study. The research question is: *Does the impact of social origin on overeducation vary across fields of study?* The main hypothesis is that social origin is more effective for preventing overeducation among higher educated graduates from fields of study that do not lead to a specific occupation (e.g. social sciences, humanities). Besides skills coming from schooling and formal qualifications, employers value skills and knowledge gained in other contexts, such as the professional life and the family context. Labour economics research has focused on the influence of education gained on-the-job training and job experience to avoid overeducation. From a sociological perspective, I argue that skills gained through family socialization may also be important. The market value of non-cognitive skills (i.e. critical thinking, self-presentation), information and resources gained through family socialisation might be more appreciated in some fields of study than in others and, thus, may help higher educated graduates in them to avoid overeducation. Empirical evidence provided for Italy shows that the fact of having a professional father has an especially significant effect on decreasing overeducation in

those fields of study that are less technical and/or specifically targeted to an occupational niche in the labour market. The results are consistent even when controlling for the possible use of social networks to get a job.

Article 2: Cross-country comparison in overeducation incidence

Since evidence reported in the first article only stands for a specific case, it might be argued that the effect of social origin on overeducation across fields of study might in turn vary across countries, depending on educational institutions and their form of social selection. Educational institutions and their link to the labour market are likely to affect the association between educational attainment and occupational outcomes, such as overeducation. This is the reason why the second article presents a cross-national comparison of overeducation incidence. Thus, the research question is: *Do educational institutions previous to higher education level mediate the unevenly distributed effect of social origin over graduates' risk of overeducation by field of study?* The main hypothesis is that while social selection in comprehensive education systems has less impact on educational attainment, it does have it in the later transition to the labour market, with overeducation being one form of disadvantage. In highly differentiated education systems, employers may use credentials as a valid indicator to certify skills because social selection into higher education is stronger. Results show that overeducation is higher in countries with comprehensive education systems, compared to those with more vocationally oriented secondary education. Results also suggest that father's education is more of an advantage in avoiding overeducation among social science graduates in comprehensive systems than in vocationally oriented ones, while it is not an advantage in avoiding overeducation among engineering graduates, regardless of the education system. These differences remain quite stable even for overeducated graduates five years after graduation.

Article 3: Persistence in overeducation

As discussed above, a relevant part of the overeducation literature understands it as a short-term situation taking place at the beginning of the professional career. Therefore, it could be argued that differences in overeducation incidence by fields of study and social origin shown in previous articles are not that relevant if overeducation is a short-term phenomenon. This is why the third article of this thesis takes a long-term

perspective, exploring the differences in individuals' overeducation persistence across fields of study and social background. The research question followed is: *Does overeducation persistence vary among graduates coming from different fields of study and social origin?* Up to now, empirical evidence has provided mixed results in this regard; the debate has been driven towards the reasoning that overeducation can be a temporary situation for some and a long-term situation for others. Nevertheless, individuals' characteristics explaining why overeducation is a short-term experience for some and a long-term for others remain unknown. The purpose of this article is to explore if fields of study can help to disentangle differences in overeducation persistence among graduates and if social origin is moderating this relationship, in line with the same reasoning applied in the two previous articles. Results show that overeducation is a more persistent phenomenon for education, humanities and arts, as well as for science graduates. However, contrary to what has been found in the analysis of overeducation incidence, social origin has no further effect to facilitate overeducation exit.

4.2. Case selection and databases

Databases used

One of the main problems of overeducation studies has been data limitation. It is already challenging to find a database that allows for an accurate measure of overeducation and/or the construction of various indicators. But it is even more difficult to find a suitable database to garner complex and concrete questions and answers on overeducation. In order to provide empirical evidence to answer the research questions, the databases used must have information on social origin characteristics (e.g. parental education, parental occupation), field of study of graduation, overeducation questions and/or information on education and occupation to operationalise overeducation. Since the aim of this dissertation is to explore the interaction between fields of study and social origin on overeducation, a substantive number of cases are required to ensure relevant statistical power. Moreover, the target population of the study is constituted by higher educated graduates, which restricts the database choices even more.

It is obviously difficult to find a database fulfilling all the conditions mentioned above. And it is even more challenging to find a single database with rich information from a

cross-sectional, cross-national and longitudinal perspective. Consequently, to respond to the research questions with the most accurate and reliable empirical evidence, I decided to use different databases to complete this dissertation. The justification for the selection of each database and case of study follows.

Article one uses the Italian Graduate Employment Survey (GES, *Inserimento professionale dei laureate* in its original name), conducted every three years by the Italian National Institute of Statistics (ISTAT). It exclusively interviews university graduates three years after graduation. The case of Italy has been chosen for both substantive reasons and data availability and quality reasons. Italy reports comparatively below-average figures in the percentage of higher educated graduates and overeducation incidence among higher educated graduates; thus, it is not an extreme case and results from the analyses can also be considered as average in relation to other cases. Moreover, the GES database is the most complete and updated database that I was capable of finding to respond to my research question. There are a number of reasons to choose this database for the first article. A first justification is that it presents all the detailed information required to respond to the first research question and additional information to include as controls (e.g. use of social networks, entry and graduation grades). Moreover, the information provided is quite up-to-date: the survey was conducted in 2007, interviewing individuals who graduated in 2004. Thus, the labour situation taken into consideration is prior to the 2008 economic crisis, meaning that results are likely to underestimate overeducation compared to the current situation. Therefore, it cannot be considered as an extreme case. Even if it is a national database, it was chosen over cross-country databases used for the second and third articles because it contains richer and more detailed information on social origin and social network characteristics.

In the second and third article, I am using REFLEX (Research into Employment and professional FLEXibility) and HEGESCO (Higher Education as a Generator of Strategic Competences). REFLEX includes information on 14 countries⁴ and

⁴ Austria, Belgium (Flanders), Czech Republic, Estonia, Finland, France, Germany, Italy, Japan, the Netherlands, Norway, Portugal, Spain and the United Kingdom.

HEGESCO adds five more⁵. REFLEX survey includes a representative sample by country of higher educated graduates who got their degree in the academic year 1999/2000 and were surveyed in 2005; HEGESCO data corresponds to higher educated graduates from 2002/2003 interviewed in 2008. These databases focus on the relationship between higher education and competences attained and their use in the labour market. The advantages of these databases for my research are that they include information on all the required variables, with large enough graduate samples by country and field of study. Moreover, information on the job situation is registered in two time points: after graduation and five years later (at the moment of the interview). Therefore, it allows for cross-country comparisons and longitudinal analyses, even if limited. One of the shortcomings of REFLEX and HEGESCO is that they interviewed graduates in different years. REFLEX data is still before the 2008 economic crisis, and HEGESCO was compiled in 2008. However, the effects of the economic crisis on the labour market took some time to translate into individuals' outcomes (i.e. unemployment, overeducation, earnings reduction). So, results are not expected to be heavily affected by it. To my knowledge, up to the present day, this is the most up-to-date and completed cross-national database on higher educated graduates' employment situation.

For the purpose of the second paper, I have also added to REFLEX and HEGESCO some macro-level data coming from different sources. Data on the percentage of graduates at the year of graduation and youth unemployment rates have been obtained from OECD publicly available sources. Macro-level data on the degree of tracking of the education system, the index of vocational enrolment and the existence of dual systems have been retrieved from Bol and van de Werfhorst (version 4, 2014) available from Bol's personal website. These macro indicators have enriched the analytical possibilities already offered by REFLEX and HEGESCO.

⁵Lithuania, Poland, Hungary, Slovenia and Turkey.

Other databases on overeducation and skills mismatch

I also explored the possibility of using the Survey of Adult Skills PIAAC (Programme for International Assessment of Adult Competencies) launched in 2013 by the OECD. Regardless of the rich information on labour market characteristics and adult competencies for several countries, the main shortcoming of PIAAC for the purpose of my dissertation is that the target population is the whole adult working population (16-64-year-olds). Once I select university graduates, too few cases per country are left to perform complex analyses with enough statistical power. I only used PIAAC data to present some summary statistics in the introduction of this dissertation.

For the purpose of analysing overeducation duration, I also explored other databases. I considered the possibility of using the Italian longitudinal household panel ILFI (*Indagine Longitudinale sulle Famiglie Italiane*), to continue providing evidence for the Italian case. Yet, for a number of reasons, I considered the use of REFLEX/HEGESCO over ILFI more adequate to respond to my research question. First of all, while REFLEX/HEGESCO focus exclusively on graduates, ILFI surveys a representative sample of the Italian population and its objective is to reconstruct life histories. Thus, the information and questions from ILFI are not as targeted to higher educated graduates as they are in REFLEX/HEGESCO. Moreover, the number of cases dramatically falls once only recent graduates are retained, compared to the number of cases in REFLEX/HEGESCO. Still, another argument favouring REFLEX/HEGESCO over ILFI is that while ILFI is a national database, REFLEX/HEGESCO allow for cross-national analyses.

From a longitudinal perspective I also explored the National Longitudinal Survey of Youth 1997 (NLSY97). The strength of this American database is that it follows a cohort of youth through their education and transition to the labour market. It is a very suitable database to perform event-history analyses. However, and similarly to ILFI, some of the main limitations are: 1) the target population is not specifically graduates; once overeducated graduates are selected few cases are left; 2) it is a national database that does not allow for cross-national comparisons, as opposed to REFLEX/HEGESCO.

Another panel study considered is the Catalan Social Inequality Panel (*Panel de Desigualtats Socials de Catalunya, PaD*). Similarly to ILFI, it is a longitudinal

household panel targeting the whole population. The same reasons for preferring REFLEX/HEGESCO over ILFI and NLSY97 apply for the Catalan database.

I would also like to mention some other databases I have been exploring and that I have not been able to use for my dissertation because they did not have the required information at the time of writing this dissertation, but that will hopefully have it in the near future. I believe it is useful to point them out so that they can be considered for further research in the fields of overeducation and skills mismatch.

The first one is the National Education Panel Study (NEPS), an ambitious German project that aims at providing information on education and skills over the life cycle. The panel started gathering information from individuals of different age groups. Although information from a cross-sectional perspective is already available for undergraduates and young adults, so far there is no information on the transition from higher education to the labour market. However, when this information is available a lot of the currently unsolved research questions will finally get an answer, at least for the German case.

In this sense, another project worth mentioning is the Swiss database Transitions from Education to Employment (TREE). Swiss students who took the well-known OECD PISA test (Programme for International Student Assessment) were interviewed yearly until they finished upper secondary education or tertiary education. Once in the labour market, they were interviewed twice more (in 2010 and 2014). At the moment of writing this dissertation, information gathered in 2014 was not yet available. However, REFLEX/HEGESCO are still preferred over TREE and NEPS because of cross-national comparability.

Finally, I would like to refer to some forthcoming databases that will be available soon and will be very useful for overeducation and skills mismatch research. Given the concerns with the differentiation between formal qualifications and skills, the OECD conducted large-scale surveys for a significant number of countries on qualifications and skills for 15-year-old students (PISA) and the working population (PIAAC). The next step to this qualifications and skills strategy is the Assessment of Higher Education Learning Outcomes (AHELO) project, providing similar information for tertiary graduates. So, in the near future, the OECD will hopefully be providing data on

qualifications and skills for higher educated individuals across several countries. And last but not least, the Cedefop – the European Centre for the Development of Vocational Training – presented in 2015 the main results of the European Skills and Jobs Survey (ESJ), which aims at quantifying the extent of qualification and skills mismatch in Europe and its development during individuals' careers with vocational education and training. Thus, the main educational pathways will soon enjoy information on qualification and skills.

To sum up, the search and use of different databases to complete my dissertation presents positive points. First of all, it shows that I am able to deal with different large-scale databases as well as using them to apply different methodologies. Moreover, it has allowed me to develop data management skills. It also strengthens my results about overeducation, since I am not only presenting evidence for a single case, but also for several countries and from different perspectives. Lastly, it keeps me updated about new data releases that can cope with past data limitations that were preventing empirical research improvements.

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CHAPTER 1 . MEASURING OVEREDUCATION

One of the main questions around the overeducation phenomenon has been how to measure it. The methodological debate was started during the 1980s and it is still ongoing (Battu, H., Belfield, C.R. & Sloane, 2000; Chevalier, 2003; Groot, W. & van den Brink, 2000; Halaby, 1994; Hartog, 2000; Kucel, 2011; McGuinness, 2006; Quintini, 2011a; Verhaest, D. & Omey, 2006). For the past years more refined measurements have been proposed thanks to new data sources and methodologies. However, there is still no consensus on which is the best indicator. Measurement is usually driven by data availability and it is advised to use more than one indicator to cope with the limitations of each type of measurement.

There are substantial differences in overeducation figures across measurements. This has not been a problem for economists, as returns to overeducation remain quite similar regardless of the measurement used. From a sociological perspective, though, cross-measurement differences are to be discussed because of the importance to identify who these individuals are and what characterises them.

The following sections present the indicators traditionally used to measure overeducation. The advantages and drawbacks of each measurement are discussed, especially focusing on the impact they can have for a measuring overeducation among higher educated graduated. The empirical consistency across indicators is assessed using the cross-country data employed in this dissertation with the intention to detect the cross-measurement differences and biases. Finally, selection issues concerning overeducation research that are relevant for this dissertation are discussed.

1.1. Operationalisation of the concept

The literature on overeducation has heavily relied on qualifications as a proxy to measure individuals' knowledge and skills. However, this implies making some strong assumptions which are worth pointing out. Considering qualifications as a good measure to calculate overeducation assumes that relevant knowledge and skills for jobs are only acquired via formal education (Halaby, 1994), omitting skills gained in other life domains, such as on-the-job training and family socialisation. From a sociological

perspective, it is likely to think that family socialisation may bring some cognitive and non-cognitive skills valued in the labour market. Another strong assumption derived from using qualifications as an overeducation measure is that no skills heterogeneity is expected across individuals (Verhaest, D. & Omey, 2006). Individuals with college degrees from different fields of study are considered to have the same skills level, even if one studied medicine and the other one law.

Nevertheless, because of limited data availability, credentials have been used for the past three decades of academic research as a valid measure to identify overeducated workers. Given the limitations of relying only on formal qualifications, more recent surveys and data projects have paid more attention to skills measurement, focusing on skills and knowledge used at work (e.g. PIAAC, REFLEX). Although still far from perfect, these new datasets have encouraged and facilitated the improvement of previous analyses adding skills used and/or gained at work or in other life domains to formal qualifications, pushing the debate around skills mismatch concerns.

Following previous literature reviews (Kucel, 2011; Quintini, 2011; Verhaest & Omey, 2006), currently, the most commonly used overeducation measures can be classified into three groups: 1) Job Analysis, 2) Realized Matches, and 3) Workers' self-Assessment, presented and discussed as follows. Figure 1.1 below summarises the different approaches.

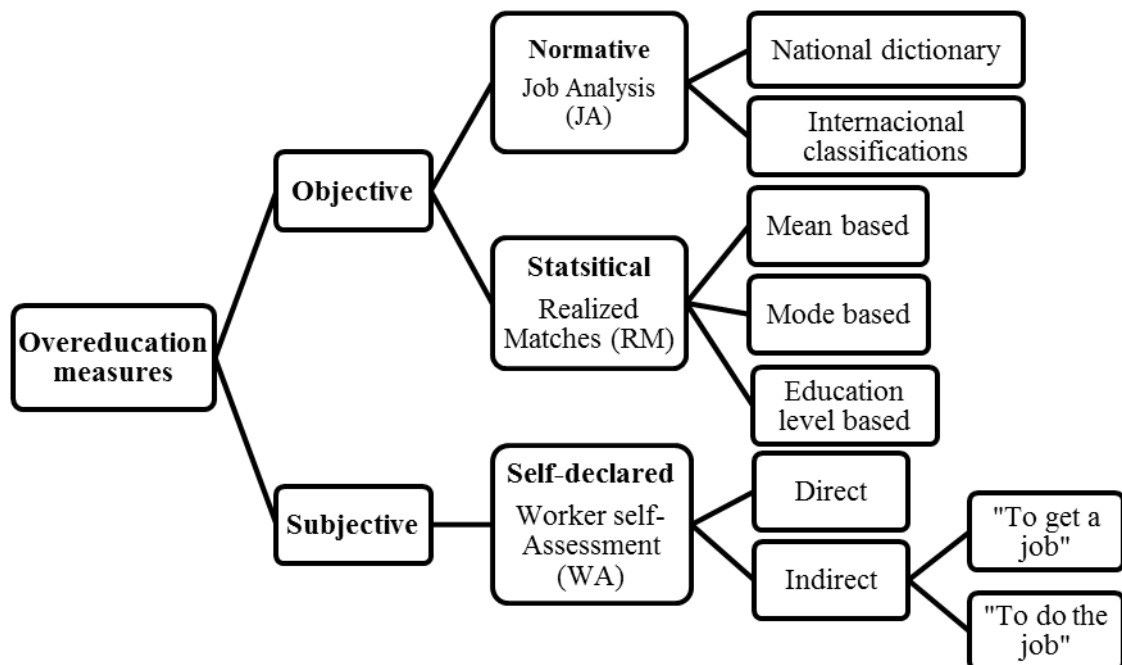
1. **Job Analysis (JA)** presents an objective measure of overeducation, introduced by Eckaus (1964) and commonly used by pioneer overeducation studies (Burris, 1983; Rumberger, 1981; Scoville, 1966). It is a normative approach based on *a priori* assumed correspondence between education and occupations, constructed on the criteria of job experts assessing educational requirements of occupations. Therefore, a worker is considered to be overeducated when his/her educational level exceeds the one assigned to be necessary to perform a job, according to job experts' classification. The most well-known classification is the American Dictionary of Occupational Titles (DOT), recently replaced by the Occupational Information Network (O*NET) online database. DOT used to be constructed by job analysts who were visiting worksites and gathering information on the tasks involved.

Nowadays, the O*NET is constantly updated by surveying a broad range of workers from different occupations. Other national occupational dictionaries worth mentioning are the Standard Occupation Classification (SOC) system developed in the United Kingdom, the Canadian National Occupation Classification (NOC) and the Australian and New Zealand Standard Classification of Occupations (ANZSCO). For international comparisons, a standardised way to execute this measurement is comparing the International Standard Classification of Education (ISCED) level with the International Standard Classification of Occupations (ISCO) level. In the case of university graduates, this would entail classifying as overeducated those who are below the level of “Associate Professionals” (ISCO 3), or those who are below the level of “Professionals” (ISCO 2), entailing a more restrictive and narrow sense of what the work of a university graduate should be.

2. **Realized Matches (RM)** is another type of objective indicator used in the overeducation literature. It was first proposed by Clogg and Shockey (1984), developed by Verdugo and Verdugo (1989) and later used by other scholars (Bauer, 2002; Groot, W. & van den Brink, 1997). This statistical approach classifies as overeducated those who exceed the mean years of education for their occupation by more than one standard deviation above the mean. The main assumption of this indicator is that in each occupation there is a core of matched workers and overeducation is calculated in relation to it. Statistical bias is expected because of the assumed symmetry of this indicator between under and overeducation. In order to avoid this bias some authors have used the median or mode as a less sensitive statistic to outliers (Mendes de Oliveira, M., Santos, M.C. & Kiker, 2000), while others have argued that the achieved level of education is a more reliable measure instead of years of education and that individuals should be considered as overeducated when exceeding the educational level of 80% of workers in their occupation (Ortiz, L. & Kucel, 2008).
3. **Worker’s self-Assessment (WA)** is a subjective measurement of overeducation first proposed by Duncan and Hoffman (1981) and later used by many more (Battu, H., Belfield, C.R. & Sloane, 2000; Sicherman, 1991;

Sloane, P.J., Battu, H. & Seaman, 1999b; Verhaest, D. & Omey, 2010). Measuring overeducation from a self-reported approach consists in using individual's opinion on whether the job requirements matches his/her educational level and/or skills (Halaby, 1994). It can be directly asked to workers if they think they are overeducated, or it can be addressed indirectly, asking workers for the required education to actually *do* the job or to *get* the job and comparing it to workers' educational level (Verhaest, D. & Omey, 2006). The fact of asking for the normative (*do*) or practical (*get*) approach can tackle different conceptions of overeducation - namely HCT and credential inflation - as reported in some empirical studies (Dolton, P.J. & Silles, 2008). Although this indicator has traditionally been treated as a dummy variable, more recently some authors have proposed an ordinal approach based on increasing degrees of overeducation in order to deal with vertical differentiation in higher education brought by Masters and other postgraduate qualifications (Barone, C. & Ortiz, 2011).

Figure 1.1: Classification of overeducation measurements



Source: own elaboration, based on Halaby, 1994; Hartog, 2000; Kucel, 2011; McGuinness, 2006; Quintini, 2011; Verhaest & Omey, 2006.

1.2. Advantages and disadvantages of each measurement

Each of these measurements has its advantages and drawbacks, summarised in Table 1.1 below. Starting with the strengths, from a conceptual perspective it has been argued that JA indicators are the most rigorous and accurate ones as they consider the requirements to “get” and “do” the job. They have been usually considered as normatively superior (Halaby, 1994); RM are good to explore individuals’ relative approach to the rest of workers and jobs, since they are based on an individual’s relative position with his/her competitors and can easily adapt to skills upgrading due to technological change or new formal qualification requirements. This can ease comparisons across cohorts, time points or countries that easily adapt skills requirements to technological changes. Another advantage of RM is that it can be calculated using standard indicators of education and occupation contained in most national labour force surveys; WA indicators are the most flexible considering job and/or local specificities and changes in job natures across time. This makes them less biased and easy to update. They are usually the best available choice.

Moving to the shortcomings, JA indicators are costly, difficult to keep up-to-date, they can easily become obsolete with occupational change and heavily affected by credential inflation (Barone, C. & Ortiz, 2011). These are the main reasons why this kind of indicator is not available in numerous countries. On top of that, they are usually nationally targeted and do not allow for cross-country comparisons. Another limitation is that their rigidity does not take into account the diversity of jobs inside occupational categories, assuming that all jobs in an occupation require the same skills and knowledge (Halaby, 1994). For instance, among the occupational level of Managers (ISCO 1) the skills and knowledge required varies widely from one job to another and by sector. It could even be questioned if a tertiary degree is required to successfully perform as a manager, especially in labour markets where small and medium enterprises (SME) are the norm. Among Professionals (ISCO 2) there might be a wider agreement that graduates have the adequate skills and knowledge to perform the range of jobs included. However, among Technicians and Associate Professionals (ISCO 3) the variety of jobs increases, as well as their qualification requirements. Thus, matching

broad occupational groups to educational levels might lead to systematic biases which are also likely to vary across countries.

RM indicators are statistically constructed and it requires that the researcher takes some arbitrary statistics (e.g. mean, mode) and cut-off points (e.g. one standard deviation) to decide who is and who is not overeducated. Moreover, they are assuming a fairly normal distribution of individuals by years of education within each occupation/job. Some recent studies have used educational levels as cut-off points (Ortiz, L. & Kucel, 2008), which are less subject to arbitrary criteria and to normal distributions assumptions. Similarly to JA indicators, differences in skills and knowledge requirements are not contemplated across jobs in the same occupation. Moreover, they might be heavily affected by credential inflation if employers decide to upgrade qualification requirements but not job tasks. For example, if there are numerous graduates and a few high-skilled jobs available, restaurants might mostly hire higher educated individuals to work as waiters. According to the RM measurement, graduates working as waiters are not to be considered as overeducated because the reference point is the rest of the workers in the occupation, instead of objective requirements to successfully perform the job tasks. Although changes in the supply and/or demand of education and skills are not likely to happen suddenly and heavily affect the population mean, it might be less indicated to assess overeducation of specific groups like recent higher educated graduates, as it is the case of this dissertation. Thus, this indicator is not very advisable for assessing overeducation among specific cohorts and labour markets heavily affected by credential inflation.

Last but not least, the main limitation of WA indicators is by relying exclusively on individuals' opinions because not all of them may perceive overeducation with the same scale. The benchmarking of their situation might vary depending on the firm size and/or the structure of the organization, leading to measurement error. Social desirability might bias overeducation estimates upward or downward: individuals may overstate their education and skills to inflate their status (Verhaest, D. & Omey, 2010), creating an upward bias. Conversely, individuals might overestimate their jobs' educational requirements to inflate their working status and, thus, it may result in an underestimation of the phenomenon. As WA indicators are based on survey responses,

they might be affected by individuals' selection bias in responding or not to the survey. It might be argued that overeducated workers are more agitated about their labour situation and eager to report it. Contrary to that, overeducation underestimation can also be caused by non-response biases: overeducated workers might be less likely to respond to work related questions because of apathy. There are also some concerns about individuals confounding overeducation with other working conditions - such as wage or type of contract – and/or job satisfaction when asking directly if they think they are overeducated. Nevertheless, indirect questions – *Which qualification do you need to do/get the job* – are pretty straightforward enough and do not leave room for misinterpretation. Some versions of WA are also sensitive to credential inflation: when asking about the qualification to *get* the job employers might adjust hiring standards to the characteristics of the supply of workers, but not to job characteristics (Hartog, 2000). However, Sicherman's (1991) evidence suggests that in the U.S. the rise in the educational level did not bias this indicator upward.

Table 1.1: Advantages and disadvantages of overeducation indicators

	Advantages	Disadvantages
Job analysis (JA)	<ul style="list-style-type: none"> - Normatively superior - Rigorous - Accurate 	<ul style="list-style-type: none"> - Massive efforts are required for its construction - Easily outdated with occupational change - Heavily affected by credential inflation - Only useful for a country - Ignores education requirement variations across jobs in the same occupation - Assumes that all skills are gained through schooling
Realized matches (RM)	<ul style="list-style-type: none"> - Based on relative terms to competitors (rest of workers) - Adaptable to skills upgrading and new qualifications requirements - Calculation based on standard education and occupation indicators 	<ul style="list-style-type: none"> - Arbitrary cut-off point (usually one standard deviation above the mean or mode) - Some groups especially affected by credential inflation - Ignores education requirement variations across jobs in the same occupation - Assumes that all skills are gained through schooling
Worker self-assessment (WA)	<ul style="list-style-type: none"> - Flexible considering job/local/country specificities - Easy to update - Straightforward question 	<ul style="list-style-type: none"> - Individuals variation in standards and criteria on jobs requirements - Social desirability bias because of inflating individuals' education or job requirements - Workers might confound overeducation with other job characteristics (wage, contract...) - Overeducated workers might be less likely to respond to work related questions - Some versions are sensitive to credential inflation - Some versions assume that all skills are gained through schooling

Source: own elaboration, based on Halaby, 1994; Hartog, 2000; Kucel, 2011; McGuinness, 2006; Quintini, 2011; Verhaest & Omeij, 2006.

Therefore, the question to pose is which criteria researchers should use to choose the most suitable indicator. Depending on the aim of the research, one kind of measurement might be more advisable than another. The use of more than one as a robustness check is usually advised, as well as combining objective and subjective indicators to show both employers' and workers' points of view. Obviously, this differentiation is rooted in the conceptualisation and theories regarding overeducation occurrence attributing more or less importance to workers and firms on the mismatch solution, as outlined in the introductory chapter. Therefore, it could be argued that different indicators of

overeducation can provide complementary and non-excluding information on the overeducation phenomenon.

Halaby (1994) pointed out the importance of self-reported measures in presenting workers' perspectives. He argues that something similar is done for unemployment: individuals are classified as unemployed when they declare that they are actively looking for a job and willing to work. According to him, this is also subjective because the intensity and effort of looking for work is likely to vary across individuals. From a sociological perspective, I think it is relevant to explore workers' subjective assessments of their own situation in relation to their expectations, the rest of workers and the labour market in general. The use of subjective indicators might be advisable when comparing different countries, sectors, occupations and fields of expertise, since individuals are likely to be more aware of the real possibilities in their domestic labour market than generic and objective classifications.

However, RM indicators might be more appropriate for case studies in countries not affected by credential inflation. It is an objective way to assess overeducation and can also facilitate comparison across workers' cohorts. JA indicators are very accurate but, as mentioned, they represent a huge effort in terms of time and resources to be constructed and keep updated. Nevertheless, if such effort has been done and is still taking place like in the U.S. with the O*NET database, it is advisable to use it because of its accuracy and case singularity.

Regardless of researchers' preferences, unsurprisingly, data availability usually dictates the choice (Hartog, 2000; McGuinness, 2006; Verhaest, D. & Omey, 2006). Table 1.2 below shows the use of the three groups of overeducation measurements during the past decades. Throughout the years, the use of WA measurements in empirical studies has outpaced the number of studies using objective indicators, becoming more dominant across time. The main reasons for this are because it is the cheapest and usually the most up-to-date measurement available (Hartog, 2000).

Table 1.2: Use of overeducation measurement by decade

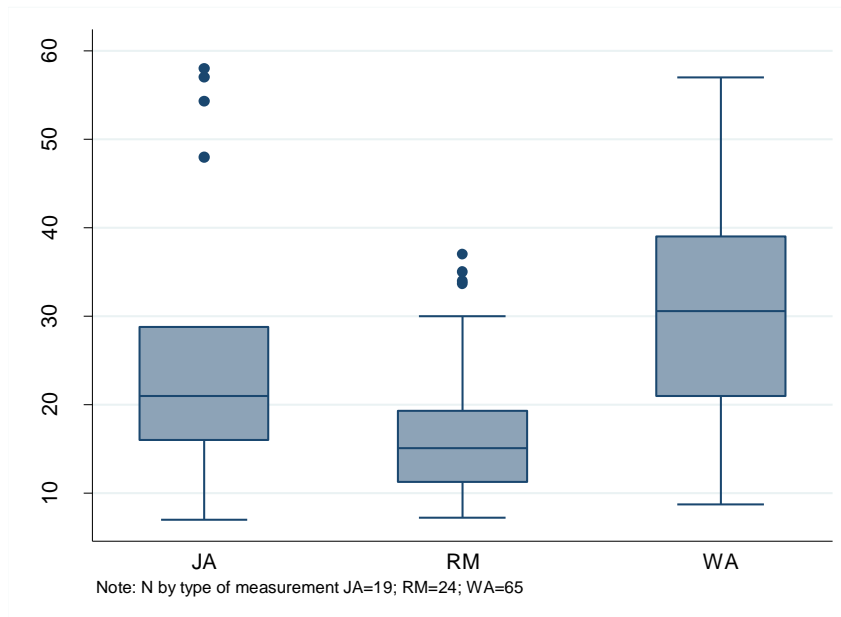
		1960s	1970s	1980s	1990s	2000s	Total
JA	N	1	3	0	12	3	19
	Rate	0.5	0.33	0	0.21	0.13	0.18
RM	N	0	1	5	13	5	24
	Rate	0	0.11	0.31	0.22	0.22	0.22
WA	N	1	5	11	33	15	65
	Rate	0.5	0.56	0.69	0.57	0.65	0.6
Total	N	2	9	16	58	23	108
	Rate	1	1	1	1	1	1

Source: own elaboration, based on 108 results from 78 studies on overeducation (Groot, W. & van den Brink, 2000; Kucel, 2011; Quintini, 2011a).

1.3. Empirical consistency across indicators

Meta-analyses of overeducation incidence across countries show that, on average, objective measurements present lower estimates than subjective ones (Groot, W. & van den Brink, 2000; McGuinness, 2006; Verhaest, D. & Omey, 2006), especially statistical ones (Battu, H., Belfield, C.R. & Sloane, 2000). Based on results from several cross-national and cross-time period studies, Figure 1.2 shows that RM indicators present the lowest median overeducation incidence, followed by JA indicators and WA. However, because of the heterogeneity of countries and time periods involved, JA and RM indicators have some outliers and WA presents accentuated dispersion.

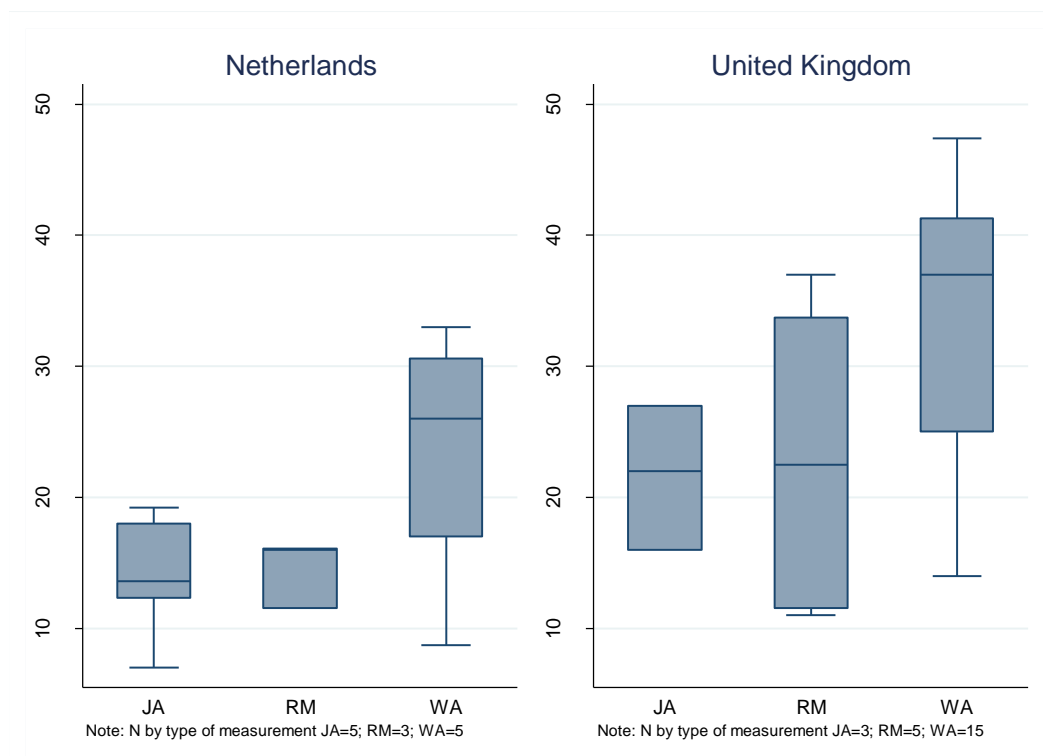
Figure 1.2: Distribution of overeducation incidence by type of measurement



Source: own elaboration, based on 108 results from 78 studies on overeducation (Groot, W. & van den Brink, 2000; Kucel, 2011; Quintini, 2011a).

Similarly, Figure 1.3 shows the median incidence of overeducation using the three types of measures for the Netherlands and the United Kingdom, as these are the two countries presenting at least one empirical study using each kind of overeducation indicator. In both cases, WA measures show larger figures, while JA and RM present similar median values. In the Netherlands, the RM indicator presents lower dispersion, whereas in the United Kingdom the JA shows more consistent results. Even if the number of cases by indicator and by country differs, this information strengthens the reasoning that different indicators might be more appropriate in one country rather than in another.

Figure 1.3: Overeducation incidence by measurement, Netherlands and United Kingdom



Source: own elaboration, based on (Groot, W. & van den Brink, 2000; Kucel, 2011; Quintini, 2011a).

Since in general terms objective indicators present lower figures, one would expect that those who are objectively overeducated are also subjectively overeducated. Nevertheless, this is not the case because the overlap is not perfect. Correlations between objective and subjective indicators are low (usually below 0.50), and limited even when comparing two objective indicators (McGuinness, 2006).

This (imperfect) overlap of the indicators has been reported by other scholars, pointing out the difficulty in identifying overeducated individuals according to basic social and demographic factors such as gender (Battu, H., Belfield, C.R. & Sloane, 2000). However, not much attention has been paid to this puzzle. The main reason is that the estimated wage returns to overeducation do not substantially change when using objective or subjective indicators (Battu, H., Belfield, C.R. & Sloane, 2000; McGuinness, 2006). The tentative explanation is that different indicators might be picking up other job and personal characteristics relevant to overeducation. But it remains unanswered which these characteristics are.

With the aim of identifying some of these characteristics and their consequences for the purpose of the present research, I use the REFLEX/HEGESCO database⁶ to provide some evidence about the differences in incidence, correlation and overlap across overeducation indicators for university graduates across European countries⁷. The use of REFLEX/HEGESCO to perform this methodological exercise over other richer and more suitable databases is that this is the database used in two of the subsequent empirical chapters. Therefore, it is worth mentioning the main limitations presented by this database for the present analysis. First of all, it only includes information on ISCED5a graduates, meaning that no information on the broader working population is available. Data from the Labour Force Survey (LFS) has been included to calculate some of the indicators (RM1 and RM2). Second, ISCO information has been used at 1 digit, making the construction of indicators requiring this information (JA1, JA2, RM1 and RM2) less accurate and probably biased, reducing the capability of tackling overeducation. Using 1-digit information I am assuming common entry conditions for a range of very different professions with different means and distributions, too. However, I took this decision because I understand it is the most conservative way to compare “graduate jobs” across countries with different education systems and labour markets and distributions across occupations. There is variation across countries on what is considered as a graduate job based on the type of higher education system and the jobs available, especially at ISCO 3 level. Finally, since no comparable occupational dictionary or any form of standardised job evaluation method is available for all the countries considered, the operationalisation of JA indicators has been done comparing broad ISCED and ISCO levels, also at 1 digit.

These limitations have affected the operationalisation of the objective indicators considered. However, as argued in the last section of the introductory chapter, REFLEX/HEGESCO is the best database available to perform the required analyses to respond to the research questions formulated in this dissertation. Regardless these data

⁶ Some information on these databases has been outlined in section 4.2 in the introductory chapter.

⁷ France, Estonia, Germany, Japan, Lithuania, Portugal, Turkey and the United Kingdom are not included in the analyses due to lack of basic information to construct one or more of the indicators considered.

weaknesses, five indicators have been constructed taking into account individuals' first relevant job⁸ after graduation. These indicators are:

- 1) **JA1** indicator only considering as *adequately matched* graduates employed in managerial and professional occupations (ISCO1 and 2) and as *overeducated* graduates employed in ISCO3 to ISCO9 occupations;
- 2) **JA2** indicator considering as *adequately matched* graduates employed in managerial, professional and associate technical occupations (ISCO1, 2 and 3) and as *overeducated* graduates employed in ISCO4 to ISCO9 occupations. The only difference with JA1 is that JA2 considers ISCO3 occupations as graduate jobs;
- 3) **RM1** indicator considering as *overeducated* those graduates employed in an occupation (ISCO 1-digit) in which 80% of the workers' highest educational level is below ISCED5a. REFLEX/HEGESCO only interviews graduates who attained ISCED5a. In order to establish the threshold - educational level of 80% of workers employed in an occupation - corresponding data by country and year from the Labour Force Survey (LFS) has been matched;
- 4) **RM2** indicator considering as *overeducated* those graduates employed in an occupation (ISCO 1-digit) in which 80% of the workers' highest educational level is below ISCED5. REFLEX/HEGESCO only interviews graduates who attained ISCED5a. In order to establish the threshold - educational level of 80% of workers employed in an occupation - corresponding data by country and year from the Labour Force Survey (LFS) has been matched. The only difference with indicator RM1 is that RM2 considers typical ISCED5b as graduate jobs;
- 5) **WA** indicator based on the indirect question "*What type of education do you feel was most appropriate for your first work after graduation?*" Individuals are considered to be *overeducated* when the educational level they deem appropriate for the job is below their educational level (ISCED5a or over). It refers to the education required to perform the job, instead of getting the job.

⁸ Relevant job is considered if it lasts more than 6 months, including self-employment and trainee jobs.

Overeducation incidence across measurements

Table 1.3 below shows the variation in overeducation incidence depending on the indicator used. Overall, JA1 considers the highest rate of overeducated graduates (0.38), JA2 the lowest (0.12), followed by RM2 (0.19); RM1 and WA present equivalent rates (0.29). Contrary to previous academic findings, objective indicators do not always present lower rates compared to subjective ones: JA1 presents a larger rate and RM1 the same one. Only RM2 shows a lower rate, compared to WA. Thus, the threshold established in job requirements to consider graduates as overeducated is crucial in this regard. Notwithstanding this variation, cross-measurement differences are smaller than the ones presented by previous studies, most of them considering the whole working population. One of the main explanations might be the homogeneity provided by the sample of university graduates. However, given the weaknesses in constructing the objective indicators, these results should be taken with caution, as the broad classification at ISCO-1 digit gathers a lot of heterogeneity in the entry requirements to the occupations included, being this issue probably more relevant in some countries than others.

Table 1.3: Overeducation incidence by measurement type

	Overeducated		Matched		Total	
	N	Rate	N	Rate	N	Rate
JA1	10,311	0.38	16,628	0.62	26,939	1.0
JA2	3,129	0.12	23,810	0.88	26,939	1.0
RM1	7,938	0.29	19,001	0.71	26,939	1.0
RM2	5,072	0.19	21,867	0.79	26,939	1.0
WA	7,384	0.29	17,738	0.71	25,125	1.0

Source: own elaboration, from REFLEX/HEGESCO and LFS.

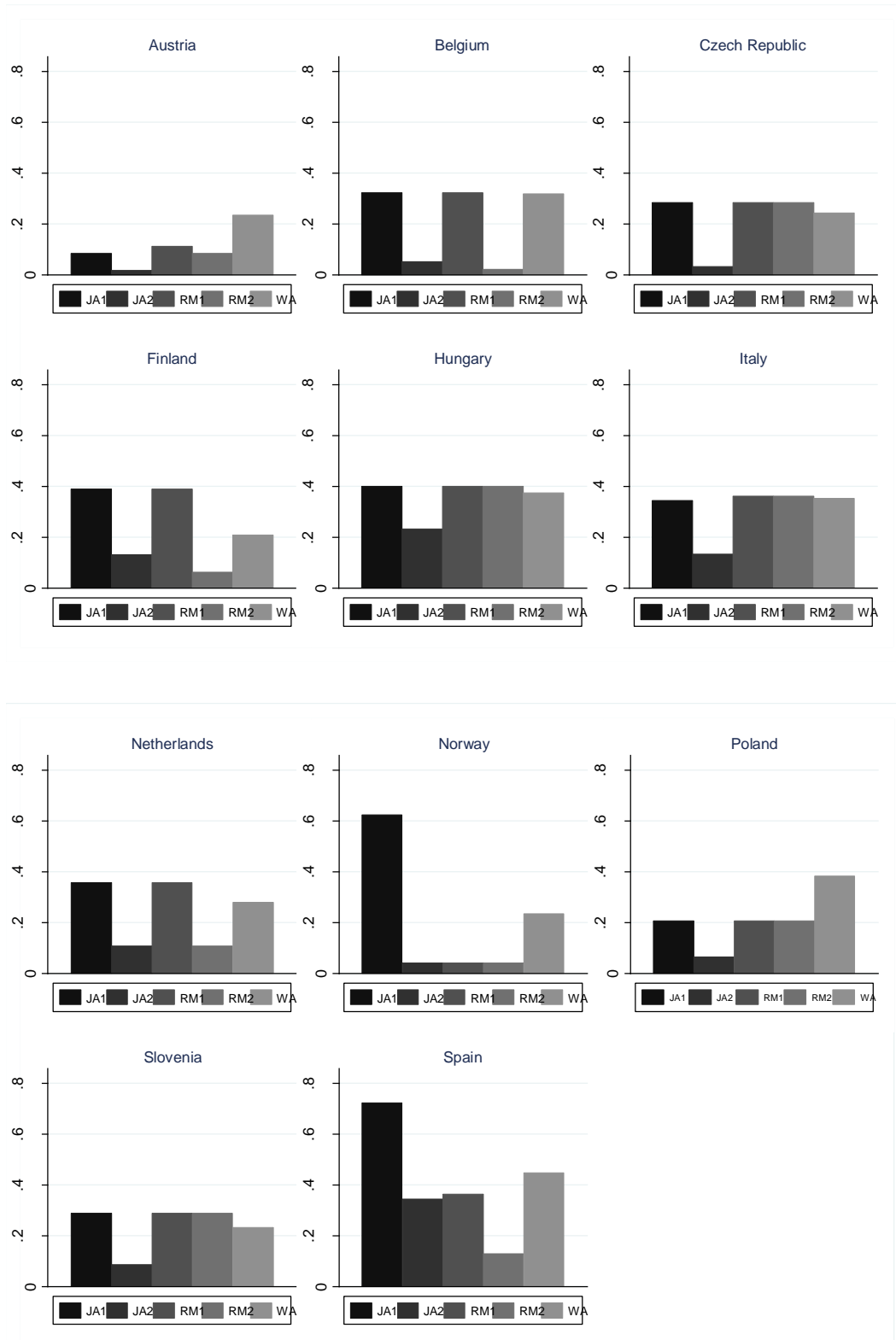
Cross-indicator differences also vary across countries. Figure 1.4 below presents overeducation rates by measurement type and country. Overall, the WA indicator is the one presenting the most consistent rates across countries. Austria and Poland are the only countries where the highest overeducation rate is presented by this subjective indicator. In the rest of the countries, the WA rate is close to the average for the rest of

the measurements. Therefore, it seems that WA indicators are useful for cross-country comparisons, at least for the database used. However, caution in results interpretation is advised, especially in countries where there are a lot of differences across indicators (e.g. Belgium, Finland, the Netherlands, and Spain).

Contrary to WA results, JA and RM indicators largely differ from one country to another, as well as their deviance from the average value with the rest of the measurements. In most countries, there is a large difference between JA1 and JA2 overeducation rate. The only difference between these two indicators is that one considers ISCO3 occupations as graduate jobs (JA2) and the other does not (JA1). In Norway and Spain, JA1 rates are quite large compared to the rest of the indicators, suggesting that JA2 is a more suitable indicator to be used at the country level because ISCO3 occupations could be treated as graduate jobs in these countries. Therefore, the JA1 indicator could be considered as an outlier/biased indicator in Norway and Spain. Conversely, in the rest of the countries JA1 seems to be a better indicator than JA2, meaning that ISCO3 occupations are not to be considered as graduate jobs. Belgium, Finland and the Netherlands show less conclusive results because of quite big differences across objective indicators in general.

With regard to statistical measurements, countries can be grouped into two subsets: those that present the same rate for RM1 and RM2 and those that present a lower RM2 rate compared to RM1. The Czech Republic, Hungary, Italy, Poland and Slovenia present the same RM1 and RM2 rates because in these countries no typical ISCED5b occupations have been detected, mainly because these kinds of studies are inexistent or atypical. In the rest of the countries, differences between RM1 and RM2 show the rate of what could be considered as a moderate type of overeducation: ISCED5a graduates employed in typical ISCED5b occupations. Belgium, Finland, the Netherlands and Spain are the countries presenting a larger difference between RM1 and RM2 and thus, a higher percentage of moderate overeducation.

Figure 1.4: Overeducation rate by measurement type and country



Source: own elaboration, from REFLEX/HEGESCO and LFS.

Overlap across overeducation indicators

In line with previous research (McGuinness, 2006; Verhaest, D. & Omey, 2006), results presented show that the correlations across overeducation measurements are not always as high as expected. Table 1.4 shows that correlations are quite high between objective indicators, but they are lower between objective and subjective ones. These results are consistent across countries, with Norway and Spain being the exceptions. However, the strength of the relationship varies across countries. In most countries, the correlation between JA1 and RM1 is very high or even perfect, which means that they are identifying the same individuals (i.e. Belgium, Finland, and the Netherlands). In some cases, the correlation is also very high or even 1.0 between JA1 and RM2. This happens in countries that have been identified as lacking typical ISCED5b occupations (e.g. the Czech Republic, Hungary, Italy, Poland and Slovenia).

Across all countries –except Norway and Spain– the correlation between objective indicators (JA and RM) is higher than between any objective and subjective ones (WA). This finding is in line with the idea that objective and subjective indicators are tackling different dimensions of overeducation. While objective indicators focus on job conditions and employers' views, subjective indicators are probably capturing workers' perspectives on their education suitability and/or need for their job. However, once again, it is worth stressing that these results should be taken with caution, as objective indicators have been constructed using ISCO-1 digit, being likely to be biased and not accurate enough to tackle overeducation.

Table 1.4: Pearson's correlation between overeducation indicators by country

Overall (N=26,939)					
	JA1	JA2	RM1	RM2	WA
JA1	1.0	-	-	-	-
JA2	0.46	1.0	-	-	-
RM1	0.795	0.561	1.0	-	-
RM2	0.603	0.472	0.745	1.0	-
WA	0.315	0.367	0.354	0.31	1.0
Austria (N=1,712)					
JA1	1.0	-	-	-	-
JA2	0.457	1.0	-	-	-
RM1	0.847	0.387	1.0	-	-
RM2	1.0	0.457	0.847	1.0	-
WA	0.251	0.233	0.219	0.25	1.0
Belgium (N=1,265)					
JA1	1.0	-	-	-	-
JA2	0.341	1.0	-	-	-
RM1	1.0	0.341	1.0	-	-
RM2	0.222	0.653	0.222	1.0	-
WA	0.328	0.238	0.328	0.16	1.0
Czech Republic (N=5,353)					
JA1	1.0	-	-	-	-
JA2	0.294	1.0	-	-	-
RM1	1.0	0.294	1.0	-	-
RM2	1.0	0.294	1.0	1.0	-
WA	0.388	0.24	0.388	0.388	1.0
Finland (N=2,508)					
JA1	1.0	-	-	-	-
JA2	0.487	1.0	-	-	-
RM1	1.0	0.487	1.0	-	-
RM2	0.323	0.663	0.323	1.0	-
WA	0.358	0.426	0.358	0.332	1.0
Hungary (N=1,119)					
JA1	1.0	-	-	-	-
JA2	0.675	1.0	-	-	-
RM1	1.0	0.675	1.0	-	-
RM2	1.0	0.675	1.0	1.0	-
WA	0.4	0.356	0.4	0.4	1.0

Italy (N=2,673)					
JA1	1.0	-	-	-	-
JA2	0.543	1.0	-	-	-
RM1	0.966	0.525	1.0	-	-
RM2	0.966	0.525	1.0	1.0	-
WA	0.356	0.326	0.364	0.364	1.0
Netherlands (N=3,262)					
JA1	1.0	-	-	-	-
JA2	0.466	1.0	-	-	-
RM1	1.0	0.466	1.0	-	-
RM2	0.466	1.0	0.466	1.0	-
WA	0.205	0.253	0.205	0.253	1.0
Norway (N= 2,126)					
JA1	1.0	-	-	-	-
JA2	0.164	1.0	-	-	-
RM1	0.164	1.0	1.0	-	-
RM2	0.164	1.0	1.0	1.0	-
WA	-0.024	0.347	0.347	0.347	1.0
Poland (N=590)					
JA1	1.0	-	-	-	-
JA2	0.512	1.0	-	-	-
RM1	1.0	0.512	1.0	-	-
RM2	1.0	0.512	1.0	1.0	-
WA	0.253	0.194	0.253	0.253	1.0
Slovenia (N=2,555)					
JA1	1.0	-	-	-	-
JA2	0.482	1.0	-	-	-
RM1	1.0	0.482	1.0	-	-
RM2	1.0	0.482	1.0	1.0	-
WA	0.28	0.265	0.28	0.28	1.0
Spain (N=3,432)					
JA1	1.0	-	-	-	-
JA2	0.45	1.0	-	-	-
RM1	0.382	0.96	1.0	-	-
RM2	0.239	0.532	0.512	1.0	-
WA	0.399	0.554	0.54	0.377	1.0

Source: own elaboration, from REFLEX/HEGESCO and LFS.

In addition to the correlation, it is also important to check the overlap between indicators in order to know the mismatch origin. There are four possible situations of match/mismatch between two overeducation indicators. Table 1.5 shows these four possible situations in which individuals are located. Cells 1 and 4 present robustness between indicators: individuals are considered overeducated or matched by both forms of measurement. Individuals classified in cells 2 and 3 show inconsistent results.

Cell 2 includes a group of individuals classified as overeducated by Indicator 1 but not by Indicator 2. If we consider Indicator 1 as a subjective indicator and Indicator 2 as an objective one, this is not to be considered as a surprising situation. As previously mentioned, overeducation meta-analyses show that subjective indicators tend to present higher figures than objective ones. However, the question remains unanswered with regards to what characterizes these individuals. Some of the criticisms to subjective indicators (e.g. different standards, lack of benchmarking) are possibly part of the explanation. Additionally, I argue that individuals might consider themselves as overeducated based on unaccomplished expectations: the job they are performing is below their initial expectations when conducting their studies, even if it theoretically/objectively matches their educational level.

Following on from the previous example, cell 3 shows the situation where people are objectively overeducated, but they do not feel subjectively overeducated. This could be considered as the less intuitive and unexpected situation. Some tentative explanations are: 1) the job tasks are more demanding than the formal title/occupation shows; 2) some individuals might have low expectations on job tasks; 3) some individuals might have a limited idea of what a job corresponding to his/her education is.

Table 1.5: Possible correspondence between two overeducation indicators

		Indicator2	
		<i>Overeducated</i>	<i>Matched</i>
Indicator 2	<i>Overeducated</i>	1. Consistent (overlap)	2. Subjectively overeducation only
	<i>Matched</i>	3. Objectively overeducation only	4. Consistent (overlap)

Source: own elaboration.

Tables 1.6, 1.7 and 1.8 below reproduce this exercise using REFLEX/HEGESCO data. Similarly to the correlation coefficients, the largest overlap on overeducation incidence is between JA1-RM1 (28.89%), with the overlap between WA-JA1 (18.52%) and WA-RM1 (16.32%) being way smaller. However, it is interesting when checking cells 2 (overeducated in subjective terms, but not in objective ones) and 3 (subjectively matched, but objectively overeducated) in Table 1.6 and 1.7. The correspondence between WA-JA2 and WA-RM2 works as expected: the percentage of university graduates who feel overeducated but are objectively matched (cell 2) outpaces the share of individuals who are objectively overeducated but do not feel as such (cell 3). Contrary to this, correspondence between WA-JA1 and WA-RM1 shows the opposite results: the share of individuals in cell 3 outpaces the one in cell 2. This might probably have much to do with the bias in constructing these indicators, as only ISCO 1 and 2 occupations are considered as graduate jobs, while some jobs included in the ISCO 3 might be considered as matched.

Results between WA-JA1 and WA-RM1 are opposite to what is theoretically expected, as the situation presented in cell 2 (overeducated in subjective terms, but not in objective ones) is considered as more intuitive than the one considered in cell 3 (subjectively matched, but objectively overeducated). Therefore, it could be argued that JA1 and RM1 indicators are upwardly biased, considering as non-graduate occupations some jobs individuals deem to be adequately matched with their educational level. However, it has to be reminded that: 1) these are overall results and they are likely to vary across countries, as suggested by the differences in incidence and cross-measurement correlations presented above; 2) the operationalisation of objective indicators is not satisfactory.

Table 1.6: Correspondence between self-reported and normative indicators

		JA1		JA2	
		<i>Overeducated</i>	<i>Matched</i>	<i>Overeducated</i>	<i>Matched</i>
WA	<i>Overeducated</i>	4,555 (18.52%)	2,634 (10.71%)	2,222 (9.04%)	4,967 (20.20%)
	<i>Matched</i>	5,131 (20.87%)	12,271 (49.90%)	782 (3.18%)	16,620 (67.59%)

Source: own elaboration, from REFLEX/HEGESCO.

Table 1.7: Correspondence between self-reported and statistical indicators

		RM1		RM2	
		<i>Overeducated</i>	<i>Matched</i>	<i>Overeducated</i>	<i>Matched</i>
WA	<i>Overeducated</i>	4,014 (16.32%)	3,175 (12.91%)	2,742 (11.15%)	4,447 (18.08%)
	<i>Matched</i>	3,484 (14.17%)	13,918 (56.60%)	1,967 (8.00%)	15,435 (62.77%)

Source: own elaboration, from REFLEX/HEGESCO and LFS.

Table 1.8: Correspondence between normative and statistical indicators

		RM1		RM2	
		<i>Overeducated</i>	<i>Matched</i>	<i>Overeducated</i>	<i>Matched</i>
JA1	<i>Overeducated</i>	7,782 (28.89%)	2,529 (9.39%)	5,030 (18.67%)	5,281 (19.60%)
	<i>Matched</i>	156 (0.58%)	16,472 (61.15%)	42 (0.16%)	16,586 (61.57%)
JA2	<i>Overeducated</i>	3,129 (11.62%)	0 (0.0%)	2,180 (8.09%)	949 (3.52%)
	<i>Matched</i>	4,809 (17.85%)	19,001 (70.53%)	2,892 (8.09%)	20,918 (77.65%)

Source: own elaboration, from REFLEX/HEGESCO and LFS.

Overeducation measurements by field of study and father's education

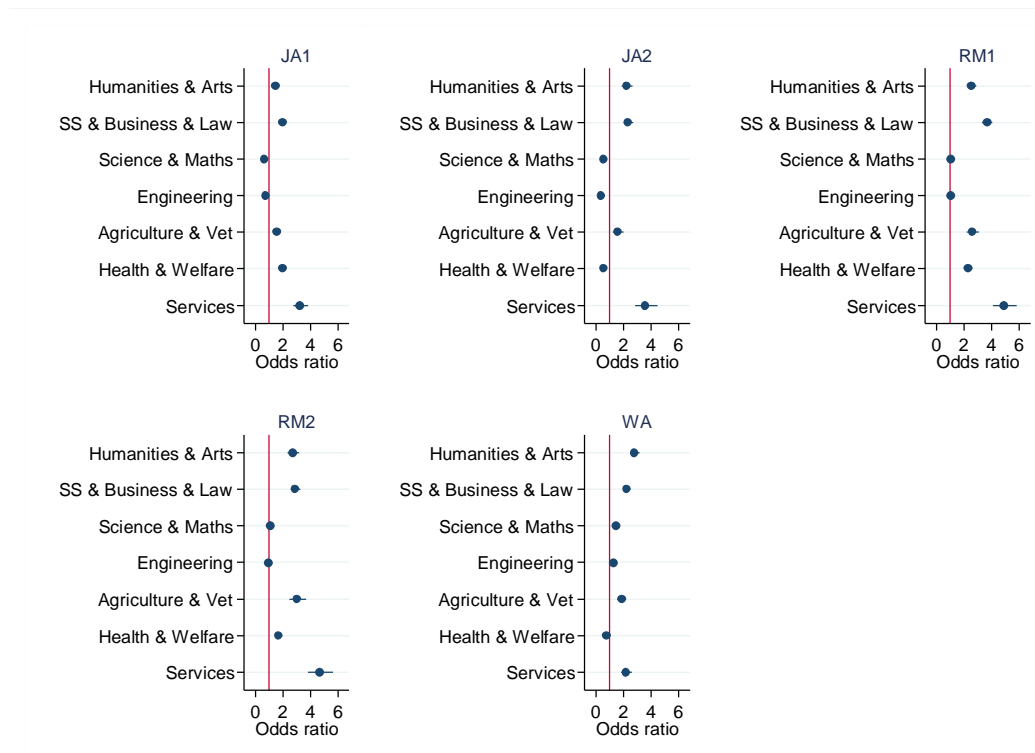
Economic research has focused on wage returns to overeducation and has mostly used extra years of education as an independent variable. But if sociologists want to use it as a dependent variable, I think some thoughts should be addressed to solving this puzzle. Different indicators might be picking up individuals with different characteristics. In order to acknowledge the biases of each measurement relevant for the present research, a basic exploration assessing to what extent overeducation likelihood by field of study and father's education differs across overeducation measurements follows.

Figure 1.5 below shows the odds ratio to be overeducated by field of study, compared to education graduates. Results are quite consistent across indicators, although not completely. In reference to education graduates, humanities & arts, social sciences, business & law, agriculture & veterinary and services⁹ are more likely to be overeducated regardless of the measurement used. Nevertheless, the magnitude of the effect varies across overeducation measurements. In the rest of the fields, results are not as consistent. Sciences & maths and engineering graduates are similarly likely to education graduates to be overeducated (RM1, RM2), although some indicators point to slightly larger (WA) or lower (JA1, JA2) likelihood of being overeducated. Health & welfare graduates present more contradictory results: they are less likely to be overeducated than education graduates according to some indicators (JA2, WA), but more likely to be overeducated according to others (JA1, RM1, RM2).

To sum up, even if results are quite consistent across indicators, it has to be kept in mind that the size effect differs across measurements. The WA indicator shows limited differences in overeducation likelihood across fields of study, while objective indicators (both normative and statistical) show larger variations in overeducation likelihood across fields of study. Thus, it could be argued that the WA indicator is the most conservative one, according to the way different overeducation measurements have been operationalised. Finally, caution should be employed when interpreting results for health & welfare graduates, which is the field of study presenting more inconsistent results across measurements.

⁹ Graduates from studies related to social, personal, safety, security and transport services are included in this category.

Figure 1.5: Odds ratio of being overeducated by field of study and overeducation measurement

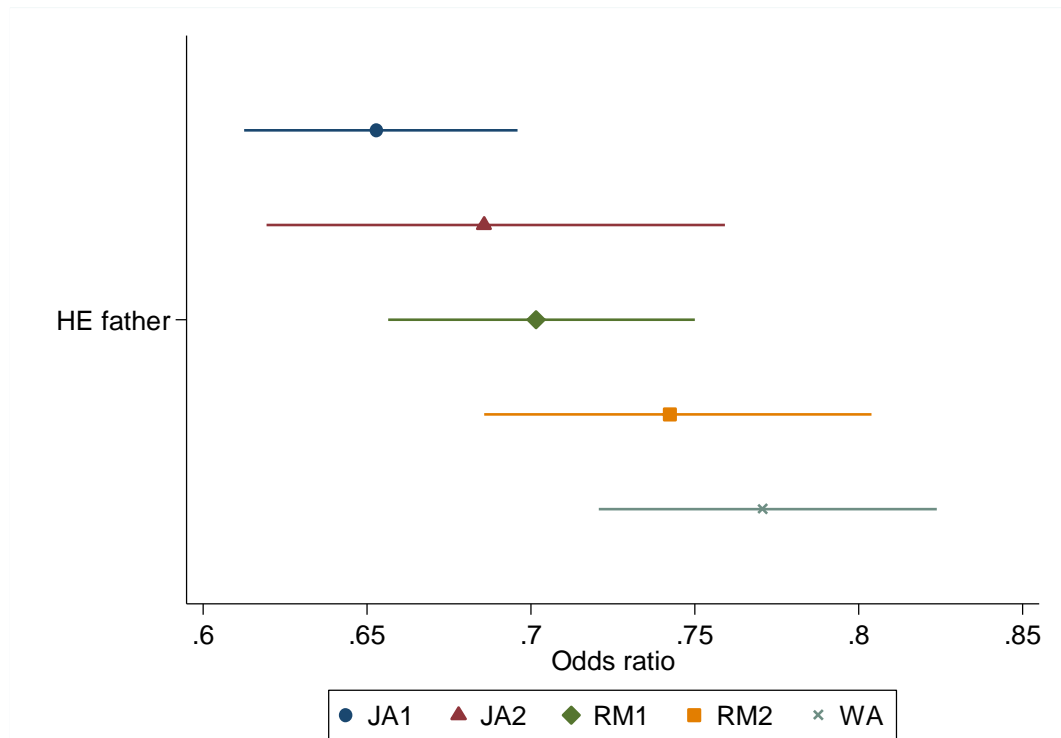


Note: odds-ratio coefficients based on logistic regression with country-fixed effects and individual-level controls for gender, age, immigration background, full-time student and father’s education. Reference category: Education.

Source: own elaboration, from REFLEX/HEGESCO and LFS.

With regard to father’s education, Figure 1.6 shows that all indicators present the same substantive result: the odds of being overeducated are lower for graduates with a higher educated father, compared to their colleagues whose father has a lower educational level. Nevertheless, it is worth pointing out that the magnitude of the effect varies depending on the indicator used. The JA1 indicator presents the lowest odds ratio compared to the rest of the overeducation indicators. Therefore, this indicator shows the largest difference in overeducation likelihood between offspring of higher educated and non-higher educated. Differences between groups decrease when using JA2, RM1, RM2 and WA, with WA being the one presenting the more limited advantage to avoiding overeducation among offspring of higher educated.

Figure 1.6: Odds ratio of being overeducated by father's education and overeducation measurement



Note: odds-ratio coefficients based on logistic regression with country-fixed effects and individual-level controls for gender, age, immigration background, full-time student and fields of study. Reference category: Non-higher educated father.

Source: own elaboration, from REFLEX/HEGESCO and LFS.

Given these differences across measurements, fields of study and father's education, from a sociological perspective I think that there are a number of reasons to favour WA indicators in the present research, using the present data and overeducation operationalisation. Firstly, the WA measurement is the one providing more consistent and reliable overeducation rates across countries. WA indicators can more easily deal with cross-national differences with regard to job/occupation requirements. The main shortcomings of JA and RM indicators are the threshold to be established about what is to be considered as a graduate job in each country. Secondly, compared to the rest of the overeducation measurements explored, the WA indicator is the one providing more conservative results with regard to the predictive power of fields of study and father's education on overeducation. As these are the main predictors used in the present research, using WA indicators will ensure that the results are underestimating rather than overestimating their effect on overeducation.

However, the results presented suggest that when considering single country studies, JA and RM indicators should be considered: JA can be an adequate indicator for countries which have constructed and updated a national job occupation dictionary and RM can be a good choice in countries where jobs rapidly adapt to technological and educational expansion changes, and are not affected by credential inflation.

1.4. Selection issues

As in any other research, there are selection issues that should be taken into account. Some of them can be solved from a methodological perspective, although some others cannot. However, it is always important to bear them in mind when interpreting the results. There are two main sources of selection bias affecting the content and results presented in this dissertation: sample selection and selection bias in overeducation.

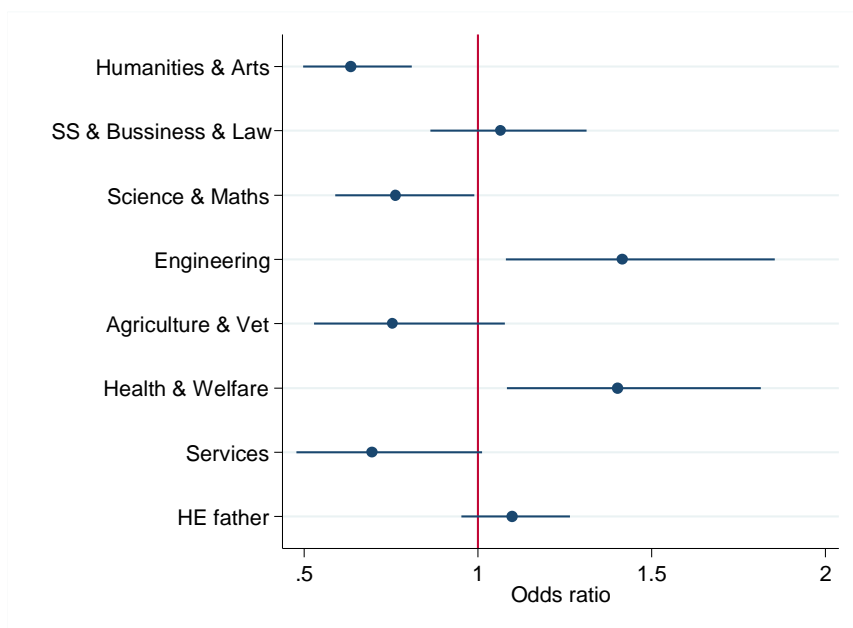
- **Sample selection:** the target group for the current research is constituted by university graduates and data used in the empirical articles corresponds exclusively to higher educated graduates. Therefore, graduates' sample selection is present and it must be kept in mind that results are only inferable to higher educated graduates, but not to the rest of the population. At first labour market entry most graduates might be lacking job experience and the only signal to be provided in the labour market is their education. Thus, their credentials are the most useful signal to be offered to the employer, while this is not the case for experienced workers. Because of these differences, it is likely that graduates behave differently than other workers (i.e. temporarily accepting an overeducated position). In this regard, there is not much that can be done to avoid this bias, but to avoid inference to the wider working population.
- **Selection bias in overeducation:** overeducated graduates are a highly selected group of individuals. To be overeducated in reference to one's job it is necessary to be employed. Thus, those graduates who are unemployed or economically inactive are not taken into account. This is a relevant bias to bear in mind, as it plays against my hypotheses. Unemployment and/or labour market inactivity are more likely to be found among those who come from a less privileged social

background and from fields of study that do not direct to specific occupations (Iannelli, C. & Soro-Bonmati, 2003; Torche, 2013).

Using REFLEX/HEGESCO data, I provide some evidence about these biases. Even if in most cases differences across groups are not statistically significant, they show us the trend among groups. Figure 1.7 below shows the odds ratios to be employed compared to education graduates. Only humanities & arts graduates are statistically significantly less likely to be employed compared to education graduates, while science & maths, agriculture & vet and services graduates are comparatively less likely to be employed than education graduates, being differences not statistically significant. Engineering and health & welfare graduates are the only ones presenting a higher likelihood to be employed compared to education graduates, although no statistically significant differences are present. Results also suggest that university graduates with a higher educated father are more likely to be employed compared to their colleagues with a non-higher educated father.

Similar results are presented in Figure 1.8 and 1.9, concerning the different likelihoods to be unemployed and inactive across fields of study and social origin. In reference to education graduates, humanities & arts graduates are more likely to be unemployed (see Figure 1.8 below) and inactive (see Figure 1.9 below). Science & maths, agriculture & veterinary and services graduates are also more likely to be unemployed compared to education graduates. Offspring of higher educated fathers are less likely to be unemployed and similarly likely to be inactive, compared to those that lack a higher educated father. Therefore, selection bias in employment is less relevant than expected among REFLEX/HEGESCO graduates, meaning that few concerns should be addressed to this issue in the current research.

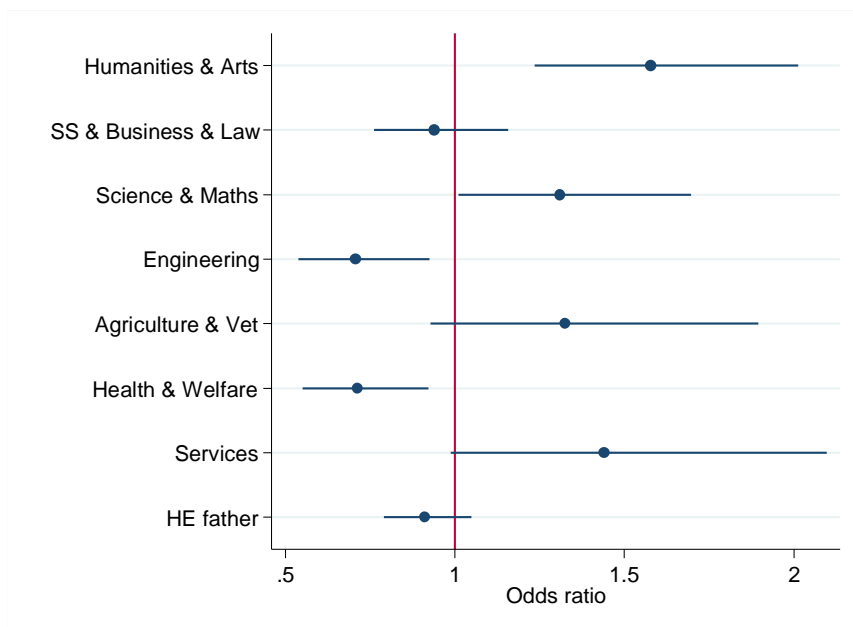
Figure 1.7: Likelihood of being employed by field of study and father's education



Note: odds-ratio coefficients based on logistic regression with country-fixed effects and individual-level controls for gender, age, immigration background, full-time student, fields of study and father's education. Reference categories: Education (fields of study) and Non-Higher Educated father (father's education).

Source: own elaboration, from REFLEX/HEGESCO.

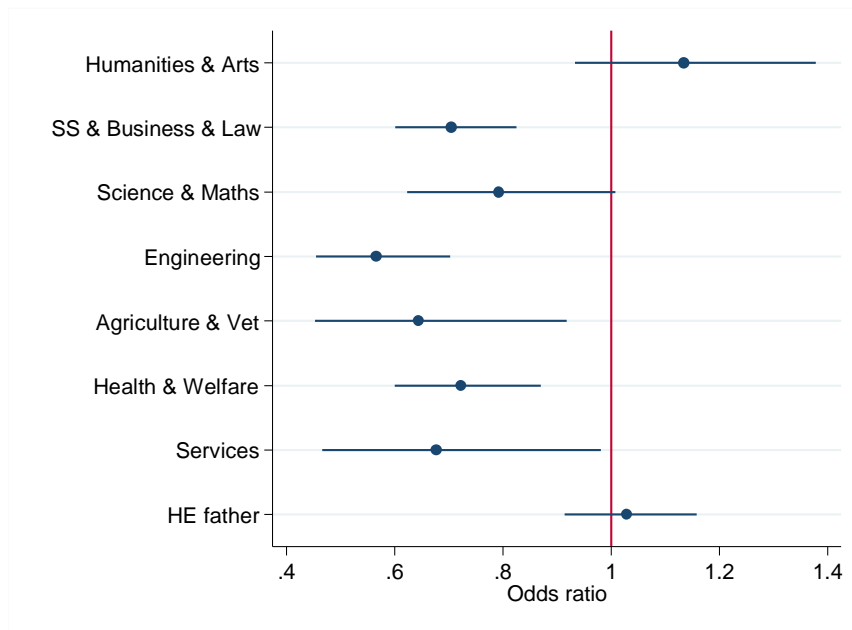
Figure 1.8: Likelihood of being unemployed by field of study and father's education



Note: odds-ratio coefficients based on logistic regression with country-fixed effects and individual-level controls for gender, age, immigration background, full-time student, fields of study and father's education. Reference categories: Education (fields of study) and Non-Higher Educated father (father's education).

Source: own elaboration, from REFLEX/HEGESCO.

Figure 1.9: Likelihood of being inactive by field of study and father's education



Note: odds-ratio coefficients based on logistic regression with country-fixed effects and individual-level controls for gender, age, immigration background, full-time student, fields of study and father's education. Reference categories: Education (fields of study) and Non-Higher Educated father (father's education).

Source: own elaboration, from REFLEX/HEGESCO.

If we take a step backwards, graduates are also a selected group of individuals: those coming from working-class families are less likely to enrol and attain a university degree from a prestigious university and/or field of study (Recchi, 2007; Shavit, Y., Arum, R. & Gamoran, 2007; Sullivan, A., Parsons, S., Wiggins, R., Heath, A. & Green, 2014; Thomsen, 2015; Triventi, 2013a). Thus, higher educated graduates coming from a less privileged social family who made it through a prestigious university and/or field are likely to be more motivated and academically talented than most colleagues from privileged social origin who also graduates in the same institution and/or field of study.

Therefore, employed individuals coming from less privileged families and less employable fields of study included in the analyses are more successful than most of their working class colleagues who graduated from a similar field but that are unemployed or economically inactive. This means that the strength of social origin on overeducation presented in this dissertation might be underestimated rather than overestimated.

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CHAPTER 3 . EDUCATION SYSTEMS AND SOCIAL SELECTIVITY CONSEQUENCES ON OVEREDUCATION PREVALENCE BY FIELD OF STUDY

Evidence provided for Italy in Chapter 2 shows that social origin is more decisive in preventing overeducation among graduates from non-occupationally focused fields of study (i.e. social sciences) than among graduates from occupationally focused ones (i.e. engineering) (Capsada-Munsech, 2015). However, such a diverse effect of social origin across fields of study may in turn be affected by educational institutions. This is the main reason why this third chapter addresses a cross-country comparison in order to explore the extent to which results presented for Italy vary across countries given different features in their education system.

3.1. Introduction

Over the past few decades, European countries have experienced overeducation to a different extent: while the average overeducation incidence among graduates is around 26%, it ranges from 14% in Portugal to 45% in Spain (Verhaest, D. & van der Velden, 2013). Although fields of study (Mavromaras, K. & McGuinness, 2012; Ortiz, L. & Kucel, 2008; Robst, 2007) and social origin (Argentin, G. & Triventi, 2011) have been stated as strong overeducation predictors across countries, the magnitude of their effect is likely to vary depending on the amount and characteristics of graduate supply.

The education stages prior to higher education partly shape the amount of future graduates and their socioeconomic characteristics. Secondary education systems with extended vocational education are well-known for not only improving labour market allocation, but also for enhancing social inequality (Bol, T. & van de Werfhorst, 2013): students from a more disadvantaged social origin are less likely to reach higher education and, in turn, university entrants and graduates are likely to be a homogenous group in terms of social origin. Therefore, social selectivity prior to higher education entry and graduation might make social origin a less relevant factor in the transition from university to the labour market and in predicting overeducation risk. Conversely, comprehensive systems are less selective in terms of social origin for entry into higher

education and graduation, but social origin might regain importance as a predictor in the first labour market experience.

Therefore, this article wants to shed some light on characteristics of the education system prior to the higher education system that strengthen or lessen social selectivity of individuals and their consequences on overeducation prevalence by field of study. With the aim of assessing this cross-country variation, the research question this article addresses is: *Do educational institutions prior to higher education level mediate the unevenly distributed effect of social origin over graduates' risk of overeducation by field of study?* For this purpose, I use REFLEX/HEGESCO data combined with macro-level data on secondary-education system characteristics to provide empirical evidence for a range of European countries. Firstly, the theoretical expectations in which the research question is framed are presented. Secondly, data and methodology used are detailed. Thirdly, main results are shown and discussed. Finally, the conclusions, limitations and further research lines are outlined.

3.2. Theoretical framework

Fields of study and social origin: predicting overeducation in all countries

Empirical evidence strongly supports field of study as a good predictor of occupational attainment (Goyette, K.A. & Mullen, 2006; Triventi, 2013b) and overeducation (Mavromaras, K. & McGuinness, 2012; Robst, 2007), especially among university graduates (Ortiz, L. & Kucel, 2008). Graduates from fields of study that do not lead to a specific occupation in the labour market (e.g. humanities, social sciences) are more likely to be overeducated, compared to graduates in occupationally focused fields of study (e.g. medicine, engineering).

Although cross-national comparisons have similarly reported the influence of fields of study on graduates' risk of overeducation (Barone, C. & Ortiz, 2011), differences across fields of study seem to be stronger as it increases the total number of graduates (Reimer, D., Noelke, C. & Kucel, 2008). Educational expansion at the tertiary level has been experienced to a larger extent in comprehensive systems than in vocationally oriented ones, providing larger numbers of graduates which, in turn, are more likely to experience differences in overeducation risk across fields of study. Therefore, it is likely

to think that the influence of fields of study is going to be stronger in countries with a comprehensive system, compared to countries with a vocational and/or tracked system.

So far, research has concentrated on the characteristics of the higher education systems to explain variation in overeducation both within and between countries. The prestige of the higher education institution has been found to be an important factor predicting overeducation risk (McGuinness, 2003; Robst, 1995b). Those attending a prestigious university are less likely to experience overeducation, compared to their colleagues from less prestigious universities. A selection effect is part of the explanation, as access to most prestigious universities has also been proved to be partly shaped by social background characteristics (Karen, 2002).

Further evidence has illustrated the signalling power of the type of vertical arrangement in higher education (Master vs Bachelor; university vs vocational college) (Barone, C. & Ortiz, 2011). In sequential systems (Bachelor vs Master), Master students signal higher skills, motivation and productivity compared to their Bachelor colleagues, but this differentiation is only relevant for avoiding overeducation when there is a large number of graduates (e.g. Norway). Similarly, in binary systems (university vs vocational colleges), university graduates are usually more advantaged because they signal higher cognitive and motivation levels (e.g. Austria, Finland, the Netherlands). Differences between university and vocational colleges are less pronounced in countries where vocational colleges are fully recognised as higher education and there is a relatively high degree of selectivity (e.g. Germany, Italy).

More recent studies have also pointed out the quality and orientation of the higher education programme (general vs specific) as possible explanations for cross-national differences in overeducation (Verhaest, D. & van der Velden, 2013). The quality of the programme explains different risks in getting an adequate job match across fields of study, but it does not explain cross-national variation. The general orientation of the programme does explain differences in overeducation risk across countries, in line with previous findings referring to the occupational focus of fields of study (Ortiz, L. & Kucel, 2008).

Beyond higher education institutions, Ortiz and Kucel (2008) find that in Germany, fields of study are less important in predicting overeducation than in Spain, suggesting that in stratified education systems, field of study is less important as a signalling device in the labour market than in comprehensive systems. Nevertheless, no further research has been conducted to assess if cross-national differences in graduates' overeducation incidence are explained by educational structures prior to entry into university and how it affects overeducation prevalence by field of study.

Education systems and social selectivity

All the research discussed so far has focused on features of the higher education system to explain graduates' overeducation risk. Yet, characteristics of previous educational stages may also influence overeducation prevalence, as well as shaping the strength of the factors predicting graduates' overeducation across countries. Here, I argue that secondary education systems partly shape the amount of future graduates and their distribution by socio-economic characteristics. Therefore, the extent of social selectivity of the secondary education system is likely to affect overeducation risk, as well as the influence of social origin on predicting it.

The literature on educational stratification has well established that cross-national differences in primary and secondary educational stages affect the way students are selected by social background (Bol, T. & van de Werfhorst, 2013; Brunello, G. & Checchi, 2007; Karen, 2002). However, education systems with a large proportion of vocationally oriented programmes at secondary education level have also been associated with a smoother school-to-work transition (Iannelli, C. & Raffe, 2007; Shavit, Y. & Müller, 2000), a lower probability of unemployment and a better job match (Shavit, Y. & Müller, 1998). Vocational tracks provide ready-to-use skills, so that students coming from a less privileged social background – who are usually more risk averse - might see vocational degrees as a safer choice to secure a position in the labour market rather than enrolling on educational paths providing more general skills (Hillmert, S. & Jacob, 2003; van de Werfhorst, 2011). Conversely, in education systems with a lower level of vocational orientation at the upper secondary level, university might be the safest way to a job match or, at the very least, to get a job.

Similarly to vocational enrolment, the placement of students in different educational tracks also enhances early social selectivity (Bol, T. & van de Werfhorst, 2013). In Europe this differentiation is usually based on the orientation of the programme (academic vs vocational), with the academic track being considered of a higher status than the vocational one (Allmendinger, 1989). In tracked systems, social origin has a greater influence on academic performance than in non-tracked ones (Brunello, G. & Checchi, 2007; van de Werfhorst, H.G. & Mijs, 2010). It is, thus, reasonable to think that in tracked systems those accessing and graduating with higher education degrees constitute a socially homogeneous group and that those coming from lower social origins have been more positively selected in terms of academic ability (Hillmert, S. & Jacob, 2010; Müller, W. & Gangl, 2003; Scherer, S., Pollak, R., Otte, G. & Gangl, 2007).

These features of secondary education systems lead to similar consequences: in countries with a high degree of vocational enrolment and/or tracking there are fewer graduates and they are more selected by social origin. Therefore, educational institutions at the secondary level shape the amount and type of graduates to be later incorporated into the labour market. The fact of competing with fewer graduates has already been shown to reduce the risk of overeducation at the first labour market entrance and differences in overeducation probability across fields of study (Reimer, D., Noelke, C. & Kucel, 2008). Yet, no attention has been paid to the homogeneity of graduates with regard to their social origin and its consequences on overeducation. Here, I argue that in vocationally oriented and/or tracked education systems, graduates' homogeneity in terms of social origin might provide a collective signal to employers, making the individual social background more irrelevant and strengthening the characteristics of the group.

This collective signal might be more important in some fields of studies than in others. In vocationally oriented systems, employers may use graduates' credentials as a way to certify and signal knowledge and skills of any kind (Jackson, M., Goldthorpe, J.H. & Mills, 2005), as graduates are a highly selected group of individuals. Contrary to this, in comprehensive systems social origin might still be a relevant predictor of skills and

ability across fields of study given the higher amount of graduates and their heterogeneity in terms of social background.

However, as shown in the previous chapter, the relevance of social background on avoiding overeducation risk varies across fields of study. Since soft skills are usually learnt through family socialisation and are more important in service-oriented occupations (Breen, R. & Goldthorpe, 2001), social background may only become an advantage for those coming from a privileged family in reducing the overeducation risk in fields of study that do not lead to a specific occupation. In turn, this social background advantage in specific fields of study is likely to be influenced by the social selection into higher education shaped by institutions of previous educational stages.

Therefore, the main hypothesis this chapter is built on is that social origin might work as a filter in shaping access to university in vocationally oriented and/or tracked education systems, whereas in comprehensive systems, social selection is less important in accessing university, but the social filter is placed at the entrance to the labour market. These different ways of social selection are likely to have consequences on overeducation risk. I argue that graduates from non-occupationally focused fields of study who come from more disadvantaged families might be more at risk of overeducation in comprehensive systems, while no differences by social origin are expected among graduates from vocationally oriented/tracked systems, regardless of the field of study of graduation. Consequently, I am arguing that education systems not only create class barriers which partly shape educational attainment, but also the likelihood of becoming overeducated.

3.3. Data

Micro-level data

REFLEX (Research into Employment and professional FLEXibility) and HEGESCO (Higher Education as a Generator of Strategic Competences) are large-scale European surveys that interview higher educated graduates five years after graduation. Both present the same set of questions, including information necessary to test the aforementioned hypotheses. The only difference is the number of countries included and the moment the data collection took place. REFLEX provides information on 14 countries¹⁹ and HEGESCO on 5 additional ones²⁰. REFLEX survey includes country representative samples of higher educated graduates who got their degree in the academic year 1999/2000 and were surveyed in 2005; HEGESCO data corresponds to graduates from 2002/2003 interviewed in 2008²¹. Observations with missing values in the main variables of interest have been dropped. Four countries, namely Estonia, Japan, Lithuania and Portugal, are not included in the analyses due to a lack of relevant information on the basic variables to perform the analyses.

REFLEX/HEGESCO interview graduates five years after graduation and ask them about their labour situation right after graduation and at the moment of the interview. Although in some cases recalling information is likely to be biased or misreported, in this case it is an advantage that individuals are reporting their job conditions five years after graduation. New labour market entrants, and especially graduates, have rarely been in contact with the labour market and might be overestimating their skills and job opportunities. After five years of labour market experience, individuals are likely to have a better perspective of how the labour market works and the nature of the available jobs, making them more competent to objectively assess if they were overeducated (or adequately matched) in their first job after graduation and at the moment of the interview.

¹⁹ Austria, Belgium (Flanders), the Czech Republic, Estonia, Finland, France, Germany, Italy, Japan, the Netherlands, Norway, Portugal, Spain and the United Kingdom.

²⁰ Lithuania, Poland, Hungary, Slovenia and Turkey.

²¹ More detailed information on the projects is available (Allen, J. & van der Velden, 2011).

Sample selection and selection biases concerning graduates overeducation – already discussed in section 4 of Chapter 1 - are present and taken into account. The survey's focus is on graduates' employment and no information on the wider working population is included. Thus, an implicit sample selection is present and it must be kept in mind that results from the analysis are only inferable to university graduates. Another selection bias may derive from the fact that overeducated graduates are necessarily employed. Most of the 37,527 interviewed graduates have been in paid employment at some point after graduation (34,927; 93.1%). At the moment of the interview, 32,616 were employed (89.9%), 1,659 unemployed (4.6%) and 1,999 inactive (5.5%)²².

Dependent variable: Overeducation

Based on the methodological debate on how to measure overeducation (Clogg, C. & Shockey, 1984; Halaby, 1994; Hartog, 2000; Verhaest, D. & Omey, 2006) and the empirical evidence provided in the methodological chapter²³, the analyses rely on a subjective indicator. Self-reported indicators are the ones reporting the most consistent cross-country estimates. The main reason is that they are the most up-to-date and flexible source of information with regard to context specificities, which is to be considered as an advantage when doing cross-country comparisons. Furthermore, subjective indicators are the least biased source of information if the formulated question is straightforward and does not leave room for misinterpretation, such as the one used in this article.

Two overeducation variables have been constructed: one for the first relevant job²⁴ after graduation (O_{AG}) and a second one for the current job at the moment of the interview (O_{+5}) (i.e. 5 years after graduation). Both derive from the corresponding question “*What type of education do you feel was most appropriate for this work?*” with the possible answers being *PhD, Other postgraduate qualifications, Master, Bachelor, and Lower than higher education*. Corresponding variables comparing individual's educational

²² The likelihoods to be employed, unemployed and economically inactive across fields of study and social origin have been acknowledged using REFLEX/HEGESCO data in section 1.4 of Chapter 1.

²³ See section 1.3 in Chapter 1.

²⁴ Jobs left within 6 months after graduation are not considered. (Self)employment started before graduation is considered if continued for more than 6 months after graduation. Trainee jobs are included as relevant jobs.

level –differentiating between PhD, Master and BA- and the education level deemed appropriate to perform the job tasks are already coded in REFLEX/HEGESCO. There are four possible categories: *Higher level*, *Same level*, *Lower level of tertiary education*, and *Below tertiary level*. I recoded them into a binary variable, considering as *Overeducated* those included in the category *Lower tertiary level* and *Below tertiary level*; and as *Matched* those included in the *Same level* category. Individuals declaring that their job requires a *Higher level* are classified as *Undereducated* and excluded from the analyses²⁵ because the interest of the research is to compare overeducated graduates with those who are employed in an adequate position. Moreover, there are few cases by field of study and country in order to include them in the analyses²⁶. Formally:

$$O_{AG} = \begin{cases} 0 & \text{if "Same level" (Matched)} \\ 1 & \text{if "Lower tertiary level" or "Below tertiary level" (Overeducated)} \\ \text{Missing} & \text{if "Higher level" (Undereducated)} \end{cases}$$

$$O_{+5} = \begin{cases} 0 & \text{if "Same level" (Matched)} \\ 1 & \text{if "Lower tertiary level" or "Below tertiary level" (Overeducated)} \\ \text{Missing} & \text{if "Higher level" (Undereducated)} \end{cases}$$

Table 3.1 below shows the distribution of the two dependent variables O_{AG} and O_{+5} . The share of overeducated graduates is 29.3% in the first relevant job after graduation, and it decreases to 18.7% when considering the employment situation five years after graduation. Although 16.2% of the individuals considered move from an overeducated job to a matched one five years after graduation, 13.4% of individuals are overeducated in both points in time. The job situation worsens for a minority of individuals, who move from a matched to an overeducated job (5.5%).

²⁵ Undereducated: 2,207 cases in the first relevant job after graduation and 3,330 in the current job at the moment of the interview.

²⁶ Further justification for excluding undereducated from the analyses have already been discussed in section 1.3 in the introductory chapter.

Table 3.1: Overeducation indicators distribution

	Frequency	Percentage
After graduation (O_{AG})		
<i>Matched</i>	18.488	70.7
<i>Overeducated</i>	7.668	29.3
<i>Total</i>	26.156	100.0
5 years after graduation (O₊₅)		
<i>Matched</i>	20.380	81.3
<i>Overeducated</i>	4.674	18.7
<i>Total</i>	25.054	100.0
Comparison O_{AG} & O₊₅		
<i>Matched</i>	16.995	64.9
<i>Overeducated</i>	3.495	13.4
<i>Overeducated-Matched</i>	4.234	16.2
<i>Matched-Overeducated</i>	1.442	5.5
<i>Total</i>	26.166	100.0

Source: own elaboration, from REFLEX/HEGESCO.

However, overeducation incidence dramatically varies across countries, ranging from 15.8% in Germany to 44.8% in Spain when considering the first relevant job after graduation. The percentage of overeducated graduates is lower five years after graduation, with the overall reduction being -10.6%. However, the magnitude of the reduction widely varies across countries: Spain (-21.1%) and Poland (-18.7%) experience substantial decreases in the share of overeducated graduates, while in Austria (-6.1%), Turkey (-6.5%) and Slovenia (-7.3%) this reduction is less pronounced. Germany is the exception, as overeducation incidence remains stable, showing a non-substantially relevant increase.

Table 3.2: Overeducation distribution across countries (O_{AG} and O_{+5})

	Job after graduation		Job 5 years after graduation		Difference 5 years-after graduation	
	Frequency	Percentage	Frequency	Percentage	Δ Frequency	Δ Percentage
Germany	226	15.8	228	17.8	2	2.0
Finland	512	21.0	230	10.8	-282	-10.2
Slovenia	528	23.2	385	16.0	-143	-7.3
Austria	369	23.5	237	17.4	-132	-6.1
Norway	455	23.6	290	16.4	-165	-7.1
Czech Republic	1201	24.3	644	12.5	-557	-11.9
Netherlands	884	28.0	472	16.2	-412	-11.8
Belgium	366	31.7	225	20.1	-141	-11.6
Turkey	559	33.4	373	26.8	-186	-6.5
France	403	33.5	256	23.5	-147	-10.0
Italy	883	35.3	570	24.1	-313	-11.2
Hungary	431	37.5	251	25.4	-180	-12.0
Poland	226	38.2	166	19.5	-60	-18.7
United Kingdom	602	43.6	285	22.5	-317	-21.1
Spain	1532	44.8	988	31.7	-544	-13.1
Total	9177	29.8	5600	19.2	-3577	-10.6

Note: countries ordered by ascending order in the percentage of overeducated in the first job after graduation.

Source: own elaboration, from REFLEX/HEGESCO.

Independent variables

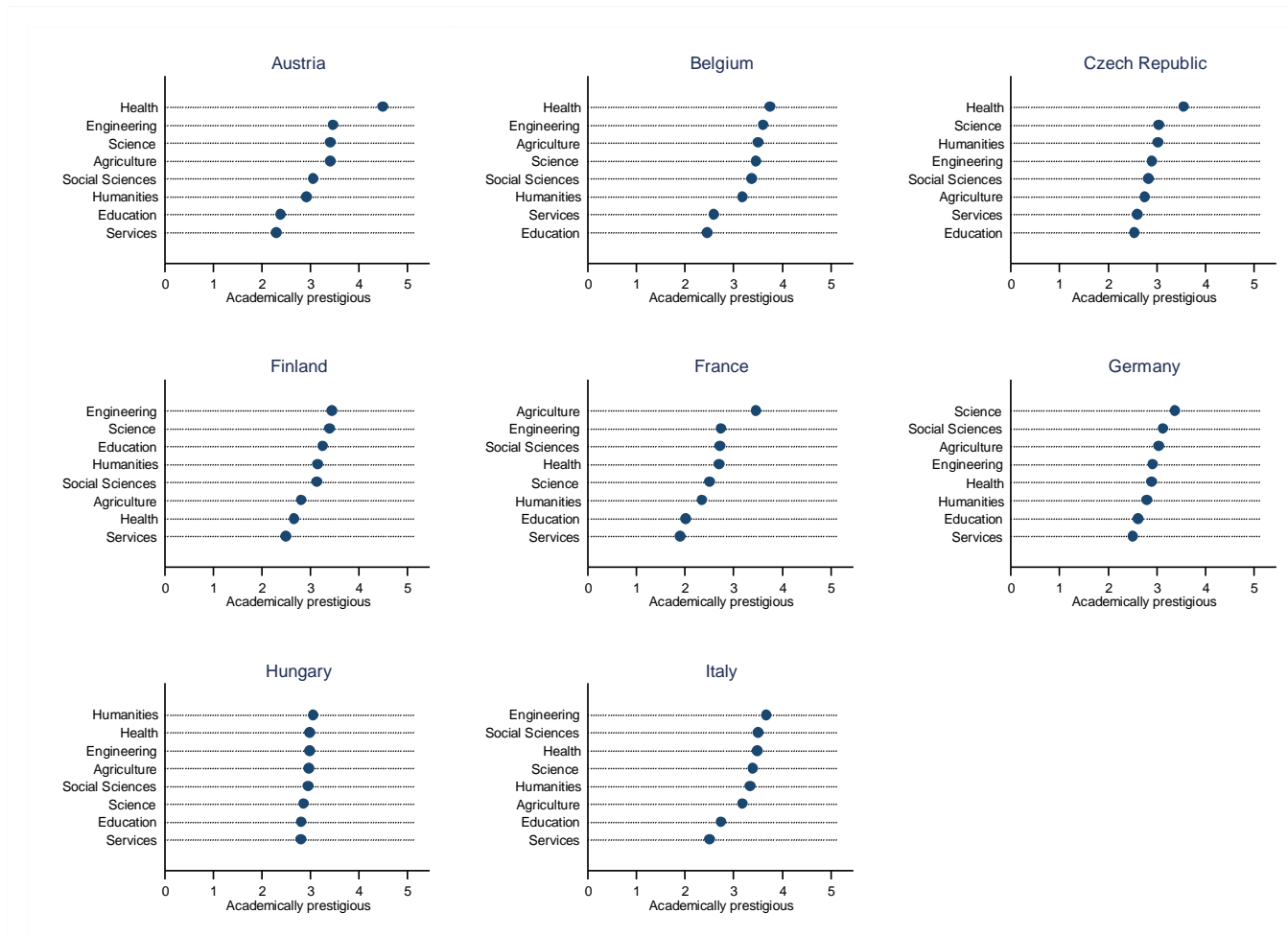
Field of study and social origin are the two main individual-level predictors included in the analyses, accompanied by a set of control variables. Table 3.3 below presents the independent variables distribution. *Field of study* is introduced via eight dummy variables corresponding to the International Standard Classification of Education - Fields of Study (ISCED-Fields of Study) at 1-digit²⁷, similarly to previous studies assessing the role of field of study on educational and occupational outcomes (Barone. C. & Ortiz. 2011; Goyette. K.A. & Mullen. 2006; Mavromaras. K. & McGuinness. 2012; Ortiz. L. & Kucel. 2008; Robst. 2007). The eight categories are: 1) Humanities & Arts (Reference Category), 2) Education, 3) Social Sciences & Business & Law, 4) Science & Maths & Computing, 5) Engineering & Manufacturing & Construction, 6) Agriculture & Veterinary, 7) Health & Welfare, and 8) Services.

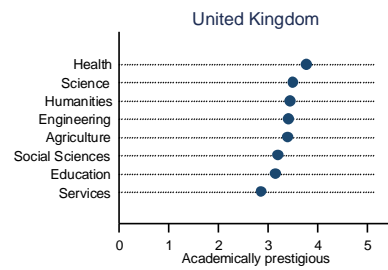
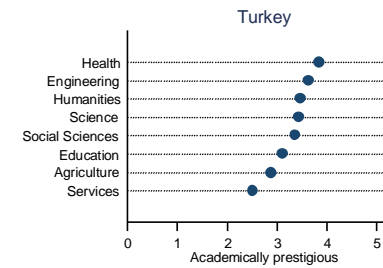
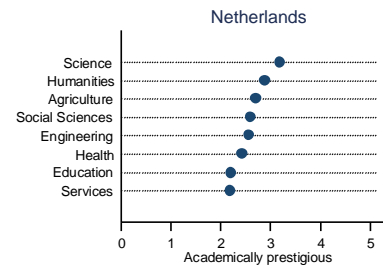
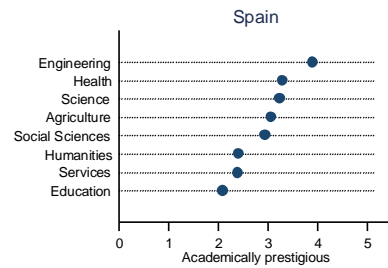
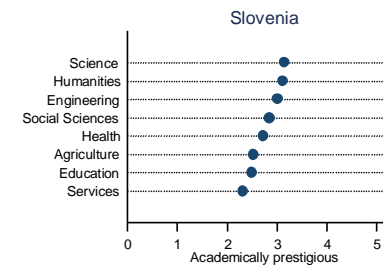
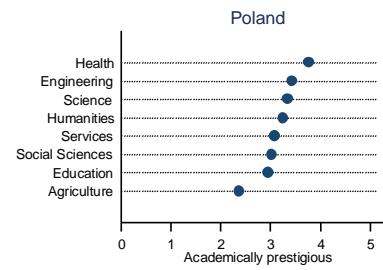
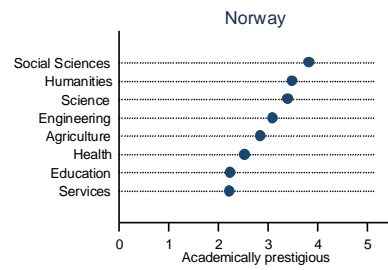
²⁷ See Table 3.6 in the Appendix for the detailed classification.

One of the issues to bear in mind is that fields of study might provide different signals across countries. The prestige, relevance and human capital associated with each field of study is likely to vary across countries. Figure 3.1 below shows the cross-country variation in the average academic prestige of each field of study. Based on a scale from 1 (not at all) to 5 (to a very high extent) interviewed graduates reported to what extent they agree with the statement that their study programme is “academically prestigious”. This descriptive cross-country variation provides two relevant pieces of information for the present research. First, it shows that health, engineering and science are among the most prestigious fields in most countries, while education and services are those considered as the least prestigious. Second, countries can be classified into two groups: those that present variation in the prestige of fields of study and those that present similar average levels of prestige. Thus, it is likely to think that differentiation by field of study and social origin might be less relevant in countries presenting less variation in the prestige of their fields, as is the case of Germany, Hungary, Slovenia and the United Kingdom.

Although it would also be desirable to control for the prestige of the higher education institution to tackle this complementary form of horizontal differentiation, REFLEX/HEGESCO database does not provide publicly available information on the university attended by the interviewed graduates or a proxy for university prestige. Therefore, it is impossible to control for this type of horizontal differentiation.

Figure 3.1: Academic prestige by field of study and country





Note: countries ordered by alphabetical order.
 Source: own elaboration, from REFLEX/HEGESCO.

The concept of social origin is captured via father's and mother's level of education. Both are dummy variables differentiating between having a father/mother who attained higher education studies or not, as cultural tastes, behaviours and preferences are usually transmitted by parents with high educational attainment (Breen & Goldthorpe, 2001; Hansen, 1996; Torche, 2013). As shown in Chapter 2, parental education and occupation are two types of cultural capital that influence overeducation likelihood. However, parental occupation is not available in REFLEX/HEGESCO and, thus, it is not possible to assess its differentiated and/or additional effect on top of parental education.

Control variables included in the analyses are: sex (*Men; Women*), country of birth (*Home country; Foreign country*), student status (*Full-time; Part-time*); participation in work placement or internships (*Yes; No*), age (continuous variable), average secondary grades and average university grades (standardised by country: $\mu=0$ and $\sigma=1$). The influence of gender and immigrant background have already been outlined in the introductory chapter. Student status can work in opposite directions: being a full-time student can be a positive signal for employers because it means the person has intensively invested in human capital for some years. Conversely, those that are part-time students might be combining human capital investment with work experience gain. If part-time students are working in a study-related job, employers might consider it as an advantage, but not if students are working in a non-study-related job because of economic reasons. Participation in work placement/internships has been included in the analysis to control for previous work experience and the higher probability of getting a matched job and, thus, it is expected to reduce overeducation probability. Age approximates labour market experience and, consequently, it is expected to be negatively associated with overeducation. Average grades when finishing secondary education and university control for ability and academic performance. It might be argued that those who are overeducated are lacking some relevant skills and abilities, compared to their adequately matched colleagues. Introducing the average grades ensures comparison across graduates with similar levels of skills and abilities. Furthermore, it controls for the primary and secondary educational effect of social origin on educational attainment (Breen, R. & Goldthorpe, 2001).

Table 3.3: Independent variables distribution

	Job after graduation (O _{AG})				Job 5 years after graduation (O ₊₅)			
	Overeducated		Matched		Overeducated		Matched	
	N / Mean	% / (SD)	N / Mean	% / (SD)	N / Mean	% / (SD)	N / Mean	% / (SD)
Field of study								
<i>Humanities & Arts</i>	1,071	14.0	1,513	8.2	637	13.6	1,729	8.5
<i>Education</i>	634	8.3	2,529	13.7	456	9.8	2,570	12.6
<i>Social Sciences</i>	3,198	41.7	5,422	29.3	1,712	36.6	6,624	32.5
<i>Science</i>	737	9.6	1,709	9.2	479	10.3	1,792	8.8
<i>Engineering</i>	1,058	13.8	3,440	18.6	690	14.7	3,744	18.4
<i>Agriculture & Vet</i>	245	3.2	551	3.0	190	4.1	608	3.0
<i>Health & Welfare</i>	484	6.3	2,814	15.2	335	7.6	2,699	13.2
<i>Services</i>	241	3.1	510	2.8	155	3.3	614	3.0
Father's education								
<i>Non-HE father</i>	5,391	70.3	11,874	64.2	3,205	68.6	13,374	65.6
<i>HE father</i>	2,277	29.7	6,614	35.8	1,469	31.4	7,006	34.4
Mother's education								
<i>Non-HE mother</i>	6,070	79.2	13,840	74.9	3,662	78.4	15,508	76.1
<i>HE mother</i>	1,598	20.8	4,648	25.1	1,012	21.6	4,872	23.9
Sex								
<i>Men</i>	2,898	37.8	7,637	41.3	1,820	38.9	8,595	42.2
<i>Women</i>	4,770	62.2	10,851	58.7	2,854	61.1	11,785	57.8
Country of birth								
<i>Home country</i>	7,457	97.3	17,993	97.3	4,521	96.7	19,877	97.5
<i>Foreign country</i>	211	2.7	449	2.7	153	3.3	503	2.5
Student status								
<i>Full-time</i>	5,793	75.5	14,600	79.0	3,612	77.3	15,875	77.9
<i>Part-time</i>	1,875	24.5	3,888	21.0	1,062	22.7	4,505	22.1
Work placement/internship								
<i>Yes</i>	3,934	51.3	11,232	60.7	2,526	54.0	11,796	57.9
<i>No</i>	3,734	48.7	7,256	39.3	2,148	46.0	8,584	42.1
Age	30.75	(4.327)	31.00	(4.669)	31.03	(4.727)	30.99	(4.764)
Average secondary grades	-0.063	(0.986)	0.029	(1.001)	-0.047	(0.988)	0.018	(0.999)
Average university grades	-0.110	(0.946)	0.032	(0.991)	-0.078	(0.969)	-0.001	(0.979)
Total	7,669	29.3	18,488	70.7	4,674	18.7	20,380	81.3

Note: only cases with information on the dependent variables are shown.

Source: own elaboration, from REFLEX/HEGESCO.

Macro-level data

Two groups of macro-level indicators are included in the analyses: education system and labour market indicators, which are summarised in Table 3.4 below. Education system indicators come from Bol & van de Werfhorst (2013)²⁸. These are the most complete and up-to-date cross-country comparative indicators²⁹ with regard to the countries and education system features that this article focuses on. Although the main predictor is the degree of vocational enrolment, the degree of tracking and the existence of dual system are also included in the analyses to control for similar characteristics of the education system that might enhance or lessen overeducation risk. The definition of the three indicators is as follows:

- 1) Index of vocational enrolment: This summarises the percentage of students enrolled in vocational tracks at upper secondary level, combining information from the OECD and UNESCO. It aims to capture the prevalence of vocational education over academic and general education. Education systems with a higher percentage of vocational enrolment generally facilitate adequate labour market allocation, which in turn reduces overeducation risk. (Bol, T. & van de Werfhorst, 2013).
- 2) Index of tracking: referring to the allocation of students to different curricula, usually differentiating between academic and vocational streams. The index summarises information based on a principal-factor analysis of three country-level variables: a) the age at first selection into different tracks; b) the percentage of the total curriculum that is tracked in primary and secondary courses; and c) the number of tracks available for 15-year-olds. Previous research has traditionally used only one of these three indicators as a proxy for tracking, while this index includes them all.
- 3) Dual system: this indicator gathers the percentage of the upper secondary vocational education that takes place in a dual system format (i.e. combining

²⁸ I am using version 4 of the data, which is available in Bol's personal website (Bol, n.d.).

²⁹ To reduce measurement error vocational enrolment and tracking indexes are standardised with a mean of 0 and a standard deviation of 1.

school and work-based knowledge), allowing the capture of the specificity of the vocational system.

Besides the characteristics of the education system, there are a number of labour market structural factors that may also account for cross-country differences in overeducation incidence. Previous overeducation studies targeting the whole working population have shown that structural differences in the supply and demand side - such as the educational composition of the workforce, strictness of the employment protection legislation (EPL) and the level of R&D – explain to a large extent cross-national variation (Di Pietro, 2002). Conversely, studies focusing on graduates' overeducation have argued that cyclical factors - such as the unemployment rate - might be more relevant for explaining cross-national differences among new labour market entrants (Verhaest, D. & van der Velden, 2013). Since this research focuses on graduates, cyclical labour market factors are taken into consideration. Three indicators have been considered to tackle the degree of competition with other high-skilled new entrants and the labour market opportunities for youth:

- 1) Percentage of graduates with higher educated father: it is an aggregated measure derived from REFLEX/HEGESCO showing the proportion of graduates whose father attained a higher education qualification. Countries with larger percentages present a more homogenous group of selected graduates by social origin. It also implicitly controls for the educational expansion. Social origin is expected to be less influential in predicting overeducation risk in these countries.
- 2) Percentage of young graduates: aged 25-34 in the year of graduation (2000 for REFLEX countries; 2003 for HEGESCO countries), aiming to control for the competition in accessing high-skilled jobs. Countries with a higher percentage of youth graduates are expected to increase overeducation likelihood. Information comes from OECD publications (OECD, 2002, 2005).
- 3) Youth unemployment rate: among 15-24 year-olds in the year of graduation (2000 for REFLEX countries; 2003 for HEGESCO countries). High youth unemployment rates might encourage tertiary education enrolment in an attempt to avoid joblessness. Information comes from OECD statistics (OECD, n.d.).

Table 3.4: Macro-level indicators distribution by country

	Education system			Labour market		
	Index of vocational enrolment	Index of tracking	Dual system (vocational specificity)	% Graduates whose father has tertiary education	% Graduates aged 25-34*	% Youth unemployment (aged 15-24)**
Hungary	-0.70	1.42	13.2	34.8	17.0	13.4
Turkey	-0.14	1.20	7.4	33.2	11.0	16.5
Spain	0.00	-1.10	2.8	25.6	36.0	26.0
Poland	0.30	-0.08	6.5	29.1	20.0	41.9
France	0.39	-0.47	11.3	42.6	35.0	18.4
UK	0.47	-1.04	0.0	34.2	30.0	12.6
Finland	0.74	-0.87	10.5	23.8	38.0	21.1
Norway	0.89	-1.04	13.3	45.8	35.0	10.4
Germany	0.89	1.86	45.0	63.2	22.0	15.6
Belgium	0.95	1.02	3.3	56.1	36.0	17.4
Italy	0.95	0.17	0.0	18.9	12	31.2
Slovenia	1.06	0.12	3.7	24.3	24.7	17.3
Netherlands	1.26	0.94	20.0	43.7	26.0	5.8
Austria	1.70	1.18	32.7	25.0	15.0	5.2
Czech Republic	1.74	1.62	35.5	32.9	11.0	18.1

*Year 2001 for REFLEX countries (except for France and Germany 2003); Year 2003 for HEGESCO countries (except for Slovenia 2005).

**Year 2000 for REFLEX countries (except for France and Germany 2003); Year 2003 for HEGESCO countries (except for Turkey 2006).

Note: countries ordered by ascending order in the index of vocational enrolment.

3.4. Methods

Multilevel logistic models with random slopes have been conducted to assess if the influence of social origin on overeducation varies across fields of study and the degree of vocational enrolment of the education system. The nested structure of the data and the correlation of the error terms within-country justify the use of multilevel analysis. Moreover, the research question inherently calls for a cross-level interaction to differentiate whether individual-level effects vary based on the degree of vocational enrolment of the national education system. The general form of the model is as follows:

$$Y_{ij} = \beta_{0j} + \beta_{1j}X_{1ij} + \beta_{2j}X_{2ij} + \beta_{3j}X_{1ij} * X_{2ij} + \beta_{4j}Z_j + \beta_{5j}X_{1ij} * Z_j + \beta_{6j}X_{2ij} * Z_j + \beta_{7j}X_{1ij} * X_{2ij} * Z_j + U_{0j} + U_{1j}X_{1ij} + R_{ij}$$

where Y is the logit of the probability to be overeducated, β_{0j} is the intercept for each country, X_1 is a vector of fields of study and X_2 of father's education, both at individual

level (i); Z is a vector of education system characteristics of the country (j), and R and U are random error terms at each level. Intercept and slopes are random, as they vary between and within countries. Additional individual and country variables are included in the following models, as independent variables have been introduced stepwise. A total of 10 models have been conducted, specified as follows:

- Model 0 is the empty model and only contains the intercept and random effects at the country level.
- Model 1 incorporates field of study and control variables at the individual level.
- Model 2 adds father's and mother's educational attainment.
- Model 3 incorporates interactions between father's education and field of study.
- Model 4a-b-c includes, separately, the education system variables (i.e. vocational orientation, tracking and dual system) due to possible collinearity among them.
- Model 5 includes the three education system variables together.
- Model 6 introduces the percentage of graduates whose father attained higher education.
- Model 7 excludes the previous one because of the high correlation with the newly incorporated percentage of tertiary graduates and the unemployment rate.
- Model 8 incorporates the three-way interaction between the degree of vocational enrolment, social science graduates and father's education. This is the full model and the one reported in the following section.
- Model 9a introduces the percentage of graduates whose father attained a higher education qualification, excluding the education system variables, while Model 9b does the same including the percentage of tertiary graduates. Model 9c includes the unemployment rate. These are robustness-check models assessing if supply and demand variables explain cross-country overeducation variation to a larger extent than education system indicators.

Models are replicated using the two dependent variables presented above (O_{AG} and O_{+5}). The main results are presented and discussed in the following section in odds ratios and illustrated by figures showing the predicted probabilities of being overeducated by field of study, father's education and the index of vocational

enrolment. Since only 15 countries are included in the analyses, the results are not robust enough to disentangle the explanatory power of level 1 and 2 variables. Therefore, the results are interpreted as cross-national variation, but no explanatory claims are formulated (Bryan, M. L. & Jenkins, 2015). Model coefficients in odds ratios are available in Tables 3.8 (O_{AG}) and 3.9 (O₊₅) in the Appendix.

3.5. Results & Discussion

Results and their substantive discussion are divided into three groups: 1) results that confirm and/or are in line with previous research; 2) differences across education systems and fields of study; and 3) differences across education systems by field of study and father's education.

In line with previous studies (Goyette, K.A. & Mullen, 2006; Mavromaras, K. & McGuinness, 2012; Ortiz, L. & Kucel, 2008; Robst, 2007; Triventi, 2013b), field of study and parental educational background are stated as strong overeducation predictors. As presented in Table 3.5 below, graduates from all fields of study are less likely to be overeducated compared to humanities graduates. However, overeducation risk clearly varies across fields of study: social science and services graduates present the highest overeducation risk after humanities graduates, while health and engineering graduates present the lowest relative risk. With regard to parental educational background, having a higher educated father and/or mother reduces overeducation likelihood - relative to those that do not have a higher educated father and/or mother. In consonance with previous research (Verhaest, D. & van der Velden, 2013), results are consistent when predicting overeducation likelihood in the first relevant job after graduation and five years later, reinforcing the relevance of these overeducation predictors in different moments of graduates' careers. Only predictions for agriculture graduates and graduates with a higher educated mother become non-statistically significant when considering the job five years after graduation.

Table 3.5: Odds ratios of being overeducated by field of study and parental educational background

	O_{AG}	O₊₅
<i>Fields of study RC: Humanities</i>		
Education	0.359*** (0.0232)	0.511*** (0.0378)
Social sciences	0.816*** (0.0394)	0.694*** (0.039)
Science	0.588*** (0.0367)	0.690*** (0.0496)
Engineering	0.501*** (0.029)	0.571*** (0.0383)
Agriculture	0.656*** (0.0597)	0.91 (0.091)
Health	0.260*** (0.0176)	0.388*** (0.0301)
Services	0.754*** (0.0689)	0.822* (0.0862)
Higher Educated father	0.818*** (0.0286)	0.914** (0.0374)
Higher Educated mother	0.875*** (0.0341)	0.932 (0.0426)
N	26,156	25,054

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: own elaboration, from REFLEX/HEGESCO.

It is worth pointing out that these results are consistent even when controlling for secondary and university grades. As we are comparing graduates with similar skills and abilities, it cannot be claimed that overeducation is explained by lower skills levels among overeducated graduates. The fact of including grades in the analyses also controls partly for primary and secondary effects derived from social origin on academic performance and study choices (Boudon, 1974; Jackson, M., Erikson, R. Goldthorpe, J.H. & Yaish, 2007).

Other independent variables worth noting are gender, student status and internship (see Tables 3.7 and 3.8 in the Appendix). Women are more likely than men to be overeducated after graduation and five years later. This finding is consistent even when comparing graduates with the same qualification and grades. Thus, results suggest that female graduates are systematically getting lower quality jobs than men. The fact of being a part-time student increases the probability of being overeducated compared to full-time students in the first job after graduation, but not five years later. As suggested, this might be because part-time students are working for economic reasons in a non-

study-related job. Following my expectations, those that did not undertake an internship are more likely to be overeducated.

Differences across education systems and fields of study

Coming to the role of the institutional variables, Table 3.6 below shows that the education system variables help us understand cross-country variation in overeducation to a larger extent than supply- and demand-side labour market variables³⁰. The three educational system variables show statistically significant results when introduced separately, suggesting that higher levels of vocational enrolment, tracking, and dual system, decrease overeducation risk. When introduced jointly, the index of vocational enrolment remains as the most important education system indicator. Neither the percentage of graduates whose father attained higher education, nor the percentage of youth tertiary graduates, nor the youth unemployment rate show statistically significant differences in overeducation risk when included jointly with education system indicators.

³⁰ See full models in Tables 3.8 and 3.9 in the Appendix.

Table 3.6: Odds ratio of being overeducated by the macro level variables

	M4a	M4b	M4c	M5	M6	M7	M8	M9a	M9b	M9c
Vocational enrolment	0.658*** (0.0761)			0.736** (0.0879)	0.739** (0.0897)	0.732*** (0.0871)	0.707*** (0.0853)			
Tracking system		0.858* (0.0749)		0.984 (0.0835)	0.984 (0.0834)	0.937 (0.11)	0.936 (0.109)			
Dual system			0.982*** (0.0059)	0.99 (0.0074)	0.989 (0.0079)	0.99 (0.0076)	0.99 (0.0075)			
% graduates with HE father					1.001 (0.0061)			0.995 (0.0083)		
% youth graduates						0.547 (0.565)	0.528 (0.543)		1.825 (1.901)	
% youth unemployment						0.742 (0.644)	0.721 (0.622)			3.362 (3.616)
Insig2u	0.13*** (0.05)	0.08*** (0.03)	0.09*** (0.04)	0.06*** (0.02)	0.06*** (0.02)	0.06*** (0.02)	0.06*** (0.02)	0.15*** (0.06)	0.15*** (0.06)	0.14*** (0.05)
sigma_u	0.037	0.023	0.027	0.019	0.019	0.019	0.018	0.043	0.043	0.041
rho	0.353	0.28	0.302	0.25	0.25	0.247	0.245	0.384	0.384	0.373
Observations	26,156									
N countries	15									

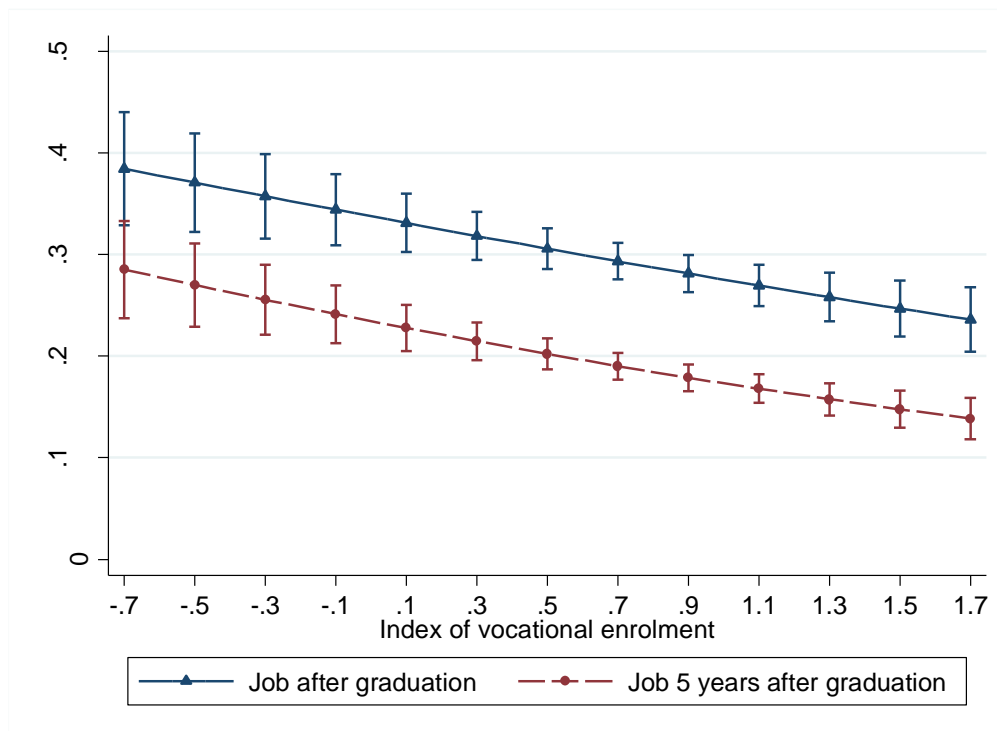
Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: own elaboration, from REFLEX/HEGESCO.

As expected, there is a negative association between overeducation probability and the degree of vocational enrolment of the education system (Figure 3.2 below): the predicted probability of being overeducated decreases as it increases the index of vocational enrolment. Although the predicated probability is higher when considering the first job after graduation compared to the job five years later, the slope is almost identical. Thus, in line with recent research (Bol, T. & van de Werfhorst, 2013; Di Stasio, V., Bol, T. & van de Werfhorst, 2015; Levels, M., van der Velden, R. & Di Stasio, 2014), evidence suggests that education systems with a high degree of vocational enrolment at secondary level lessen overeducation risk, compared to more comprehensive systems. This article provides specific evidence for graduates.

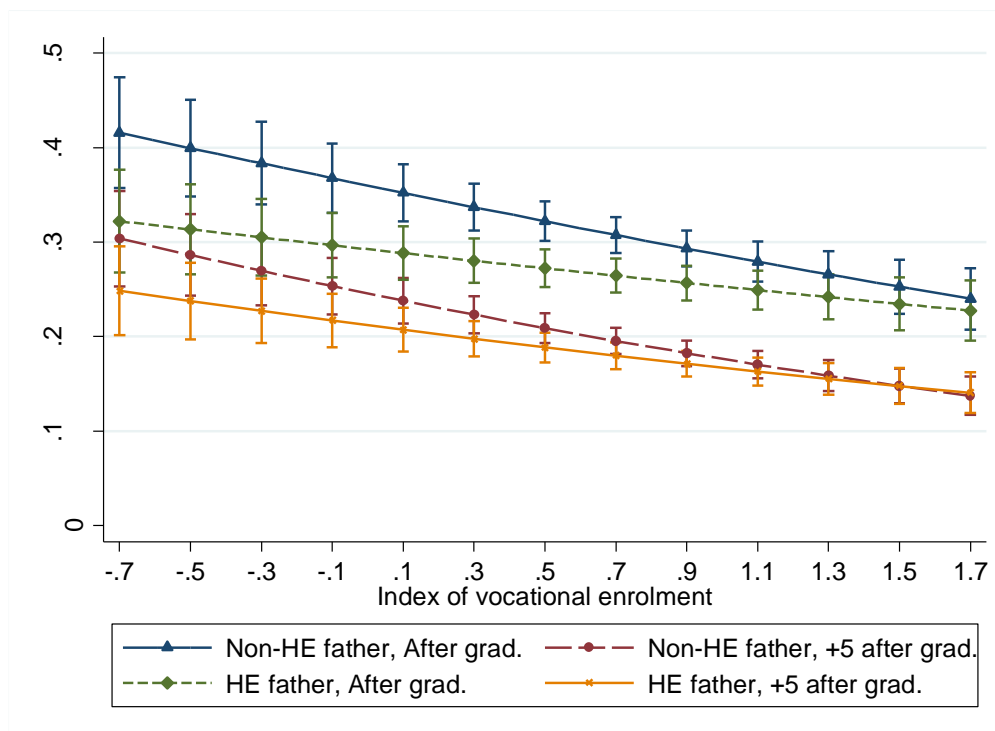
Figure 3.2: Predicted probabilities of being overeducated by degree of vocational enrolment of the education system (O_{AG} and O_{+5})



Source: own elaboration, from REFLEX/HEGESCO.

However, results do not present substantive differences between graduates with and without a higher educated father. Figure 3.3 below shows that the probability of being overeducated is higher for offspring of non-higher educated father's in the first job after graduation and five years later. Even if not always statistically significant, differences are larger among graduates from education systems with a low degree of vocational enrolment and almost inexistent in education systems with a high degree of vocational enrolment. Therefore, contrary to my hypothesis, it cannot be claimed that father's education background makes a big difference in reducing overeducation risk across education systems.

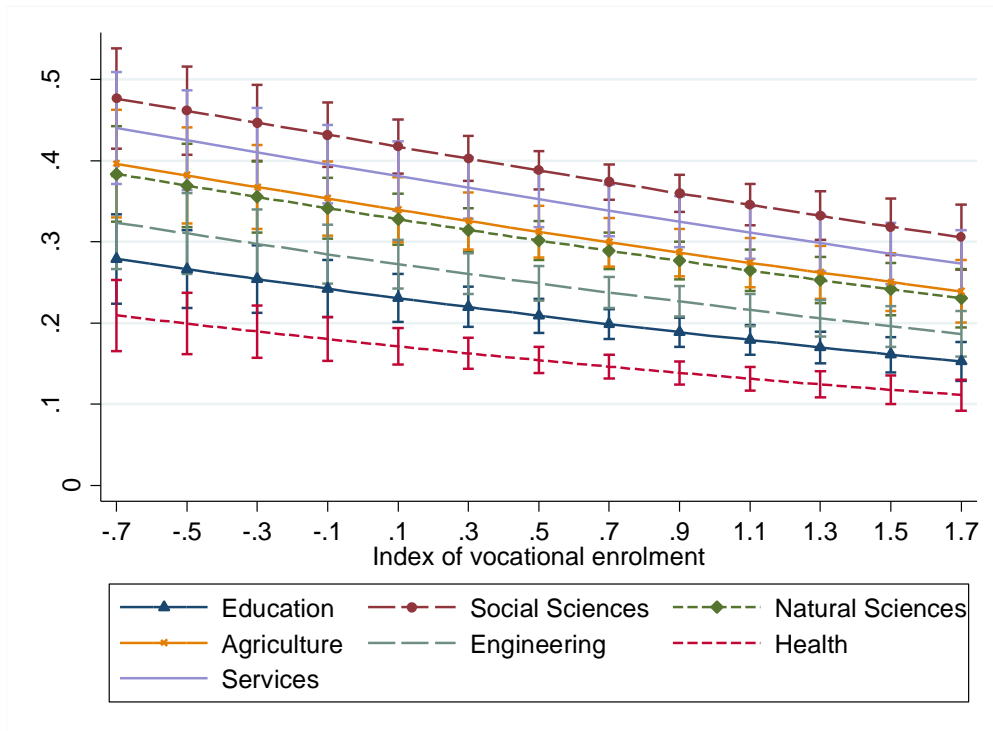
Figure 3.3: Predicted probabilities of being overeducated by degree of vocational enrolment of the education system and father's education (O_{AG} and O_{+5})



Source: own elaboration, from REFLEX/HEGESCO.

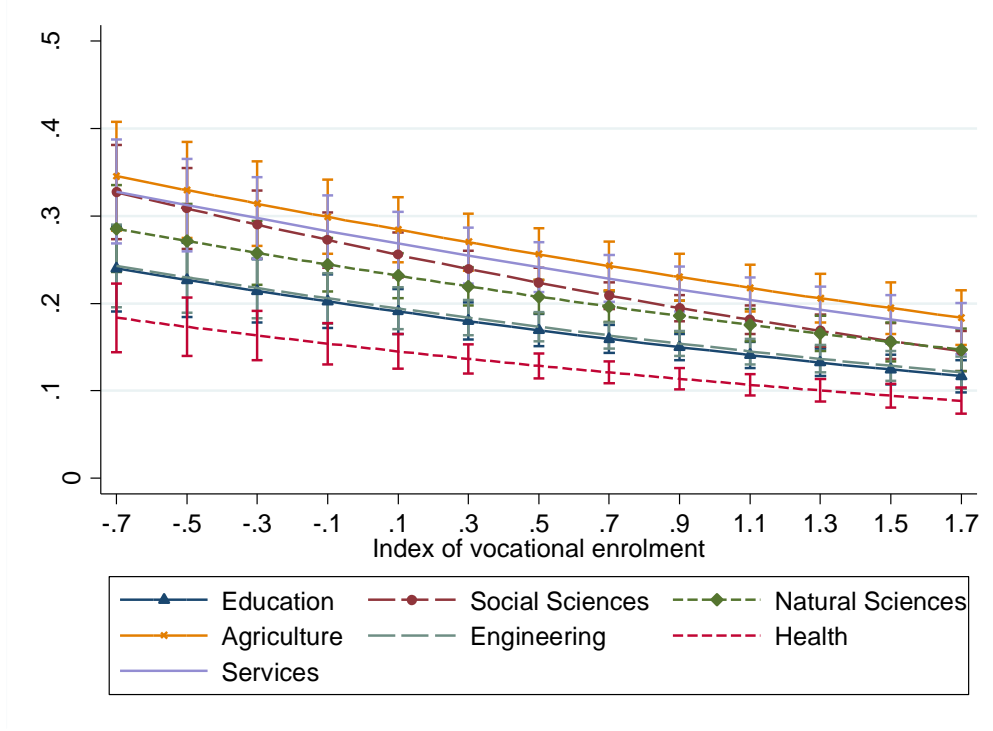
Figures 3.4 and 3.5 show the predicted probabilities of being overeducated by field of study and degree of vocational enrolment. All fields of study follow the same pattern: overeducation likelihood constantly decreases as it increases the degree of vocational enrolment in the education system. However, the magnitude of the effect varies across fields of study and between the first job after graduation and five years later. While in the first job after graduation, social sciences and services graduates are the most likely to be overeducated, and five years after graduation social sciences graduates reduce their overeducation likelihood in relative and absolute terms. Service graduates reduce their overeducation likelihood in absolute terms, but relative to the rest of the fields, they are still in second position, after agriculture graduates. Health, education and engineering graduates are always the less prone to fall into overeducation. Therefore, across education systems, the differences in overeducation likelihood between occupationally focused and transversally focused fields of study persist, even if the effect size differs.

Figure 3.4: Predicted probabilities of being overeducated by field of study and degree of vocational enrolment of the education system (O_{AG})



Source: own elaboration, from REFLEX/HEGESCO.

Figure 3.5: Predicted probabilities of being overeducated by field of study and degree of vocational enrolment of the education system (O₊₅)



Source: own elaboration, from REFLEX/HEGESCO.

Differences across education systems by field of study and father's education

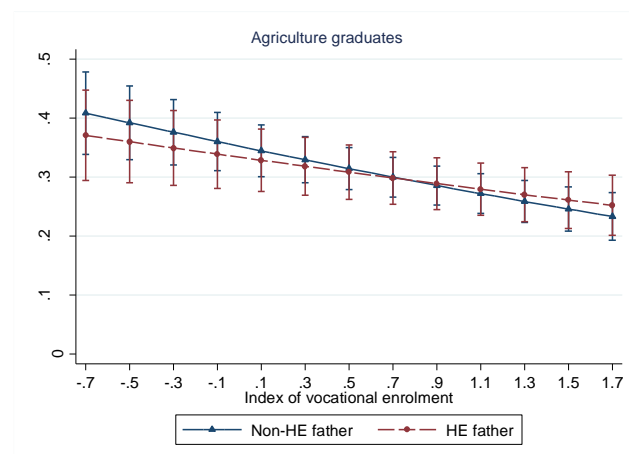
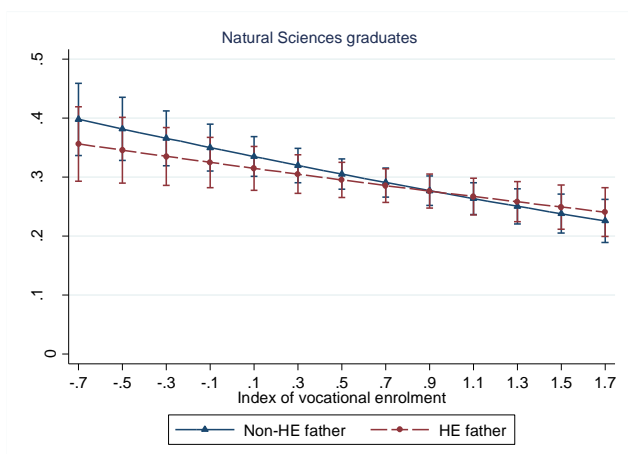
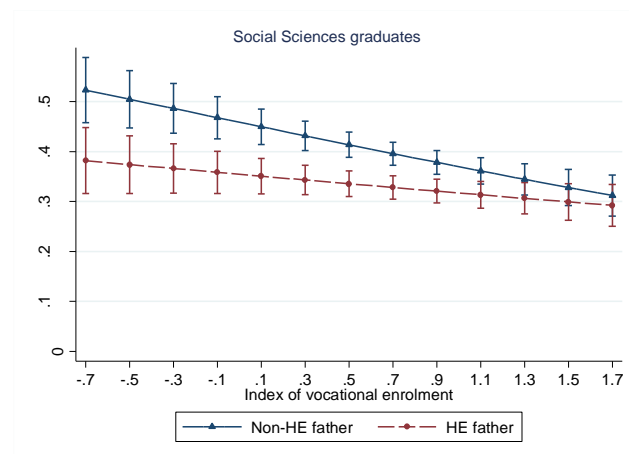
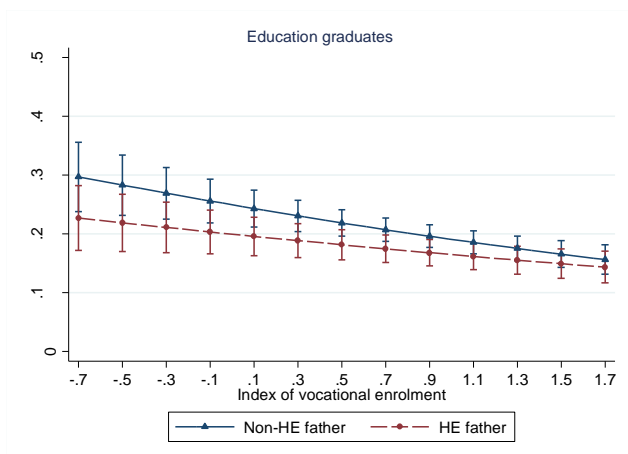
Next, I present the main results which aims to answer the research question of this article. In order to easily interpret and compare the interaction effects between field of study, father's education and the degree of vocational enrolment, Figures 3.6 and 3.7 show the predicted probabilities of being overeducated by degree of vocational enrolment and father's education for each field of study of graduation, referring to the first relevant job after graduation (Figure 3.6) and five years later (Figure 3.7).

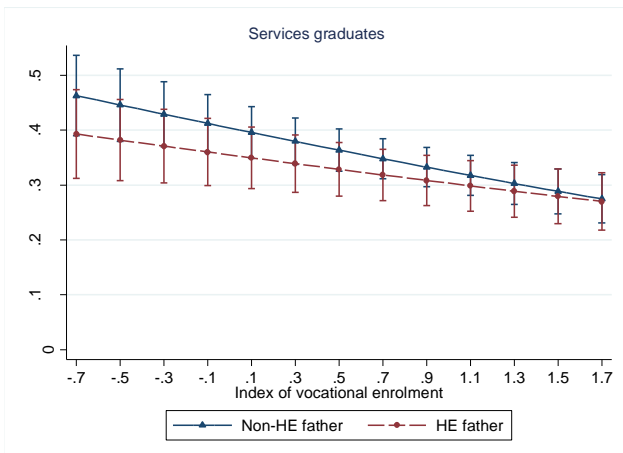
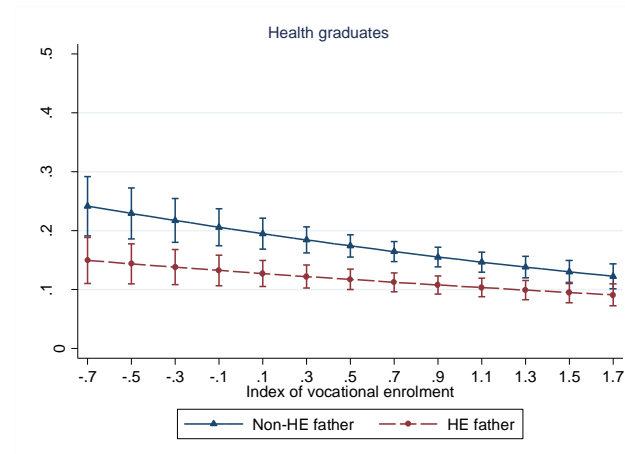
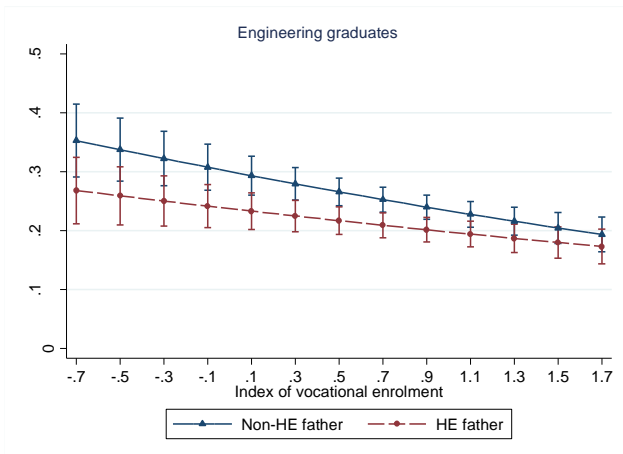
When focusing on the first relevant job after graduation, no differences are observed in the likelihood of being overeducated between offspring of higher educated and non-higher educated father's, except for social science graduates from education systems with a low degree of vocational enrolment. Therefore, in line with the theoretical expectations, results suggest that social origin is an advantage in reducing overeducation risk among graduates from non-occupationally focused fields of study (i.e. social sciences) in comprehensive systems, but not in education systems with a high degree of vocational enrolment.

It must be noted that there are also some differences between offspring of higher educated and non-higher educated fathers in the field of health but only if the degree of vocational enrolment is low. Thus, even if unexpected, results suggest that social origin also has an influence on reducing overeducation risk among health graduates in comprehensive systems.

Differences by social origin among social science graduates five years after graduation have vanished regardless of the education system (Figure 3.7). Nevertheless, differences between offspring of higher educated and non-higher educated have appeared among services graduates. Those that have a higher educated father present a lower probability of being overeducated than their peers with a non-higher educated father. Differences between these two groups of individuals decrease as it increases the degree of vocational enrolment of the education system. Since the field of study of services is also considered as a non-occupationally focused field, results are in line with present research expectations.

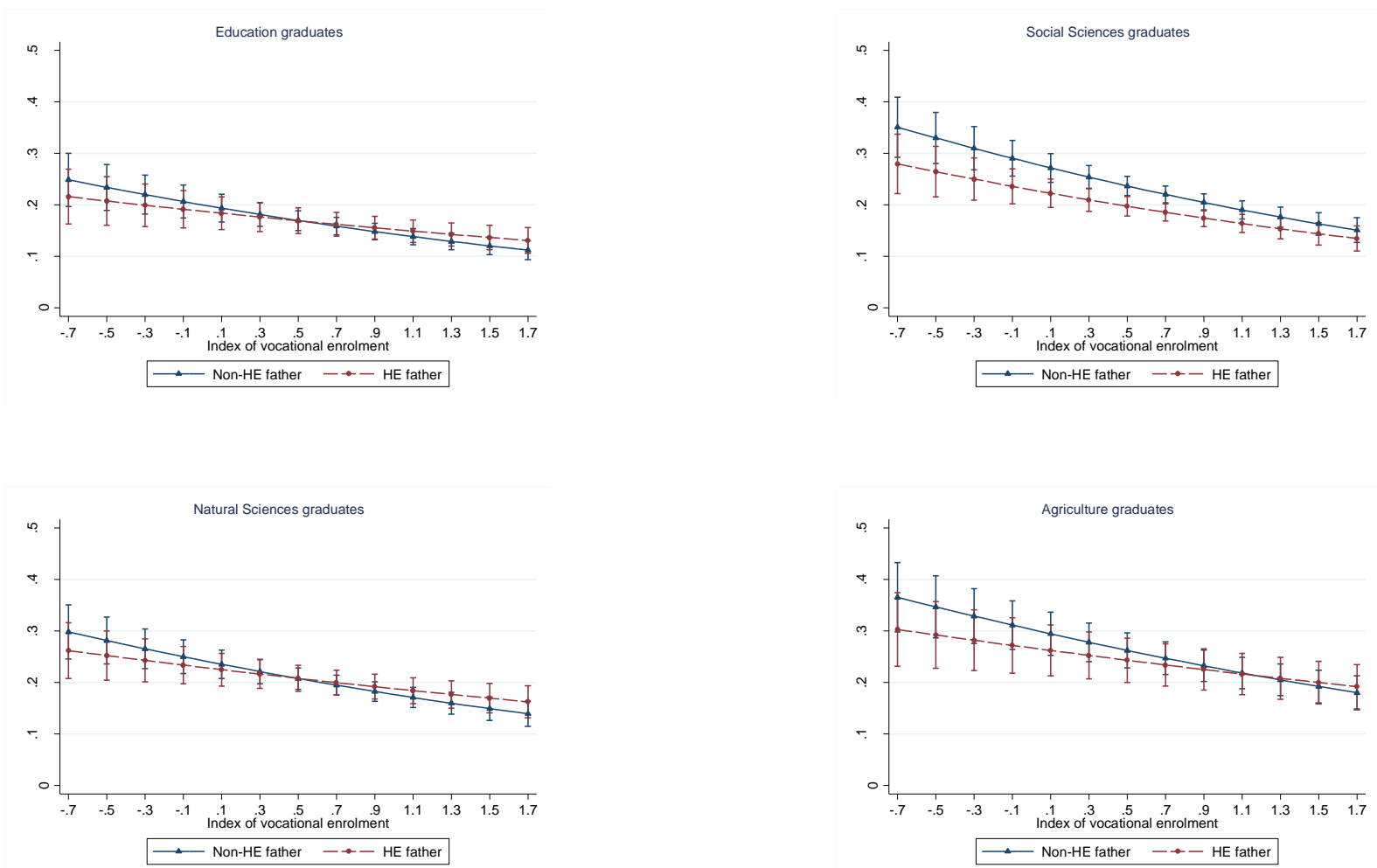
Figure 3.6: Predicted probabilities of being overeducated by field of study and father's education by degree of vocational enrolment of the education system (O_{AG})

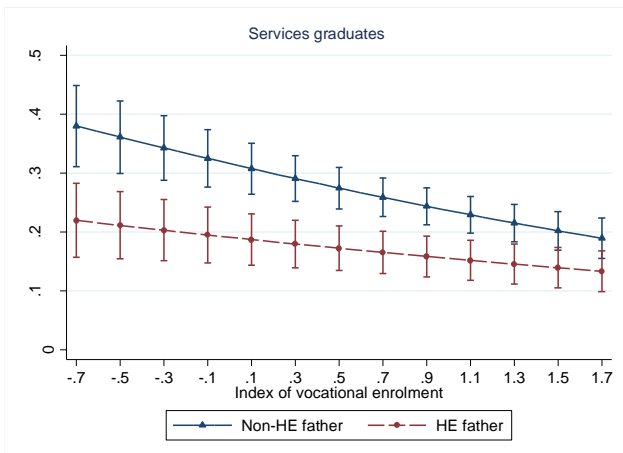
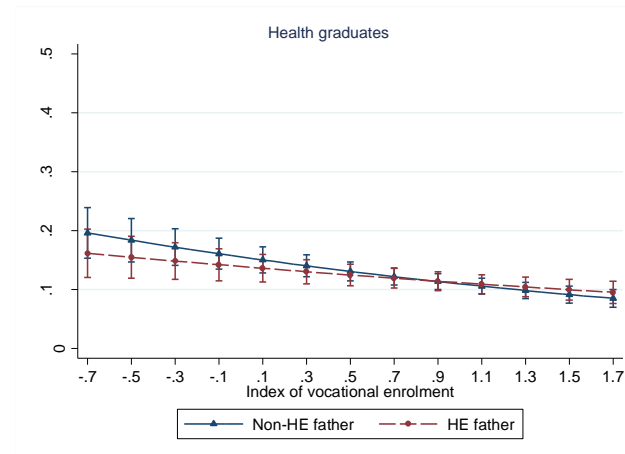
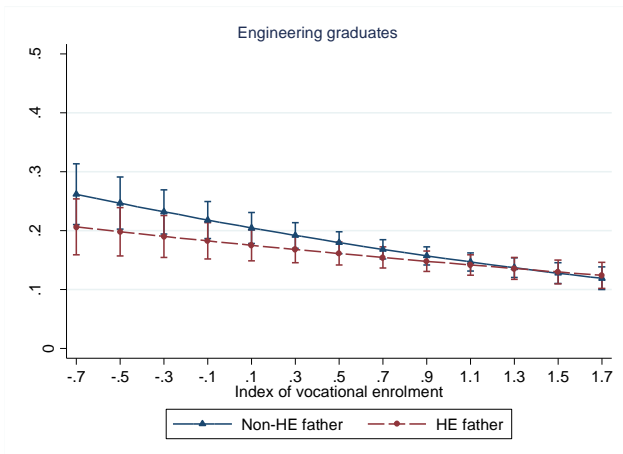




Source: own elaboration, from REFLEX/HEGESCO.

Figure 3.7: Predicted probabilities of being overeducated by field of study and father's education by degree of vocational enrolment of the education system (O₊₅)





Source: own elaboration, from REFLEX/HEGESCO.

3.6. Conclusions

Empirical evidence provided by several studies shows that overeducation is a non-negligible phenomenon across advanced economies. However, its magnitude varies widely across countries. The present article has explored the extent to which the influence of field of study and parental educational background on overeducation risk is mediated by education system characteristics prior to the higher education level.

Results confirm previous findings showing that fields of study and social origin are strong predictors of overeducation risk across countries (Goyette, K.A. & Mullen, 2006; Mavromaras, K. & McGuinness, 2012; Ortiz, L. & Kucel, 2008; Robst, 2007) both after graduation and at the early career stages (Verhaest, D. & van der Velden, 2013), even when controlling for ability. Results provided also confirm that graduates' overeducation likelihood varies across countries based on education systems characteristics, such as their degree of vocational enrolment, in line with recently published studies targeting the whole working population (Di Stasio, V., Bol, T. & van de Werfhorst, 2015). Generally, results show that graduates from vocationally oriented education systems are less prone to be overeducated, compared to those in comprehensive systems. This result applies to graduates from all fields of study.

Although differences are not statistically significant, empirical evidence suggests that social origin is less important in predicting overeducation in vocationally oriented systems, since they implicitly select by social origin at earlier stages of the educational trajectory, while in comprehensive systems, social origin regains influence as a filter in the transition to the labour market. Results provided show that educational institutions differently mediate the effect of social origin on graduates' overeducation risk by field of study, both at the first entry to the labour market and in the early career stages. In line with my expectations, in comprehensive systems, social science graduates coming from a more privileged social origin are more likely to avoid overeducation, while limited or inexistent differences by social origin are observed for the remaining graduates. Thus, results confirm that the differentiated effect of social origin on overeducation probability is only existent in comprehensive systems and, especially, among graduates

from non-occupationally focused fields of study (i.e. social sciences), where soft skills mainly gained through family socialisation are considered as having a market value.

It is worth pointing out that results hold controlling for country level differences in the supply of graduates and the youth unemployment rate. This suggests that education system characteristics explain to a larger extent variation in graduates' overeducation risk than labour market supply and demand contextual characteristics.

Finally, it should be stressed that one of the main limitations of the present research is that social origin has been captured through parental education because of a lack of comparable cross-national data on parental occupation, which would have been preferred. Further research should explore if more detailed information on parental occupation might show larger differences among graduates within and between countries.

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CHAPTER 4 . ARE ALL GRADUATES EQUALLY LIKELY TO EXIT OVEREDUCATION? ASSESSING THE ROLE OF FIELD OF STUDY AND SOCIAL ORIGIN ON OVEREDUCATION EXIT

It might be argued that evidence provided in the previous two chapters is of limited relevance if overeducation is a short-lasting phenomenon. So far, the academic literature has provided mixed results with regard to overeducation duration. This chapter addresses overeducation from a flexible perspective, considering that overeducation can be a short employment experience for some individuals, but a long-lasting situation for others. In line with previous chapters, fields of study and social origin are used as main drivers to disentangle individuals' pathways. Additionally, selected work-related characteristics are also included in the analyses because, so far, they have provided inconclusive results in predicting overeducation duration.

4.1. Introduction

The academic debate on overeducation initially focused on its incidence and consequences on wages. The discussion later moved to overeducation duration: is overeducation a temporary or a persistent phenomenon? It could be argued that overeducation incidence and its negative consequences on workers' lives do not matter much if overeducation is a short-lasting phenomenon. However, empirical evidence concerning overeducation duration presents mixed results: some claim that overeducation is a stepping stone; others argue it is more likely to be a trap. The paradox is that some work-related characteristics have been used to argue for both overeducation exit and persistence (Agut, S., Peiro, J. M. & Grau, 2009; Battu, H., Belfield, C.R. & Sloane, 1999; Dolton, P.J. & Silles, 2008; Frei, C. & Sousa-Poza, 2012). Therefore, it seems reasonable to think that overeducation can be either a permanent or a temporary situation depending on a number of individual and firm (employer) characteristics. One of them is field of study of graduation, which has already been reported as a good predictor of overeducation incidence (Barone, C. & Ortiz, 2011; Ortiz, L. & Kucel, 2008). Given the heterogeneity of ready-to-use skills in the labour market across fields of study, the matching process might vary among

individuals who differ in these characteristics and, so, in their overeducation duration. Moreover, knowledge and skills gained via family socialization, which are highly valued in the service sector (Breen, R. & Goldthorpe, 2001), might also be important to exit overeducation. Individuals' social background is a relevant predictor of early occupational attainment (Härkönen, J. & Bihagen, 2011; Torche, 2013) and, thus, it could also partly explain differences in overeducation duration across fields of study.

Therefore, this article aims to shed some light on the differences in overeducation persistence among individuals who graduated from different fields of study, social background, and who present different work-related individual and firm characteristics. Thus, the research question I am addressing is: *Does graduates' overeducation duration differ across fields of study? Do these differences interact with social origin and work-related characteristics?* For this purpose, I analyse a sample of overeducated graduates using REFLEX/HEGESCO data. The article firstly revises the theories on overeducation duration and the empirical evidence supporting them. Secondly, the theoretical reasons why overeducation persistence should be expected to differ across fields of study, social origin, work-related individual and firm characteristics are presented. Thirdly, the data, the variables operationalisation and the methodology used to provide empirical evidence are outlined. Afterwards, the results are explained and discussed. Finally, the conclusions are exposed as well as the main limitations and further research lines.

4.2. Theoretical framework

Overeducation: a transitory or persistent phenomenon?

Theories explaining overeducation duration have traditionally been classified into two groups³¹: the ones that regard overeducation as a temporary phenomenon and the ones that understand it as a more persistent one. On the one hand, the temporary approach is mainly defended by the Human Capital Theory (Becker, 1993) and the Matching Theory (Pissarides, 2000). They regard overeducation as a temporary mismatch between firms' needs and worker's human capital (Becker, 1964) – basically due to the costly

³¹ Theories referring to overeducation duration are extensively discussed in the introductory chapter.

process of candidates' job searching or firms' looking for productive workers in a labour market with imperfect information (Pissarides, 2000). Horizontal and vertical mismatches can happen, but they are to be solved in a relatively short period of time: either the worker will move to another job that fully utilizes their education or the firm will adapt to workers' education.

On the other hand, the main theory understanding overeducation as a persistent phenomenon is the Job Competition Model (JCM) (Thurow, 1975). According to JCM, workers always have an incentive to invest more in education because they are in a natural state of competition for job positions. They can persist in overeducation if other workers with more qualifications attain the best job vacancies and the characteristics of the job do not change.

In an intermediate position, the Assignment Theory (Sattinger, 1993) treats workers as rational market players who choose the job that maximises their utility and economic returns in the sector they are specialised in. In some cases, economic maximisations can take place in an overeducated position. Overeducation can be solved via individuals' or firms' adjustments, but sometimes, workers and firms may voluntarily opt for overeducation if it maximises their economic objectives. Thus, overeducation can be either a temporary or a long-lasting situation. In consonance with this, theories of Job/Career Mobility (Sicherman & Galor, 1990) argue that workers may voluntarily enter their profession through overeducated positions, so as to rapidly achieve future promotions by improving their skills with on-the-job training. However, this situation might last for a short or long period of time.

So far, the empirical evidence reported is not conclusive. Scholars testing the validity of overeducation duration theories provide mixed results, favouring and contradicting both the temporary and the persistent approach (Büchel, F. & Mertens, 2004; Dolton, P. & Vignoles, 2000; Frei, C. & Sousa-Poza, 2012; Frenette, 2004; McGuinness, S. & Wooden, 2007; Robst, 1995a; Sicherman, 1991). Sicherman (1991) confirmed his career mobility theory using U.S. panel data, showing that the wage penalty experienced during the early career stages was compensated for via promotion. The theory was retested by Robst (1995), who got more ambiguous results concerning improvements in

the occupational position of overeducated workers, compared to those who were adequately matched. More recently, Frei and Sousa-Poza (2012) reveal relatively short overqualification spells using Swiss data: close to a half of workers who experienced overeducation found an adequate job one year later.

Conversely, Dolton and Vignoles (2000) concluded that overeducation is not a phenomenon only affecting recent graduates: 38% of British graduates were overeducated in their first job; six years after graduation, 30% still remained in overeducated positions. Frenette (2004) shows that almost 75% of Canadian graduates who enter overeducation persist there during the following five years; in addition to this, those who did not experience overeducation at the beginning of their career are less likely to fall into it later on. Contrary to career mobility theories, Büchel and Mertens (2004) show the limited upward career movements and wage growth among German overeducated workers. Additionally, McGuinness and Wooden's (2007) results using Australian data suggest that, even if overskilled workers are more likely to experience job changes, most of the job mobility experienced by these workers is involuntary and does not ultimately lead to skills-matched positions, as also suggested by previous analyses for a cohort of British graduates (McGuinness, 2003).

Given the mixed results provided by empirical research, it seems reasonable to think that overeducation can be either a transitory or a permanent situation depending on a number of individual characteristics. Moreover, it is also likely to vary across countries, given different educational institutions and school-to-work links. From a career mobility perspective, Rubb (2003) argues that overeducation can be a short-run state for individuals aiming to gain some experience and career opportunities, while for some workers it can be a long-term form of employment. Workers are in a natural state of competition at the beginning of their career, but this situation may not last long if there are enough suitable job positions for all workers. Moreover, competition might slow down gradually once each worker finds a matched job. Some individuals might initially opt for overeducation due to economic maximization, but they are likely to move to a matched job -or be willing to- when gaining more work experience and work-specific skills. Similarly, maladjustments due to imperfect information might last either for a short period or a longer one. One of the factors that might explain different time spans

in overeducation is field of study of graduation. Next, I argue why field of study can be a relevant factor in this respect.

Field of study and overeducation persistence

Among graduates, field of study of graduation has been stated as a strong predictor of overeducation incidence at first labour market entry (Ortiz & Kucel, 2008; Robst, 2007) and some years after graduation (Barone, C. & Ortiz, 2011; Verhaest, D. & van der Velden, 2013). Graduates from fields of study providing general skills and not targeting a specific occupation (i.e. humanities, social sciences) are more prone to becoming overeducated, compared to those who graduated from fields of study offering occupation-specific skills (i.e. medicine, engineering). However, so far no attention has ever been paid to the influence of field of study on the likelihood of exiting overeducation. Therefore, this article aims to fill this gap by assessing the influence of field of study in predicting the probability of overeducation exit.

Using Australian data, differences in overeducation persistence have already been observed by educational pathways (Mavromaras, K. & McGuinness, 2012): while overeducated graduates are more likely to remain in that situation, overeducated workers holding a vocational education and training degree are more prone to rapidly exit overeducation. The main explanation reported is that higher degrees usually provide general skills, which are more difficult to match directly to job-specific skills requirements; whereas vocational education and training courses teach ready-to-use skills, thus smoothing the transition from education to a suitable job, and also from overeducation to a matched job.

Following Mavromaras and McGuinness (2012), I argue that the same logic can be applied to graduates: overeducated graduates from technical and occupation-oriented fields of study might more easily move to a matched job than their colleagues from fields of study providing general skills. Overeducated graduates from occupationally focused fields can rapidly adapt to firms' needs or move to a more suitable job. Contrary to this, graduates from fields of study that do not direct to a specific occupation or job might have a more challenging matching process, either because it is more difficult to assess the skills they are lacking to match an adequate job or what the

firm should change to fully utilize their knowledge and skills. Thus, overeducation is expected to be more persistent among graduates from general fields of study than among graduates from labour-oriented fields.

An alternative hypothesis is that as in occupation-oriented fields, overeducation incidence is less common as those graduates who fall into overeducation might be a selected group of individuals by abilities. Therefore, employers might perceive this situation as a bad signal and graduates from occupation-oriented fields falling into overeducation might end up trapped in this situation. Conversely, overeducation incidence is more common among graduates from transversal fields of study. Consequently, overeducation is not regarded as a bad signal and might be used as a stepping stone to a better job match.

This competition between hypotheses is also applicable across countries. The main hypothesis is likely to apply in countries presenting large overeducation incidence figures (e.g. Spain and the United Kingdom), as overeducation might be seen as a “normal” situation and is more likely to work as a stepping stone to a better job match. Contrary to this, in countries with low overeducation incidence figures (e.g. Germany, Finland) the scarring effects of overeducation might convert it into a trap.

Regardless of the hypothesis used, the mechanisms facilitating the transition from overeducation to a matched job might vary across fields of study, given the variation in the skills and jobs in which individuals are allocated. In the next section, I argue about some individual's and firms' characteristics that are likely to differently influence the transition from overeducation to a matched job across fields of study.

Different ways of exiting overeducation by field of study

The heterogeneity of ready-to-use skills and the nature and specification of the jobs that university graduates from different fields of study perform lead us to think that there might be different ways to get out of overeducation. Social stratification literature has pointed to social origin as a relevant factor to predict early occupational attainment (Härkönen, J. & Bihagen, 2011; Torche, 2013), but limited efforts have been directed to assess overeducation persistence from a social stratification perspective.

While in the previous chapters the main predictors of overeducation incidence were field of study of graduation and social origin, in the present chapter I also incorporate work-related factors in order to assess overeducation persistence. Field of study and social origin are likely to have an effect on overeducation incidence, but after some years in the labour market, other factors related to the world of work might be more likely to have an influence on escaping from overeducation. The recent debate on overeducation as a stepping stone or a trap has provided some hints on individuals' work-related (e.g. work experience, on-the-job training) (Baert, S., Cockx, B. & Verhaest, 2013; Frei, C. & Sousa-Poza, 2012) and firm-specific characteristics (e.g. size and degree of innovation) that might influence overeducation persistence (Agut, S., Peiro, J. M. & Grau, 2009; Battu, H., Belfield, C.R. & Sloane, 1999; Toner, 2011). The next section illustrates the way each one of these factors facilitates overeducation exit.

Social origin

A persistent finding in the literature on intergenerational mobility is that educational attainment is a relevant predictor for first-entry job, but its influence declines later in the occupational career (Breen, 2004). However, the influence of social class remains stable throughout the occupational career (Bernardi, F. & Ballarino, 2016; Härkönen, J. & Bihagen, 2011). Contrary to this, evidence provided shows a negligible influence of social origin in predicting overeducation persistence (Battu, H., Belfield, C.R. & Sloane, 1999). Nevertheless, I argue that the effect of social background on overeducation exit might vary across fields of study. Fields of study providing less occupation-specific skills lead to a range of occupations within the service sector that value non-cognitive skills and personality traits, which in turn are usually generated early in life and are strongly conditioned by social origin (e.g. behavioural traits, self-presentation ability, cultural tastes) (Breen & Goldthorpe, 2001). These kinds of skills are characterised for being mainly developed in socio-economically advantaged families. Even if they are valued by employers it is difficult to show them and their value in productivity terms in a job interview or in the short run. Graduates from a more privileged social background possessing these skills might fall into overeducation, but rapidly escape once they can show the value of their non-cognitive skills to employers and get a promotion. Although these skills can be learned, they are not usually taught

either at university or via on-the-job training. Therefore, among graduates from general fields, overeducation is expected to be a stepping stone for those who come from a privileged social background and a trap for those with a more disadvantaged social origin.

Work experience and training

One of the explanations for overeducation occurrence is a lack of an individual's human capital, which can be gained through schooling, but also via work experience and on-the-job training. Thus, one way that graduates might escape from overeducation is by increasing their human capital and acquiring more work-related skills. While some claim work experience is a relevant factor to overcome overeducation (Dolton, P. & Vignoles, 2000), others have pointed out its irrelevance in helping workers to exit overeducation if employers do not adapt job requirements to qualification improvements over time (Frei, C. & Sousa-Poza, 2012). Given these contradictory results, I argue that the relevance of work experience in facilitating overeducation exit might vary across fields of study: graduates from labour-oriented fields that lead to occupations that value experience in a specific profession might be more likely to escape overeducation by gaining work experience than graduates from transversal fields.

The effect of on-the-job training in reducing overeducation persistence varies depending on the overeducation measurement used (Dolton, P.J. & Silles, 2008) and its lack has been highlighted as a factor promoting overeducation persistence (Baert, S., Cockx, B. & Verhaest, 2013). On-the-job training might more easily take place – and thus help – graduates from labour-oriented fields, in which the lack of technical and occupation-specific skills are easily detectable and, consequently, can be addressed. Therefore, work experience and on-the-job training are expected to ease overeducation exit, especially among graduates from labour-oriented fields.

Firms' size and innovation

Firms' characteristics and their adjustments can also partly explain overeducation duration. Career progression in small firms is naturally more limited. Therefore, a graduate hired by a small firm in an overeducated position is less likely to get out of

overeducation via internal promotion. Empirical evidence supports this hypothesis (Battu, H., Belfield, C.R. & Sloane, 1999), although the effect of firms' size is not linear: medium sized firms are the ones presenting lower overeducation persistence (Dolton, P.J. & Silles, 2008). Firm size might be more relevant to escape from overeducation among graduates from non-occupationally focused fields: soft skills – which are especially relevant in these fields– are more difficult to show to employers at first glance, but employers might realise gradually and internally promote these graduates to a matched job. In addition to this, there is also a distribution argument. The relevance of firm size is also likely to vary across fields of study given the different distribution of the firms employing graduates across fields of study. Using REFLEX/HESGESCO data, Table 4.1 below shows that there are substantive differences across fields of study with regard to the number of employees in the firm. While most education graduates are mainly employed in firms/institutions with less than 50 employees (44.5%), it is less common for services (25.9%) and science graduates (23.7%). More than half of social science (50.4%), engineering (50.7%), health (53.6%), services (50.3%) and science graduates (53.9%) are employed in large firms (more than 250 employees).

Table 4.1: Distribution of firm size (number of employees) by fields of study

-	Less than 50 employees		From 50 to 249 employees		More than 249 employees	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Education	1,561	44.5	1,023	29.2	922	26.3
Agriculture & Vet	373	38.7	229	23.8	362	37.6
Humanities & Arts	1,015	36.3	706	25.2	1,077	38.5
SS-Business-Law	2,983	29.6	2,017	20.0	5,077	50.4
Engineering	1,534	28.5	1,120	20.8	2,731	50.7
Health & Welfare	1,053	27.2	746	19.2	2,080	53.6
Services	240	25.9	221	23.8	466	50.3
Science	680	23.7	645	22.4	1,549	53.9
Total	9,439	31.0	6,707	22.1	14,264	46.9

Source: own elaboration, from REFLEX/HEGESCO.

Firms introducing innovation in their goods, services, processes and modes of organisation are more likely to provide high-skilled jobs for graduates and, thus, reduce overeducation probability (Toner, 2011). Additionally, innovative firms tend to be more

flexible and likely to enhance individuals' innovation in their job position, promoting full skills utilisation as a way of career development, and facilitating moving to a matched job (Agut, S., Peiro, J. M. & Grau, 2009; Battu, H., Belfield, C.R. & Sloane, 1999). However, the influence of firms' innovation on overeducation exit might vary depending on the field of graduation and the sector employing those graduates, as innovation has mainly taken place in technological environments. So, there might be a composition effect too. As shown in Table 4.2 below, the mean punctuation in the firms' innovation index³² (values from 3 – low innovation - to 15 – highly innovative) is above the average for employed graduates from the fields of engineering, science and agriculture.

Table 4.2: Distribution of the innovation index (3-15) by field of study

	N	Mean	SD
Engineering	5,629	10.53	2.67
Science	2,981	10.50	2.76
Agriculture & Vet	989	9.99	2.83
SS-Business-Law	10,381	9.80	2.80
Services	941	9.72	2.66
Health & Welfare	4,059	9.68	2.69
Humanities & Arts	2,949	9.65	2.86
Education	3,521	9.56	2.68
Average	31,765	9.95	2.77

Source: own elaboration, from REFLEX/HEGESCO.

To sum up, I expect graduates employed in larger firms and more innovative ones to be more likely to exit overeducation. While the effect of firm size is expected to be stronger among graduates from transversal fields, innovation is expected to have a stronger effect on overeducation exit among overeducated graduates from occupation-focused fields.

Employment change

Except for work experience, the previous work-related individual and firm characteristics might be either the cause or the consequence of overeducation exit. Overeducated workers might move to a larger and more innovative firm, where they receive on-the-job training and, thus, move out of overeducation. Previous studies have

³² More detailed information on the construction of this innovation index in the next data section.

shown that overeducated workers are more likely to change occupation and/or employer, but a non-negligible proportion of those who move do not succeed in getting a matched job (Frei, C. & Sousa-Poza, 2012; McGuinness, S. & Wooden, 2007). This puzzle might again be partly explained by field of study of graduation. Overeducated graduates from occupationally focused fields of study might be aware of the mismatch reason (e.g. lack of specific human capital, non-adequate sector/employer) and, thus, move to another job that corrects the mismatch cause. Conversely, graduates from general fields might have more difficulties in assessing the mismatch reason and, thus, look for another job that adequately uses their human capital; they might move to another job that improves other job characteristics (e.g. wage) but still remain overeducated. Therefore, employment change is expected to more easily lead to overeducation exit among graduates from labour-oriented fields than for graduates from general fields.

4.3. Data

As in Chapter 3, I am using REFLEX/HEGESCO to provide empirical evidence to respond to the research question. Both are large-scale graduate surveys focusing on the transition from higher education to the labour market³³. They present the same set of questions, including information necessary to test the aforementioned hypotheses. The only difference is the number of countries included and the moment the data collection took place³⁴. Observations with missing values in the main variables of interest have been dropped. Four countries, namely Estonia, Japan, Lithuania and Portugal, have not been included in the analyses due to lack of relevant information on the basic variables to perform the analyses. REFLEX/HEGESCO interviews graduates five years after graduation and asks them about their employment situation after graduation and at the moment of the interview. Although recalling information may be biased and/or individuals might be misreporting information, as I have argued earlier, for the present research it can be considered as an advantage because graduates might have a better

³³ More detailed information on the projects is available (Allen, J. & van der Velden, 2011).

³⁴ See section 3.3 in Chapter 3 for more detailed information.

perspective of what the labour market looks like and the nature of the jobs some years after graduation.

Since this chapter focuses on overeducation persistence, I only keep in the sample those graduates who were overeducated³⁵ in their first relevant job³⁶ after graduation; their employment situation five years after graduation is assessed, as it has been similarly done in other studies (Dolton, P.J. & Silles, 2008). One of the advantages of considering overeducation right after graduation is that the concepts of overeducation and overskilling are very close, as graduates tend to have limited or negligible work experience and, thus, none or few skills might have been gained from another source other than formal education (Baert, S., Cockx, B. & Verhaest, 2013).

The initial sample of employed graduates after graduation includes 30,818 and, among them, 9,177 are overeducated (29.8%). However, the sample of early overeducated graduates is reduced to 6,791 when taking into account individual characteristics. This large drop of cases is due to missing information in parental education (n=746), work experience (n=461), unemployment spells (n=271), sex (n=304) and country of birth (n=313). The bias possibly induced by this loss of cases plays against my hypotheses, as individuals whose fathers have a lower educational level, less work experience, experienced unemployment spells and/or with an immigrant background are less likely to respond to these questions. Therefore, these groups are likely to be under-represented and the figures given might be underestimating the effects.

The sample falls to 5,604 when including work-related variables in the analyses. Most of this last reduction is explained by non-employed individuals five years after graduation (673 individuals), who do not have information on work-related training, firm size and innovation because they do not have a job. Therefore, the selection biases of these analyses must be kept in mind: only overeducated graduates in the first relevant

³⁵ As in Chapter 3, I rely on a self-reported measurement to select early overeducated graduates.

³⁶ Jobs left within 6 months after graduation are not considered. (Self)employment started before graduation is considered if continued for more than 6 months after graduation. Trainee jobs are included as relevant jobs.

job after graduation are taken into account; and only those individuals who are employed five years after graduation when considering work and firm-related factors.

Dependent variables

The two dependent variables considered assess the labour market situation of early overeducated graduates five years after graduation. The only difference between them is that the first one considers those who are not employed (unemployed and inactive individuals), while the second one only considers employed individuals.

- a) Labour market situation: it considers the labour market situation of all early overeducated graduates five years after graduation. Three possible outcomes are taken into consideration: 1) still overeducated, 2) adequately matched, and 3) not employed. This variable is constructed using two different questions. First, to classify graduates as overeducated or adequately matched, I rely on a workers' self-reported measure³⁷. As in Chapter 3, the variable derives from the question “*What type of education do you feel was most appropriate for this work?*” referring to their job five years after graduation. The possible answers are *PhD, Other postgraduate qualifications, Master, Bachelor, and Lower than higher education*. In the database, results are already coded comparing the educational level attained by graduates and the education considered as appropriate for the job. The variable has four categories *Higher level, Same level, Lower level of tertiary education, and Below tertiary level*. I recoded it into a binary variable, considering as *Overeducated* those included in the category *Lower tertiary level* and *Below tertiary level*. Those included in the *Same level* category are categorised as *Adequately matched*, while those declaring that their job required a *Higher level* are not included in the analyses. The reason for excluding people who would be classified as *Undereducated*³⁸ is because the interest of the research is to compare overeducated graduates with those who are employed in

³⁷ I refer to the theoretical and empirical discussion on overeducation measurement in Chapter 1 for relying on a self-reported indicator.

³⁸ There are 3,330 undereducated individuals in the current job at the moment of the interview (5 years after graduation).

an adequate position³⁹. Moreover, there are not enough number of cases per field of study in order to conduct the analyses. Second, non-employed individuals (either inactive or unemployed) are identified from the question “*Are you currently in paid employment?*”⁴⁰. Those that are not in paid employment are classified as “*Not employed*”. The combination of these two questions results into the first dependent variable. Formally:

$$LMS = \begin{cases} 0 & \text{if Overeducated (No change)} \\ 1 & \text{if Matched (Positive change)} \\ 2 & \text{if Not employed (Change)} \end{cases}$$

- b) Employment situation: it considers the labour market situation of early overeducated graduates who are employed five years after graduation. This variable is used to assess the influence of work-related and firm characteristics on overeducation exit and, thus, only employed graduates are included. Two possible outcomes are considered: 1) still overeducated, 2) adequately matched. This variable is constructed only using the first part of the previous dependent variable. Formally:

$$ES = \begin{cases} 0 & \text{if Overeducated (No change)} \\ 1 & \text{if Matched (Positive change)} \end{cases}$$

Table 4.3 below summarises three pieces of information. The upper part of the table presents the employment situation after graduation. Among the employed graduates, 29.8% are overeducated. The middle part shows the labour situation five years after graduation of these 29.8% of early overeducated individuals: 50.5% moved to an adequately matched job, 39.6% are still overeducated and 9.9% are not employed (inactive or unemployed). The lower part of the table only considers early overeducated graduates that are employed five years after graduation: the share of adequately matched

³⁹ Further justification for excluding undereducated from the analyses have already been discussed in section 1.3 in the introductory chapter.

⁴⁰ This measure is preferred to the combination of two other variables asking for labour status (in or out of the labour force) and employment situation (employed or unemployed) because of higher response rate.

increases up to 56.2%, while the remaining 43.8% of employed graduates are still in an overeducated position.

Table 4.3: Summary statistics: sample selection and dependent variable

	Frequency	Percentage
Employment situation after graduation		
Adequately matched	21,641	70.2
Overeducated	9,177	29.8
Total	30,818	100.0
Labour situation 5 years after graduation (only among overeducated in their first job)		
Adequately matched	3,431	50.5
Still overeducated	2,687	39.6
Not employed	673	9.9
Total	6,791	100.0
Employment situation 5 years after graduation (only among overeducated in their first job and currently employed)		
Adequately matched	3,148	56.2
Still overeducated	2,456	43.8
Total	5,604	100.0

Note: only observations used in the analyses.

Source: own elaboration, from REFLEX/HEGESCO.

As only overeducated graduates in their first relevant job after graduation are retained in the analyses, a limited number of cases per country are left to allow for specific country analyses including interaction terms between fields of study and the main independent variables of interest. Moreover, it is important to bear in mind that overeducation figures after graduation and five years later are markedly different across countries (see Table 3.2 in Chapter 3). Tables 4.4 and 4.5 below present the distribution of the two dependent variables by country. Even if Germany is one of the countries with lower overeducation incidence figures, it looks like those who fall into it are mainly remaining in an overeducated position five years later (54.1%). However, Finland also presents low numbers of overeducated, but only a small proportion of them (28.7%) remain in such a situation five years later. Spain and the United Kingdom are the two countries presenting larger initial overeducation figures; in the United Kingdom, most of them move to a matched job five years after graduation (55.4%), but in Spain, this figure is quite lower (43.1%) and most of the early overeducated remain in such a situation after some years (44.7%). Moving to non-employment, it affects a minority of individuals across all countries. However, there are some important differences, as it ranges from 19.6% in Finland to 4.5% in Slovenia.

Table 4.4: Distribution of the dependent variable LMS by country

	Overeducated		Matched		Not Employed	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Germany	84	54.9	55	36.0	14	9.2
Turkey	150	51.2	101	34.5	42	14.3
France	144	50.4	104	36.4	38	13.3
Spain	560	44.7	551	44.0	142	11.3
Belgium	129	44.5	148	51.0	13	4.5
Hungary	122	43.4	116	41.3	43	15.3
Norway	137	42.7	164	51.1	20	6.2
Slovenia	177	40.2	243	55.2	20	4.6
Austria	106	38.3	135	48.7	36	13.0
Italy	205	35.3	328	56.5	48	8.3
United Kingdom	123	35.2	193	55.3	33	9.5
Czech Republic	341	34.7	546	55.6	95	9.7
Netherlands	244	34.2	423	59.2	47	6.6
Finland	116	28.9	210	52.4	75	18.7
Poland	49	28.8	114	67.1	7	4.1
Total	2,687	39.6	3,431	50.5	673	9.9

Note: only observations used in the analyses.

Source: own elaboration, from REFLEX/HEGESCO.

Table 4.5: Distribution of the dependent variable ES by country

	Overeducated		Matched	
	Frequency	Percentage	Frequency	Percentage
Germany	72	61.5	45	38.5
Turkey	134	58.8	94	41.2
France	122	57.6	90	42.5
Spain	501	50.5	492	49.6
Hungary	116	50.7	113	49.3
Belgium	117	46.3	136	53.8
Austria	101	45.5	121	54.5
Norway	125	44.6	155	55.4
Slovenia	168	42.4	228	57.6
Italy	183	41.2	261	58.8
United Kingdom	119	39.3	184	60.7
Czech Republic	312	37.8	514	62.2
Netherlands	231	36.3	405	63.7
Finland	110	35.3	202	64.7
Poland	45	29.4	108	70.6
Total	2,456	43.8	3,148	56.2

Note: only observations used in the analyses.

Source: own elaboration, from REFLEX/HEGESCO.

Independent variables

The main independent variable of this article is *field of study*. As in Chapter 3, field of study is introduced via eight dummy variables corresponding to the ISCED-Fields of Study at 1-digit, similarly to previous studies assessing the role of field of study on educational and occupational outcomes (Barone, C. & Ortiz, 2011; Goyette, K.A. & Mullen, 2006; Mavromaras, K. & McGuinness, 2012; Ortiz, L. & Kucel, 2008; Robst, 2007). The eight categories are: 1) Humanities & Arts (Reference Category), 2) Education, 3) Social Sciences & Business & Law, 4) Science & Maths & Computing, 5) Engineering & Manufacturing & Construction, 6) Agriculture & Veterinary, 7) Health & Welfare, and 8) Services. Tables 4.6 and 4.7 below present the distribution of the eight dummy variables, as well as the rest of the independent variables considered in the analyses.

Father's and mother's education level are expected to capture the concept of social origin. Both are dummy variables differentiating between having a father/mother who attained higher education studies or not. Cultural tastes, behaviours and preferences are usually transmitted by parents with high educational attainment (Breen, R. & Goldthorpe, 2001; Hansen, 1996; Torche, 2013). As shown in Chapter 2, parental education and occupation are two types of cultural capital that influence overeducation likelihood. However, parental occupation is not available in REFLEX/HEGESCO and, thus, it is not possible to assess its differentiated effect from parental education.

Work experience is measured as the number of months employed since graduation reported by the graduate. Work experience prior to graduation is not taken into account, because it might be more relevant in predicting overeducation incidence at first-job entry, but not duration. The number of months has a minimum of 1 month and a maximum of 60 months (5 years), what would mean the individual has always been employed since graduation. Measuring work experience through the number of months employed is an advantage over using age as a proxy, especially for women, who are more likely to have employment interruptions due to maternity leave (Dolton, P. & Vignoles, 2000). However, a disadvantage of this measurement is that months in employment might not only pick up the positive human capital development from

employment, but also the negative scar of unemployment for those with lower work experience. This is the main reason why another variable accounting for the number of months in unemployment self-reported by the individual is included as a control in the models.

Graduates are asked if they are still in their first employment after graduation, which is the one used to consider them as either overeducated or not. Possible answers are either “*Yes*” or “*No*”. This differentiation will help us understand if the matching process is taking place via internal or external promotion.

Work-related training is a dummy variable derived from the question “*Did you follow any work-related course/training in the past 12 months?*” Possible answers are either “*Yes*” or “*No*”. Other forms of training not related to work are not taken into account. An important problem of this variable is that it might have taken place either during the overeducation period or already when the individual transitioned to a matched job. This is the main reason why this variable is included in interaction with the question if they are still in their first employment, to address the endogeneity problem.

The number of employees working in the organisation is used as a proxy for a firm’s size. A three-category variable has been constructed differentiating between small (less than 50 employees), medium (between 50 and 249 employees) and large firms (more than 250 employees), similarly to previous studies (Battu, H., Belfield, C.R. & Sloane, 1999; Dolton, P.J. & Silles, 2008). This information refers to the firm where the individual is working five years after graduation.

The degree of innovation of the firm is tackled through an innovation index constructed out of worker’s punctuation in a scale from 1 (very low) to 5 (very high) in reference to the extent of innovation in his/her firm with regard to: 1) the product and/or service; 2) the technology, tools and instruments; 3) the knowledge and methods. The index of innovation sums up the three punctuations, presenting a final scale from 3 (very low) to 15 (very high). This information refers to the firm where the individual is working five years after graduation.

Similarly to Chapter 3, control variables introduced in the analyses are: sex (*Men*; *Women*), country of birth (*Home country*; *Foreign country*), student status (*Full-time*; *Part-time*), participation in work placement or internship (*Yes*; *No*), average secondary and university grades⁴¹ to control for ability and academic performance. By introducing average grades we are comparing graduates with similar levels of skills and abilities and controlling for primary and secondary educational effects. Finally, a dummy variable by country is included in order to control for cross-country differences.

Table 4.6: Summary statistics of independent variables. All early overeducated (LMS)

	Overeducated		Matched		Not employed	
	N/Mean	%/(SD)	N/Mean	%/(SD)	N/Mean	%/(SD)
Field of study						
<i>Education</i>	250	44.8	245	43.9	63	11.3
<i>Humanities & Arts</i>	404	44.1	389	42.4	124	13.5
<i>SS-Business-Law</i>	1,056	37.1	1,501	52.8	288	10.1
<i>Sciences</i>	290	43.7	315	47.4	59	8.9
<i>Engineering</i>	356	37.8	531	56.3	56	5.9
<i>Agriculture & Vet</i>	93	41.5	113	50.5	18	8.0
<i>Health & Welfare</i>	151	35.7	223	52.7	49	11.6
<i>Services</i>	87	40.1	114	52.5	16	7.4
Father's education						
<i>Non-HE father</i>	1,895	39.9	2,369	49.9	488	10.3
<i>HE father</i>	792	38.8	1,062	52.1	185	9.1
Mother's education						
<i>Non-HE mother</i>	2,132	39.8	2,693	50.2	536	10.0
<i>HE mother</i>	555	38.8	738	51.6	137	9.6
Months employed	47.35	(14.57)	49.99	(12.66)	33.51	(15.78)
Months unemployed	4.17	(7.95)	3.02	(6.04)	10.85	(12.85)
Sex						
<i>Women</i>	1,626	38.7	2,054	48.9	519	12.36
<i>Men</i>	1,061	40.9	1,377	53.1	154	5.94
Country of birth						
<i>Home country</i>	2,608	39.5	3,348	50.7	644	9.76
<i>Foreign country</i>	79	41.4	83	43.5	29	15.18
Student status						
<i>Full-time</i>	2,036	39.2	2,643	50.9	510	9.83
<i>Part-time</i>	651	40.6	788	49.2	163	10.17
Work placement/internship						
<i>Yes</i>	1,420	40.4	1,736	49.3	363	10.32
<i>No</i>	1,267	38.7	1,695	51.8	310	9.47
Average secondary grades	-0.070	(0.97)	-0.037	(1.00)	-0.137	(1.00)
Average university grades	-0.120	(0.95)	-0.097	(0.93)	-0.177	(0.99)
Total	2,687	39.6	3,431	50.5	673	9.9

Note: only cases with information on the dependent variables are shown.

Source: own elaboration, from REFLEX/HEGESCO.

⁴¹ Grades standardised by country: $\mu=0$ and $\sigma=1$.

Table 4.7: Summary statistics of independent variables. Employed early overeducated (ES)

	Overeducated		Matched	
	N/Mean	(%)/(SD)	N/Mean	(%)/(SD)
Field of study				
<i>Education</i>	214	49.5	218	50.5
<i>Humanities & Arts</i>	359	50.8	348	49.2
<i>SS-Business-Law</i>	976	41.5	1,375	58.5
<i>Sciences</i>	265	47.9	288	52.1
<i>Engineering</i>	337	40.3	499	59.7
<i>Agriculture & Vet</i>	87	45.1	106	54.9
<i>Health & Welfare</i>	133	39.1	207	60.9
<i>Services</i>	85	44.3	107	55.7
Father's education				
<i>Non-HE father</i>	1,723	44.4	2,162	55.7
<i>HE father</i>	733	42.6	986	57.4
Mother's education				
<i>Non-HE mother</i>	1,947	44.2	2,454	55.8
<i>HE mother</i>	509	42.3	694	57.7
Months employed	47.48	(14.42)	50.10	(12.50)
Months unemployed	4.16	(7.90)	2.92	(5.81)
Work-related training				
<i>Yes</i>	1,315	38.3	2,120	61.7
<i>No</i>	1,141	52.6	1,028	47.4
Firm's size				
<i>Small firm</i>	776	49.5	793	50.5
<i>Medium firm</i>	485	40.3	718	59.7
<i>Large firm</i>	1,195	42.2	1,637	57.8
Innovation index	9.20	(2.87)	10.06	(2.70)
Employment change				
<i>Yes</i>	1,291	33.5	2,567	66.5
<i>No</i>	1,165	66.7	581	33.3
Sex				
<i>Women</i>	1,465	44.1	1,860	55.9
<i>Men</i>	991	43.5	1,288	56.5
Country of birth				
<i>Home country</i>	2,383	43.7	3,070	56.3
<i>Foreign country</i>	73	48.3	78	51.7
Student status				
<i>Full-time</i>	1,862	43.3	2,442	56.7
<i>Part-time</i>	594	45.7	706	54.3
Work placement/internship				
<i>Yes</i>	1,298	44.6	1,611	55.4
<i>No</i>	1,158	43.0	1,537	57.0
Average secondary grades	-0.055	(0.97)	-0.033	(0.99)
Average university grades	-0.129	(0.93)	-0.097	(0.91)
Total	2,456	43.8	3,148	56.2

Note: only cases with information on the dependent variables are shown.

Source: own elaboration, from REFLEX/HEGESCO.

4.4. Methods

Given the different nature of the two dependent variables, two different analyses are addressed. First, a multinomial logistic regression is performed to assess the influence of fields of study in interaction with social origin. The formal model is as follows:

$$\log\left(\frac{p_{ij}}{p_{i1}}\right) = \alpha_j + \beta_{1j}X_{i1} + \beta_{2j}X_{i2} + \beta_{3j}X_{i3} + \beta_{4j}X_{i1}X_{i2} + \varepsilon_{ji}$$

where p is the log-odds of membership in each category of the dependent variable vs the base line category (here, adequately matched) as a linear function of covariates; i is the i th individual and j the j th category of the dependent variable; α is the intercept, x_1 is field of study, x_2 father's education and x_3 mother's education. A stepwise procedure has been implemented to tackle the influence of each variable separately. Three models have been performed (coefficients are available in Table 4.10 in Appendix):

- Model 1 introduces field of study and control variables, including number of months employed and unemployment, to assess the sole effect of field of study on the likelihood of remaining overeducated or of moving to non-employment in relation to moving to an adequately matched job. This first model also includes a dummy variable per country to control for cross-country differences.
- Model 2 adds father's and mother's education to the previous model, in order to assess the influence of parental education.
- Model 3 adds interaction terms between field of study and father's education to the previous model, to assess if social origin differently affects overeducation exit across fields of study.

Second, a logistic regression is performed to evaluate the influence of work-related variables on the likelihood of remaining in or escaping from overeducation. Formally:

$$\text{logit}(p_i) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_1 X_4 + \varepsilon_i$$

where p_i is the logit of the probability to be matched, α is the intercept, x_1 is field of study, x_2 father's education and x_3 mother's education and x_4 a work-related variable. A stepwise procedure has also been used to introduce individuals' and firms' work-related variables and assess their differentiated effect.

- Model 1 includes field of study, father's and mother's education and control variables, including number of months employed and unemployment, and a dummy variable per country to control for cross-country differences.
- Model 2 adds to the previous work-related training.
- Model 3 adds to the previous firm's size.
- Model 4 adds to the previous the innovation index.
- Model 5 adds to the previous employment change.
- Models 6-10 incorporate interaction terms separately to assess the different influence of each work-related variable across fields of study. Model 6 adds to the previous an interaction term between fields of study and months of employment; all models also include an interaction between work-related training and employment change to address the endogeneity problem previously mentioned.
- Model 7 adds to the previous an interaction term between fields of study and work-related training and removes the previous interaction term.
- Model 8 adds to the previous an interaction term between fields of study and firm's size and removes the previous interaction term.
- Model 9 adds to the previous an interaction term between fields of study and innovation index and removes the previous interaction term.
- Model 10 adds to the previous an interaction term between fields of study and employment change and removes the previous interaction term.

The results are presented in predicted probabilities and in plotted predicted probabilities when interactions are included, in order to easily assess the marginal effect of a unit/category change in each variable by field of study and for each outcome variable (still overeducated, adequately matched or not employed).

Individuals from different countries are pooled into the same analyses, although country dummy variables are included to control for cross-country differences in overeducation incidence, field of study and social origin. The focus of interest is on differences by fields of study and the influence of covariates, rather than countries. As argued earlier, limited numbers are left by country for assessing cross-national variation in the interaction effect of each independent variable with field of study. However, results provide a comparative descriptive picture of the phenomenon to inspire further comparative studies.

4.5. Results & Discussion

Following the argumentation of the theoretical expectations, the results are organised in three parts. Firstly, I present the predicted probabilities of staying or exiting overeducation by field of study. Secondly, predicted probabilities of staying or exiting overeducation are displayed by social origin and work-related characteristics. Finally, the predicted probabilities of staying or exiting overeducation are presented by field of study in interaction with each one of the covariates of interest, to evaluate if social origin and work-related characteristics differently affect the probability of exiting overeducation across graduates from different fields of study.

Overeducation exit by field of study

In line with previous research, results show that some fields of study present a higher probability of remaining in overeducation (Dolton, P. & Vignoles, 2000; Dolton, P.J. & Silles, 2008). Table 4.8 below shows the predicted probabilities of early overeducated graduates to stay in overeducation, to move to a matched job or to non-employment five years after graduation, controlling for relevant covariates. If we take into consideration employed and non-employed individuals five years after graduation (multinomial model), only humanities graduates present a higher predicted probability of remaining in an overeducated position (0.45) than moving to a matched job (0.44). Across fields of

study, humanities graduates are always the most likely to remain in overeducation (0.45), followed by education (0.44), services (0.42), sciences (0.41) and agriculture graduates (0.41). Fields presenting a higher probability of moving to a matched job are engineering (0.54), social sciences (0.53) and agriculture graduates (0.51). Results remain in a similar order when only considering employed graduates five years after graduation (logistic model). Those that are more likely to move from an overeducated position to non-employment are humanities graduates (0.11) and health graduates (0.12).

These results do not exactly match the main theoretical expectation. Graduates from non-occupation focused fields were expected to be more likely to remain in an overeducated position than graduates from occupation-focused fields. The only fields of study providing results supporting this hypothesis are humanities (non-occupation), and engineering and health (occupation-focused). Humanities graduates are more likely to remain in overeducation, compared to graduates from the rest of the fields, while engineering and health graduates are more likely to move to a matched job. However, results for social science and education graduates are more in line with the alternative hypothesis: social science graduates are more likely to exit overeducation, while overeducated education graduates are comparatively more likely to remain in such a situation five years after graduation. This finding suggests that overeducation has scarring effects for education graduates: those that fall into overeducation project a negative signal -probably because it is not common to experience it- making overeducation exit more difficult. Conversely, among social science graduates, overeducation is a common phenomenon and it is likely to be used as a stepping stone to a better job match.

Table 4.8: Predicted probabilities of being matched/overeducated/not employed by field of study 5 years after graduation (early overeducated graduates)

	Multinomial model						Logistic model			
	Overeducated		Matched		Not employed		Overeducated		Matched	
Humanities & Arts	0.45***	(0.017)	0.44***	(0.017)	0.11***	(0.009)	0.50***	(0.018)	0.50***	(0.018)
Education	0.44***	(0.021)	0.47***	(0.021)	0.09***	(0.010)	0.48***	(0.023)	0.52***	(0.023)
Services	0.42***	(0.034)	0.49***	(0.033)	0.08***	(0.018)	0.46***	(0.033)	0.54***	(0.033)
Sciences	0.42***	(0.019)	0.49***	(0.019)	0.10***	(0.012)	0.45***	(0.020)	0.55***	(0.020)
Agriculture & Vet	0.41***	(0.033)	0.51***	(0.032)	0.07***	(0.016)	0.44***	(0.033)	0.56***	(0.033)
Health & Welfare	0.39***	(0.025)	0.50***	(0.025)	0.12***	(0.015)	0.42***	(0.026)	0.58***	(0.026)
Engineering	0.38***	(0.017)	0.54***	(0.016)	0.08***	(0.010)	0.41***	(0.017)	0.59***	(0.017)
SS-Business-Law	0.37***	(0.009)	0.53***	(0.009)	0.10***	(0.005)	0.42***	(0.009)	0.58***	(0.009)
N	6,791						5,604			
Pseudo R-squared	0.0852						0.1315			

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: coefficients controlling for covariates; categories in descending order by probability to remain overeducated.

Source: own elaboration, from REFLEX/HEGESCO.

As expected, the predicted probabilities of exiting from or remaining in overeducation by field of study are not homogeneous across countries. Although in some countries overeducation incidence is lower, individuals who fall into it are likely to remain there, as is the case for Germany. As shown in Table 4.9 below, in Germany the probability of remaining overeducated five years after graduation is above 50% in all fields of study. Similarly, Turkey and France present probabilities above or close to 50% for remaining in an overeducated position across all fields of study. Therefore, it suggests that in these countries overeducation is a trap. Conversely, in Finland, Poland and the United Kingdom, all fields of study present probabilities below 40% for remaining in overeducation, ranging from a minimum of 26% in Poland for engineering graduates to 39% for humanities graduates in the United Kingdom. Thus, in these countries, overeducation seems to be a stepping stone to an adequate job match. The rest of the countries are in an intermediate position, suggesting that overeducation can be a long-term phenomenon mainly for humanities and education graduates, but a stepping stone for engineers and social science graduates.

It is worth pointing out that the ordering of fields of study in the probability of remaining overeducated is practically the same across all countries. With a few – and relatively small number of exceptions – humanities and education graduates are the most likely to remain overeducated compared to their colleagues from other fields of

study in the same country, while social sciences and engineering graduates are the least. Therefore, the influence of fields of study on the probability of escaping from overeducation is similar across countries, but the magnitude of the effect varies widely.

Table 4.9: Predicted probabilities of remaining overeducated by field of study and country (early overeducated graduates)

	Humanities & Arts	Education	Services	Science	Agriculture & Vet	Health & Welfare	Engineering	SS-Business-Law	N
Germany	0.60*** (0.042)	0.60*** (0.044)	- -	0.57*** (0.044)	0.57*** (0.052)	0.54*** (0.048)	0.53*** (0.043)	0.52*** (0.042)	153
Turkey	0.56*** (0.033)	0.56*** (0.036)	0.55*** (0.046)	0.54*** (0.034)	0.54*** (0.044)	0.50*** (0.040)	0.50*** (0.034)	0.49*** (0.030)	293
France	0.55*** (0.033)	0.55*** (0.037)	0.53*** (0.046)	0.52*** (0.034)	- -	0.48*** (0.040)	0.49*** (0.035)	0.47*** (0.030)	286
Belgium	0.51*** (0.033)	0.49*** (0.038)	0.46*** (0.046)	0.46*** (0.036)	- -	0.44*** (0.039)	0.42*** (0.033)	0.41*** (0.030)	290
Spain	0.50*** (0.022)	0.49*** (0.025)	0.47*** (0.038)	0.47*** (0.023)	0.47*** (0.037)	0.43*** (0.030)	0.43*** (0.022)	0.42*** (0.016)	1,253
Norway	0.49*** (0.033)	0.47*** (0.036)	0.45*** (0.043)	0.44*** (0.034)	0.44*** (0.043)	0.42*** (0.036)	0.40*** (0.032)	0.40*** (0.029)	321
Slovenia	0.48*** (0.031)	0.46*** (0.033)	0.43*** (0.031)	0.43*** (0.031)	0.43*** (0.041)	0.41*** (0.035)	0.39*** (0.028)	0.39*** (0.024)	440
Hungary	0.48*** (0.034)	0.48*** (0.036)	0.46*** (0.046)	0.45*** (0.036)	0.46*** (0.044)	0.41*** (0.039)	0.41*** (0.034)	0.40*** (0.030)	281
Austria	0.43*** (0.034)	0.42*** (0.036)	0.40*** (0.045)	0.40*** (0.035)	0.40*** (0.045)	0.36*** (0.038)	0.36*** (0.033)	0.35*** (0.029)	277
Czech Republic	0.41*** (0.025)	0.40*** (0.026)	0.38*** (0.036)	0.37*** (0.025)	0.37*** (0.035)	0.34*** (0.028)	0.33*** (0.020)	0.33*** (0.017)	982
Italy	0.41*** (0.026)	0.40*** (0.031)	0.37*** (0.039)	0.36*** (0.026)	0.37*** (0.027)	0.35*** (0.032)	0.34*** (0.025)	0.33*** (0.020)	581
Netherlands	0.40*** (0.025)	0.39*** (0.028)	0.36*** (0.036)	0.36*** (0.026)	0.35*** (0.037)	0.34*** (0.027)	0.32*** (0.023)	0.32*** (0.019)	714
United Kingdom	0.39*** (0.029)	0.38*** (0.035)	0.36*** (0.042)	0.36*** (0.031)	0.35*** (0.041)	0.33*** (0.035)	0.32*** (0.030)	0.31*** (0.026)	349
Poland	0.35*** (0.043)	0.34*** (0.043)	0.31*** (0.047)	0.31*** (0.040)	0.31*** (0.045)	0.29*** (0.042)	0.27*** (0.036)	0.27*** (0.034)	170
Finland	0.33*** (0.028)	0.33*** (0.032)	0.31*** (0.038)	0.31*** (0.029)	0.31*** (0.038)	0.28*** (0.029)	0.28*** (0.027)	0.27*** (0.023)	401
Multinomial model	0.45*** (0.017)	0.44*** (0.021)	0.42*** (0.034)	0.42*** (0.019)	0.41*** (0.033)	0.39*** (0.025)	0.38*** (0.017)	0.37*** (0.009)	6,791

Note: coefficients controlling for covariates; countries in descending order by probability to remain overeducated in Humanities & Arts.

Source: own elaboration, from REFLEX/HEGESCO.

Overeducation exit by social origin and work-related characteristics

Besides field of study, other covariates are also expected to influence graduates' likelihood of overeducation exit. Starting with the role of social origin, contrary to the expectations, Table 4.10 below shows that social origin does not differentiate between those who exit or remain in overeducation. Graduates with a higher educated father are similarly as likely to move to a matched job (0.52) as their colleagues with a non-higher educated father (0.50). The probability of remaining in overeducation is very similar for graduates with a non-higher educated father (0.40) and with a higher educated father (0.38), as it is to move to non-employment (0.10 and 0.09, respectively). Therefore, social origin does not seem to be relevant in predicting the probability to move out from an overeducated position, at least in the way it is here operationalised.

Moving to the role of work-related characteristics, the probability of moving to a matched job increases as does the number of months employed. Graduates with six months of work experience have a lower probability of moving to a matched job (0.44) compared to those that have been employed throughout the five years (0.59). Conversely, more months in unemployment reduce the probability to move to a matched job and increase the that of remaining in overeducation. Graduates with work-related training are also more likely to move to a matched job (0.60). Less conclusive is the role of firm size, as it does not present a linear pattern, as already suggested in previous studies (Dolton, P. & Vignoles, 2000; Dolton, P.J. & Silles, 2008). Medium-sized firms report the highest probability of moving to a matched job (0.61), compared to small firms (0.54) and large ones (0.56). The innovation index does present a linear pattern and, as expected, graduates employed in low innovative firms are more likely to remain overeducated (0.57) than those employed in highly innovative firms (0.34), which are more prone to offer graduate jobs. However, the most conclusive result is that those who moved out from their initial job are more likely to be matched (0.68) than those who did not (0.33). Therefore, except for the firm's size, the rest of the work-related variables affect overeducation exit as theoretically expected.

Table 4.10: Predicted probabilities of being matched/overeducated/not employed by social origin and work-related characteristics 5 years after graduation (early overeducated graduates)

	Overeducated		Matched		Not employed	
Father's education						
<i>Non-HE father</i>	0.40***	(0.007)	0.50***	(0.007)	0.10***	(0.004)
<i>HE father</i>	0.38***	(0.012)	0.52***	(0.012)	0.09***	(0.007)
Mother's education						
<i>Non-HE mother</i>	0.40***	(0.007)	0.51***	(0.007)	0.10***	(0.004)
<i>HE mother</i>	0.39***	(0.014)	0.51***	(0.014)	0.11***	(0.008)
Work experience						
<i>6 months</i>	0.57***	(0.024)	0.44***	(0.024)	-	-
<i>1 year</i>	0.55***	(0.021)	0.45***	(0.021)	-	-
<i>2 years</i>	0.51***	(0.015)	0.49***	(0.015)	-	-
<i>3 years</i>	0.48***	(0.009)	0.52***	(0.009)	-	-
<i>4 years</i>	0.44***	(0.006)	0.56***	(0.006)	-	-
<i>5 years</i>	0.41***	(0.008)	0.59***	(0.008)	-	-
Months unemployed						
<i>0 months</i>	0.42***	(0.007)	0.58***	(0.007)	-	-
<i>3 months</i>	0.44***	(0.006)	0.56***	(0.006)	-	-
<i>6 months</i>	0.45***	(0.007)	0.55***	(0.007)	-	-
Work-related training						
<i>Yes</i>	0.50***	(0.010)	0.60***	(0.008)	-	-
<i>No</i>	0.41***	(0.008)	0.51***	(0.010)	-	-
Firm's size						
<i>Small firm</i>	0.46***	(0.012)	0.54***	(0.012)	-	-
<i>Medium firm</i>	0.39***	(0.013)	0.61***	(0.013)	-	-
<i>Large firm</i>	0.45***	(0.009)	0.56***	(0.009)	-	-
Innovation index						
<i>Low innovation (3)</i>	0.57***	(0.017)	0.43***	(0.017)	-	-
<i>Medium innovation (9)</i>	0.45***	(0.006)	0.55***	(0.006)	-	-
<i>High innovation (15)</i>	0.34***	(0.013)	0.66***	(0.012)	-	-
Employment change						
<i>Yes</i>	0.33***	(0.007)	0.68***	(0.007)	-	-
<i>No</i>	0.67***	(0.011)	0.33***	(0.011)	-	-
N			6,791 / 5,604			
Pseudo R-squared			0.0852 / 0.1315			

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: coefficients controlling for covariates; results for father's and mother's education correspond to the multinomial model, while results for work-related factors to the logistic model.

Source: own elaboration, from REFLEX/HEGESCO.

Overeducation exit by field of study, social origin and work-related characteristics

One of the expectations and contributions this paper aims to show is that the influence of the aforementioned covariates differ across fields of study. The following plotted interactions show the influence of social origin and work-related characteristics on each field of study. Starting with social origin, Figure 4.1 shows that there are no differences in the probability of remaining in overeducation, moving to a matched job or to non-

employment depending on father's education. Among early overeducated graduates, individuals with a non-higher educated father are as likely to remain in an overeducated position five years after graduation as their colleagues with a higher educated father. This finding is consistent in all fields of study, although it is worth pointing out that - even if not statistically significant - the fields of health and services present a different trend, showing that graduates with a higher educated father are less likely to remain in overeducation. Therefore, contrary to what was expected, social origin is not a good predictor of overeducation persistence in any field of study; social origin neither corrects nor increases overeducation probability.

With regard to the influence of work-related characteristics, results differ by field of study. As shown in Figure 4.2, work experience influences the probability of exiting overeducation in half of the fields of study considered. Among social sciences, science, engineering, services graduates and -to a lesser extent- health graduates, the number of months in employment increases the probability of moving to a matched job. Therefore, it seems that in these fields, the skills gained via work experience promote a better job match. The results are not completely in line with the theoretical expectations: occupationally focused fields of study, such as science and engineering, were expected to decrease overeducation probability to a larger extent than non-occupationally focused fields, such as humanities. However, social science and services graduates - which are non-occupationally focused fields of study - seem to decrease overeducation probability thanks to work experience to a similar extent to engineering and science, while no differences are presented for education and agriculture graduates, both occupationally focused fields. Results for health graduates are in a mid-position, suggesting that only extended work experience (4-5 years) is an advantage to escape from overeducation.

Figure 4.3 shows that for half of the fields of study - namely education, health, science and engineering - work-related training is a useful tool for exiting overeducation, while in the rest of the fields there is no evidence supporting that work-related training improves the chances of getting a good job match. These results work in line with the theoretical expectations, suggesting that work-related training can be more useful for graduates from occupationally focused fields than for those from transversal fields. Overeducated graduates from occupationally focused fields - and their employers -

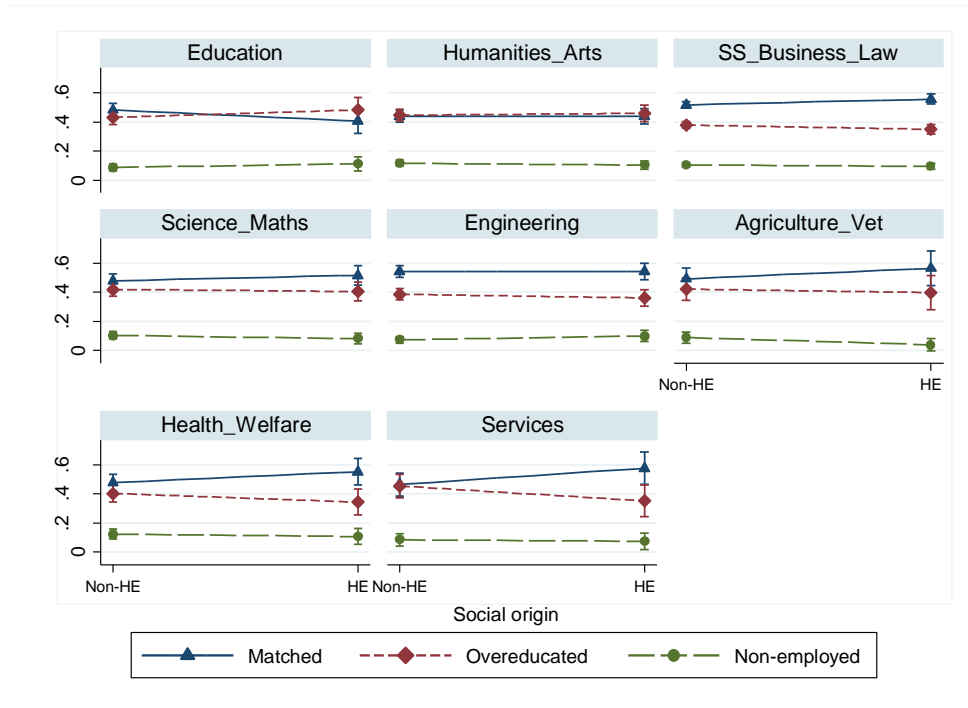
might more easily detect the kind of training they need to adapt to job requirements or to move to a matched job.

In line with previous research (Dolton, P.J. & Silles, 2008) and the overall results, firm size does not present a linear behaviour. Figure 4.4 shows that in most fields of study, the number of employees in the firm is not a relevant factor in predicting overeducation exit. Social science graduates are the only ones for which working in a medium firm decreases the likelihood of remaining overeducated, compared to those graduates from the same field that work in small and large firms. Therefore, there is limited evidence to support the expectation that larger firms facilitate internal career mobility.

Focusing on the results for the innovation index, Figure 4.5 shows that in five out of the eight fields of study – humanities, science, social sciences, education and engineering - the degree of innovation of the firm clearly influences overeducation exit. Graduates employed in highly innovative firms are more likely to move to a matched job than remaining in an overeducated position five years after graduation. This result holds even for humanities graduates, for which no other work-related factor improved their job situation. So, results suggest that, generally, highly innovative firms present more graduate job opportunities. The innovation index seems to make no difference for health and agriculture graduates to escape from overeducation. Although it could be argued that most of the firms employing these graduates are highly innovative, the mean innovation punctuation and standard deviation is similar to other fields, as presented in Table 4.2 above.

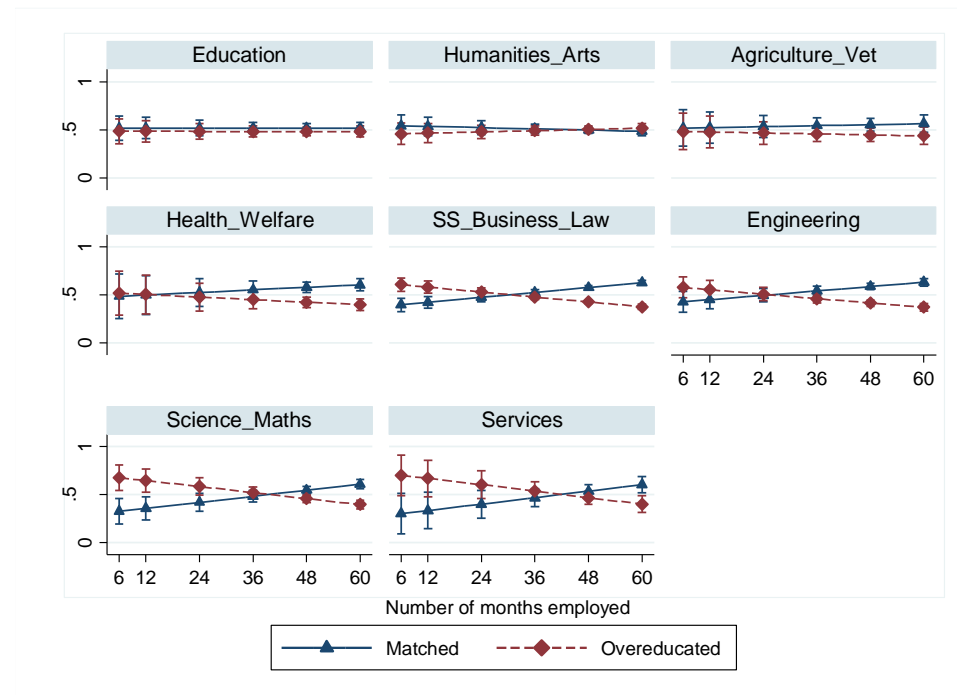
Finally, with regard to employment change, Figure 4.6 presents a clear consensus across fields of study: the likelihood of escaping from overeducation is higher for those that moved out from their first relevant job after graduation. The consistency of this finding for all graduates empirically supports Human Capital Theory; the matching process takes place due to individuals' job searches, moving to a firm that fully uses their education. There is little support to say that firms adapt their technology and jobs to graduates' education to maximise their productivity, regardless of the field of study of graduation.

Figure 4.1: Predicted probabilities of being matched/overeducated/non-employed by field of study and social origin



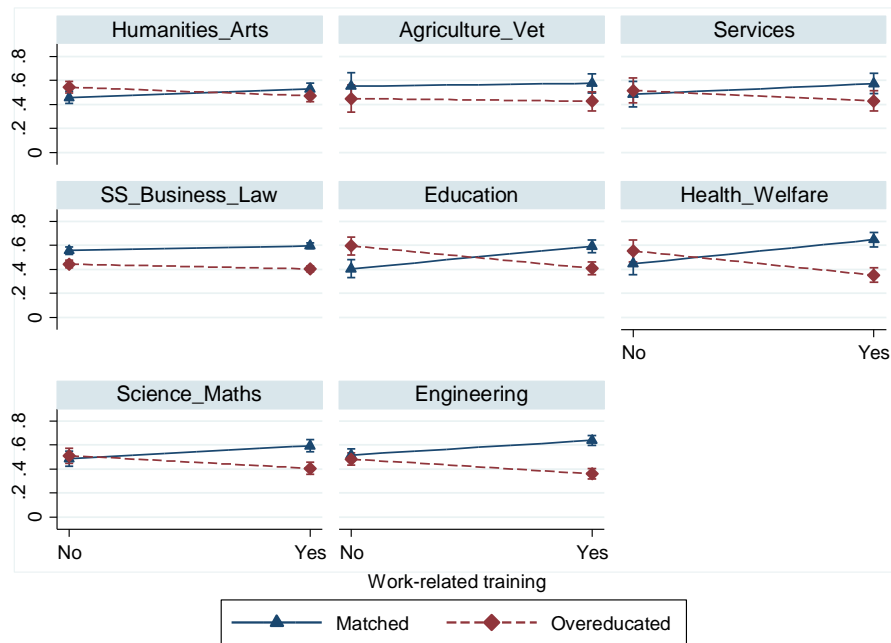
Source: own elaboration, from REFLEX/HEGESCO.

Figure 4.2: Predicted probabilities of being matched/overeducated by field of study and work experience



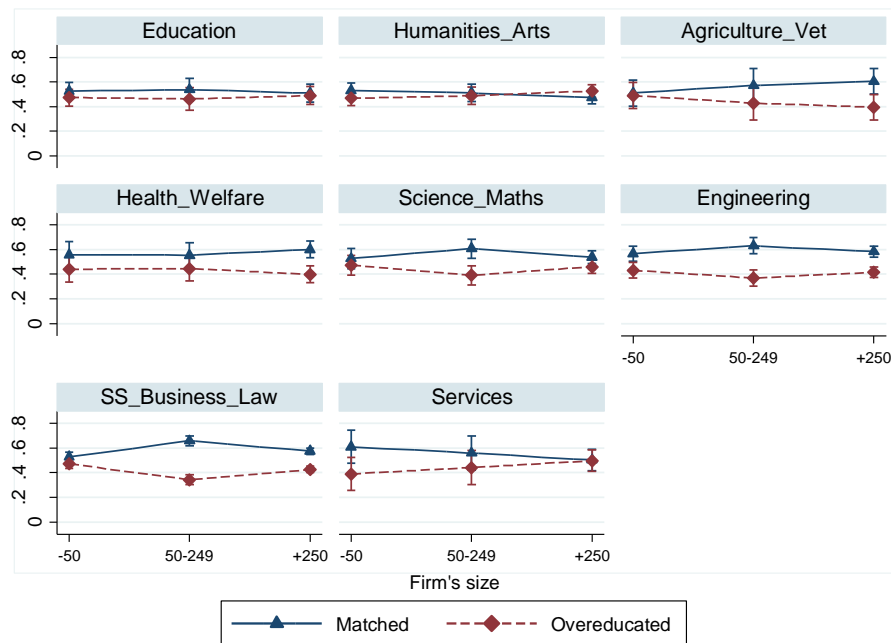
Source: own elaboration, from REFLEX/HEGESCO.

Figure 4.3: Predicted probabilities of being matched/overeducated by field of study and work-related training



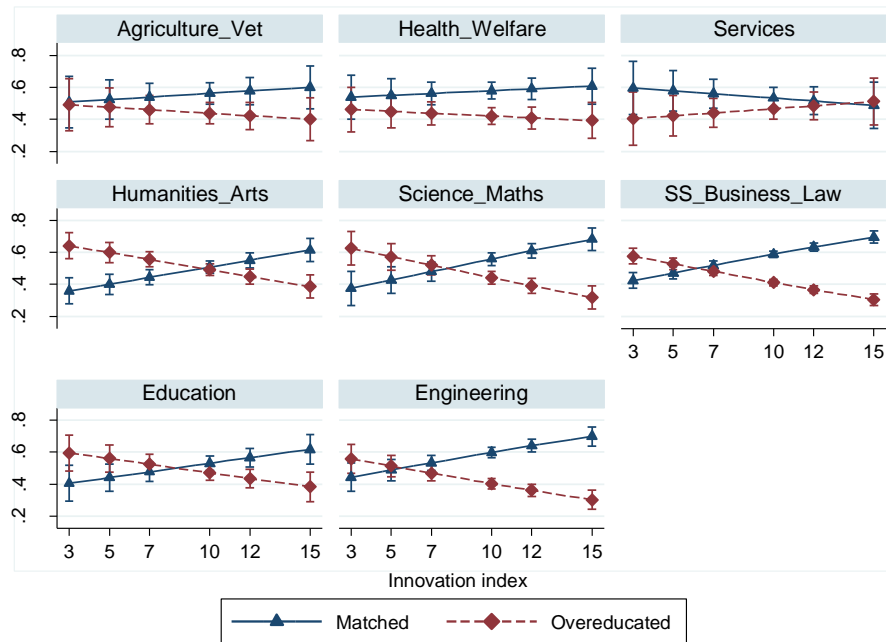
Source: own elaboration, from REFLEX/HEGESCO.

Figure 4.4: Predicted probabilities of being matched/overeducated by field of study and firm's size



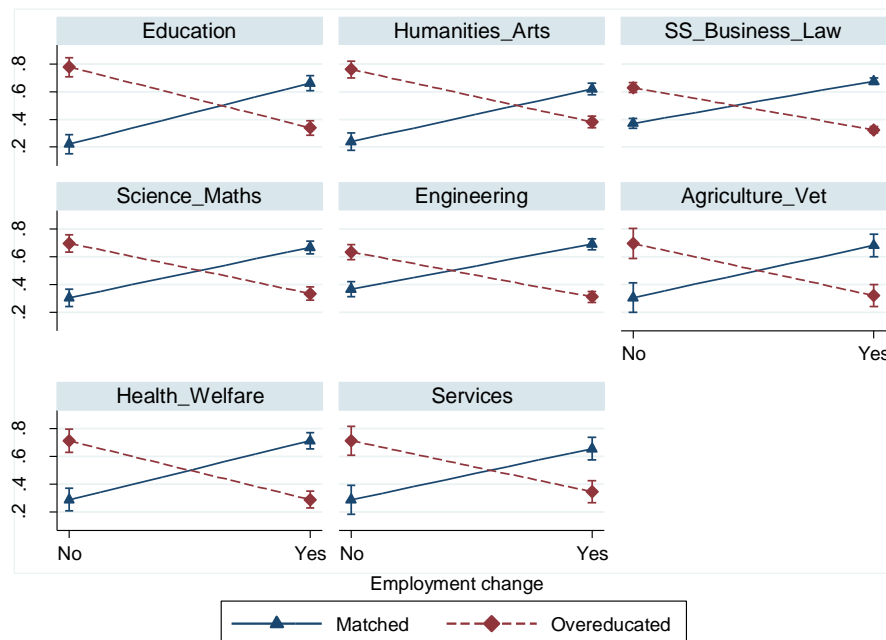
Source: own elaboration, from REFLEX/HEGESCO.

Figure 4.5: Predicted probabilities of being matched/overeducated by field of study and innovation index



Source: own elaboration, from REFLEX/HEGESCO.

Figure 4.6: Predicted probabilities of being matched/overeducated by field of study and employment change



Source: own elaboration, from REFLEX/HEGESCO.

4.6. Conclusions

Academic research on overeducation duration presents mixed results: while some argue overeducation is a short-lasting phenomenon others claim it is a long-run form of employment. However, it might be claimed that overeducation is a temporary situation for some and more persistent for others. Aiming to contribute to the existing debate, this article has analysed a group of early overeducated graduates in their first relevant job after graduation, assessing if the probability of moving out from overeducation five years after graduation varies across fields of study.

Results suggest that field of study is a good predictor of overeducation exit: among those that fell into overeducation the probability of moving to an adequately matched job varies across fields of study. Humanities, education, science and services graduates are more likely to remain in an overeducated position, compared to engineering, agriculture, health and social science graduates. The expectation that graduates from occupationally focused fields of study would be more likely to exit overeducation is not completely supported by empirical evidence. Education graduates are more likely to remain overeducated than expected, suggesting that in this particular field of study, overeducation is a trap. Conversely, social science graduates present a higher probability of exiting overeducation than expected suggesting that for graduates in this field, overeducation is more likely to be a stepping stone to a better job match. These findings shed some light on the mixed results reported so far on the discussion of overeducation as a temporary or a persistent phenomenon, supporting the hypothesis that overeducation might be a temporary situation for some individuals, but a long-form of employment for others.

The ordering of fields of study in the probability of remaining overeducated is practically the same across countries: humanities and education graduates are the most likely to remain overeducated compared to their colleagues from other fields of study in the same country, while social sciences and engineering graduates are the least. However, the magnitude of the effect varies widely across countries, suggesting that in some countries, overeducation is a trap (e.g. Germany, Turkey, France), while in others it is a stepping stone to a matched job (e.g. Finland, Poland, the United Kingdom).

A consistent finding across fields of study is that social origin does not influence overeducation persistence. Among early overeducated graduates the fact of having a higher educated father is not an advantage for moving to a matched job. Nevertheless, we should bear in mind that graduates from disadvantaged families are more likely to be overeducated at the beginning of their career. Therefore, since there is not any correction of the initial disadvantage, it can be stated that social origin neither aggravates nor corrects for the initial social disadvantage in overeducation incidence.

Factors influencing overeducation exit also vary across fields of study. While there is little empirical support for stating that larger firms facilitate a good match, individuals with more work experience, work-related training and who are employed in a high innovative firm are more prone to exit overeducation in a relevant number of fields of study. However, results suggest that factors influencing overeducation persistence vary across fields of study.

Last but not least, the most consistent finding across fields of study is that overeducated graduates who moved out from their first job after graduation are more prone to being in a matched position. Individuals move to a job that fully utilises their education – supporting Human Capital Theory – rather than firms adapting their technology to graduates' education.

Some limitations have to be pointed out, with the first one regarding the measurement of social origin. Father's education is an incomplete measure for capturing the concept of social origin. Father's occupation would have been a better indicator. However, this information is not available in REFLEX/HEGESCO. Another data limitation worth mentioning is that these are pooled analyses including all countries. Few cases are left when concentrating analyses on early overeducated graduates and even less when differentiating by field of study. Therefore, the number of cases per country and field of study is too limited to perform country analyses including interaction terms between fields of study and work-related characteristics. Given the difference in the prestige of fields of study by country and the relevance of overeducation incidence across countries, further research should focus on exploring overeducation exit by field of study at the country level. Moreover, cross-national differences in education systems

and labour market institutions might enhance different forms of overeducation exit across fields of study.

Finally, another line for further research refers to the need of longitudinal data in order to assess if an individual's work-related factors (i.e. work experience, work-related training) and firm's characteristics (i.e. size, innovation) are either the cause or the consequence of overeducation exit. As argued above, it is not possible when using the available cross-sectional data to assess if an individual has moved to a matched job and then got on-the-job training and more work experience or, conversely, because they got work-related training and work experience they moved to a matched job. The same applies for firm's characteristics. These are relevant questions to be answered in the near future in order to better understand how the matching process works and if it is the role of individuals or firms to better adapt to the education and skills available in the labour market.

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CONCLUSIONS

Research studies on overeducation initially addressed the phenomenon from an economic perspective. The main focus was on the profitability and economic returns of an extra year of education (Freeman, 1976; Rumberger, 1981; Sicherman, 1991) and its consequences in terms of productivity and job satisfaction (Allen, Jim, Levels, M., van der Velden, 2013; Fleming, C.M. & Kler, 2008; Green, F. & Zhu, 2010; Verhaest, D. & Omeij, 2010).

More recently, some empirical studies on overeducation have adopted a sociological standpoint, assessing the role of socio-economic factors (Barone, C. & Ortiz, 2011; Büchel, F. & van Ham, 2003; Dekker, R., Grip, A. & Heijke, 2002; Kler, 2006; Mavromaras, K. & McGuinness, 2012; Ortiz, L. & Kucel, 2008), educational institutions and labour market characteristics on overeducation (Di Stasio, V., Bol, T. & van de Werfhorst, 2015; Levels, M., van der Velden, R. & Allen, 2014; Levels, M., van der Velden, R. & Di Stasio, 2014; Verhaest, D. & van der Velden, 2013).

The aim of this dissertation is to contribute to the sociological empirical research establishing a bridge between the labour economics and the social stratification literature relevant for the study of university graduates' overeducation risk. Social stratification research has long established that social origin has a strong impact on people's life chances (Lucas, 2001). Therefore, it is likely to think that graduates' chances of falling into overeducation might differ according to their social background. The dramatic higher education expansion experienced in most advanced economies has helped to reduce social inequalities. Younger cohorts have enjoyed better educational opportunities and have experienced a decrease in the degree of social inequalities (Breen, R. & Jonsson, 2007; Breen, R. & Luijkx, 2004; Scherer, S., Pollak, R., Otte, G. & Gangl, 2007).

Although economic and educational expansion has diminished inequalities in the first educational stages of higher education, recent evidence shows that social origin influence might regain relevance in the transition to the labour market (Torche, 2013). With higher education expansion, the upper classes look for quantitative and qualitative

ways to differentiate from the rest (Shavit, Y., Arum, R. & Gamoran, 2007). The main consequence of this process is that the labour market opportunities and privileges traditionally associated with the attainment of a university degree are no longer generalised, but limited to a selection of well-established study programmes and institutions (Berggren, 2008). Therefore, in this framework, this dissertation adds to and enhances the debate on assessing the influence of social origin across fields of study of graduation for such an outcome like overeducation.

Main findings

A first step of this research was obviously based on assessing the risk of overeducation incidence. Previous studies showed both field of study of graduation (Barone, C. & Ortiz, 2011; Ortiz, L. & Kucel, 2008) and social origin (Mavromaras, K. & McGuinness, 2012; Mavromaras, K., McGuinness, S. & Fok, 2009) as relevant overeducation predictors, but they did not consider the eventual combined effect of these two factors. Based on the influence that social origin has on academic achievement (primary effects) and study choices (secondary effects) (Breen, R. & Goldthorpe, 2001; Sullivan, A., Parsons, S., Wiggins, R., Heath, A. & Green, 2014) and, more concretely, in field-of-study choice (van de Werfhorst, 2002), the first research piece of this dissertation (Chapter 2) explores an ultimately different effect of social origin on graduates' overeducation risk across fields of study.

Empirical evidence reported in Chapter 2 for a representative sample of Italian graduates shows that, in line with my expectations, social origin is more decisive in preventing overeducation among graduates from transversal fields of study (e.g. social sciences), while it has a negligible effect among graduates from occupationally focused fields of study (e.g. engineering). More specifically, having a professional father is an advantage in avoiding overeducation incidence in transversal fields of study. The main explanation is that transversal fields of study lead to a range of occupations in the service sector where soft skills (e.g. critical thinking, self-presentation) are regarded as having an economic value, even if these are personality and class traits rather than meritocratic attainments (Breen, R. & Goldthorpe, 2001). The influence of social origin (measured via parental education and occupation) has proved to be decisive in avoiding

overeducation in transversal fields of study and to work independently from the use of social networks as an advantage to get a job.

Such a differentiated effect of social origin across fields of study in preventing overeducation is likely to differ across countries given different education systems. For this reason, Chapter 3 addresses a cross-country comparison aiming to assess if some features of the education system moderate this unevenly distributed effect of social origin on overeducation across fields of study. Previous research addressing the role of educational institutions on overeducation risk concentrates on features of the higher education system (Barone, C. & Ortiz, 2011; McGuinness, 2003; Reimer, D., Noelke, C. & Kucel, 2008; Robst, 1995b; Verhaest, D. & van der Velden, 2013). My contribution focuses on previous educational stages that differently select the future amount and distribution of graduates by social origin.

The main hypothesis of Chapter 3 is that secondary education systems with a high degree of vocational enrolment select individuals by social origin to a larger extent than comprehensive systems, reducing the number of future graduates and making them a more homogenous group in terms of social background characteristics. Therefore, the expectation was that social origin would be more important in predicting overeducation risk in countries with comprehensive systems and especially for graduates from transversal fields of study; while in countries with vocational education systems, social origin would explain graduates' overeducation risk to a lesser extent. However, results for graduates from 15 European countries with different education systems do not fully support this hypothesis. Although there is empirical support to say that graduates' overeducation risk is higher in comprehensive systems than in vocationally oriented ones across all fields of study and that social origin is more relevant for preventing overeducation in this type of education system, the differentiated effect of social origin across fields of study is not so decisive. One explanation for this unexpected finding is that social origin was approximated through parental education, and not parental occupation. As father's occupation has been shown to be a more relevant predictor of overeducation (as shown in Chapter 2) the fact of lacking this important piece of information in this chapter could have affected my results. Another explanation might simply be that arrangements of the education system previous to the higher education

level are not so decisive in predicting graduates overeducation incidence and, thus, further research should continue on exploring higher education institutions to assess graduates' overeducation risk.

From an economic perspective, some scholars have claimed that overeducation incidence is not so relevant if it is a short-term phenomenon. This is why Chapter 4 addresses overeducation persistence from a social stratification standpoint. Empirical research on the topic has provided mixed results regarding overeducation duration: while some claim it is a short-lasting situation (Frei, C. & Sousa-Poza, 2012; Robst, 1995a; Sicherman, 1991) others argue it is a long-term form of employment (Büchel, F. & Mertens, 2004; Dolton, P. & Vignoles, 2000; Frenette, 2004; McGuinness, S. & Wooden, 2007). Given these mixed results, some have proposed the view that overeducation might be a stepping stone for some individuals, but a trap for others (Rubb, 2003). Adopting this last perspective, I have here hypothesised that graduates' field of study of graduation could help us differentiate between those who escape from overeducation and those who remain in such a situation.

Results suggest that field of study is a good predictor of overeducation exit: among those who fell into overeducation, the probability of moving to an adequately matched job varies across fields of study. However, there is not a clear pattern. While overeducation seems to be a trap for humanities, education, science and service graduates it is a stepping stone for most of the early overeducated graduates in engineering, agriculture, health and social sciences. These findings shed some light on the mixed results so far reported on the discussion of overeducation as a temporary or a persistent phenomenon, supporting the hypothesis that overeducation might be a short-term situation for some individuals, but a long-form of employment for others.

The ordering of fields of study in the probability of remaining overeducated is practically the same across all countries: humanities and education graduates are the most likely to remain overeducated, while social sciences and engineering graduates are the least. However, the magnitude of the effect varies widely across countries, suggesting that in some countries overeducation is a trap (e.g. Germany, Turkey,

France), while in others it is a stepping stone to a matched job (e.g. Finland, Poland, the United Kingdom).

Another consistent finding across countries and fields of study is that social origin does not play a role in overeducation duration. Therefore, the expectation that social origin could also be an advantage in moving out from overeducation in transversal fields of study is not supported by empirical findings. Work-related factors turn out to be more decisive than ascribed attributes in explaining job match or overeducation exit, such as working experience, on-the-job training or the degree of innovation of the firm. However, we also have to bear in mind that social origin has an influence on overeducation incidence. Thus, it might be that social origin neither corrects nor increases overeducation probability. In other words, the effect of social origin on graduates' fall into overeducation is not corrected by time.

All these findings have been collated using self-reported overeducation measures. The discussion presented in Chapter 1 provides enough evidence to state that, regardless the data limitations pointed out, this is a good measure for conducting overeducation research because of its up-to-date nature and cross-country comparability. Moreover, it is the indicator presenting the most conservative results in relation to social origin and field of study of graduation –at least when using REFLEX/HEGESCO data and given the operationalisation employed-, the two key factors studied in reference to graduates' overeducation in this dissertation.

Implications of the results

The results discussed earlier make evident the relevance of addressing the overeducation phenomenon from a social stratification perspective. Even if graduates have attained the highest educational level, which situates them in a privileged and advantageous position in the labour market relative to non-graduates, social origin inequalities are still present among individuals with the same educational attainment. The direct effects of the OED triangle might no longer be decisive in graduates' occupational attainment, but the influence of social origin operates in an indirect and moderating way. Therefore, it can be argued that the process of social stratification is becoming more complex and sophisticated.

Focusing on graduates' overeducation, it has been claimed that the direct influence of graduates' social origin on their destination (OD) is no longer working as a simple direct effect (Goldthorpe, 2014). Social origin influence is also working as an indirect effect through educational choices and as a moderating effect in the transition from education to the labour market. The indirect effect of social origin on the final destination through education (OED) has been extensively supported by empirical findings: social origin still plays an important role in educational choices (OE) (Sullivan, A., Parsons, S., Wiggins, R., Heath, A. & Green, 2014; van de Werfhorst, H. G., Sullivan, A. & Yi Cheung, 2003; van de Werfhorst, 2002) and to a different extent depending on the educational system (Brunello, G. & Checchi, 2007). In vocationally oriented and/or tracked systems social origin is especially relevant, whereas its influence seems to be less important in comprehensive systems. However, in comprehensive systems, the influence of social origin is likely to regain importance at the transition from education to the labour market destination (ED) (Bol, T. & van de Werfhorst, 2013; Brunello, G. & Checchi, 2007; Torche, 2013). The present research adds to the previous evidence and findings by supporting the view that social origin also plays a moderating effect on the transition from higher education to the labour market (ED), which differs depending on the field of study of graduation and, to a lesser extent, on the degree of vocational orientation of the education system.

An extended version of the well-known social elevator metaphor (Blau, P.M. & Duncan, 1967) might be useful to help illustrate this complex situation. Higher education expansion has helped individuals from a less privileged social origin to take the 'lift to the top floor' and attain a higher occupational position compared to their parents. However, once they arrive to that imagined "top floor" thanks to higher educational attainment, they realise that that original top floor has expanded horizontally (there are more people) and that there have been more floors recently built on top of it. This horizontal and vertical expansion is larger for graduates from transversal fields of study than for occupationally focused ones. To access the additional floors graduates need to know the right door to knock on, behave in a specific and expected way to persuade the gatekeeper to let them in and, maybe, know someone who can direct them to the right door with a good reference. Otherwise, they just end up in that "top floor" of higher educated people, and are likely to experience overeducation.

These indirect and moderating effects played by field of study and social origin are part of the re-stratification of higher education (Goldthorpe, 2014) and one of the consequences is a higher overeducation risk.

Overeducation is, therefore, a new form of social stratification, albeit more complex and sophisticated, compared to the classical division between employed, unemployed or economically inactive labour market statuses. Overeducation is to be considered as a disadvantageous labour market situation, which is more likely to be experienced by graduates from specific fields of study and, among them, from a specific social background. However, the results of this research suggest that the influence of social background is more relevant in the first labour market experience, when most recent graduates lack working experience and job-related skills. Social origin clearly diminishes its influence in predicting overeducation persistence and exit probability some years after graduation.

Overeducation incidence and persistence among graduates clearly differs across countries. Previous studies have shown that the higher education institutions play an important role in predicting overeducation risk by field of study and social origin (Barone, C. & Ortiz, 2011; Verhaest, D. & van der Velden, 2013). Previous educational stages seem to have some influence on the amount of graduates (Reimer, D., Noelke, C. & Kucel, 2008) and on the overeducation probability, but the unevenly distributed effect of social origin across fields of study does not change according to the education system.

All these findings have clear policy implications that might be addressed from two complementary approaches. On the one side, it is clear that there are some fields of study more prone to overeducation than others. One of the reasons for this is that they do not directly lead to specific occupations in the labour market and provide less ready-to-use skills. Another reason is that even if higher educational attainment provides higher levels of skills, knowledge and abilities with productive value, as higher education expands employers might use personality traits –which are likely to be gained through family socialisation– as a hiring criterion. Therefore, education systems should wonder about their curricula and skills training in order to assess if it is desirable to

teach and train students with these kind of soft skills valued in the labour market. This would probably diminish social inequalities, especially in fields of study leading to the service sector, and have a larger impact if addressed in the early stages of the educational trajectory.

On the other side, overeducation might appear if there are not enough graduate jobs available for the number of individuals holding a tertiary degree. Welfare states and firms, probably with public administration support, should promote the creation and maintenance of graduate jobs in order to fully utilize individuals' skills and knowledge. From an economic perspective, the fact of not fully utilising the educational investment provided by a country is the result of an inefficient situation, which translates into a reduction in the potential productivity of the national workforce. From a sociological standpoint, it is unfair and a form of social stratification that two people with the same educational attainment present such different forms of occupational attainment. Links between universities and the labour market might facilitate overeducation reduction. This research has shown that the lack of abilities of some national economies to generate high-skilled jobs may have an adverse social effect, as among graduates who are most likely to fall into overeducation are the ones coming from lower social origin. Therefore, the lack of impetus from these economies not only has an adverse economic effect, but possibly a social one, too.

Limitations and further research

This dissertation contributes to the current debate on graduates' overeducation risk from a social stratification perspective and answers the research questions presented. However, as any piece of original scientific work, it presents some limitations, creates new questions and points to further research lines.

The first limitation is data availability. As discussed in the last section of the introductory chapter, it is difficult to find a good quality database that includes the required information and number of cases to perform the present research. It is even more difficult to find a single database providing cross-sectional and longitudinal information. Chapter 2 relies on the GES database because of its rich information in terms of social origin characteristics (parental education and father's occupation) and

the use of social networks to get a job. However, it is a cross-sectional database providing information for a single country (i.e. Italy). Chapters 3 and 4 rely on REFLEX/HEGESCO data because they provide the information required for the present research for several countries, although this information is less specific than the one available in GES. The main data limitation is that the social origin can only be operationalised via parental educational level, which is not the best measure of social origin. As argued earlier, parental occupation is a more relevant predictor of graduates' overeducation risk. Moreover, parental occupation is more likely to highlight different positions in society, while parental educational level might have different relevance across countries given their degree of educational expansion and the moment it took place.

Another data limitation refers to persistence analyses. REFLEX/HEGESCO provides information for two points in time (after graduation and five years later). However, it would be more advisable to use panel longitudinal data to assess individual trajectories. REFLEX/HEGESCO was the best available choice (to my knowledge) to address the research questions presented, as argued in the last section of the introductory chapter. Nevertheless, further research on overeducation duration should assess it from a longitudinal perspective. Regardless of the recent efforts on using panel data to address persistence in overeducation and overskilling (Carroll, D. & Tani, 2013; Kiersztyn, 2013) other methodologies such as event history analysis or sequence analyses would provide a more clear pattern of the time span of the phenomenon and the trajectories of overeducated individuals, similarly as it has already been done for individuals with secondary education level (Pollmann-Schult, M. & Büchel, 2004; Verhaest, D., Schatteman, T. & Van Trier, 2015). This would allow the expansion of the discussion into how much time is to be considered as a “short” or “long” period in overeducation. At the moment there is no consensus – or even discussion – on this issue. The restriction of the five years after graduation imposed by the survey questionnaire design from REFLEX/HEGESCO has indirectly – or even unintentionally – established the five year time span as a long period in overeducation. Further discussion both at the theoretical and empirical level on overeducation persistence should probably address some other questions, such as if there is a kind of “structural” or “frictional” overeducation, as happens with unemployment.

Concerning the ongoing debate on the positionality of education (Bol, 2015; Di Stasio, V., Bol, T. & van de Werfhorst, 2015; Shavit, Y. & Park, 2016; Triventi, M., Panichella, N., Ballarino, G., Barone, C. & Bernardi, 2014), it would be interesting to replicate the current analyses considering education as a positional good. That would mean attributing part of the value of educational credentials to their relative scarcity in the population. This exercise would be especially interesting for comparing results across countries: cross-country differences with regard to the role of social origin on predicting overeducation might vary depending on the consideration of education as a positional (relative) or nominal (absolute) good. Educational expansion at the tertiary level has taken place to different extents and at different points in time among the countries under study. Thus, the relative position of graduates in each country and education system is likely to vary and have different consequences for overeducation prevalence. Moreover, recent research shows that the loss of prestige associated with educational expansion is larger in general fields than in technical ones (Ortiz, L. & Rodriguez-Menes, 2015). However, no assessment has been undertaken so far on the influence of social origin on the loss of occupational prestige.

There are two changes experienced in the past few years that would also justify the replication of the analyses presented in order to explore possible changes: the great recession and the implementation of the Bologna system. If another round of REFLEX/HEGESCO were to take place in the same countries it would be possible to assess if overeducation – and other labour market outcomes – has increased as a result of the economic crisis. At the country level, at least for the results presented in Chapter 2, analyses are replicable using the recently released 2011 GES. This would also easily allow us to compare if the influence of social origin on overeducation across fields of study has diminished, increased or remains equal between pre- and post-Bologna graduates. Recent studies have addressed the social effects of the Bologna system in access and graduation (Neugebauer, 2014), but few efforts have been directed towards the consequences of Bologna on the labour market outcomes for graduates.

Another line for further research would be the discussion between overeducation, overskilling and other types of skills mismatch from a social stratification perspective. Even if all the analyses in the present research control for ability (using grades as a

proxy), the current discussion is moving towards the area of skills mismatch (Assirelli, 2015). Educational expansion has meant that the majority of individuals attain a given educational level. As the number of individuals in a group increases, it is likely that skills heterogeneity does too. Disentangling the overlapping and non-overlapping areas between overeducation and overskilling might be useful to help detect the specific types of skills and/or knowledge underutilised in the labour market. Some recent work has already addressed the consequences of underutilisation of specific skills in terms of earnings and job satisfaction (Sánchez-Sánchez, N. & McGuinness, 2015), but it would be interesting to further explore if the type of skills underutilised varies across graduates from different fields of study and social origin.

Another research line that remains quite unexplored is the discussion on the heterogeneous range of jobs included in managerial positions. Although the standard procedure is to consider Managers (ISCO 1 occupations) as jobs requiring a tertiary degree, the overuse of this title in some countries/sectors/firms might lead to an overestimation of overeducation, meaning that overeducation would not be as high as its rate or incidence may suggest. In countries and/or sectors mainly constituted by small and medium enterprises (SMEs) there might be at least one manager per firm, even if the tasks and job performance do not match with higher education knowledge and skills. However, this consideration is probably influenced by the degree of innovation of the firm: highly innovative firms might be more likely to provide graduate jobs (including managerial positions) than non-innovative ones.

Finally, there is still some room for further discussion concerning the overeducation measurement. Even if the aim of this dissertation is not to provide methodological contributions, Chapter 1 has discussed at length the differences across measurements for different countries and the influence of fields of study and social origin on predicting each overeducation measurement. The further steps to be taken would be to assess the influence of other socio-economic characteristics (e.g. age, gender, immigrant status, educational level) on each overeducation measurement. This would facilitate a better understanding of the differences across overeducation measurements and the dimensions they are tackling. As I have argued, different indicators usually address the phenomenon either from the workers' or the employers' view and the overlap is not

perfect. Regardless of the modest contribution of the present research in this sense, further research should concentrate on exploring differences between these two views and to what extent they are influenced by workers' and employers' aspirations and ambitions.

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APPENDIX

Tables Introduction

Table 0.3: Mapping of the four ISCO-08 skill levels to ISCED-97 levels of education

ISCO-08 skill level	ISCED-97 groups
4	6 Second stage of tertiary education (leading to an advanced research qualification)
	5a First stage of tertiary education, 1st degree (medium duration)
3	5b First stage of tertiary education (short or medium duration)
2	4 Post-secondary, non-tertiary education
	3 Upper secondary level of education
	2 Lower secondary level of education
1	1 Primary level of education

Source: ILO.

Table 0.4: Mapping of ISCO-08 major groups to skill levels

ISCO-08 skill level	ISCO-08 major groups
3 + 4	1 Managers
4	2 Professionals
3	3 Technicians and Associate Professionals
2	4 Clerical Support Workers
	5 Services and Sales Workers
	6 Skilled Agricultural, Forestry and Fishery Workers
	7 Craft and Related Trades Workers
	8 Plant and Machine Operators, and Assemblers
1	9 Elementary Occupations
1 + 2 + 4	0 Armed Forces Occupations

Source: ILO.

Tables Chapter 2

Table 2.4: Odds ratios: Impact of field of study, parental education and father's occupation on overeducation (Indicator 1)

	Indicator 1					
	Model 0	Model 1	Model 2	Model 3	Model 4	Model 5
<i>Humanities: RC Field of Study</i>						
Economics	0.871** (0.0566)	0.873** (0.0568)	0.871** (0.0567)	0.946 (0.0657)	0.947 (0.0659)	0.943 (0.0656)
Sociopolitical	1.487*** (0.112)	1.515*** (0.115)	1.513*** (0.115)	1.650*** (0.136)	1.643*** (0.136)	1.633*** (0.135)
Law	0.534*** (0.0436)	0.553*** (0.0453)	0.554*** (0.0454)	0.602*** (0.0540)	0.588*** (0.0530)	0.585*** (0.0527)
Scientific	0.304*** (0.0217)	0.304*** (0.0218)	0.304*** (0.0218)	0.321*** (0.0247)	0.317*** (0.0245)	0.317*** (0.0244)
Engineering	0.285*** (0.0226)	0.284*** (0.0225)	0.284*** (0.0225)	0.293*** (0.0249)	0.290*** (0.0247)	0.290*** (0.0247)
Architecture	0.382*** (0.0355)	0.382*** (0.0356)	0.382*** (0.0356)	0.348*** (0.0362)	0.332*** (0.0347)	0.332*** (0.0347)
Medicine	0.0194*** (0.00427)	0.0201*** (0.00444)	0.0202*** (0.00446)	0.0246*** (0.00585)	0.0235*** (0.00559)	0.0235*** (0.00559)
Sports	0.703*** (0.0774)	0.703*** (0.0775)	0.705*** (0.0777)	0.755** (0.0893)	0.738** (0.0876)	0.740** (0.0878)
University father		0.763*** (0.0439)	0.806*** (0.0584)	0.805*** (0.0584)	0.798*** (0.0581)	
University mother		0.885* (0.0561)	0.890* (0.0566)	0.890* (0.0566)	0.885* (0.0564)	0.834*** (0.0508)
Professional			0.911 (0.0691)	1.279* (0.177)	1.269* (0.176)	1.099 (0.144)
Professional*Economics				0.521*** (0.0969)	0.529*** (0.0987)	0.532*** (0.0993)
Professional*Sociopolitical				0.556*** (0.116)	0.561*** (0.118)	0.562*** (0.118)
Professional*Law				0.593** (0.121)	0.586*** (0.120)	0.579*** (0.119)
Professional*Scientific				0.682* (0.138)	0.665** (0.135)	0.664** (0.135)
Professional*Engineering				0.781 (0.159)	0.771 (0.158)	0.772 (0.158)
Professional*Architecture				1.534* (0.359)	1.563* (0.367)	1.561* (0.366)
Professional*Medicine				0.325* (0.207)	0.312* (0.199)	0.305* (0.195)
Professional*Sports				0.606	0.621	0.628

				(0.194)	(0.199)	(0.201)
<i>No ties: RC Use of social networks</i>						
Strong ties					1.639***	1.630***
					(0.121)	(0.120)
Weak ties					1.323***	1.323***
					(0.0634)	(0.0634)
<i>Men: RC Sex</i>						
Women	0.989	0.971	0.971	0.966	0.973	0.978
	(0.0421)	(0.0415)	(0.0415)	(0.0413)	(0.0418)	(0.0419)
Italian nationality	1.006	0.903	0.899	0.925	0.953	0.977
	(0.161)	(0.145)	(0.145)	(0.149)	(0.155)	(0.158)
Laurea grade	0.997***	0.997***	0.997***	0.997***	0.997***	0.997***
	(0.000464)	(0.000465)	(0.000465)	(0.000466)	(0.000467)	(0.000467)
Maturità grade	0.980***	0.980***	0.980***	0.980***	0.981***	0.981***
	(0.00305)	(0.00306)	(0.00306)	(0.00307)	(0.00308)	(0.00308)
<i>Working Occasionally while studying: RC Working while studying</i>						
Working	1.025	1.015	1.015	1.020	1.017	1.020
	(0.0634)	(0.0629)	(0.0629)	(0.0633)	(0.0633)	(0.0635)
Not Working	0.889**	0.914*	0.916*	0.918*	0.915*	0.911**
	(0.0408)	(0.0422)	(0.0423)	(0.0425)	(0.0425)	(0.0423)
Professional Training	0.464***	0.459***	0.460***	0.457***	0.449***	0.452***
	(0.0911)	(0.0905)	(0.0906)	(0.0902)	(0.0889)	(0.0894)
<i>North-West: RC Region</i>						
North-East	1.359***	1.354***	1.353***	1.355***	1.352***	1.350***
	(0.0757)	(0.0756)	(0.0755)	(0.0757)	(0.0758)	(0.0756)
Centre	1.218***	1.233***	1.232***	1.230***	1.219***	1.216***
	(0.0697)	(0.0707)	(0.0707)	(0.0707)	(0.0703)	(0.0701)
South	1.183***	1.168**	1.170***	1.166**	1.153**	1.160**
	(0.0714)	(0.0706)	(0.0707)	(0.0706)	(0.0701)	(0.0705)
Islands	1.178*	1.175*	1.175*	1.172*	1.147	1.151
	(0.103)	(0.103)	(0.103)	(0.103)	(0.101)	(0.101)
Foreign	0.830	0.856	0.857	0.842	0.825	0.823
	(0.109)	(0.113)	(0.113)	(0.111)	(0.109)	(0.109)
N	14.653	14.653	14.653	14.653	14.653	14.653
Constant	2.329***	2.707***	2.717***	2.502***	2.099***	2.008***
Pseudo R²	0.120	0.123	0.123	0.125	0.129	0.128

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: own elaboration, from GES (ISTAT, 2007)

Table 2.5: Odds ratios: Impact of field of study, parental education and father's occupation on overeducation (Indicator 2)

Indicator 2						
	Model 0	Model 1	Model 2	Model 3	Model 4	Model 5
<i>Humanities: RC Field of Study</i>						
Economics	1.159** (0.0757)	1.162** (0.0759)	1.157** (0.0756)	1.247*** (0.0869)	1.249*** (0.0872)	1.248*** (0.0871)
Sociopolitical	1.576*** (0.120)	1.598*** (0.122)	1.594*** (0.121)	1.717*** (0.142)	1.715*** (0.142)	1.712*** (0.141)
Law	0.570*** (0.0479)	0.584*** (0.0492)	0.586*** (0.0494)	0.596*** (0.0553)	0.591*** (0.0549)	0.590*** (0.0548)
Scientific	0.517*** (0.0357)	0.519*** (0.0358)	0.518*** (0.0358)	0.539*** (0.0401)	0.537*** (0.0399)	0.537*** (0.0399)
Engineering	0.605*** (0.0449)	0.605*** (0.0450)	0.604*** (0.0449)	0.618*** (0.0492)	0.616*** (0.0491)	0.616*** (0.0491)
Architecture	0.464*** (0.0436)	0.465*** (0.0437)	0.466*** (0.0438)	0.449*** (0.0466)	0.442*** (0.0459)	0.442*** (0.0459)
Medicine	0.0324*** (0.00638)	0.0333*** (0.00657)	0.0336*** (0.00663)	0.0353*** (0.00801)	0.0348*** (0.00791)	0.0348*** (0.00790)
Sports	0.500*** (0.0607)	0.501*** (0.0608)	0.502*** (0.0610)	0.523*** (0.0680)	0.518*** (0.0674)	0.518*** (0.0675)
University father		0.853*** (0.0474)	0.950 (0.0663)	0.946 (0.0661)	0.944 (0.0660)	
University mother		0.867** (0.0535)	0.877** (0.0543)	0.879** (0.0544)	0.878** (0.0543)	0.864** (0.0511)
Professional			0.831** (0.0613)	1.081 (0.152)	1.074 (0.151)	1.035 (0.138)
Professional*Economics				0.552*** (0.103)	0.557*** (0.104)	0.558*** (0.104)
Professional*Sociopolitical				0.600** (0.127)	0.602** (0.128)	0.603** (0.128)
Professional*Law				0.843 (0.175)	0.845 (0.175)	0.842 (0.175)
Professional*Scientific				0.751 (0.145)	0.751 (0.145)	0.750 (0.145)
Professional*Engineering				0.828 (0.156)	0.827 (0.156)	0.827 (0.156)
Professional*Architecture				1.168 (0.285)	1.181 (0.288)	1.180 (0.288)
Professional*Medicine				0.727 (0.334)	0.722 (0.332)	0.718 (0.330)
Professional*Sports				0.744 (0.266)	0.754 (0.269)	0.756 (0.270)

No ties: RC Use of social networks

Strong ties					1.166**	1.165**
					(0.0866)	(0.0864)
Weak ties					1.142***	1.142***
					(0.0535)	(0.0535)

Men: RC Sex

Women	1.109**	1.095**	1.095**	1.092**	1.096**	1.097**
	(0.0462)	(0.0458)	(0.0458)	(0.0457)	(0.0459)	(0.0459)
Italian nationality	0.970	0.898	0.892	0.907	0.919	0.925
	(0.150)	(0.140)	(0.139)	(0.142)	(0.144)	(0.144)
Laurea grade	0.997***	0.997***	0.997***	0.997***	0.997***	0.997***
	(0.000454)	(0.000455)	(0.000455)	(0.000455)	(0.000456)	(0.000456)
Maturità grade	0.986***	0.987***	0.987***	0.987***	0.987***	0.987***
	(0.00301)	(0.00301)	(0.00302)	(0.00302)	(0.00302)	(0.00302)

Working Occasionally while studying: RC Working while studying

Working	0.943	0.936	0.937	0.940	0.938	0.939
	(0.0579)	(0.0575)	(0.0576)	(0.0578)	(0.0578)	(0.0578)
Not Working	0.827***	0.845***	0.848***	0.849***	0.849***	0.848***
	(0.0370)	(0.0380)	(0.0381)	(0.0382)	(0.0383)	(0.0382)
Professional Training	0.409***	0.407***	0.407***	0.405***	0.403***	0.403***
	(0.0844)	(0.0841)	(0.0841)	(0.0837)	(0.0833)	(0.0834)

North-West: RC Region

North-East	1.212***	1.207***	1.206***	1.205***	1.204***	1.204***
	(0.0657)	(0.0655)	(0.0654)	(0.0655)	(0.0654)	(0.0654)
Centre	1.082	1.092	1.091	1.089	1.084	1.084
	(0.0600)	(0.0607)	(0.0606)	(0.0606)	(0.0604)	(0.0603)
South	0.966	0.957	0.959	0.954	0.952	0.953
	(0.0573)	(0.0568)	(0.0570)	(0.0568)	(0.0567)	(0.0567)
Islands	0.998	0.996	0.997	0.992	0.983	0.984
	(0.0856)	(0.0856)	(0.0857)	(0.0854)	(0.0847)	(0.0848)
Foreign	0.886	0.908	0.911	0.898	0.891	0.890
	(0.111)	(0.114)	(0.114)	(0.113)	(0.112)	(0.112)

N	14,650	14,650	14,650	14,650	14,650	14,650
Constant	1.380	1.524*	1.535**	1.448*	1.348	1.334
Pseudo R²	0.0904	0.0917	0.0921	0.0931	0.0937	0.0937

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: own elaboration, from GES (ISTAT, 2007)

Table 2.6: Pretest with nine-category father's occupation variable

	Indicator 1	Indicator 2
<i>Humanities: RC Field of Study</i>		
Economics	0.873** (0.0570)	1.163** (0.0762)
Sociopolitical	1.516*** (0.115)	1.599*** (0.122)
Law	0.555*** (0.0455)	0.587*** (0.0495)
Scientific	0.302*** (0.0217)	0.517*** (0.0357)
Engineering	0.285*** (0.0226)	0.606*** (0.0451)
Architecture	0.383*** (0.0357)	0.468*** (0.0440)
Medicine	0.0202*** (0.00445)	0.0337*** (0.00664)
Sports	0.708*** (0.0781)	0.502*** (0.0611)
<i>Manager: RC Father's Occupation</i>		
Professional	0.809*** (0.0622)	0.828** (0.0623)
Intermediate profession	1.039 (0.0727)	1.079 (0.0736)
Administrative	0.985 (0.0818)	1.104 (0.0889)
Family Services	1.092 (0.0985)	1.044 (0.0928)
Craftsmen	1.189** (0.0905)	1.064 (0.0797)
Qualified Manual	1.251*** (0.107)	1.294*** (0.108)
Non-Qualified Manual	1.239* (0.142)	1.196 (0.135)
Army	0.807 (0.128)	0.761* (0.120)
<i>Men: RC Sex</i>		
Sex	0.975 (0.0416)	1.101** (0.0460)
Italian nationality	0.934 (0.150)	0.903 (0.141)
Laurea grade	0.997***	0.997***

	(0.000465)	(0.000456)
Maturità grade	0.979***	0.986***
	(0.00306)	(0.00301)
<i>Working Occasionally while studying: RC Working while studying</i>		
Working	1.017	0.937
	(0.0630)	(0.0576)
Not Working	0.912**	0.846***
	(0.0421)	(0.0380)
Professional Training	0.465***	0.409***
	(0.0916)	(0.0845)
<i>North-West: RC Region</i>		
North-East	1.356***	1.215***
	(0.0758)	(0.0661)
Centre	1.229***	1.091
	(0.0706)	(0.0607)
South	1.176***	0.962
	(0.0713)	(0.0573)
Islands	1.172*	1.001
	(0.103)	(0.0862)
Foreign	0.855	0.916
	(0.113)	(0.115)
<hr/>		
N	14.653	14,650
Constant	2.404***	1.407
Pseudo R²	0.123	0.0928

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: own elaboration, from GES (ISTAT, 2007)

Tables Chapter 3

Table 3.7: ISCED 1997 (and 2011) Fields of Education

Education	Teacher training and education science
Humanities and Arts	Arts
	Humanities
Social Sciences, Business and Law	Social and behavioural science
	Journalism and information
	Business and administration
	Law
Science	Life sciences
	Physical science
	Mathematics and statistics
	Computing
Engineering, manufacturing and construction	Engineering and engineering trades
	Manufacturing and processing
	Architecture and building
Agriculture	Agriculture, forestry and fishery
	Veterinary
Health and Welfare	Health
	Social services
Services	Personal services
	Security services
	Transport services

Source: UNESCO.

Table 3.8: Logistic regression coefficients (odds ratio). Job after graduation.

O _{AG}	M0	M1	M2	M3	M4a	M4b	M4c	M5	M6	M7	M8	M9a	M9b	M9c
Intercept	0.421*** (0.0463)	0.355*** (0.0676)	0.417*** (0.0797)	0.395*** (0.0763)	0.420*** (0.0804)	0.527*** (0.103)	0.510*** (0.102)	0.567*** (0.11)	0.548** (0.152)	0.707 (0.301)	0.736 (0.313)	0.473** (0.167)	0.341*** (0.109)	0.317*** (0.0866)
Education (RC: Humanities)		0.371*** (0.0239)	0.359*** (0.0232)	0.379*** (0.0288)	0.379*** (0.0288)	0.379*** (0.0288)	0.379*** (0.0288)	0.380*** (0.0289)	0.380*** (0.0289)	0.380*** (0.0289)	0.382*** (0.0291)	0.379*** (0.0288)	0.379*** (0.0288)	0.379*** (0.0288)
Social sciences		0.824*** (0.0397)	0.816*** (0.0394)	0.883** (0.0528)	0.883** (0.0528)	0.884** (0.0528)	0.883** (0.0528)	0.883** (0.0528)	0.884** (0.0528)	0.883** (0.0528)	0.907 (0.0674)	0.883** (0.0528)	0.883** (0.0528)	0.883** (0.0528)
Science		0.594*** (0.037)	0.588*** (0.0367)	0.588*** (0.0453)	0.588*** (0.0453)	0.588*** (0.0453)	0.588*** (0.0453)	0.588*** (0.0453)	0.588*** (0.0453)	0.588*** (0.0453)	0.586*** (0.0452)	0.588*** (0.0453)	0.588*** (0.0453)	0.588*** (0.0453)
Engineering		0.509*** (0.0293)	0.501*** (0.029)	0.535*** (0.0378)	0.536*** (0.0378)	0.536*** (0.0378)	0.536*** (0.0378)	0.536*** (0.0378)	0.536*** (0.0378)	0.536*** (0.0378)	0.539*** (0.0381)	0.535*** (0.0378)	0.535*** (0.0378)	0.535*** (0.0377)
Agriculture		0.665*** (0.0604)	0.656*** (0.0597)	0.653*** (0.0721)	0.653*** (0.0721)	0.653*** (0.0721)	0.653*** (0.0722)	0.654*** (0.0722)	0.654*** (0.0722)	0.653*** (0.0722)	0.654*** (0.0724)	0.652*** (0.0721)	0.653*** (0.0721)	0.652*** (0.072)
Health		0.263*** (0.0178)	0.260*** (0.0176)	0.295*** (0.024)	0.294*** (0.0239)	0.295*** (0.024)	0.295*** (0.024)	0.295*** (0.024)	0.295*** (0.024)	0.295*** (0.024)	0.296*** (0.0241)	0.295*** (0.024)	0.295*** (0.024)	0.295*** (0.024)
Services		0.768*** (0.07)	0.754*** (0.0689)	0.775** (0.0859)	0.774** (0.0858)	0.776** (0.086)	0.774** (0.0858)	0.775** (0.0859)	0.775** (0.0859)	0.775** (0.0859)	0.782** (0.0867)	0.775** (0.0858)	0.775** (0.0859)	0.774** (0.0858)
Higher Educated father			0.818*** (0.0286)	0.953 (0.0825)	0.954 (0.0826)	0.954 (0.0825)	0.955 (0.0826)	0.955 (0.0826)	0.954 (0.0826)	0.955 (0.0827)	0.874 (0.0863)	0.954 (0.0826)	0.953 (0.0825)	0.954 (0.0825)
Higher Educated mother			0.875*** (0.0341)	0.876*** (0.0342)	0.876*** (0.0342)	0.875*** (0.0342)	0.876*** (0.0342)	0.875*** (0.0342)	0.875*** (0.0342)	0.876*** (0.0342)	0.879*** (0.0343)	0.876*** (0.0342)	0.876*** (0.0342)	0.876*** (0.0342)
Education#HEfather				0.87 (0.118)	0.869 (0.118)	0.87 (0.119)	0.87 (0.118)	0.87 (0.119)	0.87 (0.119)	0.87 (0.118)	0.856 (0.117)	0.87 (0.118)	0.87 (0.118)	0.87 (0.118)
Socialsciences#HEfather				0.801** (0.0787)	0.801** (0.0786)	0.801** (0.0786)	0.802** (0.0787)	0.801** (0.0786)	0.801** (0.0786)	0.801** (0.0786)	0.735** (0.0931)	0.801** (0.0786)	0.802** (0.0787)	0.801** (0.0786)
Science#HEfather				1.021 (0.13)	1.02 (0.13)	1.021 (0.13)	1.021 (0.13)	1.021 (0.13)	1.021 (0.13)	1.02 (0.13)	1.031 (0.132)	1.02 (0.13)	1.021 (0.13)	1.02 (0.13)
Engineering#HEfather				0.833 (0.0956)	0.833 (0.0956)	0.832 (0.0954)	0.833 (0.0956)	0.832 (0.0954)	0.832 (0.0955)	0.832 (0.0954)	0.825* (0.0946)	0.833 (0.0955)	0.833 (0.0956)	0.833 (0.0956)
Agriculture#HEfather				1.046 (0.198)	1.046 (0.198)	1.046 (0.198)	1.046 (0.198)	1.046 (0.198)	1.046 (0.198)	1.045 (0.198)	1.052 (0.199)	1.046 (0.198)	1.047 (0.198)	1.045 (0.198)
Health#HEfather				0.686*** (0.0956)	0.686*** (0.0956)	0.687*** (0.0957)	0.686*** (0.0957)	0.687*** (0.0958)	0.687*** (0.0958)	0.687*** (0.0957)	0.678*** (0.0946)	0.686*** (0.0956)	0.686*** (0.0956)	0.686*** (0.0956)

Services#HEfather				0.942	0.942	0.943	0.943	0.943	0.943	0.944	0.943	0.925	0.942	0.942	0.942
				(0.18)	(0.18)	(0.18)	(0.18)	(0.18)	(0.18)	(0.18)	(0.18)	(0.177)	(0.18)	(0.18)	(0.18)
Vocational enrolment					0.658***				0.736**	0.739**	0.732***	0.707***			
					(0.0761)				(0.0879)	(0.0897)	(0.0871)	(0.0853)			
Tracking system						0.858*			0.984	0.984	0.937	0.936			
						(0.0749)			(0.0835)	(0.0834)	(0.11)	(0.109)			
Dual system							0.982***	0.99	0.989	0.99	0.99	0.99			
							(0.0059)	(0.0074)	(0.0079)	(0.0076)	(0.0075)				
% graduates with HE father									1.001				0.995		
									(0.0061)				(0.0083)		
% youth graduates										0.547	0.528			1.825	
										(0.565)	(0.543)			(1.901)	
% youth unemployment										0.742	0.721				3.362
										(0.644)	(0.622)				(3.616)
HEfather#Vocational												1.117*			
												(0.0669)			
Socialsciences#Vocational												0.972			
												(0.0524)			
HEfather#Socialsciences#Vocational												1.098			
												(0.106)			
Gender (RC: Male)	1.230***	1.227***	1.225***	1.225***	1.226***	1.225***	1.225***	1.225***	1.225***	1.225***	1.225***	1.225***	1.225***	1.225***	1.225***
	(0.0385)	(0.0385)	(0.0385)	(0.0385)	(0.0385)	(0.0385)	(0.0385)	(0.0385)	(0.0385)	(0.0385)	(0.0385)	(0.0385)	(0.0385)	(0.0385)	(0.0385)
Country of birth (RC: home country)	1.022	1.048	1.05	1.051	1.05	1.051	1.051	1.051	1.051	1.05	1.043	1.051	1.05	1.052	
	(0.0894)	(0.0919)	(0.0923)	(0.0923)	(0.0922)	(0.0923)	(0.0923)	(0.0923)	(0.0923)	(0.0923)	(0.0917)	(0.0923)	(0.0923)	(0.0924)	
Student status (RC: Full-time student)	1.244***	1.236***	1.236***	1.237***	1.235***	1.236***	1.236***	1.236***	1.236***	1.236***	1.237***	1.235***	1.236***	1.235***	1.235***
	(0.0472)	(0.047)	(0.0469)	(0.047)	(0.0469)	(0.0469)	(0.0469)	(0.0469)	(0.0469)	(0.0469)	(0.047)	(0.0469)	(0.047)	(0.0469)	
Internship (RC: Yes)	1.210***	1.211***	1.211***	1.210***	1.219***	1.210***	1.217***	1.217***	1.217***	1.217***	1.216***	1.210***	1.211***	1.211***	1.211***
	(0.0417)	(0.0418)	(0.0418)	(0.0417)	(0.0421)	(0.0417)	(0.042)	(0.042)	(0.042)	(0.042)	(0.0421)	(0.0418)	(0.0418)	(0.0418)	
Age	0.992**	0.990***	0.990***	0.990***	0.990***	0.990***	0.990***	0.990***	0.990***	0.990***	0.990***	0.990***	0.990***	0.990***	0.990***
	(0.0038)	(0.0038)	(0.0038)	(0.0038)	(0.0038)	(0.0038)	(0.0038)	(0.0038)	(0.0038)	(0.0038)	(0.0038)	(0.0038)	(0.0038)	(0.0038)	(0.0038)
University grades	0.879***	0.882***	0.883***	0.883***	0.883***	0.883***	0.883***	0.883***	0.883***	0.883***	0.883***	0.883***	0.883***	0.883***	0.883***
	(0.0133)	(0.0134)	(0.0134)	(0.0134)	(0.0134)	(0.0134)	(0.0134)	(0.0134)	(0.0134)	(0.0134)	(0.0134)	(0.0134)	(0.0134)	(0.0134)	(0.0134)
Secondary grades	0.900***	0.906***	0.906***	0.906***	0.906***	0.906***	0.906***	0.906***	0.906***	0.906***	0.907***	0.906***	0.906***	0.906***	0.906***

		(0.0132)	(0.0133)	(0.0133)	(0.0133)	(0.0133)	(0.0133)	(0.0133)	(0.0133)	(0.0133)	(0.0133)	(0.0133)	(0.0133)	(0.0133)
lnsig2u	0.178***	0.154***	0.151***	0.151***	0.125***	0.0785***	0.0912***	0.0624***	0.0623***	0.0609***	0.0602***	0.148***	0.148***	0.139***
	(0.0665)	(0.0581)	(0.0566)	(0.0569)	(0.0471)	(0.0303)	(0.0346)	(0.024)	(0.024)	(0.0235)	(0.0232)	(0.0555)	(0.0556)	(0.0524)
sigma_u	0.0513	0.0449	0.0438	0.0439	0.0365	0.0233	0.027	0.0186	0.0186	0.0182	0.018	0.0429	0.043	0.0406
rho	0.422	0.393	0.388	0.389	0.353	0.28	0.302	0.25	0.25	0.247	0.245	0.384	0.384	0.373
Observations	26,156	26,156	26,156	26,156	26,156	26,156	26,156	26,156	26,156	26,156	26,156	26,156	26,156	26,156
Number of countries	15	15	15	15	15	15	15	15	15	15	15	15	15	15

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: own elaboration, from REFLEX/HEGESCO

Table 3.9: Logistic regression coefficients (odds ratio). Job five years after graduation.

O_{t5}	M0	M1	M2	M3	M4a	M4b	M4c	M5	M6	M7	M8	M9a	M9b	M9c
Intercept	0.236*** (0.0221)	0.187*** (0.0384)	0.203*** (0.0418)	0.192*** (0.04)	0.193*** (0.0408)	0.250*** (0.0518)	0.219*** (0.0488)	0.258*** (0.0539)	0.232*** (0.0645)	0.282*** (0.117)	0.290*** (0.12)	0.182*** (0.0623)	0.203*** (0.0636)	0.167*** (0.0462)
Education (RC: Humanities)		0.519*** (0.0383)	0.511*** (0.0378)	0.523*** (0.0462)	0.523*** (0.0462)	0.525*** (0.0464)	0.523*** (0.0463)	0.525*** (0.0464)	0.525*** (0.0464)	0.525*** (0.0464)	0.527*** (0.0466)	0.523*** (0.0462)	0.523*** (0.0462)	0.523*** (0.0462)
Social sciences		0.697*** (0.0391)	0.694*** (0.039)	0.765*** (0.0535)	0.766*** (0.0535)	0.767*** (0.0537)	0.766*** (0.0535)	0.767*** (0.0536)	0.767*** (0.0537)	0.767*** (0.0536)	0.806** (0.0686)	0.766*** (0.0535)	0.765*** (0.0535)	0.765*** (0.0535)
Science		0.693*** (0.0498)	0.690*** (0.0496)	0.705*** (0.0629)	0.705*** (0.0629)	0.705*** (0.0629)	0.705*** (0.0629)	0.706*** (0.063)	0.706*** (0.063)	0.706*** (0.063)	0.705*** (0.063)	0.705*** (0.0629)	0.705*** (0.0629)	0.704*** (0.0629)
Engineering		0.575*** (0.0385)	0.571*** (0.0383)	0.606*** (0.0501)	0.606*** (0.0501)	0.607*** (0.0502)	0.606*** (0.0501)	0.607*** (0.0501)	0.607*** (0.0502)	0.607*** (0.0501)	0.610*** (0.0504)	0.606*** (0.0501)	0.606*** (0.0501)	0.606*** (0.0501)
Agriculture		0.915 (0.0914)	0.91 (0.091)	0.961 (0.117)	0.961 (0.117)	0.962 (0.117)	0.962 (0.117)	0.961 (0.117)	0.962 (0.117)	0.961 (0.117)	0.965 (0.117)	0.961 (0.117)	0.961 (0.117)	0.961 (0.117)
Health		0.390*** (0.0302)	0.388*** (0.0301)	0.399*** (0.0385)	0.399*** (0.0385)	0.400*** (0.0386)	0.399*** (0.0385)	0.401*** (0.0386)	0.401*** (0.0386)	0.401*** (0.0386)	0.402*** (0.0388)	0.399*** (0.0385)	0.399*** (0.0385)	0.399*** (0.0385)
Services		0.828* (0.0868)	0.822* (0.0862)	0.996 (0.124)	0.996 (0.124)	0.997 (0.124)	0.996 (0.124)	0.997 (0.124)	0.998 (0.124)	0.997 (0.124)	1.003 (0.125)	0.997 (0.124)	0.996 (0.124)	0.996 (0.124)
Higher Educated father			0.914** (0.0374)	1.071 (0.106)	1.071 (0.106)	1.074 (0.106)	1.072 (0.106)	1.074 (0.106)	1.072 (0.106)	1.074 (0.106)	0.954 (0.107)	1.07 (0.106)	1.071 (0.106)	1.071 (0.106)
Higher Educated mother			0.932 (0.0426)	0.934 (0.0427)	0.934 (0.0427)	0.933 (0.0426)	0.934 (0.0427)	0.932 (0.0426)	0.932 (0.0426)	0.933 (0.0427)	0.934 (0.0427)	0.934 (0.0427)	0.934 (0.0427)	0.934 (0.0427)
Education#HEfather				0.989 (0.15)	0.989 (0.15)	0.987 (0.15)	0.989 (0.15)	0.988 (0.15)	0.988 (0.15)	0.987 (0.15)	0.969 (0.147)	0.989 (0.15)	0.989 (0.15)	0.989 (0.15)
Socialsciences#HEfather				0.756** (0.0862)	0.756** (0.0862)	0.754** (0.086)	0.756** (0.0862)	0.754** (0.0861)	0.755** (0.0861)	0.754** (0.086)	0.796 (0.115)	0.756** (0.0863)	0.756** (0.0862)	0.756** (0.0862)
Science#HEfather				0.961 (0.141)	0.961 (0.141)	0.96 (0.141)	0.961 (0.141)	0.961 (0.141)	0.961 (0.141)	0.961 (0.141)	0.973 (0.143)	0.961 (0.141)	0.961 (0.141)	0.961 (0.141)
Engineering#HEfather				0.856 (0.113)	0.856 (0.113)	0.856 (0.113)	0.856 (0.113)	0.856 (0.113)	0.856 (0.113)	0.856 (0.113)	0.852 (0.112)	0.856 (0.113)	0.856 (0.113)	0.856 (0.113)
Agriculture#HEfather				0.868 (0.18)	0.868 (0.18)	0.868 (0.18)	0.868 (0.18)	0.868 (0.18)	0.869 (0.18)	0.868 (0.18)	0.878 (0.181)	0.869 (0.18)	0.868 (0.18)	0.868 (0.18)
Health#HEfather				0.932 (0.143)	0.932 (0.143)	0.934 (0.143)	0.933 (0.143)	0.934 (0.143)	0.934 (0.143)	0.934 (0.143)	0.919 (0.141)	0.933 (0.143)	0.932 (0.143)	0.932 (0.143)

Services#HEfather	0.545***	0.545***	0.546***	0.545***	0.546***	0.546***	0.546***	0.546***	0.533***	0.545***	0.545***	0.545***
	(0.124)	(0.124)	(0.125)	(0.125)	(0.125)	(0.125)	(0.125)	(0.122)	(0.124)	(0.124)	(0.124)	(0.124)
Vocational enrolment		0.669***			0.681***	0.689***	0.680***	0.668***				
		(0.0671)			(0.0756)	(0.0771)	(0.0758)	(0.0766)				
Tracking system			0.982		1.094	1.093	1.072	1.071				
			(0.0851)		(0.0863)	(0.0855)	(0.118)	(0.117)				
Dual system				0.99	0.994	0.993	0.994	0.994				
				(0.0064)	(0.0069)	(0.0073)	(0.0071)	(0.0071)				
% graduates with HE father						1.003			1.001			
						(0.0057)			(0.0076)			
% youth graduates							0.771	0.748			0.793	
							(0.746)	(0.723)			(0.756)	
% youth unemployment							0.9	0.867				2.096
							(0.73)	(0.703)				(2.085)
HEfather#Vocational								1.163**				
								(0.0792)				
Socialsciences#Vocational								0.939				
								(0.0599)				
HEfather#Socialsciences#Vocational								0.935				
								(0.107)				
Gender (RC: Male)	1.194***	1.193***	1.192***	1.192***	1.191***	1.191***	1.192***	1.192***	1.192***	1.192***	1.192***	1.192***
	(0.0437)	(0.0437)	(0.0438)	(0.0438)	(0.0437)	(0.0437)	(0.0437)	(0.0437)	(0.0438)	(0.0438)	(0.0438)	(0.0438)
Country of birth (RC: home country)	1.325***	1.340***	1.341***	1.341***	1.342***	1.342***	1.342***	1.341***	1.341***	1.330***	1.341***	1.342***
	(0.128)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.129)	(0.13)	(0.13)
Student status (RC: Full-time student)	1.081*	1.078*	1.077	1.077	1.076	1.077	1.074	1.075	1.074	1.076	1.077	1.076
	(0.0489)	(0.0488)	(0.0488)	(0.0488)	(0.0487)	(0.0488)	(0.0486)	(0.0487)	(0.0487)	(0.0487)	(0.0488)	(0.0488)
Internship (RC: Yes)	1.116***	1.116***	1.115***	1.115***	1.124***	1.113***	1.124***	1.125***	1.124***	1.128***	1.115***	1.115***
	(0.0451)	(0.0451)	(0.0451)	(0.0451)	(0.0453)	(0.045)	(0.0455)	(0.0455)	(0.0455)	(0.0457)	(0.0451)	(0.0451)
Age	0.994	0.993	0.993	0.993	0.994	0.993	0.994	0.994	0.994	0.994	0.993	0.993
	(0.0044)	(0.0044)	(0.0044)	(0.0044)	(0.0044)	(0.0044)	(0.0044)	(0.0044)	(0.0044)	(0.0044)	(0.0044)	(0.0044)
University grades	0.929***	0.931***	0.933***	0.933***	0.933***	0.933***	0.933***	0.932***	0.932***	0.932***	0.933***	0.933***
	(0.0163)	(0.0163)	(0.0164)	(0.0164)	(0.0164)	(0.0164)	(0.0164)	(0.0164)	(0.0164)	(0.0164)	(0.0164)	(0.0164)
Secondary grades	0.929***	0.932***	0.931***	0.931***	0.931***	0.931***	0.931***	0.931***	0.931***	0.932***	0.931***	0.931***
	(0.0159)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Insig2u	0.126***	0.121***	0.121***	0.122***	0.122***	0.0565***	0.105***	0.0518***	0.0507***	0.0515***	0.0513***	0.122***
												0.122***
												0.117***

	(0.0474)	(0.0458)	(0.0459)	(0.0462)	(0.046)	(0.0224)	(0.04)	(0.0206)	(0.0201)	(0.0205)	(0.0204)	(0.0461)	(0.046)	(0.0445)
sigma_u	0.0369	0.0355	0.0355	0.0358	0.0356	0.0169	0.0308	0.0155	0.0152	0.0154	0.0154	0.0357	0.0357	0.0344
rho	0.355	0.348	0.348	0.349	0.349	0.238	0.323	0.228	0.225	0.227	0.227	0.349	0.349	0.343
Observations	25,054	25,054	25,054	25,054	25,054	25,054	25,054	25,054	25,054	25,054	25,054	25,054	25,054	25,054
Number of countries	15	15	15	15	15	15	15	15	15	15	15	15	15	15

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: own elaboration, from REFLEX/HEGESCO

Tables Chapter 4

Table 4.11: Multinomial logistic regression coefficients (odds ratio), interaction terms with fields of study and social origin

Reference outcome: Matched	M1		M2		M3	
	Over-educated	Not employed	Over-educated	Not employed	Over-educated	Not employed
Constant	1.029 (0.296)	0.127*** (0.0604)	1.038 (0.299)	0.127*** (0.0604)	0.949 (0.278)	0.109*** (0.0525)
Humanities&Arts (RC: Education)	1.090 (0.135)	1.354 (0.277)	1.103 (0.136)	1.370 (0.281)	1.152 (0.166)	1.581* (0.375)
SS-Business-Law	0.730*** (0.0764)	0.973 (0.174)	0.734*** (0.0769)	0.978 (0.175)	0.817* (0.0970)	1.149 (0.234)
Science	0.883 (0.114)	0.984 (0.229)	0.892 (0.116)	0.993 (0.231)	0.980 (0.148)	1.232 (0.330)
Engineering	0.724*** (0.0883)	0.716 (0.165)	0.727*** (0.0887)	0.719 (0.166)	0.786* (0.110)	0.699 (0.192)
Agriculture&Vet	0.835 (0.143)	0.679 (0.217)	0.840 (0.145)	0.682 (0.218)	0.954 (0.193)	0.989 (0.355)
Health&Welfare	0.820 (0.117)	1.248 (0.298)	0.817 (0.117)	1.248 (0.298)	0.948 (0.156)	1.522 (0.415)
Services	0.874 (0.152)	0.777 (0.257)	0.880 (0.153)	0.783 (0.259)	1.090 (0.225)	0.981 (0.390)
HE father			0.901 (0.0593)	0.862 (0.101)	1.343 (0.297)	1.635 (0.595)
HE mother			0.978 (0.0717)	1.058 (0.138)	0.981 (0.0721)	1.061 (0.138)
HE father*Humanities					0.761 (0.202)	0.526 (0.228)
HE father*SS					0.633* (0.150)	0.496* (0.196)
HE father*Science					0.661 (0.186)	0.415* (0.209)
HE father*Engineering					0.699 (0.187)	0.885 (0.429)
HE father*Agriculture&Vet					0.600 (0.229)	0.200** (0.160)
HE father*Health&Welfare					0.541* (0.178)	0.435 (0.236)
HE father*Services					0.459** (0.175)	0.411 (0.293)
Gender (RC: Male)	1.004 (0.0582)	2.156*** (0.245)	1.003 (0.0582)	2.152*** (0.244)	1.000 (0.0581)	2.142*** (0.244)
Country of birth (RC: Home country)	1.124 (0.183)	1.547* (0.376)	1.137 (0.185)	1.568* (0.381)	1.139 (0.186)	1.581* (0.385)
Student status (RC: Full-time)	1.162** (0.0754)	1.386*** (0.159)	1.158** (0.0752)	1.384*** (0.158)	1.158** (0.0754)	1.383*** (0.158)
Internship (RC: Yes)	1.022 (0.0644)	1.051 (0.119)	1.023 (0.0646)	1.054 (0.119)	1.025 (0.0648)	1.059 (0.120)
University grades	0.952* (0.0644)	0.884** (0.119)	0.952* (0.0646)	0.884** (0.119)	0.951* (0.0648)	0.886** (0.120)

	(0.0274)	(0.0449)	(0.0274)	(0.0450)	(0.0274)	(0.0451)
School grades	0.989	0.917*	0.990	0.917*	0.990	0.917*
	(0.0269)	(0.0446)	(0.0270)	(0.0448)	(0.0270)	(0.0449)
Months employed	0.986***	0.942***	0.986***	0.942***	0.986***	0.942***
	(0.00227)	(0.00304)	(0.00227)	(0.00304)	(0.00227)	(0.00305)
Months unemployed	1.008*	1.046***	1.007*	1.046***	1.008*	1.046***
	(0.00454)	(0.00547)	(0.00454)	(0.00548)	(0.00454)	(0.00550)
Spain (RC: Italy)	1.603***	1.624**	1.615***	1.639**	1.615***	1.644**
	(0.178)	(0.340)	(0.180)	(0.344)	(0.180)	(0.346)
France	1.993***	1.815**	2.042***	1.852**	2.050***	1.862**
	(0.326)	(0.503)	(0.336)	(0.516)	(0.337)	(0.520)
Austria	1.235	2.790***	1.246	2.827***	1.252	2.856***
	(0.198)	(0.761)	(0.200)	(0.772)	(0.201)	(0.781)
Germany	2.559***	2.980***	2.691***	3.140***	2.657***	2.989***
	(0.514)	(1.126)	(0.545)	(1.197)	(0.540)	(1.143)
Netherlands	0.994	1.438	1.030	1.497	1.035	1.507
	(0.128)	(0.365)	(0.134)	(0.383)	(0.135)	(0.386)
United Kingdom	1.004	1.954**	1.024	1.985**	1.024	1.988**
	(0.151)	(0.532)	(0.154)	(0.543)	(0.154)	(0.545)
Finland	0.873	2.816***	0.881	2.838***	0.876	2.832***
	(0.133)	(0.682)	(0.134)	(0.688)	(0.133)	(0.689)
Norway	1.460**	1.856**	1.519***	1.928**	1.508***	1.928**
	(0.218)	(0.577)	(0.229)	(0.604)	(0.228)	(0.605)
Czech Republic	0.921	1.157	0.937	1.178	0.936	1.204
	(0.109)	(0.252)	(0.112)	(0.257)	(0.112)	(0.264)
Belgium	1.409**	0.712	1.476**	0.740	1.473**	0.748
	(0.217)	(0.255)	(0.231)	(0.268)	(0.231)	(0.271)
Slovenia	1.199	0.606	1.213	0.610	1.202	0.612
	(0.164)	(0.187)	(0.166)	(0.188)	(0.165)	(0.189)
Turkey	2.238***	2.406***	2.293***	2.473***	2.294***	2.447***
	(0.375)	(0.694)	(0.385)	(0.715)	(0.386)	(0.710)
Poland	0.756	0.819	0.770	0.818	0.769	0.833
	(0.149)	(0.373)	(0.153)	(0.374)	(0.153)	(0.382)
Hungary	1.813***	4.284***	1.850***	4.338***	1.845***	4.373***
	(0.299)	(1.189)	(0.306)	(1.208)	(0.305)	(1.220)
N	6,791	6,791	6,791	6,791	6,791	6,791
Pseudo R-squared	0.0849	0.0849	0.0852	0.0852	0.0863	0.0863

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: own elaboration, from REFLEX/HEGESCO

Table 4.12: Logistic regression coefficients (odds ratio), work-related variables

	M1	M2	M3	M4	M5
Reference outcome: Matched	Overeducated	Overeducated	Overeducated	Overeducated	Overeducated
Constant	1.118 (0.335)	1.386 (0.420)	1.476 (0.449)	3.503*** (1.124)	9.645*** (3.345)
Humanities&Arts (RC: Education)	1.109 (0.146)	1.046 (0.139)	1.054 (0.141)	1.038 (0.140)	1.113 (0.157)
SS-Business-Law	0.762** (0.0850)	0.758** (0.0852)	0.762** (0.0861)	0.752** (0.0856)	0.765** (0.0917)
Science	0.921 (0.127)	0.903 (0.125)	0.921 (0.128)	0.964 (0.135)	0.876 (0.130)
Engineering	0.756** (0.0972)	0.724** (0.0940)	0.733** (0.0954)	0.748** (0.0981)	0.727** (0.101)
Agriculture&Vet	0.884 (0.159)	0.888 (0.161)	0.885 (0.161)	0.876 (0.160)	0.836 (0.162)
Health&Welfare	0.803 (0.122)	0.821 (0.126)	0.831 (0.128)	0.817 (0.127)	0.771 (0.127)
Services	0.962 (0.173)	0.947 (0.172)	0.959 (0.175)	0.952 (0.175)	0.933 (0.181)
HE father	0.914 (0.0625)	0.924 (0.0637)	0.929 (0.0642)	0.921 (0.0641)	0.997 (0.0734)
HE mother	0.953 (0.0723)	0.956 (0.0731)	0.947 (0.0726)	0.957 (0.0740)	0.946 (0.0774)
Months employed	0.987*** (0.00237)	0.988*** (0.00239)	0.988*** (0.00240)	0.988*** (0.00242)	0.986*** (0.00257)
Months unemployed	1.008* (0.00466)	1.007 (0.00470)	1.008 (0.00471)	1.006 (0.00474)	1.021*** (0.00523)
Work-related training (RC: No)		0.582*** (0.0335)	0.586*** (0.0344)	0.616*** (0.0365)	0.559*** (0.0621)
Medium firm (RC: Small firm)			0.750*** (0.0602)	0.753*** (0.0609)	0.722*** (0.0617)
Large firm			0.902 (0.0607)	0.942 (0.0641)	0.930 (0.0669)
Innovation index				0.908*** (0.00939)	0.909*** (0.00993)
Employment change (RC: No change)					0.178*** (0.0189)
Training*Echange					1.282* (0.169)
Gender (RC: Male)	1.003 (0.0608)	1.005 (0.0614)	1.008 (0.0617)	1.003 (0.0619)	1.042 (0.0682)
Country of birth (RC: Home country)	1.107 (0.188)	1.158 (0.198)	1.182 (0.202)	1.210 (0.209)	1.202 (0.218)
Student status (RC: Full-time)	1.176**	1.165**	1.167**	1.177**	1.110

	(0.0802)	(0.0801)	(0.0804)	(0.0817)	(0.0819)
Internship (RC: Yes)	1.020	1.011	1.012	1.020	1.026
	(0.0674)	(0.0674)	(0.0675)	(0.0686)	(0.0729)
University grades	0.948*	0.961	0.962	0.977	0.974
	(0.0294)	(0.0300)	(0.0301)	(0.0308)	(0.0326)
School grades	0.998	1.001	1.001	1.001	0.986
	(0.0285)	(0.0288)	(0.0288)	(0.0291)	(0.0304)
Spain (RC: Italy)	1.442***	1.581***	1.566***	1.493***	1.999***
	(0.173)	(0.191)	(0.190)	(0.182)	(0.262)
France	1.811***	1.841***	1.840***	1.579**	1.679***
	(0.321)	(0.328)	(0.329)	(0.286)	(0.324)
Austria	1.208	1.334*	1.311	1.237	1.391*
	(0.203)	(0.227)	(0.223)	(0.213)	(0.254)
Germany	2.516***	2.649***	2.679***	2.469***	2.625***
	(0.555)	(0.589)	(0.597)	(0.554)	(0.629)
Netherlands	0.912	0.933	0.938	0.914	1.233
	(0.125)	(0.129)	(0.130)	(0.128)	(0.184)
United Kingdom	0.936	1.037	1.045	1.032	1.463**
	(0.147)	(0.164)	(0.166)	(0.165)	(0.248)
Finland	0.787	0.846	0.853	0.854	0.900
	(0.125)	(0.136)	(0.137)	(0.138)	(0.156)
Norway	1.303*	1.279	1.294	1.226	1.797***
	(0.207)	(0.205)	(0.208)	(0.198)	(0.309)
Czech Republic	0.812	0.922	0.925	0.921	0.904
	(0.103)	(0.118)	(0.119)	(0.119)	(0.125)
Belgium	1.314*	1.472**	1.487**	1.474**	1.689***
	(0.218)	(0.247)	(0.250)	(0.249)	(0.304)
Slovenia	1.081	1.160	1.173	1.156	1.232
	(0.156)	(0.169)	(0.171)	(0.170)	(0.193)
Turkey	1.914***	1.963***	1.963***	2.054***	2.418***
	(0.341)	(0.352)	(0.353)	(0.372)	(0.464)
Poland	0.670*	0.750	0.756	0.711	0.694
	(0.139)	(0.157)	(0.159)	(0.151)	(0.155)
Hungary	1.614***	1.633***	1.624***	1.505**	1.834***
	(0.278)	(0.283)	(0.282)	(0.264)	(0.344)
N	5,604	5,604	5,604	5,604	5,604
Pseudo R-squared	0.0288	0.0403	0.0420	0.0535	0.131

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: own elaboration, from REFLEX/HEGESCO

Table 4.13: Logistic regression coefficients (odds ratio), interaction terms with months employed, work related training and firm's size

Reference outcome: Matched	M6 Over- educated		M7 Over- educated		M8 Over- educated
Constant	5.052*** (2.335)	Constant	13.07*** (4.945)	Constant	8.288*** (3.056)
Humanities&Arts (RC: Education)	0.863 (0.398)	Humanities&Arts (RC: Education)	0.777 (0.175)	Humanities&Arts (RC: Education)	0.972 (0.214)
SS-Business-Law	2.018* (0.790)	SS-Business-Law	0.482*** (0.0980)	SS-Business-Law	0.991 (0.186)
Science	2.916** (1.525)	Science	0.670* (0.162)	Science	0.998 (0.257)
Engineering	1.724 (0.777)	Engineering	0.584** (0.131)	Engineering	0.819 (0.185)
Agriculture&Vet	1.017 (0.628)	Agriculture&Vet	0.494** (0.166)	Agriculture&Vet	1.081 (0.327)
Health&Welfare	1.248 (0.885)	Health&Welfare	0.816 (0.233)	Health&Welfare	0.856 (0.265)
Services	3.379* (2.474)	Services	0.682 (0.216)	Services	0.664 (0.252)
HE father	1.004 (0.0742)	HE father	0.993 (0.0733)	HE father	0.988 (0.0729)
HE mother	0.946 (0.0776)	HE mother	0.947 (0.0776)	HE mother	0.948 (0.0777)
Months employed	1.000 (0.00704)	Months employed	0.986*** (0.00258)	Months employed	0.986*** (0.00258)
Months unemployed	1.021*** (0.00527)	Months unemployed	1.022*** (0.00524)	Months unemployed	1.022*** (0.00525)
Work-related training (RC: No)	0.556*** (0.0620)	Work-related training (RC: No)	0.345*** (0.0854)	Work-related training (RC: No)	0.560*** (0.0625)
Medium firm (RC: Small firm)	0.717*** (0.0614)	Medium firm (RC: Small firm)	0.718*** (0.0615)	Medium firm (RC: Small firm)	0.948 (0.260)
Large firm	0.923 (0.0667)	Large firm	0.920 (0.0665)	Large firm	1.081 (0.258)
Innovation index	0.910*** (0.00996)	Innovation index	0.909*** (0.00997)	Innovation index	0.909*** (0.00996)
Employment change (RC: No change)	0.179*** (0.0190)	Employment change (RC: No change)	0.179*** (0.0191)	Employment change (RC: No change)	0.179*** (0.0190)
Training*Echange	1.281* (0.170)	Training*Echange	1.268* (0.169)	Training*Echange	1.272* (0.168)
Memployed*Humanities	1.005 (0.00932)				
Memployed*SS	0.980***				

	(0.00769)		
Mememployed*Science	0.975**		
	(0.0100)		
Mememployed*Engineering	0.982**		
	(0.00879)		
Mememployed*Agriculture & Vet	0.996		
	(0.0127)		
Mememployed*Health&Welfare	0.990		
	(0.0134)		
Mememployed*Services	0.973*		
	(0.0142)		
		Training*Humanities	1.732**
			(0.484)
		Training*SS	2.025***
			(0.498)
		Training*Science	1.482
			(0.441)
		Training*Engineering	1.354
			(0.375)
		Training*Agriculture&Vet	2.201*
			(0.900)
		Training*Health&Welfare	0.926
			(0.322)
		Training*Services	1.611
			(0.642)
		Medium*Humanities	1.164
			(0.408)
		Large*Humanities	1.224
			(0.373)
		Medium*SS	0.552*
			(0.169)
		Large*SS	0.740
			(0.194)
		Medium*Science	0.708
			(0.276)
		Large*Science	0.871
			(0.290)
		Medium*Engineering	0.769
			(0.273)
		Large*Engineering	0.856
			(0.259)
		Medium*Agriculture&Vet	0.784
			(0.399)

				Large*Agriculture&Vet	0.585 (0.256)
				Medium*Health&Welfare	1.077 (0.487)
				Large*Health&Welfare	0.751 (0.294)
				Medium*Services	1.358 (0.758)
				Large*Services	1.554 (0.726)
Gender (RC: Male)	1.036 (0.0680)	Gender (RC: Male)	1.044 (0.0685)	Gender (RC: Male)	1.052 (0.0692)
Country of birth (RC: Home country)	1.208 (0.220)	Country of birth (RC: Home country)	1.204 (0.219)	Country of birth (RC: Home country)	1.206 (0.219)
Student status (RC: Full-time)	1.110 (0.0821)	Student status (RC: Full-time)	1.111 (0.0821)	Student status (RC: Full-time)	1.112 (0.0823)
Internship (RC: Yes)	1.020 (0.0726)	Internship (RC: Yes)	1.031 (0.0734)	Internship (RC: Yes)	1.027 (0.0731)
University grades	0.975 (0.0327)	University grades	0.976 (0.0327)	University grades	0.976 (0.0327)
School grades	0.985 (0.0304)	School grades	0.985 (0.0304)	School grades	0.988 (0.0306)
Spain (RC: Italy)	2.041*** (0.268)	Spain (RC: Italy)	1.973*** (0.259)	Spain (RC: Italy)	2.006*** (0.264)
France	1.710*** (0.332)	France	1.662*** (0.321)	France	1.687*** (0.327)
Austria	1.376* (0.253)	Austria	1.374* (0.251)	Austria	1.398* (0.257)
Germany	2.596*** (0.623)	Germany	2.602*** (0.626)	Germany	2.643*** (0.635)
Netherlands	1.213 (0.182)	Netherlands	1.201 (0.180)	Netherlands	1.252 (0.188)
United Kingdom	1.448** (0.246)	United Kingdom	1.435** (0.243)	United Kingdom	1.443** (0.245)
Finland	0.910 (0.158)	Finland	0.893 (0.155)	Finland	0.903 (0.157)
Norway	1.808*** (0.312)	Norway	1.755*** (0.303)	Norway	1.822*** (0.314)
Czech Republic	0.896 (0.124)	Czech Republic	0.893 (0.124)	Czech Republic	0.919 (0.127)
Belgium	1.728*** (0.312)	Belgium	1.655*** (0.299)	Belgium	1.712*** (0.309)
Slovenia	1.240	Slovenia	1.210	Slovenia	1.255

	(0.195)		(0.190)		(0.198)
Turkey	2.363***	Turkey	2.414***	Turkey	2.469***
	(0.454)		(0.464)		(0.475)
Poland	0.706	Poland	0.681*	Poland	0.706
	(0.158)		(0.152)		(0.158)
Hungary	1.826***	Hungary	1.812***	Hungary	1.860***
	(0.343)		(0.341)		(0.349)
N	5,604	N	5,604	N	5,604
Pseudo R-squared	0.134	Pseudo R-squared	0.134	Pseudo R-squared	0.134
Standard errors in parentheses		Standard errors in parentheses		Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1		*** p<0.01, ** p<0.05, * p<0.1		*** p<0.01, ** p<0.05, * p<0.1	

Source: own elaboration, from REFLEX/HEGESCO

Table 4.14: Logistic regression coefficients (odds ratio), interaction terms with innovation index and employment change

	M9		M10
Reference outcome: Matched	Over- educated		Over- educated
Constant	8.755*** (4.303)	Constant	14.63*** (5.837)
Humanities&Arts (RC: Education)	1.314 (0.625)	Humanities&Arts (RC: Education)	0.902 (0.256)
SS-Business-Law	0.990 (0.410)	SS-Business-Law	0.458*** (0.106)
Science	1.302 (0.683)	Science	0.637* (0.173)
Engineering	0.890 (0.427)	Engineering	0.469*** (0.119)
Agriculture&Vet	0.532 (0.350)	Agriculture&Vet	0.632 (0.222)
Health&Welfare	0.451 (0.270)	Health&Welfare	0.688 (0.211)
Services	0.278* (0.192)	Services	0.694 (0.246)
HE father	0.997 (0.0735)	HE father	0.995 (0.0734)
HE mother	0.942 (0.0771)	HE mother	0.946 (0.0776)
Months employed	0.986*** (0.00257)	Months employed	0.986*** (0.00257)
Months unemployed	1.021*** (0.00524)	Months unemployed	1.021*** (0.00524)
Work-related training (RC: No)	0.561*** (0.0624)	Work-related training (RC: No)	0.553*** (0.0620)
Medium firm (RC: Small firm)	0.720*** (0.0616)	Medium firm (RC: Small firm)	0.723*** (0.0620)
Large firm	0.930 (0.0670)	Large firm	0.927 (0.0669)
Innovation index	0.919** (0.0351)	Innovation index	0.909*** (0.00994)
Employment change (RC: No change)	0.177*** (0.0188)	Employment change (RC: No change)	0.106*** (0.0281)
Training*Echange	1.287* (0.170)	Training*Echange	1.297* (0.172)
Innovation*Humanities	0.983 (0.0470)		
Innovation*SS	0.973		

	(0.0405)		
Innovation*Science	0.961		
	(0.0495)		
Innovation*Engineering	0.979		
	(0.0467)		
Innovation*Agriculture&Vet	1.049		
	(0.0692)		
Innovation*Health&Welfare	1.058		
	(0.0638)		
Innovation*Services	1.135*		
	(0.0785)		
		Echange*Humanities	1.357
			(0.437)
		Echange*SS	2.044***
			(0.547)
		Echange*Science	1.538
			(0.490)
		Echange*Engineering	1.851**
			(0.548)
		Echange*Agriculture&Vet	1.439
			(0.608)
		Echange*Health&Welfare	1.132
			(0.414)
		Echange*Services	1.488
			(0.631)
Gender (RC: Male)	1.040	Gender (RC: Male)	1.042
	(0.0682)		(0.0683)
Country of birth (RC: Home country)	1.201	Country of birth (RC: Home country)	1.195
	(0.218)		(0.217)
Student status (RC: Full-time)	1.111	Student status (RC: Full-time)	1.100
	(0.0821)		(0.0815)
Internship (RC: Yes)	1.023	Internship (RC: Yes)	1.026
	(0.0729)		(0.0729)
University grades	0.974	University grades	0.974
	(0.0326)		(0.0326)
School grades	0.985	School grades	0.983
	(0.0304)		(0.0304)
Spain (RC: Italy)	2.013***	Spain (RC: Italy)	2.004***
	(0.264)		(0.263)
France	1.695***	France	1.667***
	(0.328)		(0.322)
Austria	1.390*	Austria	1.364*
	(0.254)		(0.250)
Germany	2.634***	Germany	2.665***

	(0.632)		(0.640)
Netherlands	1.243	Netherlands	1.227
	(0.186)		(0.184)
United Kingdom	1.479**	United Kingdom	1.483**
	(0.251)		(0.252)
Finland	0.897	Finland	0.903
	(0.156)		(0.157)
Norway	1.825***	Norway	1.806***
	(0.314)		(0.311)
Czech Republic	0.905	Czech Republic	0.908
	(0.125)		(0.125)
Belgium	1.696***	Belgium	1.689***
	(0.306)		(0.304)
Slovenia	1.235	Slovenia	1.238
	(0.194)		(0.194)
Turkey	2.435***	Turkey	2.429***
	(0.468)		(0.465)
Poland	0.690*	Poland	0.701
	(0.154)		(0.156)
Hungary	1.839***	Hungary	1.854***
	(0.346)		(0.348)
N	5,604	N	5,604
Pseudo R-squared	0.133	Pseudo R-squared	0.133

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: own elaboration, from REFLEX/HEGESCO.