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The Transition from University to Work in Italy (1998-2011): Over-education and Gender Differences across Fields of Study

Nicola De Luigi [*] *and Federica Santangelo* [**]

Abstract: With higher education expanding, there is a higher likelihood that graduates are employed in jobs for which their education level is superior to the required one. While previous research has shown that fields of study make a difference in the likelihood of being over-educated in the university-to-work transition, the main novelty of this paper is to take another step forward in the investigation of the mechanisms governing over-education, focusing on whether men and women with a degree in the same field of study run the same risk of being over-educated in their current employment. Using data from the Italian Graduates Employment Survey (1998-2011), the paper applies two adaptations from a methodological point of view. First, it develops a Heckman model to adjust the effect due to the process of selection into the sample of graduate employees. Secondly, it tries to reduce the error in the measurement of over-education by combining two different measures that are usually implemented separately. The results provide evidence that, although the disadvantage of women with respect to men in terms of the probability of over-education has disappeared, gender inequalities endure within specific fields of study.

Keywords: over-education, gender, field of study, sample selection bias

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Introduction

Over the last decades, the expansion in higher education in many European countries has raised the possibility that graduate workers may be employed in jobs for which their educational attainment is superior to the requirements of the position. In particular, studies have found that a substantial proportion of graduates faces difficulties in entering the labour market and finding a job that matches their educational level (Barone & Ortiz, 2011; Verhaest & Van der Velden, 2013). Such findings have raised a considerable controversy not only in the academic field, but also in public policy, over the extent to which graduates are mismatched or not in the labour market and the extent to which this might be increasing. Indeed, while the growth in the number of graduates is generally accepted as intrinsically good, the fact that many of them may be unable to secure graduate-level jobs indicates the inability of demand to keep pace with the increasing supply of the graduate workforce and the risk of a devaluation of higher education certificates. (Kucel, 2011; Wolbers, 2003).

In this paper, we focus on over-education in the transition from university to the labour market, and investigate how gender differences across fields of study varies over time. The considerable expansion of higher education has made fields of study a relevant criterion for selecting among potential employees and allocating them to jobs (Ballarino & Bratti, 2009; van de Werfhorst, 2008).

While empirical evidence shows a substantial association between fields of study and over-education (Barone & Ortiz, 2011; De Luigi & Santangelo, 2014; Di Pietro & Cutillo, 2006; Dolton & Vignoles, 2000; Frenette, 2004; Ortiz & Kucel, 2008), evidence about the different risks men and women being over-educated are inconclusive. Scholars have shown that compared to men, women are systematically disadvantaged with respect to wages and non-monetary labour market risks such as unemployment and low-status jobs (Charles & Bradley, 2002). Even if female tertiary graduates are typically overrepresented in fields of study more strongly associated with over-education (education, humanities, arts and social sciences), a few studies dealing with the relationship between gender and over-education reveal contrasting results. This would suggest that male and female graduates in the same field of study may face differing probabilities of being over-educated.

This paper further investigates the mechanisms ruling over-education, focusing on whether men and women with a degree in the same field of study run the same risk of being over-educated.

Introducing gender into the analysis of the relationship between fields of study and over-education and analysing change over time, we investigate how gender stereotypes shape job matching processes in different occupational contexts and whether a re-shaping of the effects of gender have been occurred over the years, following the considerable growth in women's participation in university education.

The paper is structured as follows. The section *Over-education and the graduate labour market: the role of the field of study* briefly illustrates the theoretical approach that attempts to explain the effect of field of study on over-education in the job matching process. *Theoretical background and hypothesis* reviews the more relevant theoretical considerations explaining gender inequalities in education and the labour market and formulates a set of hypotheses. *Data and methods* introduces data and methods used for the empirical analysis, whilst also discussing the controversial issues in terms of measurements about over-education, *Results* summarises and discusses the results and the section *Conclusions* provides some concluding remarks.

Over-education and the graduate labour market: the role of the field of study

Researchers have attempted to conceptualise and explain the impact of the field of study on over-education within the framework of a number of *labour market matching theories*.

According to the *Human Capital Theory* (HCT) (Becker, 1964), a worker's productivity is shaped by their available human capital, namely a set of skills, knowledge or other characteristics. Workers and new labour-market entrants in particular try to improve their human capital by investing in education. Different investments in education account for differing outcomes for workers. However, graduates are not homogeneous in their skill sets, because on-the-job training and experience also count (Chevalier, 2003). Over-educated graduates may have lower abilities and experience than graduates whose qualifications match their jobs. In this context, graduate fields of study may help to establish a different stock of human

capital. Employers, for instance, can assign more importance to the subject of study and area of specialisation, directing their attention to no more than a specific segment of the graduate population. Some fields of study may also make a difference because they are more able either to convey job-related skills or to channel workers into specific occupations or occupational segments, requiring less on-the-job training to fully utilise an employee's initial education

Signaling (Spence, 1974) and *screening* (Arrow, 1973) approaches try to clarify what kind of signals (information) education conveys to employers at the moment of selection. The hiring of a worker is viewed as an "investment under uncertainty" (Spence, 1973, p. 356) because employers cannot directly assess the future productivity of candidates. Indeed, while HCT insists on the relationship between workers' education and productivity, these approaches argue that "diplomas count, to some extent independently of what a person has learned" (Müller, 2005, p. 462). Employers make inferences about the quality of potential employees, trying to obtain information about their skills by relying on "the observable characteristics" (Spence, 1974, p. 7), which are expected to increase productivity. Educational attainment is a recognisable characteristic that job applicants use to signal their abilities to employers. In turn, employers use educational attainment as *screening devices* to assess workers' unobservable characteristics, such as general abilities, learning aptitude or motivational aspects. As the number of graduates grows, the signalling value of a university degree in the labour market may decrease. In response, employers have to rely on other information in selecting job applicants. They may give more importance to other recognisable characteristics, such as fields of study, to ensure the recruitment of the most productive graduates Some fields may be more highly valued than others because they are more academically demanding and more strongly dependent on pre-existing abilities or knowledge. Graduates in such fields signal not so much a possible different acquisition of skills, but rather a better endowment regarding pre-existing cognitive abilities, motivation or commitment (Davies & Guppy, 1997).

In a similar way to signalling or screening approaches, the *Job Competition Theory* (Thurow, 1975) argues that employers rank job applicants in an imaginary *labour queue;* taking into account their education level. However, education is not only considered, together with

others characteristics such as age, sex and personal habits, as a signal for unobserved productivity, but also as an indicator of being apt for training. Indeed, according to this theory, skills required for a job are mainly learnt not at school, but during on the job training. Since on the job training is a cost for employers, they rank job applicants within *labour queues* by assessing characteristics that are thought to minimise on-the-job training costs. Processes through which employers prioritise job applicants within *labour queues* are not the only factors responsible for matching supply and demand. Indeed, demand depends on the structure of employment opportunities, and is therefore considered as independent from the labour supply. Crucial, in this perspective, is the job applicant's position in the queue relative to other competing applicants simultaneously queuing for the same job position. Employers may react to this situation by evaluating the expected training costs whilst also taking into account differences in academic requirements between fields of study and their occupational specificity and selectivity (Klein, 2010). Occupational specificity refers to the fact that some fields of study, such as health and welfare, are more occupationally focused because they bring with them a higher degree of employability and relevance of study content in certain occupations while others, such as the humanities and arts or social sciences, lack specific occupational profiles and may lead to a wide range of occupations. Selectivity relates to how demanding academic fields of study are. Employers may assume that graduates in the most relevant and challenging fields promise lower training costs and therefore place such graduates higher in the *labour queue* rank.

Despite strong differences among these approaches, some connections are discernable. Firstly, these approaches offer an important understanding of why people invest in education and why education is responsible for specific labour market outcomes such as over-education. Secondly, even if the matching mechanisms discussed above differ, they lead to similar outcomes. From a human capital perspective, employers are said to reward education because it enhances employee productivity; according to a signalling and job completion model, education signals positive attributes to employers that they associate with lower training costs. Thirdly, they provide valuable explanations about how fields of study interact with these mechanisms, intervening as additional and to a certain extent more reliable selection criteria for employers in assessing the productivity and training

costs of graduate job applicants.

Theoretical background and hypothesis

The main focus of this paper is to analyse how the role of the field of study in channelling graduates into over-educated jobs translates into different risks for men and women and how these risks have changed over time.

Gender plays a central role in shaping the relationship between education and labour market outcomes. An extensive literature has explained why women and men chose different fields of study and how these gender differences translate into labour market segregation and gender occupational inequality in earnings and other non-monetary labour market outcomes, such as unemployment and occupational status (Smyth & Steinmetz, 2008). The traditional explanation generally refers to different occupational preferences and the choices made by men and women (Ridgeway & England, 2007). Scholars have shown that cultural norms and stereotypes about gender influence "the assessments people make about what they are good at and therefore the choices they make about training and jobs" (Ridgeway, 2011, p. 106). From childhood on, people learn which are the more appropriate tasks for one sex or the other, develop preferences toward specific gender typical fields of study and occupations, and positively assess their own abilities, especially when these are consistent with tasks considered appropriate for their own sex. Therefore, it is not surprising that many women express preferences for or interest in "fields characterised by a functional or symbolic affinity to traditional domestic roles" (Charles & Bradley, 2002, p. 102) and try to enter the labour market with preferences consistent with sex segregation. Moving on from divergent assumptions (cost-benefit calculations), rational choice perspectives also reach the same cultural conclusions, analysing gender differences in occupational preferences as the consequences of family expectations that women generally have the primary responsibility for the everyday needs of dependent children (Groot & Maassen van den Brink, 2000) For this reason, women may choose jobs by paying more attention than men to specific non-pecuniary rewards, such as having mother-friendly work conditions, even if this means lower occupational returns for

their education in terms of earnings, authority and status.

Research has also shown that gender inequalities in education and the labour market stem not only from differences in the preferences of workers, but also from the behaviours of employers. According to Ridgeway (2011, p. 99), gender occupational inequality should be considered as an "emergent structure that comes about through the job-matching processes by which applicants seek and employers place men and women into different positions in an employment organisation". Analysing the demand-side of the job-matching process, scholars have shown that employers behave differently toward men and women in response to their own gender's bias, which signal what is expected from the typical male or female worker. In particular, elements such as sex-role stereotypes and occupation sex labels (competencies and traits presumed to be required for the job) influence employers' cultural beliefs and images of the ideal worker for the job position on offer (Reskin, 1993). In other words, sex is an ascribed attribute regarded by employers as having economic value and, therefore, constituting merit from their point of view. This means that employers may engage (consciously or unconsciously) in the disparate treatment of similarly educated men and women when hiring; according to their own specific preferences, expectations or prejudices about the suitability or ability of male and female workers for particular jobs (Ridgeway & Correll, 2004).

Taken together, these supply-side and demand-side theories offer a useful explanation of gender segregation in education and the labour market, as well as of gender occupational inequality, especially gender inequality in wages (Bobbitt-Zeher, 2007; Bradley, 2000; Davies & Guppy, 1997). With regard to the gender wage gap, studies have shown the same pattern. In relation to non-monetary labour market returns, research has indicated that the impact of gender impinges on the selected outcome considered. When gender is effectively salient in a context, the role of gender beliefs may also depend on contextual factors that can suppress or enhance their effects. In this regard, Reskin suggests – assuming the perspective of the *Job Competition Model* – that labour queues should be taken into account as gender queues (Reskin, 1991). Therefore, other things being equal, attitudes to gender will more likely make employers advance male applicants to the front of the labour queue in male-typed contexts, while women are placed at the back of the same labour queue. On the

contrary, in female-typed labour market segments, employers will probably not favour men, but opt instead for placing women at the front of the labour queue. In other words, to be a female graduate in a female dominated field of study, and being a candidate for a job in a female-dominated occupation, may be a competitive advantage compared to men, despite the risk of being over-educated.

This means that regarding over-education, women should not be always disadvantaged compared to men, even if female tertiary graduates are typically over-represented in fields of study more strongly associated with over-education (education, humanities, arts and social sciences) and under-represented in scientific fields, such as engineering and computing in particular.

At the international level, a few studies have dealt with the relationship between gender and over-education, revealing contrasting results. Although a number of studies indicate (controlling analyses for field of study) that over-education is more frequent among female workers than among men (Battu, Belfield, & Sloane, 2000), others have observed that gender differences regarding the likelihood of being over-educated varies in relation to the measure adopted (Chevalier, 2003).

In Italy, also, results are contrasting and depending on how over-education is measured. Terraneo (2010) has analysed the educational determinants of over-education among 2004 graduates three years after graduation relying on different measures based on the worker's assessments of the level of education required to obtain a job. Fields of study being equal, Terraneo has argued that, considering a so-called "over-education in the strict sense measure", female graduates seem to confront a higher risk, compared to men, of entering a job that does not require both a formal university degree and a real use of skills acquired during their time at university. Using a different measure, i.e. "substantial over-education" (when the university degree is required for entering in a job, while graduates judge that the skills acquired are not necessary for the tasks of the job) gender differences disappear. The analysis also confirms that scientific fields of study such as medicine, chemistry-pharmacy, engineering and architecture are more protective against the risk of being over-educated for both men and women. However, Terraneo has pointed out that scientific fields of study are more protective for men than for women. This means that gender counts in the relationship between the field of study and over-

education. It is also important to highlight that gender differences are stronger in fields of study such as law and economic-statistics. Indeed, female graduates in these fields experience about the same disadvantage as those who graduate in the political sciences and languages fields (namely the worst fields of study for women in terms of job prospects), while men exhibit the same chances of being employed as graduates in scientific fields of study. Focusing on the same survey, for individuals who graduated in 1998 and interviewed three years after graduation, Cutillo and Di Pietro (2006) show a males' higher incidence of over-education in the university to work transition. They measured over-education relying on what Terraneo (2010) has defined as "substantial over-education" and they developed a model correcting data analysis for the selectivity bias that may result from the process of female selection in the sample of graduate employees. Cutillo and Di Pietro explain the lower likelihood of women being over-educated by referring to the lower social pressure they experience compared to men in getting a job in a traditional society such as the Italian one. This cultural norm is considered the gender framework in which women are unwilling to work if they cannot find a job that matches their level of education. Moreover, they also suggest that this result may be a consequence of the increase in employment in the service sector in the last decade, which has seen an unparalleled increase in demand for well-educated women relative to well-educated men. Finally, analysis has confirmed the significant effect of the field of study on over-education.

Throughout the second half of the 20th century, a large number of significant changes have occurred in gender inequality in education and the labour market in all industrialised countries (England, 2010). Since 1970, the participation of women in tertiary education has increased, and between the 80s and the first half of the 90s women have caught up with and have done better than men in rates of university graduates (Buchmann, DiPrete, & McDaniel, 2008; Sartori, 2009). In the same period, women have also increased their participation in the labour market, even if in Italy the female activity rate remains considerably lower than that of men (Scherer & Reyneri, 2008). Despite these important changes, a lot of evidence shows that gender inequality persists in several aspects of educational and occupational careers (Barbieri, Cutuli, Lugo, & Scherer, 2015; Bradley, 2000; Charles & Bradley, 2002). As scholars indicate, high rates of female access to tertiary education are paralleled by a persistent high rate of gender

segregation (Barone, 2011; Bradley & Charles, 2003; Triventi, 2010). Gender segregation in education is considered a key factor in gender occupational inequality because it channels women into lower status jobs with the lowest remuneration (Bobbitt-Zeher, 2007; Cantalini, 2015; Smyth & Steinmetz, 2008).

Empirical evidence suggests therefore that gender inequality in education and the labour market is highly resistant to change. According to England (2010), what makes gender inequality resistant to change is the persistent and vigorous belief in "gender essentialism", i.e. the idea that men and women are innately and fundamentally different. Charles and Grusky (2004) argue that gender essentialism is compatible with a certain kind of gender egalitarianism, which states that individuals should have equal rights to education and jobs of their choice. According to this formal view of gender parity, individuals do not perceive gender as discriminatory. They agree that men and women are "equal but different" (Bradley & Charles, 2003): asserting formal gender parity may not inhibit the belief in the existence of "natural" differences in talents and inclinations between males and females.

Research, however, has focused on trends that challenge this belief in gender essentialism, opening room for some desegregation. According to some scholars, more women than ever have achieved a degree in a scientific field of study and entered many previously male-dominated jobs because, compared to traditionally female jobs, these are generally better paid and offer higher status (England & Li, 2006). On the contrary, men do not have such an incentive to challenge gender essentialism because the so-called devaluation of activities done by women has changed little. As Charles and Bradley (2002, p. 102) have pointed out, when women challenge gender essentialism they often choose fields of study labelled as scientific, but characterised by a "symbolic affinity with traditional caring roles", such as psychology or medicine: subjects specifically oriented to the well-being and personal development of others, or more traditionally scientific fields that "can lead to a care job like teaching as a second-best option" (Barone, 2011, p. 159).

Research hypotheses

These theoretical considerations suggest some lines of enquiry regarding the research question this paper deals with. First of all, on the basis of the

research evidence regarding the relationships between gender and over-education, it is difficult to formulate straightforward hypothesises. If it is true that, given the generally lower labour market participation of women, they can afford to wait for a job matching their level of education, it is also true that women with a degree have a greater economic incentive for employment because they can earn more. While the first assumption would lead to a competitive advantage for women, the second would contribute to reduce this advantage.

The following hypotheses are about gender differences within fields of study. Firstly, drawing on the statement that the labour queue is a gender queue, we would expect that the role of the field of study on over-education translates into different risks for men and women. Specifically, we would expect that in typically male-dominated fields of study men may be advantaged compare to women in the likelihood of obtaining a job matching their educational level. On the contrary, in the fields of study that are typically female-dominated, we may expect a female advantage. Moreover, we may expect that men may be advantaged also in fields of study that channel a considerable portion of graduates into independent work and in which rules for recruitment are less formal and specific.

Secondly, as far as changes over time of the gender differences within fields of study are concerned, research has highlighted a widespread social acceptance of the idea that many jobs continue to be gendered and that women are suitable for specific occupations, such as care jobs, strictly related to their innate abilities, which are naturally different from typical male aptitudes. However, research has also highlighted that men and women (especially graduate women) cope differently with "gender essentialism". Therefore, we can assume that major changes over time in gender differences may affect the fields of study that are typically male-dominated.

Data and methods

In order to explore our hypotheses, we implement the analyses on the "Indagine statistica sull'inserimento professionale dei laureati" (Statistical survey on graduates' occupational careers). Since the end of the 80s: every three years the Italian National Statistical Institute interviews graduates

three years after obtaining their degree. Our sample includes students who graduated in 1995, 1998, 2001, 2004 and 2007.

Measurements of over-education

Despite a large consensus on the definition of over-education, great differences in the approaches used to measure the required level of education for a particular job remain; promoting a debate focused on the precision and consistency of the various measurement approaches. Four different methods have been identified: the *average education level*; *job dictionaries;* workers' self- assessment about the real use of skills obtained through education; and formal educational requirements for the job. Each of these methods has its advantages and disadvantages, proving to be more useful in capturing some aspects and less reliable in others and their use can lead to different results (Kucel, 2011). Nevertheless, as Hartog (2000, p. 133) highlights, "usually the choice is dictated by data availability: you use what is available"

In this paper, the analysis applies a measure of over-education combining the formal employers' requirement for the job and the workers' self-assessment about their actual exploitation of skills and knowledge obtained during tertiary education. Such a measure has two advantages. First of all, it provides a definition closer to the specific context (regions, sectors, industries) in which graduates work; thereby avoiding the assumption that all workers with a given education level are perfect substitutes. Secondly, it can be considered closer to the so-called "genuine measure of over-education" (Chevalier, 2003) because it does not consider over-educated graduates working in a sub-graduate occupation who are satisfied with their jobs.

Sample and variables

Table 1 (Appendix) shows the number of subjects interviewed and those instead who have been the subjects of our analyses. Those who during the time spent at university held a job and did not change it after obtaining the degree were excluded. Their employment outcome, in fact, is not influenced by degree achievement. Moreover, these subjects did not enter the survey section on over-education. For the same reason, we excluded subjects who were in occasional or seasonal jobs at the time of the interview. Since 2001 the national survey has been conducted on subjects

who attained the Bachelor's degrees and those who also attained a Master's degree. In order to compare graduates from previous waves, which only included single cycle degrees (4, 5 or 6 years), Bachelor's degrees were excluded.

The remaining difference between those interviewed and who is involved in the analyses is chargeable to missing values on the variables of interest. Analyses were therefore made on 78.335 subjects: 50.983 with a job (65,1%) and 27.352 who were not employed. Our independent variables are sex and the field of study in which the degree is awarded. Fields of study were classified in eleven modalities: science, chemistry, biology, medicine, literature, law, economy, psychology, social and political sciences, engineering and, finally, architecture.

Table 2 (Appendix) shows the percentage of over-education by fields of study and sex over the years. The general trend is rather oscillating, apart from the minimum reached by 1998's graduates. Women are overrepresented compared to men in all the sample years, particularly in economy and law. Since 2001 over-educated men are overrepresented in literature and language. Exploring over-education just three years after graduation could lead to an overestimation of the phenomenon. However, labour mobility and the opportunity to acquire knowledge and experience on the job would have the effect of hiding endogenous and unobservable phenomena. In other words, the more flexible, open to change and to learning the graduates are, the more they can differentiate themselves in the course of their working experiences and the more they may get professional positions consistent with their degree. As the years go by over-educated graduates may have unobservable characteristics that make them more vulnerable and less able to fit into appropriate jobs (Alba-Ramírez, 1993). It would also be more difficult to distinguish between over-education and over skilling. (Baert et al., 2013). Additionally, the employment status three years after graduation does not rule out the possibility that the over-educated population has different characteristics from those who would rather endure a longer period of unemployment in order to find a more suitable occupation. Those who are forced by stringent economic reasons to accept any kind of work, despite their level of education, according to some authors, run the risk of being trapped. A job search would not be easy whilst already employed through lack of time and energy; moreover, employers may have prejudices against the over-educated. For example,

Baert and colleagues (2013) claim that over-education could generate some kind of cognitive decline. In this sense, on average, women are facilitated compared to men. In most cases women are not influenced by social pressure to accept any or the first job offered to them regardless of the skills required (Cutillo & Di Pietro, 2006). On the other hand, it is also possible that those outside the labour market may be similar to the over-educated rather than to those who find a suitable job quickly. For these reasons, in order to limit and control the effect of the sample selection due to the fact that not all the graduates three years after graduation are employed, a Heckman probit model is estimated (Heckman, 1979) [1].

This model consists of two equations. The first one is the selection equation: a probit equation that estimates the probability of being employed three years after graduation. The second, a probit equation again, estimates the probability of being over-educated. In order to be reliable, the model requires that the selection equation be estimated with at least one instrumental variable. This requires at least one variable that we assume has a correlation with the probability of being employed, but that has no correlation with the probability of being over-educated. Table 3 shows a scheme of the variables introduced in the model.

In the selection equation four instrumental variables were introduced: the first takes into account whether the subjects are not employed because they are engaged in another course of study, such as specialisation, masters or a Ph.D. Two instrumental variables relate to the household of the respondent: if married; and if cohabitant with own child. Finally, we introduced also the interaction between sex and cohabiting children. The conjugate state and the presence of children, in fact, act differently on men and women. In the first case, they increase the likelihood of being employed to meet the economic needs of the family, whilst in the case of women there is an increase in the likelihood that the labour market is abandoned to devote time to the care of home and children. The literature indicates that for women, a working mother is a model to which they are socialised and are stimulated to seek personal fulfilment in the labour market, not just in the care of the family (Del Boca, Locatelli, & Pasqua, 2000). Whether the respondent's mother worked or not will therefore be the last instrumental variable considered.

[1] Results do not change even when considering the dependent variable as continuous developing a classical Heckman model. Results are available from the author upon request.

Table 3. Independent, control and instrumental variables

	Probability of being employed	Probability of being over-educated
Independent Variables		
Sex	√	√
Fields of study	√	√
Control Variables		
Older than thirty years	√	√
Graduation year	√	√
Graduation final mark	√	√
Geographical area of the University	√	√
Cultural Background	√	√
Working during education	√	√
Graduated on time	√	√
Training and/or post tertiary degree		√
Previous job experiences		√
Job tenure		√
Full-time employed		√
Self-employed		√
Refused job offers		√
Instrumental variables		
Currently involved in education	√	
Married	√	
Cohabitant children	√	
Mother worked	√	

Common control variables between the selection and main equation of the Heckman probit model are: a dichotomous variable that indicates if the respondent is over thirty years old. We assume that finding a job and a job that matches a graduate's skill is more difficult as the subject gets older. As outlined in the previous paragraph, women and men may be socialised to develop different preferences in their field of study: women are more prone to prefer humanities whereas men are more disposed to choose scientific fields of study. Therefore, we would like to differentiate between gender and field of study in the probability of being employed and in the probability of being over-educated by introducing an interaction variable between sex and field of study both in the selection and in the main equations.

The year of graduation enables us to take into consideration changes over time in the labour market. An interaction term between graduation

year and sex is also introduced in order to point out the huge expansion of women with a tertiary degree and the improvement of female employment rates over time. The same reasons have suggested the inclusion of the geographic area of the university as a control variable: the employment rates in the south are lower than in the north of Italy, and this is particularly true for women. The final grade and the time of graduation are signals of a graduate's performances. The highest level of education between a graduate's father and mother (low if none of them earned a diploma, medium if at least one of them reached the diploma, high if at least one of them accomplished a tertiary degree) is a proxy of family cultural background. We assume that the higher the family background the higher the probability not only of being employed three years after graduation, but also the lower the probability of being over-educated. The family, in fact, may activate informal networks to aid the job search, which is more effective the higher the family's social position. A dummy variable indicating whether graduates were working while studying denotes the graduates' economic needs. Besides the control variables just outlined, in the main equation of the model we control for postgraduate education, which also includes training and specialisation[2]. A dichotomous variable indicates whether, before the current job, but after graduation, a respondent has performed another job. The duration in months of the occupation can be considered a proxy of the skills acquired in the workplace. The type of employment is synthesised by two variables: if self-employed and full time employed. The last control variable added on the basis of previous observations is whether job offers have been rejected before accepting the current occupation - the assumption is that persons who have been able to afford to wait before accepting a job are less likely to be over-educated. Research points out that employed women with children suffer a decrease in human capital stock, suggesting the crucial role of control variables like trainings, post graduate qualifications and job tenure as being particularly relevant in the case of women cases (Di Pietro & Cutillo, 2006, p. 43).

Some scholars recommend the possibility that there are unobservable characteristics that influence the choice of the field of study and employment outcomes of individuals (Cutillo & Di Pietro, 2006; Ortiz & Kucel, 2008). On the one hand, we believe that since we have entered a

[2] We test this variable also in the selection equation, but it seems to have no correlation with the probability of being employed.

number of variables it may be assumed that the phenomenon is under control (Ballarino & Bratti, 2009). On the other hand, our interest, as explained above, is not to evaluate how over-education is distributed between disciplines - because the literature has already consolidated results on this topic - but to observe whether there are gender differences within fields of study.

Results

Table 4 presents the results of the Heckman probit model. The model is consistent and it confirms that, without taking into account the effect of the sample selection, over-education would have been overestimated[3]. Furthermore, the analysis of the results shows that instrumental variables act in the expected way: having had a working mother increases the chances of being employed. Family commitments increase the probability of work for men, whereas they decrease the probability for women.
Control variables affect outcomes as expected. Still, it is of some interest to note that job tenure does not influence the probability of being over-educated. Furthermore, being at least on the second job increases the probability of being over-educated. This may be due to the fact that in a period of time of only three years from graduation, at least two transitions in different occupational positions is to the employers point of view a sign of poor reliability (Baert et al., 2013) and they would not be prone to risk the cost of training on the job. Being in full time employment, while reducing the risk of experiencing periods of unemployment, nonetheless, increases the probability of being over-educated.
As far as our first research hypothesis is concerned analyses show that being a woman increases the risk of getting a job not suited to the educational level attained until the end of the 90s. Over the time period considered the total probability of being over-educated is substantially stable, with the only exception being for graduates in 1998, which was considerably reduced. For women, however, the gap compared to males is gradually decreasing. This data is consistent with an increase in men's risk

[3] The coefficient rho is the correlation between residuals of the two equations and it is negative which means that performing the equation on over-education without taking into account the sample selection would have overrated the over-education probabilities).

of being over-education.

In order to clearly highlight gender differences within fields of study from Figure 1 to Figure 5 (Appendix) the predictive margins by sex and fields of study have been estimated[4]. It is true that in all the fields of study where women were disadvantaged in terms of probability of over-education, gender differences have thinned over time. Furthermore, in some disciplines women have gained an advantage compared to their male colleagues.

Table 4. Heckman selection model on the probability of being employed and probit model on the probability of being over-educated

	Pr (of being employed)			Pr (of being over-educated)		
	B	CI 95%		B	CI 95%	
Sex						
Male	-	-	-	-	-	-
Female	-0.39	-0.50	-0.29	0.35	0.08	0.63
Age						
<30	-	-	-	-	-	-
30+	-0.17	-0.21	-0.13	0.16	0.11	0.21
Graduation year						
1995	-	-	-	-	-	-
1998	-0.01	-0.08	0.07	-0.32	-0.41	-0.22
2001	-0.10	-0.18	-0.02	0.23	0.14	0.32
2004	-0.16	-0.24	-0.08	0.19	0.10	0.28
2007	-0.20	-0.28	-0.13	0.20	0.11	0.28
Field of study						
Science	0.65	0.56	0.74	0.90	0.65	1.15
Chemistry	0.89	0.79	0.99	0.24	-0.02	0.50
Geo-biology	0.58	0.49	0.66	0.99	0.74	1.23
Engineering	1.35	1.27	1.43	0.47	0.22	0.71
Architecture	0.90	0.80	1.00	0.73	0.48	0.98
Economy	0.92	0.84	1.00	0.99	0.75	1.23
Political and Social Sciences	0.61	0.51	0.71	1.45	1.20	1.69
Law	0.14	0.05	0.22	0.94	0.71	1.18
Literature and Language	0.40	0.31	0.49	1.50	1.26	1.75
Psychology	0.83	0.68	0.99	0.93	0.66	1.21
Medicine	-	-	-	-	-	-
Final mark						
<=90	-0.04	-0.11	0.03	0.36	0.27	0.45
91-100	-0.04	-0.08	0.01	0.32	0.26	0.38
101-105	0.04	0.00	0.09	0.22	0.16	0.28
106-110	0.02	-0.02	0.06	0.13	0.07	0.19
110 cum laude	-	-	-	-	-	-

[4] Predictive margins are calculated with all other variables at their means.

	Pr (of being employed)			Pr (of being over-educated)		
	B	CI 95%		B	CI 95%	
Geographic area of the University						
North	-	-	-			
Centre	-0.24	-0.28	-0.21	0.10	0.05	0.15
South and Isles	-0.53	-0.56	-0.49	0.06	0.01	0.11
Highest parent' education level						
Low	0.02	-0.02	0.06	0.11	0.06	0.16
Medium	0.06	0.02	0.09	0.04	-0.01	0.09
High	-	-	-	-	-	-
*Graduation year*sex*						
Female*1998	0.11	0.02	0.20	-0.14	-0.25	-0.02
Female *2001	0.08	-0.02	0.18	-0.26	-0.38	-0.14
Female *2004	0.19	0.09	0.29	-0.26	-0.38	-0.15
Female *2007	0.18	0.08	0.27	-0.31	-0.42	-0.20
*Sex*field of study*						
Female*Science	0.26	0.13	0.39	-0.22	-0.53	0.08
Fem*chemistry	0.34	0.21	0.46	-0.31	-0.64	0.01
Fem*geobiology	-0.02	-0.14	0.09	-0.15	-0.44	0.14
Fem*eng	0.02	-0.09	0.13	-0.13	-0.42	0.15
Female*arch	0.08	-0.04	0.21	-0.07	-0.37	0.23
Female*econ	0.13	0.03	0.22	0.07	-0.20	0.35
Female*political and social sciences	0.21	0.09	0.34	-0.31	-0.59	-0.02
Female*law	0.02	-0.08	0.11	0.15	-0.14	0.44
Female*literat and language	0.35	0.25	0.46	0.16	-0.13	0.44
Female*psychoy	0.13	-0.07	0.32	0.01	-0.33	0.35
Working while studying				0.04	-0.29	0.38
No	-0.30	-0.33	-0.27	0.07	0.03	0.11
Yes	-	-	-	-	-	-
Degree obtained on time						
No	-0.12	-0.16	-0.08	0.18	0.13	0.23
Yes	-	-	-	-	-	-
Training and/or other tertiary degree						
No				0.25	0.22	0.29
Yes				-	-	-
Previous job experiences						
No				-	-	-
Yes				0.04	0.00	0.08

	Pr (of being employed)			Pr (of being over-educated)		
	B	CI 95%		B	CI 95%	
Job tenure in months				-0.01	-0.01	0.00
Working full time						
No				0.27	0.22	0.33
Yes				-	-	-
Self-employed						
No				-	-	-
Yes				0.29	0.24	0.33
Refused job offers						
No				0.13	0.08	0.18
Yes				-	-	-
Married						
No	-0.07	-0.11	-0.04			
Yes	-	-	-			
Cohabitant Children						
No	0.24	0.10	0.38			
Yes	-	-	-			
*Sex*cohab. children*						
Female with cohabitant children	-0.86	-1.02	-0.71			
Mother worked						
No	-0.05	-0.08	-0.02			
Yes	-	-	-			
Currently involved in education						
No	-	-	-			
Yes	-1.01	-1.05	-0.98			
Constant	0.86	0.77	0.95	-2.70	-2.97	-2.43
Rho	-0.39	-0.47	-0.31			
Wald chi2(46)	2835.30					
N	78335					

Among the 1995's graduates the only three areas with no significant differences between males and females are the scientific, chemistry, literature and language fields. In all other fields of study women suffer a disadvantage that, such as in the case of law, political and social sciences, economy and psychology exceed the probability of males of being over-educated by ten percentage points (with the highest value of 16 percentage point in law). Since 1998, the situation has completely changed. There are only three fields of study in which women's disadvantage persists:

economy; political and social sciences; and law[5]. The differences oscillate between a maximum of eight percentage points in law to a minimum of four in the psychological field. In 2001 and 2004 the gender differences by sector only endure in three subject areas: economy and law (where women are over-represented in terms of probability of performing occupations for which they are over-educated) and among graduates in literature and language. In this field the presence of women is considerably higher than that of men, but men suffer a disadvantage, with a probability of being over educated of over 43% compared to 35% for women who graduated in 2001 and 42% versus 33% for women who graduated in 2004.

As already noticed, over the years, gender differences have narrowed, being at the lowest level for graduates of 2007; the last cohort of graduates considered in our analyses. However, the examination of gender differences within different disciplinary groups shows a much more complex situation. For male graduates in science, chemistry and in literature and language, the probability of being over-educated is significantly higher than that of the corresponding female colleagues. The differences are around at least three percentage points in chemistry, toward a maximum of ten percentage points in literature.

For graduates in economy and law, however, the female disadvantage appears rooted in the different cohorts of graduates: women with a degree in economics have a higher risk of over-education compared to males with a difference of four percentage points, while a degree in law costs six percentage points to female in terms of greater probability of being over-education with respect to males

To summarise, from 1998 onward, women's probability of being over-educated diminished in comparison to men's. As figure 1 to 5 (Appendix) show, there are nevertheless only minimal changes – none of them statistically significant – in women's probabilities of being over-educated within fields of study. From 2001 onward, in every field of study men's probabilities of being over-educated grows well above the 1995 levels. As a direct consequence, differences with women, who on the contrary remain substantially stable, are narrowing. The decision to investigate over-education deeper and more precisely within fields of study has therefore unveiled that there persist areas where women's, or men's disadvantages

[5] We base our comments only on predictive margins that are statistically different using the Bonferroni test which is more restrictive than a Wald test at the 5% level of confidence.

are rooted. As England and Li (2006) pointed out, it appears that devaluation of activities done by women has changed little, so that men in women-dominated fields like literature and language run a higher risk of being over-educated. On the other hand, in Italy the large number of women who are entering male dominated jobs still need to deal with gender essentialism (England, 2010).

Scholars have explained women's disadvantages in law and economics, highlighting that in relation to a number of professional activities, such as lawyers, accountants and architects, there is a process of intergenerational transmission of activities that primarily involves male children (Arum & Müller, 2004). Male graduates in these disciplines are therefore more likely than women to gain access to an already established network that will enable them to develop human and social capital to become prominent professionals, both in terms of prestige and income (Barbieri, 1998).

The female advantage in chemistry and science may be a challenging sign. Nonetheless, we were not able to outline a trend over time in these fields of study, and it is therefore necessary to be cautious in the interpretation of the result and await future research on the topic.

Conclusions

Research on the transition from university to work often highlights that female graduates are generally disadvantaged compared to men in labour market outcomes such as employment chances, wages and occupational prestige. The first aim of this paper is to analyse whether female disadvantage also exists in relation to a specific outcome such as over-education and how it eventually changes over time.

The analyses presented in this work firstly highlight that since the new millennium women's disadvantage with respect to men in terms of probability of being over-educated has disappeared - even after correcting for the bias in the selection sample. The lack of gender differences seems to be caused primary by a huge deterioration in terms of over-education for men, not by an improvement of women's labour opportunities.

Secondly, this paper's purpose is to take a further step forward in the investigation of the well-known relationship between fields of study and over-education, focusing on whether men and women with a degree in the

same field of study run the same risk of being over-educated.

Data analyses shows that gender inequalities within fields exist and are persistent. Specifically, female graduates in literature and language subjects are more protected than males from the risk of being over-educated, whereas in the fields of economy and law females are more likely than men to be over-educated. As far as the other fields of study are concerned, gender conditions have coalesced. Furthermore, in 2007 females also gained an advantage with respect to males in scientific fields such as chemistry and science.

Therefore, the picture presented highlights a loss of relevance, with respect to the probability of being over-educated, for gender stereotypes in shaping job-matching processes in the graduate labour market regarding scientific fields of study. However, the research also suggests that many graduate labour market sectors continue to be gender biased and beliefs persist that men are not suitable for certain female occupations and women are not appropriate for certain male dominated professions. In other words, the gender essentialism hypothesis, i.e. the idea that men and women are innately and fundamentally different, continues to be helpful in explaining female advantages in traditionally female dominated fields of study such as literature and male advantages in fields of study such as law and economics. Law and economics usually refer to professional job positions that require carrier transitions that often conflict with motherhood and are characterised by a male intergenerational transmission of professionalism.

Further research should focus on several issues. First of all, even though our analyses contained several attempts to avoid an endogeneity problem, as done by other scholars (Ballarino & Bratti, 2009), we cannot completely exclude that the choice of the field of study may be driven by unobservable variables that are different for women and men and which also affect over-education. Data availability has not permitted control for a crucial variable: being employed in the public or in the private sector. Furthermore, data shows an unexpectedly low probability of over-education in 1998 that may give rise to some doubts and should be further examined, even though relations between our variables of interest remain coherent.

In 2007, a change in the traditionally male dominated fields of study seems to have occurred. Future research should pay great attention as to whether this change has persisted over time. Engineering, for example, is another area where women are improving their outcomes in terms of over-

education, and further research should explore whether these results are comparable internationally because they may signal that traditionally male dominated jobs are increasingly open to the growing involvement of females in the labour market.

This study was a joint effort by both authors, though sections *Introduction, Over-education and the graduate labour market: the role of the field of study* and *Theoretical background and hypothesis* are by Nicola De Luigi while sections *Data and methods*, *Results* and *Conclusions* are by Federica Santangelo.

References

Alba-Ramírez, A. (1993). Mismatch in the Spanish Labor Market: Overeducation? *The Journal of Human Resources, 28*(2), 259-278. doi: 10.2307/146203

Arrow, K. (1973). Higher education as a filter. *Journal of Public Economics, 2*(3), 193-216.

Arum, R., & Müller, W. (2004). „The Reemergence of Self-Employment: Comparative Findings and Empirical Propositions ". *The Reemergence of Self-Employment. A Comparative Study of Self-Employment Dynamics and Social Inequality. Princeton/Oxford*, 426-454.

Baert, S., Cockx, B., & Verhaest, D. (2013). Overeducation at the start of the career: Stepping stone or trap? *Labour Economics, 25*, 123-140. doi: http://dx.doi.org/10.1016/j.labeco.2013.04.013

Ballarino, G., & Bratti, M. (2009). Field of study and university graduates' early employment outcomes in Italy during 1995–2004. *Labour, 23*(3), 421-457.

Barbieri, P. (1998). Lavoro autonomo di "seconda generazione": problemi e prospettive. *Polis, 12*(2), 263-282.

Barbieri, P., Cutuli, G., Lugo, M., & Scherer, S. (2015). The Role of Gender and Education in Early Labor Market Careers: Long-Term Trends in Italy. In H. P. Blossfeld, J. Skopek, M. Triventi, & S. Buchholz (Eds.), *Gender, Education and Employment An International Comparison of School-to-Work Transitions* (pp. 142-160). Cheltenham,

UK: Edward Elgar Publishing.
Barone, C. (2011). Some things never change: Gender segregation in higher education across eight nations and three decades. *Sociology of Education, 84*(2), 157-176.
Barone, C., & Ortiz, L. (2011). Overeducation among European University Graduates: a comparative analysis of its incidence and the importance of higher education differentiation. *Higher Education, 61*(3), 325-337. doi:10.1007/s10734-010-9380-0
Battu, H., Belfield, C. R., & Sloane, P. J. (2000). How well can we measure graduate over-education and its effects? *National institute economic review, 171*(1), 82-93.
Becker, G. (1964). *Human capital: a theoretical analysis with special reference to education*. New York: Columbia University Press for NBER.
Bobbitt-Zeher, D. (2007). The gender income gap and the role of education. *Sociology of Education, 80*(1), 1-22.
Bradley, K. (2000). The incorporation of women into higher education: Paradoxical outcomes? *Sociology of Education, 73*(1), 1-18.
Bradley, K., & Charles, M. (2003). Uneven Inroads: Understanding Women's Status In Higher Education. In D. Baker, B. Fuller, E. Hannum, & R. Werum (Eds.), *Inequality Across Societies: Families, Schools and Persisting Stratification. Research in the Sociology of Education* (Vol. 14, pp. 247-274). Emerald Group Publishing Limited.
Buchmann, C., DiPrete, T. A., & McDaniel, A. (2008). Gender inequalities in education. *Annu. Rev. Sociol, 34*, 319-337.
Cantalini, S. (2015). Genere, settore di studio e reddito: un'analisi delle disuguaglianze salariali di genere tra i laureati italiani. *Stato e mercato, 104*(2), 189-227.
Charles, M., & Bradley, K. (2002). Equal but Separate? A Cross-National Study of Sex Segregation in Higher Education. *American Sociological Review, 67*(4), 573-599. doi:10.2307/3088946
Charles, M., & Grusky, D. B. (2004). *Occupational ghettos: The worldwide segregation of women and men*. Stanford, CA: Stanford University Press.
Chevalier, A. (2003). Measuring Over-Education. *Economica, 70*(279), 509-531. doi:10.2307/3549038
Cutillo, A., & Di Pietro, G. (2006). The effects of overeducation on wages in Italy: a bivariate selectivity approach. *International Journal of Manpower, 27*(2), 143-168. doi: 10.1108/01437720610666182
Davies, S., & Guppy, N. (1997). Fields of Study, College Selectivity, and Student Inequalities in Higher Education. *Social Forces, 75*(4), 1417-1438. doi:10.2307/2580677
De Luigi, N., & Santangelo, N. (2014). Overeducation nel mercato del lavoro italiano : una questione di genere? Retrieved from doi: 10.3280/SL2014-136010
Del Boca, D., Locatelli, M., & Pasqua, S. (2000). Employment Decisions of Married Women: Evidence and Explanations. *Labour, 14*(1), 35-52. doi:10.1111/1467-9914.00123
Di Pietro, G., & Cutillo, A. (2006). University Quality and Labour Market Outcomes in Italy. *Labour, 20*(1), 37-62. doi: 10.1111/j.1467-9914.2006.00333.x
Dolton, P., & Vignoles, A. (2000). The incidence and effects of overeducation in the U.K. graduate labour market. *Economics of education review, 19*(2), 179-198. doi: http://dx.doi.org/10.1016/S0272-7757(97)00036-8
England, P. (2010). The gender revolution: Uneven and stalled. *Gender & Society, 24*(2),

149-166.
England, P., & Li, S. (2006). Desegregation Stalled: The Changing Gender Composition of College Majors, 1971-2002. *Gender and Society, 20*(5), 657-677.
Frenette, M. (2004). The overqualified Canadian graduate: the role of the academic program in the incidence, persistence, and economic returns to overqualification. *Economics of education review, 23*(1), 29-45.
Groot, W., & Maassen van den Brink, H. (2000). Overeducation in the labor market: a meta-analysis. *Economics of education review, 19*(2), 149-158. doi:http://dx.doi.org/10.1016/S0272-7757(99)00057-6
Hartog, J. (2000). Over-education and earnings: where are we, where should we go? *Economics of education review, 19*(2), 131-147.
Heckman, J. J. (1979). Sample Selection Bias as a Specification Error. *Econometrica, 47*(1), 153-161. doi:10.2307/1912352
Klein, M. (2010). Mechanisms for the Effect of Field of Study on the Transition from Higher Education to Work.
Kucel, A. (2011). Literature survey of the incidence of over-education: A sociological approach. *Revista Española de Investigaciones Sociológicas (REIS), 134*(1), 125-142.
Müller, W. (2005). Education and Youth Integration into European Labour Markets. *International Journal of Comparative Sociology, 46*(5-6), 461-485. doi:10.1177/0020715205060048
Ortiz, L., & Kucel, A. (2008). Do Fields of Study Matter for Over-education?: The Cases of Spain and Germany. *International Journal of Comparative Sociology, 49*(4-5), 305-327. doi:10.1177/0020715208093079
Reskin, B. (1993). Sex Segregation in the Workplace. *Annual Review of Sociology, 19*(1), 241-270. doi:10.1146/annurev.so.19.080193.001325
Reskin, B. F. (1991). Labor markets as queues: a structural approach to changing occupational sex composition. In J. Huber (Ed.), *Macro-Micro Linkages in Sociology* (pp. 170-192). Newbury Park/London/New Delhi: Sage Publications.
Ridgeway, C. L. (2011). *Framed by gender: How gender inequality persists in the modern world*. Oxford: Oxford University Press.
Ridgeway, C. L., & Correll, S. J. (2004). Unpacking the Gender System. *Gender & Society, 18*(4), 510-531. doi:10.1177/0891243204265269
Ridgeway, C. L., & England, P. (2007). Sociological approaches to sex discrimination in employment. *Sex discrimination in the workplace: Multidisciplinary perspectives*, 189-211.
Sartori, F. (2009). *Differenze e disuguaglianze di genere*. Bologna: Il Mulino.
Scherer, S., & Reyneri, E. (2008). Come è cresciuta l'occupazione femminile in Italia: fattori strutturali e culturali a confronto. *Stato e mercato, 83*(2), 183-216.
Smyth, E., & Steinmetz, S. (2008). Field of Study and Gender Segregation in European Labour Markets. *International Journal of Comparative Sociology, 49*(4-5), 257-281. doi:10.1177/0020715208093077
Spence, M. (1973). Job Market Signaling. *The Quarterly Journal of Economics, 87*(3), 355-374. doi:10.2307/1882010
Spence, M. (1974). *Market signaling: informational transfer in hiring and related screening processes*. Cambridge: Harvard University Press.
Terraneo, M. (2010). Istruzione e lavoro: la condizione dei neolaureati italiani. *Stato e*

mercato, 90(3), 425-470.
Thurow, L. C. (1975). *Generating inequality*. New York: Basic Books.
Triventi, M. (2010). Something changes, something not. Long-term trends in gender segregation of fields of study in Italy. *Italian Journal of Sociology of Education, 2*(2), 47-80.
van de Werfhorst, H. G. (2008). Educational fields of study and European labor markets: Introduction to a special issue. *International Journal of Comparative Sociology, 49*(4-5), 227-231.
Verhaest, D., & Van der Velden, R. (2013). Cross-country Differences in Graduate Overeducation. *European Sociological Review, 29*(3), 642-653. doi:10.1093/esr/jcs044
Wolbers, M. H. (2003). Job Mismatches and their Labour-Market Effects among School-Leavers in Europe. *European Sociological Review, 19*(3), 249-266.

Appendix

Table 1. Original sample and sub sample on which the analyses were developed

	1995		1998		2001		2004		2007	
	M	F	M	F	M	F	M	F	M	F
Original sample	6,289	8,047	9,273	11,148	12,153	12,925	21,509	24,346	28,535	33,465
Selected sub sample	3,497	4,824	6,047	7,680	7,464	8,459	7,080	9,189	11,068	13,027

Table 2. Percentage of graduates over-educated by graduation year, sex and field of study

	1995			1998				2001				2004				2007				
	M	N	F	N	M	N	F	N	M	N	F	N	M	N	F	N	M	N	F	N
Science	13.3	56	18.2	88	7.2	189	7.1	173	21.0	146	16.5	70	24.9	88	8.7	55	13.8	294	12.3	131
Chemistry	4.9	85	4.8	157	4.2	107	2.5	221	6.0	121	3.2	201	6.9	98	4.2	222	4.0	268	2.8	506
Geobiology	7.6	41	26.3	116	11.7	215	7.5	269	15.8	236	11.3	246	15.9	223	14.2	218	19.5	447	13.8	534
Medicine	0.2	132	0.0	122	2.1	68	0.0	59	0.5	87	0.3	56	0.8	87	0.6	60	1.7	242	2.8	235
Engineering	8.8	760	5.2	30	5.9	1356	2.0	162	11.6	1613	4.3	137	10.7	1476	5.7	138	9.3	2619	9.9	587
Architecture	12.4	162	11.8	169	4.9	406	7.8	335	12.9	351	11.1	298	11.0	323	12.9	317	13.2	569	10.8	494
Economy	18.1	880	25.3	711	11.6	1249	16.0	1123	23.4	1397	27.3	1002	19.8	1170	27.2	877	18.0	1253	21.5	1041
Political and Social Sciences	35.2	130	34.5	241	20.4	310	21.1	465	31.2	366	35.9	548	39.7	409	37.2	630	33.9	615	34.2	827
Law	11.1	379	16.4	479	6.1	545	13.5	709	15.4	644	20.1	682	13.7	610	23.5	605	10.7	821	14.1	921
Literature and Language	28.1	42	38.0	819	14.5	180	18.8	1463	39.1	193	30.6	1407	30.1	256	24.3	1675	37.3	504	22.5	1907
Psychology	0.0	3	17.3	45	10.8	42	12.0	219	24.3	50	12.4	240	20.5	52	22.4	335	8.5	113	15.3	524
Total	13.5	2672	24.6	2977	8.9	4668	14.3	5199	18.0	5204	23.6	4886	17.2	4793	23.2	5132	15.2	7745	17.7	7707

Figure 1. Predictive margins of being over-educated by field of study (medicine and geo-biology) and sex

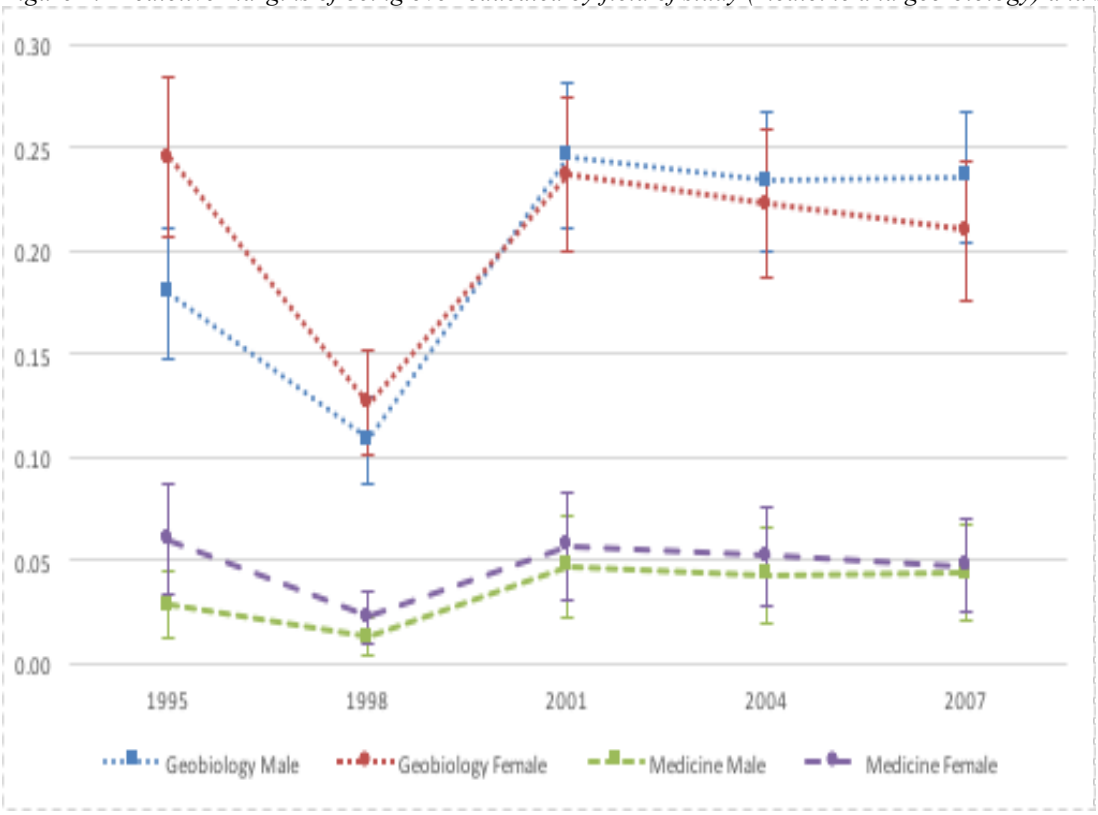

Figure 2. Predictive margins of being over-educated by field of study (chemistry and science) and sex

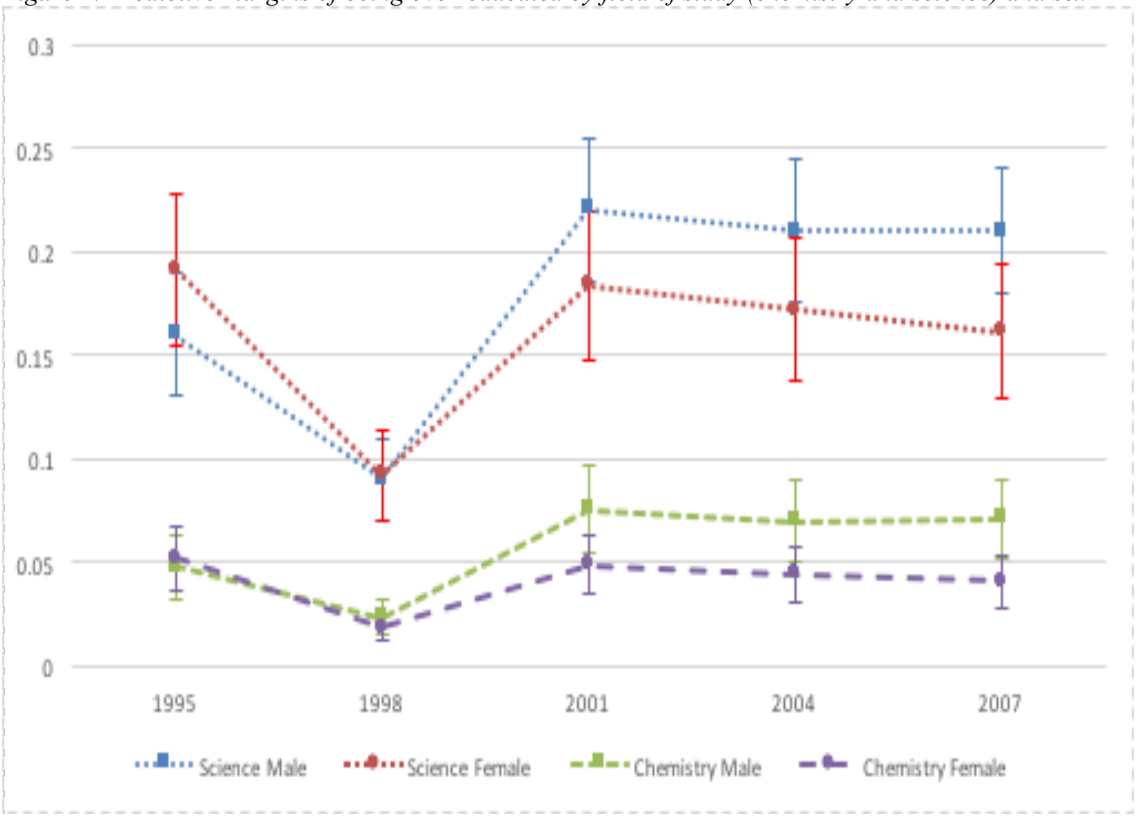

Figure 3. Predictive margins of being over-educated by field of study (Psychology, engineering and architecture) and sex

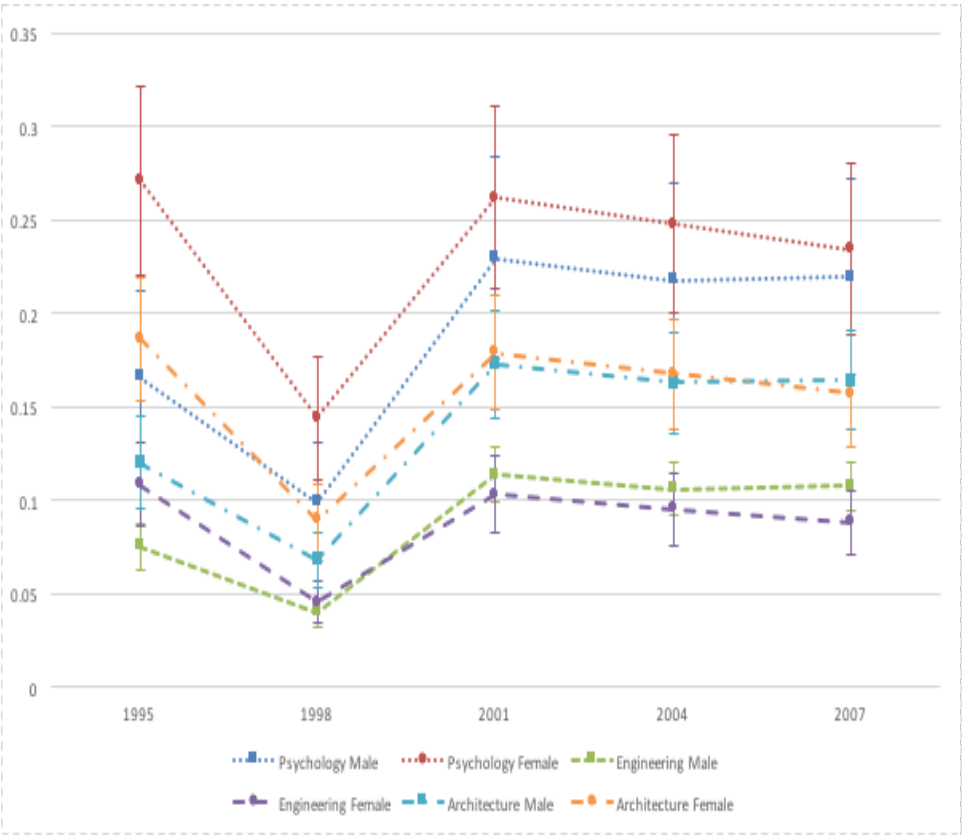

Figure 4. Predictive margins of being over-educated by field of study (economy and political and social sciences) and sex

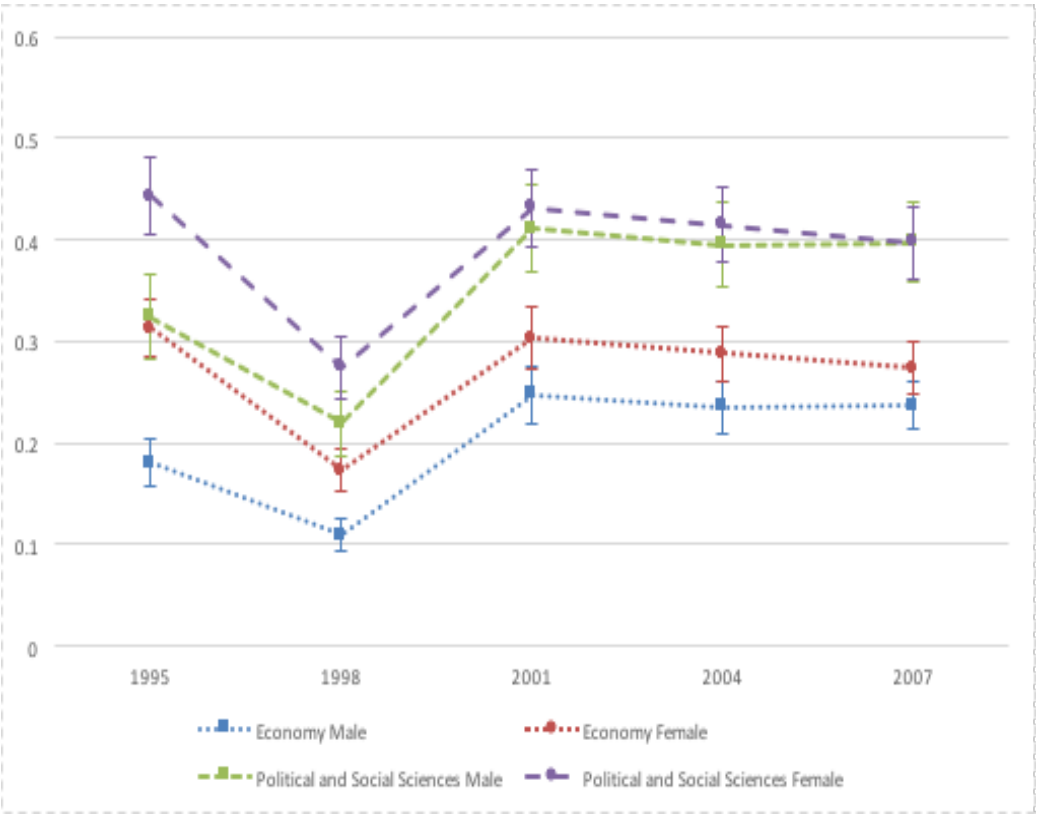

Figure 5. Predictive margins of being over-educated by field of study (Language and literature and law) and sex