

Three essays on over-education and labor market

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Abstract

This thesis studies over-education in the labor market in Spain and the UK. Resorting to the Labor Force Survey it is first researched whether over-education has significant influence on contract permanency in Spain. Controlling for endogeneity it is demonstrated that young over-educated workers in Spain are less likely to hold a permanent contract than matched young workers. In the next chapter we study the likelihood of obtaining training by over-educated workers in Spain. Results show that over-educated workers are less likely to participate in job-related training than their matched peers in the same jobs. Moreover over-educated workers would be more likely to obtain training if they got matched. Finally in the fourth chapter we investigate if job search methods affect differently the likelihood of being over-educated of graduates of soft vs. hard fields of study in the UK. The analysis reveals that hard fields graduates lose comparatively to soft fields by using any other method of job search than personal contact.

Resumen

Esta tesis estudia la sobre-educación en el mercado de trabajo en España y el Reino Unido. Utilizando la base de datos Labor Force Survey primero se investiga si la sobre-educación tiene una influencia significativa sobre el tipo de contrato (indefinido/temporal) en España. Los resultados demuestran que los trabajadores jóvenes sobre-educados en España tienen menor probabilidad de obtener un contrato indefinido que los jóvenes con educación adecuada al puesto de trabajo. En el siguiente capítulo, estudiamos la probabilidad de obtener formación por los trabajadores sobre-educados en España. Los resultados demuestran que estos trabajadores tienen menor probabilidad de participar en formación relacionada con el trabajo que sus compañeros con nivel de educación adecuado al puesto de trabajo. Además, los trabajadores sobre-educados obtendrían mayor formación si tuvieran un trabajo adecuado a su educación. Finalmente, investigamos si los métodos de búsqueda de trabajo afectan distintamente la probabilidad de estar sobre-educado para los graduados de campos "soft" vs. "hard" en el Reino Unido. El análisis revela que los graduados en campos "hard" pierden comparativamente a los graduados en campos "soft" si usan cualquier método de búsqueda que no sea contactos personales.

Thesis synopsis

This doctoral dissertation consists of three self-contained essays on Over-education and Labor Market.

Essay 1. “Over-education and contract quality”

The main issues of this paper are whether contract permanency and over-education are interrelated and which the type of such relation is. Using biprobit regression on EULFS dataset for Spain we demonstrate that over-education and contract quality are significantly negatively related even after accounting for self-selection of individuals into employment. Results suggest that women are less likely to receive permanent employment and are more likely to be over-educated. Results are presented for young group of individuals between 18 and 29 years of age.

Essay 2. “Why would over-educated workers still need more training? Evidence from Spain”

This article reviews the human capital theory’s thesis that over-educated workers should receive less training in their current jobs than matched individuals in the same jobs as they are more prone to quits. Using a special Life-Long Learning 2003 module in the European Labor Force Survey it is demonstrated that indeed Spanish workers in over-educated jobs are less likely than their matched peers to receive training related to their work. Moreover it is observed that under-educated workers are more likely to receive training than the matched ones. An argument about skill transferability is advanced as explanation of the results. The argument holds also for female workers and it extends to different fields of study.

Essay 3. “Are over-educated workers insiders or outsiders? A case of job-search methods and over-education in UK” (co-authored with Delma Byrne)

The aim of this paper is to investigate whether job search methods significantly influence the probability of being over-educated. Using British Quarterly Labor Force Survey data we demonstrate that there exist significant differences

across job search methods in their likelihood to result in over-educated jobs. The results suggest that institutional support in job search in the UK increases significantly the likelihood of becoming over-educated. Moreover it is shown that graduates of so called “soft fields” of study, as compared with the graduates of “hard fields”, have significantly worse personal networks in the job market. It is theorized that asymmetric information in the labor market defines graduates of “soft fields” as outsiders of privileged information about matching jobs. Graduates of the “hard fields” on the other hand are said to be the insiders and holders of better information about job market.

List of Contents

Thesis synopsis.....	7
Acknowledgements.....	3
Chapter 1: Introduction	11
1. Over-education	12
2. Research hypotheses	14
3. Educational attainment	17
3.1 Theories related to parental background	19
3.2 Parental influences in the course of educational attainment	25
3.3 Networks and Social Capital Theory	26
3.4 Fields of study	28
3.5 Summary of links between educational attainment and over-education	30
4. Labor market theories related to over-education	31
5. Measurement of over-education.....	34
5.1 Developments in the measurement of over-education	34
5.2 Measurement discussion	36
5.3 Meta-analysis of incidence of over-education.....	39
6. Institutional characteristics.....	44
Chapter 2: Over-education and contract quality	47
Introduction	48
2. Theoretical background	51
3. Data and Methods	55
3.1 Sample.....	55
3.2 Variables definitions	56
3.3 Econometric framework	57
4. Results.....	61
5. Conclusions	65
Appendix A.....	67
Chapter 3: Why would over-educated workers still need more training? Evidence from Spain.....	69
Introduction	70
2. Theoretical Background	73
3. Data and Methods	78

3.1	Sample.....	78
3.2	Independent variables	79
3.3	Econometric framework	81
4.	Results.....	84
5.	Conclusions	91
	Appendix B	95
	Chapter 4: Are over-educated people insiders or outsiders? A case of job search methods and over-education in UK.....	97
	Introduction	98
2.	Theoretical Background	99
3.	Data and Methods	102
4.	Results.....	105
5.	Conclusions	112
	Appendix C	114
	Conclusions.....	114
	References	125

Chapter 1

Introduction

Over-education is a labor market phenomenon whereby heterogeneous workers obtain jobs where their formal educational qualification (expressed as years of education or highest level of education achieved) exceeds educational requirements of the job. Formally such workers have more schooling than the job requires. The leading theme of this dissertation is the over-education phenomenon. In Chapter 2 we investigate the likelihood of obtaining permanent contract by over-educated workers. Chapter 3 concentrates on the probability of obtaining training by the over-educated workers. Finally in Chapter 4 we study how job search methods influence the odds of getting over-educated.

The concept of over-education is tightly linked with at least two major strands of sociological as well as economic literature. Firstly, as the name suggests over-education relates to educational attainments of individuals. Secondly, it entails their labor market performance and so it is related to labor market theories. Those two strands merge into a major research line of sociology and economics – mobility theory. Educational attainment, which we analyze in this thesis in the context of over-education, cannot be understood fully without paying at least some attention to the process of studying and its roots in family and society. We do not address directly this process in this dissertation due to data limitation. We find it worthwhile however to shed some light on parental influences on children's educational attainment because it may prove causal to at least some cases of educational mismatch. So far the literature on over-education did not pay much attention to parental influences on their offspring's labor market performance. We do not address these issues either (except very briefly in chapter 2) but we do propose them as tentative hypotheses to be kept in mind while reading this thesis.

We find it worthwhile to concentrate separately on educational attainment processes and the role of family in it on one hand and the theories of labor market on the other. Only then should we merge their predictions and discuss the phenomenon of over-education in its correct context. In the following sections we will therefore introduce briefly the concept of over-education, next sketch our research questions, and then discuss the issue of educational

attainment with the special roles of families and social networks in it. This will be followed by a presentation of major labor market theories relevant for analyzing over-education. Eventually in the second half of the chapter we will return to the major discussion of over-education and its measurement. Finally the chapter will be concluded by some references to institutional characteristics of the countries studied in this thesis with relevance to over-education.

1. Over-education

Over-education appeared firstly in economics as a concern about excess of schooling attained by American youth with respect to the labor market demand in the seventies. The first works on over-education come from Richard Freeman's "The Over-educated American" (Freeman, 1976). It is worth stressing here that over-education is a fairly misleading name since it suggests that a person acquired too much education in the life: But with respect to what? Over-education is an excess of education with respect to the job presently performed by worker. It is therefore the job that does not utilize fully worker's skills acquired through education and not the opposite whereby worker mistakenly obtained too much of education.

Freeman was among the first that conceptualized over-education as the excess of schooling with respect to requirements posed by the job. He believed that American educational system in the seventies was producing a large surplus of educated workforce with respect to aggregate labor market demand. The first analyses of the phenomenon of over-education concentrated on the aggregate observations of the American labor market. Freeman published later more specific research on particular groups in the labor market however all of them are characterized by a macro focus on the entire economy without concentrating on individual factors.

The imbalance between supply and demand for skilled labor in the labor market pointed by Freeman inspired various publications on the topic (for in-depth historical description of the early over-education literature in the US see (Buchel, 2001)). The second most important researcher who undertook the study of over-education at the beginning of eighties was Russell Rumberger (Rumberger, 1981). Rumberger's merit in studying over-education lies predominantly in bringing the discussion to the level of individuals from the primarily macroeconomic focus in Freeman's studies. Importantly both

Rumberger and Freeman did not find confirmation for the widely claimed declining returns to college education among young Americans in seventies (and at the beginning of eighties). Both of them however found a rising incidence of over-education in the U.S. labor market (Rumberger, 1981, Rumberger, 1984, Rumberger, 1987, Freeman, 1976).

In fact in the second half of eighties in an important study Herbert Smith re-worked the analyses of Freeman and demonstrated that the proclaimed decline in returns to college education in the seventies (particularly between 1970 and 1974) took place largely due to significant growth in the cohort sizes and a comparably slow response of U.S. labor market (Smith, 1986). So far however at its beginning over-education was primarily studied by labor economists and was tied to the issue of declining wage returns to college education. Smith tried to extend the term of over-education and proposed to call it underemployment which was meant to resemble more broad issues of mismatch such as possibility of unemployment or contingent employment. Despite this attempt over-education remained recognized under its original name chiefly due to the fact that most of the literature on over-education kept its focus on wage impacts of being over-educated and seemed to neglect other non-wage issues.

There are however notable distinctions of widening scope of over-education studies beyond the wage issue and both of them come from sociology (Coburn, 1975, Burris, 1983). Coburn studied the influence of over-education and under-education on mental health and Burris drew attention to socio-political consequences of over-education. Coburn found important effects of self-perceived under-/over-education while much smaller effects for objective measures of those phenomena on mental well-being. Burris was also among the first to demonstrate that over-education has adverse effects on job satisfaction but also on stratification ideology. He found however no significant influence of over-education on political leftism or political alienation.

Notwithstanding over-education may itself play an important role in the economy. It may affect growth of the economy through diminished productivity of the workforce employed below their real skill levels (Guironnet and Jaoul-Grammare, 2007). One can speak here about potential loss of productivity and opportunity cost for the economy if workers do not utilize their skills properly and are less productive than they could be in a more Pareto efficient setup. Moreover, if workers who are over-educated were also about to persist in this phenomenon for prolonged periods of their working life then it may directly affect their wages in the long run and consequently their

lifetime wealth. One must also note that over-education being a phenomenon whereby workers who have attained an educational level which exceeds their present job's requirements may also by this sole reason be misplaced in terms of their social class (Aberg, 2003). That is to say their occupation may not resemble adequately their educational attainment and this may affect their social class position which is defined primarily by their occupation as well as their educational level. Yet worse may be the situation of the less educated who usually, as Aberg (2003) observes, would persist employed within the less demanding jobs. If a large pool of over-educated workers gets employed in jobs below their skill levels the crowding out effect may push working class workers to unemployment if over-educated workforce could act as their substitutes in the production processes.

2. Research hypotheses

In the second chapter of this dissertation we are investigating the interrelatedness of temporary contracts and over-education. It is a well known fact that Spain has the highest incidence of temporary contracts among OECD countries reaching roughly 30% of all contracts. This fact itself places Spain as an interesting case for study. We have asked whether contract permanency and over-education are significantly related and if so which the sign of this relationship is.

Temporary contracts may have various reasons. Some temporary contracts are granted because the job itself is of a temporary nature. Works done in agriculture in harvest of fruits or vegetables are excellent examples of such jobs. Other temporary contracts may be established in order to substitute for workers who temporarily have to abandon their present workplaces. Such temporary contracts clearly differ from the seasonal works in the work nature and human capital requirements for performing the job.

Eventually there may be temporary probation contracts. In such cases workers are employed on temporary basis in order to check their productivity, dedication and interest in the present work before they are employed indefinitely. Such contracts serve as a refined screening mechanism for employers who may observe directly workers productivity instead of relying only on their credentials and experience. Importantly such contracts are most often used for young workers who lack proper on-the-job experience and who otherwise form a uniform group of labor force indistinguishable to potential employers.

In Chapter 2 we analyze temporary contracts in the context of over-education. We do not distinguish between the aforementioned types of temporary employment since the data do not permit so. However our sample of young individuals aged 16-29 can be assumed to be mostly employed in the probationary type of temporary employment. Certainly we cannot rule out existence of other types of temporary employment in our sample. However controlling for immigrant status, education level and degree of urbanization in the selection into employment should diminish the influence from those other types of temporary employment.

In this chapter we investigate whether over-education is positively or negatively related to permanent contracts. On the one hand we could expect that firms are willing to employ over-educated workers for their higher productivity. In such a case employers would offer over-educated workers permanent employment to attach them to the firm. In contrast to that, following the predictions of the model of Smith (2007) we should expect that over-educated workers should be offered temporary contracts. Firms and workers would establish short-term contracts and resume their searches in the near future. Since over-educated workers may be frustrated with their jobs and this may affect negatively their productivity in the long run, both employers and workers have incentive to improve the matches by searching for new opportunities.

In the third chapter we advance a question whether under-/over-educated workers are more or less likely to obtain job training than their matched peers.

We expect that over-educated workers should receive less training than matched workers while under-educated workers are more likely than the matched to obtain job-related training. This is so for two possible reasons. Firstly employers as pointed above may favor employing over-educated workers as more productive. However if they already possess an excess of skills for the present job a rational employer will not offer such worker any training since s/he does not need it to perform the job most effectively. Contrary to that under-educated workers who lack adequate skills for their present jobs should be more likely than the matched ones to receive training. Employers in the case of under-educated personnel have reasons to offer them training in order to increase their productivity to the desired level. Certainly another strategy would be to fire them and search for a matched worker but one can think that such search may be too expensive or ineffective to carry out at a given moment. In such circumstances training of under-educated workers may be more effective.

On the other hand one may apply an argument of skill transferability to hypothesize whether under-/over-educated workers should receive training. Skills are transferable to a degree that they can be productively applied in many companies. That is to say that perfectly transferable skill could be productively utilized in a continuum of companies and a perfectly non-transferable skill could be useful for one company only. Education is assumed to equip individuals with strongly transferable skills. Workers who are over-educated possess an excess of easily transferable skills and so their employment options outside their present company may incentivize them to quit. In such cases employers would not invest in workers' training since the time horizon of such investment is unclear. Alternatively under-educated workers should be more likely to stay with their present employers since their deficit of transferable skills limits their external employment chances. In any case we should expect over-educated workers to be less likely and under-educated workers to be more likely to receive training than their matched peers.

The fourth chapter is dedicated to the question of how workers get to over-educated jobs. We hypothesize that graduates from so the called “hard fields” (e.g. engineering, science, medicine) are comparatively better endowed with private job search networks than their peers from so called “soft fields” (e.g. humanities, social science, art, law, services). It is so because hard fields’ graduates have more narrowly and therefore better defined sets of possible matching jobs than the graduates of more transversal soft fields. It follows that hard fields’ graduates possess better information of the labor market than the soft fields’ graduates. This in turn implies that chances to get over-educated should be lower for hard fields’ graduates than for the soft fields’ graduates while using personal job information networks (friends). Alternatively we could express the above hypothesis saying that using any other method than personal networks while looking for a job in the case of soft fields’ graduates should produce lower odds of getting over-educated than in the case of hard fields’ graduates. Hard fields’ graduates are hypothesized to enjoy better personal job information networks than soft fields’ graduates.

In order to verify these hypotheses we have to first however present the relevant theories related to education and labor market. Below we proceed with the review of educational attainment theories followed by labor market theories.

3. Educational attainment

Education in virtually all social sciences is thought to be the factor that mainly facilitates social status attainment, and thus it is a popularly desired good in modern societies. Economists typically use to think of education as a means in creation of human capital (Becker, 1993, Checchi, 2006, Grawe and Mulligan, 2002, Roemer, 1998). In such perspective educational attainment is used as a measure of human capital stock. The highest achieved level of education is then thought to be the proxy of human capital level. Distinct from this view is the sociological perspective, where educational attainment is thought to be a mediating factor in social achievement and thus a decisive variable in social mobility (Erikson and Jonsson, 1996, Erikson and Goldthorpe, 1992, Erikson and Goldthorpe, 2002, Shavit and Blossfeld, 1993, Shavit and Muller, 1998, Ganzeboom et al., 1991, Solon, 2002, Morgan et al., 2006).

Educational attainment is however widely studied as a proper subject of research. Influencing works come here from both economics (Acemoglu and

Pischke, 2001, Altonji and Dunn, 1996, Barro and Lee, 1996, Benabou, 1996, Checchi, 2006, CrespoCuaresma, 2005, Fuente and Domenech, 2001) and sociology (Breen and Goldthorpe, 2001, Breen, 2001, Breen and Jonsson, 2000, Breen and Jonsson, 2005, Fertig and Wright, 2005, Mare, 1981, Morgan et al., 2006, Nixon and Robinson, 1999, Shavit and Blossfeld, 1993, Shavit and Muller, 1998, Weeden and Grusky, 2005). Change in educational attainment over time is recognized in most studies cited above (see for instance excellent analyses by Ishida et al. and Muller and Karle (Ishida et al., 1995, Muller and Karle, 1993)). Raftery and Hout hold an important position in this strand of literature with their Maximally Maintained Inequality thesis (Raftery and Hout, 1993). While secondary and post-secondary educational opportunities expanded greatly in Ireland (and other countries) during last decades the class-related barriers of entry into those levels of education for lower social classes kept their pace with the expansion of the educational system. This observation confirmed for various other countries in Shavit and Blossfeld (1993) draws special attention. If present cohorts' educational opportunities are so strongly related to their parental class position despite the vast educational expansion it is expected that their occupational position will be affected by these influences as well.

There exist various theories of educational attainment intending to explain the aggregate changes in educational attainment that took place in recent decades in industrial societies. Shavit and Blossfeld (1993) advance two of them as the leading ones, namely cultural reproduction theory and its functionalist counterpart called modernization theory.

Cultural reproduction is thought to be manifested through the use of educational certificates to exclude members of subordinate or low status groups from desirable positions in the occupational structure. Education-based selection and allocation in the labor market are used to maintain the hegemony and privilege of dominant social groups (Shavit and Blossfeld, 1993, Lucas, 2001). Cultural reproduction theory thus assumes that higher classes use education as means of exclusion of lower classes from occupation of desirable employment positions (DeGraaf and Wolber, 2003, Graaf et al., 2000, Graaf, 1986, Kalmijn and Kraaykamp, 1996, Lucas, 2001).

In contrast modernization theory rooted in functionalism speculates that educational system has to expand in response to the functional requirements of a modern industrial society, where education plays a central role in the process of social status attainment. With the increase of the level of educational requirements in industrial societies, skills and qualifications

attained during the educational process are becoming crucial, leading to meritocratic educational selection. Meritocracy in turn should cause greater independence of socio-cultural background of a candidate in the evaluation process for placement in education system (see Goldthorpe J. Ch. 8, in Erikson and Jonsson (1996)). In a meritocratic society, therefore, we would expect greater social equality in access to education than in the society reflecting claims advanced by the cultural reproduction theory. Interestingly what we read in an article of Paul DeGraaf about the Netherlands and what remains roughly viable today for most OECD countries is that *inequalities in educational attainment due to race, sex, and region have decreased, but inequalities that can be attributed to parents' occupation and education have remained stable* (Graaf (1986), p. 237). Important to note here is the role of governments of virtually all industrialized societies where education became more democratic (available to wider groups of society) due to the fact that *government(s) began to sell education below the real costs* (Graaf (1986), p. 237). Since the 1990s the sociological literature has witnessed a rapid growth of micro models applied to one country and relying primarily on a rational choice perspective in an attempt to explain social stratification processes. Availability of large-scale comparative datasets opened the way to more in-depth analysis of intergenerational transmission of social status (Breen and Jonsson, 2005, CrespoCuaresma, 2005, Erikson and Jonsson, 1996, Graaf et al., 2000, Graaf, 1986, Woessmann, 2004). In the following section we introduce some theories related to parental background's influence on children's educational attainment. The theories described below by no means exhaust the scope of theoretical discourse on educational attainment. Their role is rather to signalize the potential role that parents may play in their children's education and later possibly also labor market performance (though the latter to a much smaller extent than the former).

3.1 Theories related to parental background

Acemoglu and Pischke (2001) find that a 10% increase in American bottom level family income is associated with a 1.4% increase of chances that their kids will attend 4-year-college. Family income is the key factor of what Shavit and Blossfeld (1993) name "economic constraint thesis" and which Breen (2001) describes in the following way: agents' educational careers are the consequence both of ex ante decisions by the families concerned [captured by

the idea of the financial threshold above which families quit educational process because they cannot afford it] and process of 'learning by doing' involving beliefs about the probability of educational success (Breen and Goldthorpe, 2001, Marjoribanks, 2004, Sandefur et al., 2005).

In an analysis based on data on USA Altonji and Dunn (1996) observe that parental income, despite being weakly significant for children's returns to education, in their article plays a key role as a factor giving origins to children's educational attainment which in turn conditions their labor market status.

According to Erikson and Jonsson (1996) there are two distinct sets of factors governing inequality of educational opportunity:

1. Differences in academic ability and educational performance between the children of different social classes;
2. Differences between the children of different social classes resulting from their propensity to continue on to higher levels (and/or academic tracks) of education.

Erikson and Jonsson (1996) claim similarly to Altonji and Dunn (1996) that measurement of economic standing of the family is not well reflected by the income of the family. For a support of this thesis, they develop an argument that the effects of parental education and social class are stronger on children's educational attainment than the same effects of parental income. The conclusion here is that it may be that economic circumstances are not well reflected by income, and that some of their effect is instead channeled through parents' class and education.

However, in relation to transitions to tertiary education Erikson and Jonsson (1996) claim that economic conditions in the family of origin may explain a substantial part of the cross-national variation in educational inequality at university level. It does not stand in contrast to the previous thesis that parental class conditions are better reflected in their education level than in their income. It is to say, that education has more permanent character than income, which is subject to fluctuations throughout the life time. Certainly it must be stressed that parental influences decline in the course of educational process of their kids being strongest at earlier stages and weakening later at upper secondary and tertiary stages¹.

¹ This issue is separately addressed in the next section. It is important to observe that our research in this dissertation concentrates mostly on the higher levels of education where possibly parental influences may already be limited (but not null). Especially they may be still important for the young group of individuals in chapter 2, who are thought to be possibly still living with their parents.

Apart from that authors believe also that cultural resources of the family are best captured by parental education level. They observe that *neither qualitative, nor quantitative studies carried out so far have been able to specify how cultural resources interact with social class, or indeed, how they differ between countries*. Walter Muller (in the same book edited by Erikson and Jonsson (1996), Ch. 4) notes that in countries with German heritage of higher education like Germany, Sweden and the other areas of former Austro-Hungarian monarchy the upper service class derived its position historically from educational attainment. It is then natural for this class to hold educational achievement in high esteem. This in turn may influence the fact that children from upper service classes nowadays in Germany and Sweden have educational advantage over their peers from other social classes. It is the excellent example of the cultural mechanism acting from the family background to children's educational attainment.

Cultural resources of parents embodied in their educational level influence children's chances for educational achievement through the following ways:

- Better strategic knowledge of the educational system – parents, as well as to some lesser extent other members of the family, may serve with information how to go through educational system to their children; it is clear that for more affluent families the information how to choose among opportunities in the educational system is more available than to families with lower education level.
- Provision of more qualified help with learning of cognitive and other type of skills that improve scholastic aptitude tests and teacher-assigned grades.

It must be noted that economic resources of the family have their impact not only on the financial feasibility of educational choices but also on the aspirations of the family members towards their educational careers. In fact as Erikson and Jonsson (1996) claim economic resources have a decisive role for costs attached to decisions about whether or not to continue school. On top of that cultural and educational resources in the family of origin influence the probability of success at a given level of education. In addition, there is yet presumably an effect of social origin on perceived benefits, because origin status determines children's educational and occupational aspirations and orientations. Heckman goes a step further here claiming that parental origins shape not only aspirations and orientations, but also personality and most importantly ability of individuals for their entire lifetime (Heckman and Krueger, 2003).

Those aspirations are thought to be another important variable in perpetuating class differences from generation to generation. In fact some authors like Herrnstein and Murray claimed that poor inherit poverty not only due to social reasons but also due to genetic traits (Herrnstein and Murray, 1994). The moderate level of this inheritance assumed by Herrnstein reached around 60%. This claim met significant criticism in the literature, which in a way validates that Herrnstein and Murray's claims proved to be provocative if not in some sense partly true (Goldberger and Manski, 1995). Others like Erikson and Jonsson (1996) point to class conditioned aspirations that hold poorer classes within the limits of their present social position.

The theory advanced by Boudon claims that parents' social position is decisive for children's educational choices, since children from the upper classes have more to lose than those from lower classes by not continuing their education (Boudon, 1974). Even if relative educational aspirations between classes may on average be similar, the between-class differences in values attached to educational choices prevail. It is more important for upper class children to meet high parental aspirations than for their lower class peers, since respectively their parents demand less from them in absolute terms. This theory does not lie far from Role Models Theory which we describe below claiming in its "culture of poverty" version that parents from poor classes represent "bad" models for their children and value more poor class behavior than higher classes' attitudes.

Susan Mayer structures our knowledge on the theories linking education and economic status with the aforementioned role models among them (Mayer, 1997). These are:

1. Investment Theory
2. Parental Stress Theory
3. Role Models

Investment theory advanced by Gary Becker (Becker and Tomes, 1986) claims that the relationship between parents and children's economic well-being results from a set of endowments that parents pass on their children (biological, cultural etc.) combined with parental investment of time and money in their offspring. The question how much parents can invest is the only one that can be addressed in this theory since parental endowments are taken as fixed. Parental investment depends on their own norms and values, their financial constraints, as well as public policies aimed at investment in children. Becker and Tomes analyze parental decisions as a nonlinear interplay of number of children n that they decide to have and quality of parental

investment per child q . In their view parents face a non-linear budget constraint in which n and q come in a multiplicative way ($n*q$).

Becker's theory of parental investment has however far-reaching insight into human capital creation theory. Becker observed that if parents are given a monetary transfer, not all the money they spend for investment in their offspring. Additional inflow into household budget shifts upwards family's budget constraint but that does not necessarily imply that parents spend all the additional money on their children's schooling, health or extra-school activities. Since in the budget constraint of parents enters, apart from nq , also their consumption, Becker suggested that parents will spend part of the extra income on consumption irrelevant to their children's human capital. Mayer claims referring to other studies that only 38% of family income is spent on children while the remaining 62% is spent on the adults' needs. Parents' orientations and values therefore should play a central role in their investments defining how much of resource and of which kind to invest in their kids' future. This is however not the unique approach to parental investment.

Parental stress theory claims that poverty is stressful for poor parents. This in turn influences negatively parental involvement in rising of their offspring. As Mayer says stressed parents are not able to provide their children with supportive, consistent and involved parenting, which consequently leads to poor social and emotional development of children. Children from poor families according to parental stress theory have limited social and educational opportunities due to their social and emotional problems resulting from difficulties in family life. In light of parental stress theory transferring income to poor families should diminish parental stress caused by poverty and thus lead to better parenting and consequently to higher child achievements.

A version of parental stress theory called transactional theory of child development claims that children's characteristics, such as their cognitive ability, temperament, and health, shape their responses to the environment, and that these responses in turn transform the environment (Mayer, 1997). Parental stress affecting directly their children's educational attainment may also affect their job search behavior at the school to work transition and therefore it may indirectly exert an influence on their likelihood to obtain a matched job. If searching for a matching job is time consuming and costly then children from families of low income with higher levels of parental stress may be more impatient and may opt more often for jobs which do not match their educational level just to obtain a job as soon as possible.

Role models commonly assume that parents who are at the bottom of income strata develop the so called “dysfunctional” forms of behavior which are irrational for members of higher classes. In fact, one may claim that those behaviors result from a clearly rational mechanism for the lowest income classes. In other words, what is rational at the bottom of the income strata may well be irrational at higher levels of the income ladder. Parents behave in such “pseudo-irrational” way in order to diminish their mental discrepancy between what they would like for their offspring and what appears to them feasible. In fact such behavior is known in the literature of social psychology as mental accounting. Parents who live at the bottom of the income strata, probably as much as parents from higher classes, would like their kids to go to college, however to those at the bottom college for their children does not appear feasible. A rational mechanism comes into operation here and dictates parents a position in which they reject college as a non-feasible option. In turn such parents promote for their offspring behavior that is “dysfunctional” for other classes (street culture, working class culture etc.). If parents believe that their children cannot succeed in school, attaching low value to education will reduce feelings of failure. Furthermore, since children tend to model their own values and behavior on the values and behavioral models of parents, parents’ “dysfunctional” values and behaviors are transmitted to their children. As a result, poor parents are “bad” role models for their children.

Interestingly role models imply that neither by increasing parental income nor by improving parental abilities to invest in children’s human capital can possibly improve children’s life chances in the short run. According to Mayer it is parental orientations and values what should be changed. This however is a slow process and it is heavily conditioned in parental opportunities.

All theories mentioned in this section influence in a way the likelihood of over-education. As we could see parental background is crucial for the development of children, their educational attainment and their non cognitive traits. It is no surprise that all the aforementioned factors such as role models, parental stress, and economic constraints, by shaping people’s educational attainment determine their chances to be over-educated. Over-education being a mismatch between person’s educational level and their job may result as well from labor market problems or from workers’ limited information about labor market. The literature on over-education raises frequently the issue whether over-education is caused by the supply or demand factors in the labor market (McGuinness, 2006, Halaby, 1994). The quality of the supply of labor is

however determined by workers' educational attainment and often, as mentioned before, at early career stages also by their parental resources.

Role models may play a similar role here. Children of well educated parents may follow the roles of their familiars but those roles may be already out of date in the labor market which in turn will result in mismatched jobs. On the other extreme parents may transmit roles to their children which may not match with present labor market structures and may jeopardize their chances for good jobs. Eventually the human capital model suggests that incorrect or too small investment in children may result in inadequate educational attainment which again will alter their chances for matched jobs.

Importantly one should note that as predicted by stress theory even very able individuals may result in obtaining low levels of education or dropping out too early from education and this in turn may place them in low skilled jobs for which they may find themselves under-qualified. Factors such as perseverance, ambitions, stress resistance are affected by parental behavior and in turn they may determine relative success (match) or failure (mismatch) in the labor market.

As we can see job match even though observed in the labor market has its roots in educational attainment which is conditioned by parental background. The influence of parental background is not uniformly distributed across educational careers of children. The section below discusses the issue more in detail.

3.2 Parental influences in the course of educational attainment

It is well documented that parental influences are not equally important across the whole educational experience of their kids. In the book of Erikson and Jonsson (1996) Walter Muller in chapter 4 concludes that for all nations data show a large commonality in the pattern of class effects. In all nations these effects are strongest in the lower transitions. They become smaller at higher levels of the educational system. Importantly with respect to class origins, as Shavit and Blossfeld contend, educational systems experienced twofold pressures. One way pressures on greater equality of genders have been expressed in all educational system analyzed by Shavit and Blossfeld, on the other hand however pressures for maintaining academic excellence have also grown. As Shavit and Blossfeld claim educational systems responded to those

pressures by allowing for expansion on the lower levels of education (primary and lower secondary) while increasing meritocratic selectivity at higher levels of education (especially tertiary education). The conclusion of the analysis carried out by Shavit and Blossfeld is that the increase in women's rate of educational participation has put a limit on the extent to which educational institutions could reduce social selectivity.

It is important to observe that parental influences on children's educational attainment are most crucial during the early childhood and adolescence. During the early childhood the intelligence is being formed and parental investment in the right stimuli for children's intellectual growth is primordial. During adolescence on the other hand the personality traits are being cemented and so right values and attitudes need to be transmitted. Both these periods affect significantly later individuals performance in educational system and labor market (Heckman and Krueger, 2003). Parental role declines with time since in early adulthood, neither intelligence nor the personality, are malleable anymore.

3.3 Networks and Social Capital Theory

Social capital was introduced into the literature by the sociologist James Coleman in 1980s. Coleman claimed that social capital entails all social relationships of an individual in the communities to which this individual belongs; that is to say, social capital is built through belonging to all the possible variety of groups, clubs, associations etc, as well as through family ties and friends networks, including work mates networks and professional groups. We may therefore expect family background to be important for children's educational attainment not only on economic and cultural but also social grounds (Coleman et al., 1982a, Coleman et al., 1982b, Coleman, 1988, Coleman, 1992). Coleman defines social capital in the following way:

Social capital is defined by its function. It is not a simple entity but a variety of different entities, with two elements in common: they all consist of some aspect of social structures and they facilitate certain actions of actors. (...) Social capital comes about through changes in the relations among persons that facilitate action. Social capital exists in the relations among people (Coleman (1988), p. S98). According to Coleman then, social capital draws its existence on relations between people which involve norms of behavior. The existence of norms of behavior is what differentiates social capital from a very

similar concept in economics called networks (Finneran and Kelly, 2003, Ioannides and Loury, 2004, Smith, 2000). Coleman in his work concentrated mostly his analysis of social capital on relations within the family: *It is of course true that children are strongly affected by the human capital possessed by their parents.² But this human capital may be irrelevant to outcomes for children if parents are not an important part of their children's lives, if their human capital is employed exclusively at work or elsewhere outside the home. The social capital of the family is the relations between children and parents (and, when families include other members, relationships with them as well)* (Coleman (1988), p. S110).

Therefore if parental human capital is not complemented with social capital then it is useless for children's education since children cannot benefit from parents' knowledge and support. Certainly Coleman allows for existence of human capital outside the family and generally defines it as intergenerational closure, where parents of child A know parents of child B and interact with them acquiring information about their offspring from sources outside home. Parental social capital therefore can also be understood through links (either formal or informal) with other people like teachers, employers etc. Therefore social capital facilitates exchange of information and actions based on such enlarged information sets. Coleman in his famous work on social capital stressed on various occasions the importance of parent-child emotional links.

On the similar grounds Coleman et al. (1982) validate findings that children from catholic schools achieved higher grades and performed better than children from public or laic schools. It is important to note that children in catholic schools on average had less changes of school per year than children from other schools. Their families were also on average more often involved in their school lives than in laic schools. Hence, we may conclude that social capital provides another interesting insight into parental influences of children's educational outcomes (Brooks-Gunn et al., 1993).

The economic literature concentrated its efforts on explaining how networks existing between economic agents (individuals, organizations) may result in higher wages and/or easier job matching. The major observation here is that networks are mostly productive when they are linking very heterogeneous groups of agents. Such networks entail very diversified information which is

² Recall the earlier discussion of Erikson and Jonsson (1996) on parental characteristics and children's educational outcomes. Parental education is a measure of their human capital in virtually all sources analyzing educational attainment.

crucial for obtaining good jobs (Calvo-Armengol, 2004, Holzer, 1987a, Holzer, 1987b, Holzer, 1988). Job search networks (or more generally economic networks) unlike social capital do not entail the element of norms. They are strictly based on the issue of information asymmetry in the market and unequal access to it. The link between networks literature and its sociological counterpart embodied in social capital lies in the works of Granovetter who described two types of possible ties between people: strong and weak (Granovetter, 1973). Weak ties link individuals who are not closely related: work mates, members of associations, neighbors, acquaintances etc. Strong ties are thought to be linking close friends and family members. By their nature then the strong ties link very homogeneous types of individuals who are likely to possess the same type of information and therefore cannot be a good source of new information. Economic literature frequently refers to weak ties as the type of network which links heterogeneous agents producing greatest access to information.

3.4 Fields of study

The description of the literature on educational attainment would be very incomplete if we did not mention a growing body of research on fields of study (Werfhorst, 2008). The literature on educational attainment has recognized fields of study as an important factor distinguishing different types of education (Arcidiacono, 2004, Altonji, 1993, Berger, 1988, Betts, 1996, Kim and Kim, 2003, Werfhorst, 2004, Werfhorst et al., 2001, Werfhorst and Kraaykamp, 2001).

In majority the research on fields of study has concentrated on the wage effects of different fields. The analyses of the influence of fields of study have been conducted for the U.S. (Loury, 1997, Arcidiacono, 2004, Gerhart, 1990, Grogger and Eide, 1995, James et al., 1989, Loury and Garman, 1995, Marini and Fan, 1997), Canada (Finnie and Frenette, 2003), Norway (Hansen, 1997, Hansen, 2001), the Netherlands (Kalmijn and Lippe, 1997), the UK compared with Germany (Machin and Puhani, 2003, Kim and Kim, 2003), and France (Margolis and Simonnet, 2003, Margolis and Simonnet, 2002). A notable distinction is the work of Werfhorst who compared returns to different fields of study in Australia, Norway and Netherlands paying special attention to systems of education in these three countries (Werfhorst, 2004).

The majority of these studies distinguish gender as one of the key aspects of selectivity of individuals into different fields of study. They distinguish in general that while engineering could be regarded as masculine field, teacher training and health are primarily feminine domain of studies. Other fields fall in between these two types and the distribution of males/females among them depend to some degree on the country under study.

Other studies concentrate on the choice of the field of study by students. Many of them as mentioned before focused their attention on the gender issue (Bradley, 2000, Charles and Bradley, 2002, Boudarbat and Montmarquette, 2007, Canes and Rosen, 1995, Loury, 1997, Machin and Puhani, 2003, Polachek, 1978, Gerhart, 1990). Some however studied other determinants ruling the choice of field of study. Easterlin draws attention to a stylized version of role models whereby students choose their college major basing on the information on their older siblings' choices and their relative labor market success (Easterlin, 1995). Altonji analyzed the issue of uncertainty in the decisions about the choice of college major based on expected returns to education (Altonji, 1993). He supported his theoretical analysis with findings on the U.S. data. Boudarbat conducted similar analysis although supported with data for Canada (Boudarbat, 2008). Boudarbat with Montmarquette studied parental influences on the choice of fields of study (Boudarbat and Montmarquette, 2007). They found that mothers usually influence positively choice of given fields while fathers' education negatively influences their offspring's choices of the same fields as the fathers'. An interesting study comes from Cai for Chinese and Taiwanese students (Cai, 2003). It concludes that while cultural traits still play an important role in gendered choice of fields of study by students from China and Taiwan in the U.S., the Chinese policy incentivizing women's choice of technical fields, results in increased choice of engineering and science studies by Chinese women in the U.S. Finally Grogger and Eide analyzed the rise in the college wage premium in the U.S. and attributed it to the shift of students from "low skill field such as education to the high skill field such as engineering" (Grogger and Eide, 1995).

All these studies drew attention to fields of study as an important factor distinguishing between different types of educational attainment and this gave rise to their inclusion as controls in the research on over-education (Green and McIntosh, 2007, Allen and Velden, 2001, Dolton and Vignoles, 2000, Finnie and Frenette, 2003, McGuinness, 2003, McGuinness and Wooden, 2007, Smoorenburg and Velden, 2000). The over-education literature has recognized fields of study as an important factor which may actually influence the

likelihood of becoming over-educated (Ortiz and Kucel, 2008a). In chapter 4 of this thesis we analyze whether the type of field of study affects significantly the job-search methods and whether those in turn influence the likelihood of becoming over-educated. We find significant differences between fields which require higher math skills and those which are not so quantitatively oriented. The only article which clearly addresses the issue of ability selection into different fields of study notes that students from engineering, natural and pure sciences, and medicine exhibit higher quantitative ability than students of social sciences, humanities, arts, law (Arcidiacono, 2004). We have followed this in our modeling strategy in chapter 3 and chapter 4 (as mentioned before). In chapter 3 we have assumed that quantitative ability is an important selective variable for labor market candidates upon their employment. We have assumed following Arcidiacono (2004) that on average more mathematically gifted individuals self select into engineering, medicine or sciences, while less quantitatively able and more verbally oriented self-select into humanities, social sciences, services, law fields. This assumption is reinforced by findings of Arcidiacono (2004) who not only demonstrated that students of fields like engineering are more mathematically able but moreover they proved to have also better verbal skills. Notwithstanding the analysis of Arcidiacono (2004) in light of the work of Heckman and Krueger (2003) demonstrates only that fields of study reproduce the pre-existing order of ability selection which finds its roots in early childhood and family background.

3.5 Summary of links between educational attainment and over-education

We have discussed so far the educational attainment process. Its development is primarily conditioned on family background. The family background variables that should be kept in mind are very diverse here. They range from financial resources, through cultural traits, to emotional influences. It is certainly not possible to control for all these influences. In the present research we are able only to control for some aspects of family influence as the data used here does not contain rich information on family background. This is particularly troublesome since as we could see above family background plays a key role in the development of educational attainment. Inclusion of fields of study in the analyses in this thesis hopefully captures some of the

influences of parental background on educational attainment, but we have no information on other family characteristics which as proposed by various theories quoted above should be accounted for. Specifically we cannot control for presence of stress in the parental household, we have no information on students' (or later workers') aspirations, orientations and desires. We do not know anything about their cultural traits. This has to be kept in mind that more research is needed particularly into these personality traits of workers. Perhaps they may explain why some workers get over-educated while others find matching jobs with considerable ease.

In the second chapter of this thesis we control for education level of the best educated parent in the family. As Erikson and Jonsson (1996) described it parental education is the single most influential factor shaping their children's educational attainment. Since in the second chapter we concentrate on young group of individuals we found it important to control for parental level of education. In the other two chapters of this thesis we do not control for family background of individuals and so this may bias our results.

4. Labor market theories related to over-education

As we have seen in the previous sections economic and sociological literature places education as a central issue in the process of intergenerational mobility (Breen and Jonsson, 2005, Solon, 2002). Usually, educational attainment leads to better employment chances and a higher probability of upward mobility. However Freeman (1968) demonstrated that there is a ceiling on the educational attainment that bounds its productivity in terms of social mobility. Over-education in this context becomes, therefore, an issue of key importance. It is necessary to understand the mechanics of over-education as much as it is necessary to describe the role of education in mobility theory. Over-education is thought to be a problematic issue. Some researchers reject its existence and claim it to be an artifact of inadequate statistical methods (Becker, 1993). Becker's Human Capital Theory views over-education as a purely temporary state of maladjustment between a firm's technology and the human capital of its labor force. Under human capital theory, either firms adjust their technology to fully utilize the available human capital or it proves wasteful for workers to invest in too high levels of human capital. In equilibrium, the human capital model does not allow for the existence of an over-educated workforce. According to the human capital model, workers are paid their

marginal product (which means that their entire productivity is at work) which in consequence leads to a situation where workers reap wages according to their level of productivity. Earlier versions of human capital theory, particularly that of Mincer, would argue that individuals with more schooling may be compensating for a lack of work related human capital, and the apparent lower earnings of these overeducated workers may be attributable to an omitted variables problem, that is, a lack of controls for less formal measures of human capital accumulation. So, while some would argue that human capital is not consistent with the observed facts (Dolton and Vignoles 2000), this would only be true if over-education proved to be a long term phenomenon and/or persist when controls are included for work-based human capital investments and/or worker skills heterogeneity (McGuinness 2003).

Another theory which sees over-education as a temporary phenomenon is the Matching Theory (Pissarides, 2000). In the matching framework, workers search the labor market for job offers and firms screen the labor market for the most productive workers. For both sides the search is costly. Therefore there is a possibility that temporary mismatches occur which are caused either by the inadequacy of a worker's education to the job performed (horizontal mismatch between college major and job type) or in the level of required human capital for the job under question. Both types of mismatch eventually get corrected, according to matching theory since mismatched workers change jobs in order to improve their match and achieve a higher salary. That is, in a typical matching framework there are no mismatches.

Over-education, however, proves to be a problematic issue in light of both human capital and matching theories. It is demonstrated to be more persistent than both models preview (Dolton and Vignoles 2000; Frenette 2004; McGuinness and Wooden 2007; Sloane, Battu and Seaman 1999). This makes us turn to alternative theories which either extend the existing ones such as Job Mobility Theory (Sicherman and Galor, 1990, Sicherman, 1991) or propose a completely alternative view of educational attainment such as that put forward by Assignment Theory (Sattinger, 1993) or the Job Competition Model (Thurow, 1974).

Job Mobility Theory assumes that workers get into over-educated positions because of a lack of clear signals about their productivity (Sicherman, 1991, Sicherman and Galor, 1990). According to this theory, over-educated workers remain in an over-educated position only for a short period of time in order to acquire work experience, which in turn signals their productivity. With more experience, workers move to better jobs and step out of over-education

(Hersch, 1995). They adhere to better jobs either by internal mobility within firms (Groeneveld and Hartog, 2004) or external mobility (Sicherman, 1991). Therefore, even if the existence of over-education in the labor market in the long term is observed, the human capital model in light of job mobility theory does not lose its explanatory power. It is clear that workers who manage to successfully signal their productivity will obtain the best positions (Spence, 1973).

Thurow's Job Competition model assumes an entirely different view from Sicherman's job mobility theory. There are two queues in Thurow's model. Firstly workers form a queue for jobs where the relative position of a worker in the queue depends on their level of educational attainment. The second queue is formed by jobs ranked from the least demanding (in terms of training) to those requiring the highest qualification (Thurow, 1974). Under this model, workers always have an incentive to invest in more education, as it shifts them upwards in the queue for the best jobs. In such a case, over-education may be part of the natural state for workers competing for the best jobs. As the best jobs are scarce, few workers will be assigned to them and all others with high levels of education will be consequently assigned to lower quality jobs, requiring comparatively less education. This view emphasizes the importance of a person's relative position, and clearly explains over-investment in education and over-education. In the Thurow's model jobs are ordered with respect to training. The wage offered is not reflecting the productivity only but also the training costs of a worker in the job.

Finally, Sattinger's Assignment Theory forms an intermediate step between the human capital perspective and the job competition model (Sattinger, 1993). It claims that workers firstly choose the sector in which they would like to work and then within this sector they choose the job which maximizes their utility. Assignment models all specify the jobs or sectors available to workers, the relevant differences among workers, the technology relating job and worker characteristics to output, and the mechanisms that assign workers to jobs. This framework treats workers similarly to human capital theory as rational market players while allowing a job's allocative role for workers in the market, consistent with job competition theory. According to assignment theory, workers choose jobs, but only those which offer a good wage and/or other non-pecuniary characteristics. Unlike human capital theory or job competition theory, the wage in assignment theory is not directly observable; but is rather a product of a worker's optimization problem and job characteristics. It is certain in the neoclassical framework that workers look for the highest

possible wages as it is assumed that wage subsumes all other desired job characteristics. Assignment models differ significantly from the job competition interpretation in that they stress that choice of job or sector creates an intermediate step between individuals' characteristics and their earnings. Workers found in a particular sector or job are not randomly distributed, but are there based on the choices made to maximize their income or utility. The assignment models are the most plausible explanations for the existence of over-education in the labor markets as they claim that workers and firms may be voluntarily opting for establishing over-educated job matches which maximize their economic objectives.

However it has been observed that despite being rewarded for their over-education positively (Groot and Brink, 2000) over-educated workers tend to demonstrate significantly high levels of dissatisfaction and frustration (Rumberger, 1987, Tsang and Levin, 1985). This puts into question whether over-education is a phenomenon that can be harmlessly tolerated in the labor market. Thus, understanding how people get into over-educated positions becomes a key question to be addressed.

5. Measurement of over-education

5.1 Developments in the measurement of over-education

Over-education posed also significant methodological challenges to researchers. Principally its major problem is measurement. Below we sketch the short history of evolution of three major measurement strands which exist today and which have been extensively discussed by sociologist Charles Halaby, who was also the first to more systematically describe the measurement methodology of over-education (Halaby, 1994).

All the early over-education studies (mainly) by Freeman and largely all by Rumberger before the mid-eighties were based on the so called DOT-GED approach. The General Educational Development (GED) scores gave way to creation of a Dictionary of Occupational Titles (DOT). It contained information on educational requirements of jobs performed in the U.S. The job experts were firstly visiting the job sites to observe directly what requirements each job posed for educational credentials of a worker. In the second step experts were establishing the formal educational requirements for each job which they

observed. Aggregated information from the experts served later to create the Dictionary of Occupational Titles. Early research on over-education based primarily in the U.S. relied almost entirely on the DOT classification. Note that such an approach limits the definition of a “good match” to a particular educational level disregarding the possible diversity of jobs within even the most narrow occupational categories (Halaby, 1994). The DOT-based measures belong to a class of measures of over-education called Job Assessment (JA). The name comes from the aforementioned assessment of educational requirements of the jobs by work experts who created the DOT classification. In 1981 two economists Greg Duncan and Saul Hoffman (Duncan and Hoffman, 1981) published work based on an entirely new measure of over-education abandoning the DOT classification. In their influential article *The Incidence and Wage Effects of Overeducation* they rejected the DOT-based measure and instead relied on a subjective measure of over-education. Subjective measures form today another class of measures of over-education called: workers’ self-assessment (WA). The subjective measure is normally an outcome of workers’ responses to a question whether the job they currently perform requires less, as much or more education than they currently have. All the responses which claim that the job requires more education than they have are coded as under-education, all those which say that the job requires less education than a worker has are coded as over-education and the remaining are understood as correct matches. In their study Duncan and Hoffman found very large levels of over-education in American society, reaching 40% for the entire workforce and roughly 50% of the black workforce. A very important finding of theirs is the observation that over-education yields positive wage returns. Over-educated workers according to Duncan and Hoffman earn more than comparably matched workers in the same occupations. The return to an additional “over-educated” year of schooling proved to amount only to half of that for additional year of required schooling. It suggested decreasing returns to additional years of schooling in over-educated jobs. The model of Duncan and Hoffman is by far the most methodologically advanced as concerns over-education. Their famous ORU (over-/required/under-education) specification allows for much deeper conclusions than other models based on inclusion of dummy variables. The ORU model allows for instance for estimation of the relative reward to one year of over-education in terms of wage (or the training likelihood), while the models based on dummy variables measuring over-/under-education allow only for estimation of relative opportunity loss

associated with the mismatch.³ Similar approach as in Duncan and Hoffman was later employed in the early over-education studies by Rumberger and Shockey (Rumberger, 1987, Shockey, 1989) among others.

The third family of measures called realized matches (RM) was introduced into the literature on over-education by Clifford Clogg and James Shockey (Clogg and Shockey, 1984). The method applied by Clogg and Shockey to measure over-education relied on the principle that each occupation contains a core of matched workers whose educational credentials correspond to the requirements of their respective jobs. Starting from these premises they built a measure (developed further in countless other studies) which assumed that over-educated workers are those whose schooling exceeds the mean years of education specific for their respective occupation by more than one standard deviation. Consequently under-educated would be those workers (in light of Clogg and Shockey's measure) who possess less than mean minus one standard deviation years of education for their occupation. As Halaby observes this measure *aggregates summary properties of intra occupational distribution of completed schooling* (Halaby 1994, p. 49). Presently mostly the two latter methods of the measurement of over-education are being employed in analyses: workers' self-assessment (WA) and realized matches (RM). Recent review of literature on over-education can be found in the article of Seamus McGuinness (McGuinness, 2006).

5.2 Measurement discussion

One of the major criticisms that are often directed towards over-education studies is the measurement of the phenomenon itself. Decisions which workers are over-educated and which are matched with their jobs are not trivial since they always involve some degree of subjectivity either from the workers' assessment or from the side of the researcher.

There is no perfect measure of over-education in the labor market. The DOT-based measure has been criticized for its rigidity in terms of educational requirements for jobs and limited comparability across countries. There were attempts to create dictionaries of occupational titles across the world but it

³ Our data does not allow for a full specification of the ORU. In chapter 3 we have replicated our analysis with stylized version of ORU model based on educational levels instead of years of education. Years of education were suppressed in our data due to anonymization by the Eurostat.

seems that the DOT-based measures have seen already their best times. Much more attention has been drawn towards subjective measures (WA) and towards objective measures of Clogg and Shockey's style.

Subjective measures can be criticized on various fronts. Primarily however they are disliked by some researchers because they are *subjective*. Use of such measures has to be supported by trust in workers' good judgment of the relative requirements of their jobs and their truthfulness in their assessments. In other words workers have to speak the truth in terms of how they evaluate the relative educational requirements of the job towards their own educational attainment and this evaluation must be based on good knowledge of how much education the worker really needs to perform the job tasks correctly. This surely can never be fully achieved and it is the major limitation of the subjective measures. Another shortcoming of this type of measures comes from their strong ties to the semantics of the language in which the questions are asked. The same question asked in different languages will not always have the same meaning thus heavily influencing (if not impeding) the international comparisons based on such measures.

The third type of measures, namely those based on realized matches are not perfect remedy to the above problems either. Realized matches measures take into account intra occupational distribution of educational attainments and are therefore well received in the literature. On the other hand however their construction involves arbitrary decision of researcher – namely it requires setting the threshold for deciding how much education is decided too much in each occupation. Clogg and Shockey (1984) decided that more than one standard deviation above the mean is going to signify over-education but this decision is purely arbitrary. Sometimes researchers assume the interval of one standard deviation around the median to signify correct matches. It has to be stressed however that realized matches suffer from other drawbacks. Often it is the case that respondents to the survey question when asked how many years of education they possess have difficulties ascertaining how long have they really studied. Automatically however they can respond what was their age when they graduated. If the age of graduation is coded as a separate variable in the survey, then researchers may build measures of over-education knowing the typical age of starting the education in the country under study. However if age of graduation is not given then there is no objective way of verifying whether respondent did not confuse their age of leaving the education with years of education. Sometimes it happens then that we find individuals in the samples whose years of education are excessively high but

they have not achieved very high levels of education. If there is no way of verifying the level of education achieved then such observations may severely distort the results of the study on over-education.

In this thesis we propose a different measure of over-education. Our measure continues the strand initiated by Clogg and Shockey but avoids typical problems of measures based on years of education. Instead of years of education we use level of education achieved to build our matched group. This has very important implication – there is no possibility for existence of outliers in our educational measure. Levels of education are bounded from above and from below. The highest level is graduate tertiary and the lowest incomplete primary. Furthermore we have opted here for deciding the threshold for under-/over-education using percentiles instead of mean and standard deviation. This way all workers whose level of education is lower than the level of education of the workers comprising 30th percentile in their respective occupation were decided to be under-educated (they possess ‘on average’ less education than their jobs require). All workers whose level of education exceeds that of the workers in the 70th percentile in their respective occupation are decided over-educated. This way the middle 40 percentiles of workers are decided matched. This measure would be heavily criticized by Halaby (1994) for its arbitrary character. However as Halaby (1994) also observed with respect to Clogg and Shockey’s (1984) measure [also here] the required level of education per occupation and educational attainment are measured in the same metrics – in our case ISCED categorization. Use of ISCED categories brings another profit from our new measure: it allows for comparisons across Europe (or even OECD) in over-education studies. The ISCED metrics is sensitive to country-specific organization of educational systems, available curricula and but unlike years of education signifies always the same educational attainment when talking about certain educational levels. As proposed by Halaby (1994) we have also taken into account certain degree of distribution of educational levels within each occupation. It is true however that with more detailed categorization of occupational categories our measure would gain significantly on its quality.

5.3 Meta-analysis of incidence of over-education

In this section we present a meta-analysis of the research published so far on over-education. In the table presented in this section we have included only those studies, where the incidence of over-education has been measured. It is therefore clear that the list of 46 studies reported below is not a complete review of all works on over-education. It however represents a significant part of what is known contemporarily on over-education across countries. The list has been created on the basis of two other works of Groot and van den Brink (2000) and McGuinness (2006) but it contains also recent works which updates their analyses.

Table 0.1. Meta analysis of literature on over-education.

Study	Year	Measure type	Country of study	Data collection	Over-education incidence (percentages)
Aberg	2003	WA	Sweden	1995	35.8*
Alba-Ramirez	1993	WA	Spain	1985	17
Allen, Velden	2001	WA	Netherlands	1998	14
Alpin	1998	JA, RM	UK	1995	27
Bauer	2002	RM	Germany	1984-1998	11.5
Budria, Moro-Egido	2008	WA	Spain	2001	24*
Burris	1983	JA	USA	1977	21.7
Chevalier	2003	JA, WA	UK	1996	17
Cohn, Kahn	1995	RM, WA	USA	1985	33*
Cohn, Ng	2000	RM	Hong Kong	1986(1991)	35(34)*
Daly, Buchel, Duncan	2000	WA	USA(Germany)	1985(1984)	32.65(17.5)*
Dekker, Grip, Hejike	2002	WA	Netherlands	1990-1992	30.6
Dolton, Siles	2002	WA	UK	1998	22
Dolton, Siles	2008	WA	UK	1998	25
Dolton, Vignoles	2000	WA	UK	1986	30
Duncan, Hoffman	1981	WA	USA	1976	42
Fabel,	2007	JA	USA	2003-2006	58

Pascalau					
Frenette	2004	RM	Canada	1984-1995	30
Green, McIntosh	2007	WA	UK	2001	37
Groneveld, Hartog	2004	RM	Netherlands	1995(1998)	18(19)
Groot	1993	RM	Netherlands	1983	16
Groot	1996	RM	UK	1991	11
Groot, van den Brink	1997	RM	UK	1991	11.5*
Halaby	1994	JA, RM, WA	USA	1973(1977)	18(30)*
Hartog, Osterbeek	1988	WA, RM	Netherlands	1982(1960-1977)	16(7-25)
Hejike, Meng Ris	2003	WA	Netherlands	1994-1995	18 ^a
Hersch	1995	WA	USA	1991	21
McGoldrick, Robst	1996	WA	USA	1985	50*
McGuinness	2003a	WA	Northern Ireland	2000	20
McGuinness	2003b	WA	Northern Ireland	1999	24
McGuinness, Bennett	2007	WA	Northern Ireland	1999	27*
McGuinness, Wooden	2007	WA	Australia	2001-2004	(severely) 14*; (moderately) 29*
Kiker, Santos, Oliveira	1997	RM, JA	Portugal	1991	(9.4-33.1) 25.5*
Oliveira, Santos, Kiker	2000	RM	Portugal	1991	9*
Patrinos	1997	RM	Greece	1977	16
Robst	1995	WA	USA	1976, 1978, 1985	44.68
Robst	2007	WA	USA	1993	20.1 ^a *
Rumberger	1981	JA, WA	USA	1977	16*
Rumberger	1987	WA, JA	USA	1969, 1973 (1973,JA), 1977	35; 27, (32); 57
Sicherman	1991	WA	USA	1976, 1978	40.8*
Sloane, Battu, Seaman	1999	WA, JA, RM	UK	1996	40*; 22*; 33.65*
Smooenburg,	2000	WA	Netherlands	1994	39*

Velden					
Tsang, Rumberger, Levin	1991	WA, (JA)	USA	1969-1977 (1973)	35-32, (57)
Verdugo, Verdugo	1989	RM	USA	1980	10.9
Vahey	2000	WA	Canada	1982	31*
Verhaerst, Omev	2004	JA, WA, RM	Belgium	1999	54.3*; 44.5*; 12.7*
<p>*Depicts mean value of over-education (usually computed for both male and female genders). ^a Refers to field mismatch (field of education does not match the field of work). Based on Groot & van den Brink (2000) and McGuinness(2006) with updates. 46 studies reported. The JA, WA, RM indicate respectively Job Analysis method, Workers' Self-Assessment and Realized matches method (statistical method) of measuring over-education.</p>					

It is immediately clear from the above table that a large number of studies come from the U.S. (15 out of 46 studies). This is due to the data availability problem as well as some historical legacy. For a long time there were no studies on over-education in Europe primarily due to the lack of adequate data. The development of statistical measures of over-education across occupations there opened a wide avenue for new research with use of standard datasets available also in Europe. Another reason for the fact that so many studies concentrated on the American labor market is the historical legacy of works of Freeman, Rumberger and above of all Duncan and Hoffman's (1981). Panel Study of Income Dynamics and National Longitudinal Study of Youth were the most frequently used datasets in research on over-education in the U.S.

The second most often studied country in terms of over-education is the UK. The 9 studies presented in the above table by no means exhaust all the literature published on the UK with reference to over-education. That is again primarily due to data availability. For the same reason we find the 7 studies on the Netherlands.

What is striking however in the above table is the fact that estimates of average over-education incidence in a given country vary considerably from study to study. Even the same authors report often two or three different estimates for the same time span and same country. This is the result of using different measures of over-education. There is no one good universal measure of over-education accepted in the literature. Instead there are three different families of measures each leading to different results. Which is the best remains an open question. However if studies reported above are correct then

incidence of over-education like the one in Belgium reaching 50% of the labor force should cause a considerable debate on both, labor market functioning and its attunement to the educational system (Verhaers and Omeij, 2004). Belgium is not an outlier here since similar figures have been reported for the U.S. (Duncan and Hoffman, 1981, Fabel and Pascalau, 2007, McGoldrick and Robst, 1996, Robst, 1995, Tsang et al., 1991). The average Dutch figure for over-education incidence is about 16-18% with notable exceptions for two studies which reported incidence of about 30-39% (Heijke et al., 2003, Smoorenburg and Velden, 2000). The two studies reporting over-education in Spain show an increase in the incidence of over-education between 1985 and 2001 of 7 percentage points (from 14% to 24%) (AlbaRamirez, 1993, Budria and Moro-Egido, 2008). Our results for the year 2003 reported in chapter 2 of this thesis could indicate yet additional increase of up to 29% of over-education among all employed workers. Certainly the incidences measured with the use of different measures cannot be directly compared. A fairly low incidence is reported for Portugal where only 9% of workers are thought to be over-educated (this again depends on which measure is being used) (Kiker et al., 1997, Oliveira et al., 2000).

Studies for the UK demonstrate quite a clear pattern that over-education incidence has increased over time from 11% in 1991 to almost 31% in 2001 (Groot and van den Brink, 1997, Groot, 1996, Green and McIntosh, 2007). There are certainly fluctuations of the over-education incidence visible in the studies on UK labor market (as well as in the studies on other countries) but they are as we have said before attributable directly to the measurement problem of over-education.

Notwithstanding what remains clear is that over-education is not a negligible problem affecting minor parts of the labor force. It affects from a quarter to almost one third of the labor market in advanced economies like the UK, U.S. or the Dutch labor market, and thus it deserves attention as a potential threat for workers' careers and in consequence possibly their offspring's well being.

The vast majority of the studies presented in this analysis have focused on the wage effects of over-education (AlbaRamirez and Segundo, 1995, AlbaRamirez, 1993, Allen and Velden, 2001, Alpin et al., 1998, Bauer, 2002, Chevalier, 2003, Cohn, 1992, Cohn and Khan, 1995, Cohn and Ng, 2000, Daly et al., 2000, Dolton and Silles, 2002, Dolton and Silles, 2008, Frenette, 2004, Groot, 1993, Hartog and Oosterbeek, 1988, McGoldrick and Robst, 1996, McGuinness and Bennett, 2007, Patrinos, 1997, Sloane et al., 1999, Verdugo and Verdugo, 1989, Vahey, 2000).

The major observation that comes from this research is that over-educated workers are paid more than their colleagues in the same jobs but are paid comparatively less than if they would be in matched jobs. The situation with under-educated workers is a reverse, mirror view of that for over-educated workers. The under-educated workers earn more than if they would be matched but less than their peers in the same jobs as they presently are. One can therefore speak of a penalty associated with over-education which would be embodied in the opportunity cost of mismatch with respect to possible matched job. The opportunity penalty for over-education varies significantly from study to study just as the sole magnitude of the incidence of over-education. The largest penalty for over-education is reported for UK reaching 27% of wage, followed by U.S. with roughly 11-13% of wage and these figures followed by the Dutch experience with 7.5-12% wage penalty. The majority of studies apart from the forgone earnings penalty report also some reward in the present job for the years of over-education. Usually the wage reward for additional year of education while over-educated oscillates irrespectively of the country of study between 4-7%. Under-education is penalized directly in the present wage with 3-5% loss of earnings.

An important contribution to this literature comes from Tahlin and Korpi (2009). Basing on the Swedish data they analyze wage growth of over-educated workers using ORU model proposed by Duncan and Hoffman (1981).⁴ The major finding is that over-educated workers get penalized for over-education early in their careers by an inferior rate of return to schooling which influences their wages later; even after accounting for individual differences in ability the wage results prevail (Korpi and Tahlin, 2009).

Apart from the wage effects very few studies concentrated on the likelihood of training of over-educated workers. The major finding here is that over-educated workers are less likely than the matched ones to be trained (Heijke et al., 2003, Barron et al., 1989, Buchel and Mertens, 2004, Smoorenburg and Velden, 2000).

In the following section we focus our attention on institutional characteristics which by shaping labor markets and educational systems inevitably exert an impact on over-education.

⁴ This makes their analysis comparable with other works in this strand.

6. Institutional characteristics

Importantly it must be noted that the German studies listed in the meta analysis section show a very low level of over-education incidence. It might be so because of the German educational system, which is very well attuned with their labor market. The famous dual system of schooling with very well developed vocational education plays an immensely important role linking educational credentials with labor market requirements.

This leads us to the observation that Spain which is the country under study in chapters two and three of this thesis represents almost the opposite case to the German one. In Spain, which by Shavit and Muller (1998) was classified as a country pertaining to organizational space where productive skills are attained at work rather than in education, the labor market and educational system are very loosely linked. There is virtually no influence of firms on training curricula and the vocational system of education is not well esteemed. The Spanish educational system, in this respect, could be classified as well standardized (offering fairly uniform quality of education across country), poorly stratified (offering few options outside neglected vocational education and traditional academic track) and definitely not vocationally oriented as is the case of Germany or Netherlands (Allmendinger, 1989).

All these three characteristics of the Spanish educational system and its low level of connection with the labor market pose significant difficulties for young workers in attaining good matches. Other countries like UK and the U.S. are similar in this respect to Spain and all of them we observe quite high levels of over-education in the labor markets. Moreover it can be observed that over-education in these countries increased across time.

The institutional context with specific reference to labor mismatch is certainly not a new conception. It has been recognized and well documented in the literature that institutions influence the matching process and in turn also the labor mismatch (Padoa-Schioppa, 1991, Pissarides, 2000). The major effort of institutional context has been put on comparing how different educational systems and their relations to respective labor markets influence educational mismatches (Daly et al., 2000, Ortiz and Kucel, 2008a). Issues concerning employment protection legislation have been raised with respect to labor mismatch (Padoa-Schioppa, 1991). It has not however been studied how temporary contracts which are known to be shaped by employment protection legislation are related to over-education. This gives the rise to the research

question of our second chapter where we study interrelatedness of temporary contracts and over-education in Spain. Had we chosen another country than Spain certainly the results presented in chapter 2 would not need to hold. It is to say that Spain is a very special case where loosely related educational system and labor market make it difficult for the youth to make a transition from school to work. Moreover Spain, with being a country where education is by far more general in its scope than in Germany, does not produce graduates with very clearly defined labor market destinations. Instead it endows individuals with skills which represent only a fundament on which firms later build job-specific skills (Ortiz and Kucel, 2008a). The choice of Spain in the third chapter of this thesis was dictated by the same reasons as in the second. We have observed elsewhere that Spain stands out as a country with comparably higher levels of over-education than for instance Germany. This in turn together with the Spanish loose link between formal education and the labor market forced a question whether mismatched workers are likely or unlikely to get training compared to the rest of the labor force. The job-related training plays an important role in the Spanish labor market as the productive skills are thought to be acquired in Spain mostly on the job, and to a much lower degree in the schools (unlike for instance countries with the dual-system of schooling and apprenticeships).

Again had we chosen for instance Germany perhaps we would not find such a strong relationship between over-education and training as we find in Spain (Buchel, 2002). The choice of UK for the fourth chapter was purely dictated by data availability. The institutional context of the fourth chapter is important when it comes to institutional (government provided) job search methods which have proven extremely inefficient for the whole population under study. Again, had we chosen a country where the programs for job search assistance are better targeted perhaps our results from chapter four would not hold. All these cases should be further studied in comparative perspective where institutional arrangements can explicitly be controlled for.

Chapter 2

Over-education and contract quality

Abstract

The main issues of this paper are whether contract permanency and over-education are interrelated and which the type of such relation is. Using bivariate probit regression on EULFS dataset for Spain we demonstrate that over-education and contract quality are significantly negatively related even after accounting for self-selection of individuals into employment. Results suggest that women are less likely to receive permanent employment and are more likely to be over-educated. Results are presented for young group of individuals between 18 and 29 years of age.

Introduction

Temporary contracts have proliferated very much during the last decades in Spain. Presently more than 30% of the Spanish labor force is employed on fixed-term conditions. This attracted a significant attention of social scientists resulting in flourishing literature on temporary employment (Amuedo-Dorantes, 2000, Bentolila and Dolado, 1994, Dolado et al., 2002).

Temporary employment has existed in the labor markets for a considerable time. There are various types of temporary contracts. Some are associated to seasonal work, mostly in agriculture and tourism. Some other are offered for a short time as substitution for absent staff members. Other, most common, are used as a probationary period before a worker is offered a permanent employment. In recent decades most of new hires in Spain entail some type of temporary employment period even if from the start a concrete timing of permanent employment is being settled in the contract. In the present work we are interested in temporary employment among young workers and its relationship to over-education.

In the theoretical literature on temporary employment it has been established that for young workers temporary jobs are a stepping stone into the labor market and it has rather incidental than long lasting character (Booth et al., 2002). This fact has been explained mostly using probation models claiming that employers hire young workers on a temporary basis in order to observe their productivity and/or ability (Loh, 1994, Wang and Weiss, 1998, Weiss, 1995, Autor, 2001). Once productivity is observed good workers are offered a permanent position and the temporary contracts of the less productive are terminated.

However empirical research on the Spanish labor market reveals that temporary jobs may not be uniformly regarded as stepping stones. Some of them, given the segmentation of the labor market, may actually be considered dead-ends rather than stepping stones (Amuedo-Dorantes, 2000, Guell and Petrolongo, 2003). Moreover, even if a Spanish worker manages to transfer from temporary to permanent employment his/her wage remains negatively affected by the incidence of temporary employment for a considerable time (Amuedo-Dorantes and Serrano-Padial, 2007, Bentolila and Dolado, 1994). Furthermore the rates of conversion of temporary contracts into permanent remain low in Spain despite the attempts of the governments to improve the

situation of temporary workers through various reforms (Amuedo-Dorantes, 2001).

Moreover if the jobs of young workers would not only be temporary but also mismatched this could perhaps worsen their labor market situation even more. Due to the vast educational expansion of the last decades there are all the more young people entering the labor market with good educational credentials. They may however not find adequate employment corresponding to their credentials and end up in over-educated jobs (AlbaRamirez and Segundo, 1995, AlbaRamirez, 1993, Budria and Moro-Egido, 2008). Over-education, similarly to temporary employment, may have long-lasting consequences for workers' careers (Dolton and Vignoles, 2000, Frenette, 2004, McGuinness and Wooden, 2007, Sloane et al., 1999, Smoorenburg and Velden, 2000). If both the negative effects of temporary employment and over-education overlap then workers may find themselves at risk of being employed in perpetually mismatched, temporary jobs. This potentially very unfavorable situation whereby workers are employed in mismatched, temporary jobs has not been studied empirically. The aim of this research is to contribute to the understanding of temporary employment by focusing on over-educated workers.

We hypothesize that the type of employment is endogenous to over-education. The direction of the influence of over-education on the permanency of the contract is, however, not obvious. There are two possible scenarios here. On the one hand employers may be more prone to retain over-educated workers offering them permanent employment since their skills exceed those required for the job. Over-education acts as a guarantee of desired productivity and so employers have reasons to offer over-educated workers permanent contracts. In such a case we should observe that over-education is positively related to permanent contracts.

On the other hand, however, over-education constituting a labor mismatch signals to the employer that further search for the adequate candidate is needed. Over-educated workers have been demonstrated to exhibit frustration and low motivation. This in turn may adversely influence worker's productivity (Tsang, 1987). Moreover, these effects can be observed only on the job. Therefore if a firm decides to employ an over-educated worker then it will most likely offer him/her a temporary contract (Smith, 2007). In this sense contract permanency depends on the quality of the match.

Furthermore workers who are offered over-educated jobs may accept them despite that they constitute a mismatch in hope for receiving permanent

employment. In a country like Spain, where temporary employment is so elevated, workers may face situations where they have to tradeoff job stability for quality of job match. In a situation where employers have incentives to retain over-educated workers they will be offering them permanent contracts and the above tradeoffs may become common.

Both contract quality and likelihood of being over-educated, however, depend on the same set of worker's characteristics. This is being explicitly addressed in our modeling strategy with the use of a bivariate probit model.

The paper is organized as follows. The following Section 2 describes the main theories relating over-education, fields of study and contract quality issues. Section 3 explains the modeling strategy and discusses issues related to the data. Results are presented in Section 4 and Section 5 concludes.

2. Theoretical background

Temporary employment of young workers is typically thought to be a stepping stone in their careers (Amuedo-Dorantes and Serrano-Padial, 2007, Booth et al., 2002, Dolado et al., 2002). School leavers naturally possess little labor market experience and so their productivity is unknown to employers. Instead employers use educational credentials as a screening device in order to select the best candidates for the jobs on offer. If a worker employed on a temporary basis proves to be productive s/he may be retained and offered a permanent position. If however such a worker does not meet the requirements of the employer the firing costs are considerably lower in case of temporary contracts compared to permanent ones. Permanent workers are entitled to compensation for job loss while temporary workers can usually be laid off without any or only with minor compensation. This type of employment could be regarded as probationary; workers are meant to demonstrate their productivity and work motivation in order to receive indefinite contract (Loh, 1994, Wang and Weiss, 1998, Weiss, 1995, Boockmann and Hagen, 2007). Workers in temporary probationary jobs may receive also less training than their permanently employed peers. This is chiefly because employers not knowing the potential length of employment of temporary workers cannot evaluate the time horizon of their training investment and therefore may not reap the profits from such investment. Certainly the opposite situation may occur, when employers, willing to retain workers, may intentionally offer them training to attach them to the firm. In such a case training signals promotion and prospects for permanent employment. Certainly in this case over-educated workers face the tradeoff between job stability and full utilization of their human capital.

Eventually, temporary employees may still acquire some human capital in their present employment through learning-by-doing. Once employed in stable positions such workers may recoup the rewards to their superior human capital in terms of higher wages (Booth et al., 2002).

Alternatively the fixed-term workers may be viewed by employers as less productive if job stability is thought to be a signal of productivity. Workers with many incidents of temporary employment in their careers may be regarded as less productive. It is to say that given that every worker would prefer a better paid and permanent job only those who could not obtain the indefinite employment will negatively select into temporary jobs thus signaling their

lower value as labor force. This explanation relies heavily on two concepts: ability and statistical discrimination. If less able workers negatively select into temporary jobs employers may apply statistical discriminatory practice in their screening and regard temporary workers as less productive or less able even though they do not observe directly their productivity or ability. Workers who have less human capital due to lack of job experience and training are less productive and therefore receive lower wages (Becker, 1993). Young workers in their first jobs are precisely in such situation. They lack experience and training and therefore are less attractive to employers. Hence the need for probationary employment in order to be able to observe worker's potential productivity. However, if the employer can infer something about the potential productivity (or skills) of the worker, s/he may offer the worker training or a prospect of permanent employment.

A distinctively different view is presented in the argument whereby firms, apart from the permanent workforce, maintain some temporary jobs as a buffer stock of labor which can easily be dismissed in times of economic downturn. Such firm often cannot offer permanent positions to more staff due to sector characteristics. An example here could be the tourism sector which employs large numbers of temporary workers during high season while maintaining only little group of permanent staff throughout the whole year. The majority of workers in such jobs are unlikely to obtain permanent positions because the firm cannot offer them permanent jobs. A similar situation happens when worker is being employed on temporary basis as leave substitution of another permanent staff member. In such cases workers will be rewarded higher wages to compensate for the almost certain dismissal upon the time of temporary contract expiry. In such situations workers who are temporarily employed do not have an incentive to invest in the specific human capital of the firm as it is useless outside it, and because such jobs are regarded dead-ends (Booth et al., 2002).

However research on the Spanish labor market reveals that not only the replacements or buffer-type jobs can constitute dead-ends for workers (Amuedo-Dorantes, 2000, Guell and Petrolongo, 2003). Firstly workers who manage to obtain permanent jobs after the initial period of temporary probationary employment suffer from long-term wage loss compared to their peers who had not had the experience of temporary employment (Amuedo-Dorantes and Serrano-Padial, 2007, Bentolila and Dolado, 1994). Furthermore the likelihood of a temporary job being converted into permanent one is low in Spain, despite several attempts of the government to incentivize permanent

employment (Amuedo-Dorantes, 2001).⁵ Extensive research has been conducted evaluating the reforms aimed at promoting indefinite employment in economies like Spain with a strong dual labor market (Dolado et al., 2002). These observations call for further research on temporary employment and special attention should be paid to those groups of workers in fixed-term jobs whose situation in the labor market is hampered by another factor such as educational mismatch. It may be hypothesized that mismatched workers who are unable to obtain stable jobs may end up being pushed into the secondary labor market (Amuedo-Dorantes, 2000, Dekker et al., 2002, Eliason, 1995). Employment of over-educated workers in the secondary labor market may actually raise unemployment by inducing the “crowding out” effect of low educated workers from low skilled jobs into unemployment as over-educated workers take those jobs (Aberg, 2003). On top of that one should note that over-education has proven to dramatically increase in Spain during last decade (Budria and Moro-Egido, 2008). Wage losses associated with being over-educated for recent years in Spain oscillate between 7% for tertiary educated men and almost 25% for tertiary educated women. At the same time there is a 5% loss of wage growth associated with having had a temporary job.⁶ Both those phenomena may severely harm workers’ well being and labor market success; especially that temporary jobs as well as over-education are thought to create low job satisfaction and frustration (Booth et al., 2002, Allen and Velden, 2001, Rumberger, 1987, Tsang et al., 1991, Tsang and Levin, 1985). Taking into account that over-education proves to be a rather persistent phenomenon for some workers, it increases the threat that some parts of labor force presently mismatched may persist in this state (Dolton and Vignoles, 2000, Frenette, 2004, McGuinness and Wooden, 2007, Sloane et al., 1999). This issue gains special importance with regards to contract permanency.

Both being in temporary employment and being mismatched induce workers to search for other jobs (Smith, 2007). According to job mobility theory, workers may accept temporarily over-educated positions in order to acquire on-the-job experience or training and later move to better matched positions either through internal promotion or through external mobility (Sicherman,

⁵ There have been reforms introduced in 1994, 1997 and 2001 aimed at promoting permanent employment.

⁶ It must be noted here that at some point in their careers temporary workers whose contracts were turned into permanent catch up with wages of those who were always permanent workers.

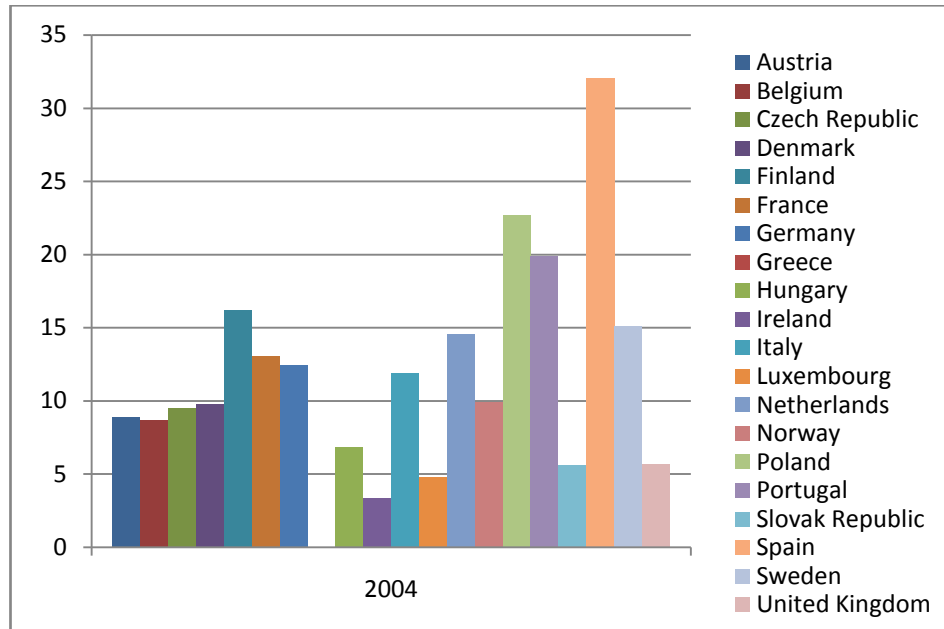
1991, Sicherman and Galor, 1990, Hersch, 1995, Groeneveld and Hartog, 2004).

Employers, being unable to sufficiently screen prospective employees, may opt for temporary (probationary) employment of over-educated workers in order to refine their screening. If workers in the probationary fixed-term employment prove to be of highly productive they may be retained and offered permanent employment.

Alternatively, employers may also opt for over-educated workers whose skills exceed job skill requirements in order to achieve most productive labor force. In such situation they would be offered permanent employment despite the over-education. When over-educated workers are offered permanent employment they face a tradeoff between the job match quality and the contract permanency. In countries like Spain where permanent contracts are scarce this tradeoff may be especially important.

We introduce fields of study as controls into our analysis. They have become all the more popular as an explanatory factor for the likelihood of over-education (Dolton and Vignoles, 2000, Frenette, 2004, McGuinness and Wooden, 2007, Ortiz and Kucel, 2008b, Smoorenburg and Velden, 2000, Wolbers, 2003). We take a step further the observations of this research and hypothesize that fields of study not only influence the likelihood of becoming over-educated but also the likelihood of obtaining a permanent contract. This is so because fields of study improve the strength of signal about a worker's potential productivity in labor markets (like the Spanish one) where a rapid educational expansion occurred (Reimer et al., 2008). We concentrate our attention on Spain due to its largest share of temporary contracts in the OECD (see Figure 2.1. below).

Figure 2.1. Share of temporary contracts in EU in 2004.



Source: OECD Stats Extracts.

3. Data and Methods

3.1 Sample

The present study relies on the European Labor Force Survey. The data used here were collected quarterly between the years 2003-2005. We have merged three quarters from each of the years. This way we have used one quarter from the year 2003, one from 2004 and one from the year 2005. This ensures that there are no duplicates in the data which could possibly bias our results.⁷

Using identifiers provided in the survey such as: `lienref` [identification of the household person: father, mother, child, aunt etc.], `hhnum` [household number] allowed us to trace all individuals and whose parental background was known in the survey. Using this sample as a benchmark we have further

⁷ EULFS data when not anonymized may be used (with limitations) as longitudinal data. The data used here cannot be utilized for longitudinal studies due to anonymization.

restricted it to individuals who were 16-29 years old, employed, whose field of study was known.⁸ Individuals in our sample, because of being part of the parents' household can be assumed to be still living with their parents. In the case of Spain such an assumption for our age group is not particularly troublesome since a large share of Spanish youth still live with their parents at the age above 25. Importantly, we choose this group for our analysis because these individuals are predominantly at the beginning of their careers and we can therefore identify their first jobs.⁹ The final sample includes 12937 individuals.¹⁰ Certainly had we chosen another sample, aged 16-39 or 16-49 our results presented in this chapter might change. We would observe much more permanent contracts and perhaps the tradeoff between job stability and a correct match for some individuals would become more evident.

3.2 Variables definitions

In this research we have used a 6-level ISCED categorization of educational attainment for Spain. The `isced61` variable has been defined identically as in Ortiz and Kucel (2008). The levels are defined as follows: (1) primary education, (2) lower secondary, (3) lower vocational, (4) upper secondary, (5) higher vocational and (6) tertiary. We used a 9 category fields of study classification. We distinguished the following fields: (I) Teacher training, (II) Humanities and arts, (III) Social sciences, business and law, (IV) Natural sciences, mathematics and computing, (V) Engineering and construction, (VI) Agriculture and veterinary studies, (VII) Health and welfare, (VIII) Services and (IX) General. Our two dependent variables in this study are `yovered` [youth over-education] and `conttype` [contract type]. Both variables are binary. Contract type is defined as 1 when it is permanent and 0 when it is temporary. By contract type therefore we are measuring the permanency of the contract. Over-education is defined as 1 when an individual has higher level of ISCED (`isced61`) than the 70th percentile worker in his/her respective occupation (ISCO88), and 0 otherwise. Our measure of over-education is similar to that

⁸ Knowing field of study we also knew the highest level of education achieved by the individuals.

⁹ Note here that we are talking about 'first jobs' not the first job because we do not control in our sample that individuals be in their very first full time employments.

¹⁰ Our sample exceeds the limit of representativeness established by Eurostat for analyses on Spain. The limit is 8000 cases for cross-section data.

used by Ortiz and Kucel (2008). Ortiz (2007) was the first to propose a measure based on ISCED categories.¹¹

Apart from the variables described above we have used a series of controls which are in standard use when studying over-education and contract quality. These were *age*,¹² *sex* (coded 0=male, 1=female), *experience* (measuring months working for the current employer¹³), *immig* (understood as immigrant status - without distinguishing the country of origin), *fsize* which stands for firm size. Firm size is thought to affect directly the type of contract offered to the job candidate but not to affect over-education. In fact it is demonstrated in matching literature that big firms may offer on average better contracts (more stable) since the relative cost of destroying a stable job for a big firm may be comparably lower than for a smaller firm. On the other hand big firms may be more risk averse since their brand has a significant market value and may not be willing to risk hostile job separations and therefore may offer more temporary than permanent contracts to newcomers. In terms of over-education or, more precisely, the required level of human capital, the neoclassical economic theory clearly suggests that all firms have the same interest in having the most educated workers.

3.3 Econometric framework

Our working hypothesis claims that over-education and contract quality are simultaneously determined in the contract offered to the job candidate and they both (at the same time) depend on the field of study of the candidate. The most plausible specification for verifying our hypothesis is therefore a simultaneous equations model where contract permanency depends on a set of explanatory variables and simultaneously also on over-education. Over-education is treated here as an endogenous dummy variable dependent on the same set of explanatory variables as contract type. The most efficient and adequate method of modelling such dependencies is bivariate probit model

¹¹ For a discussion of different measures of over-education used in the literature see the previous chapter.

¹² The age group described above entails in fact 5-years age groups which are a product of Eurostat data anonimization process.

¹³ Experience in our models measures only the months of employment in the current firm. EU LFS dataset at our disposal did not contain information on overall labor market experience (employment in other firms than the present ones) due to anonimization of the data by Eurostat.

(Monfardini and Radice, 2008). Monfardini and Radice (2008) demonstrated through Monte Carlo simulations that bivariate probit models estimated with maximum likelihood, performs well as a simultaneous equations model for probit models with an endogenous dummy variable (over-education in our case).

Our model is specified based on the premise that we use employer-employee matched data. From the demand side, employers, when offering a contract to a mismatched worker, know about the low quality of the match and, this has to be reflected in their contractual decision. Employers facing a candidate whose educational attainment exceeds the job requirements may offer him/her a permanent contract if they think that this worker will be adequately productive. Alternatively if the employer thinks that over-educated worker will be frustrated in the job on offer and that will cause his counterproductive behavior s/he may want to employ such a worker on a temporary basis in order to observe the worker's attitude and productivity. The decision to offer temporary or permanent contract to a mismatched worker certainly may depend also on the cost of further search. We can assume that firms hire over-educated workers because the cost of search for better matches exceeds the benefits from a search. Moreover as we signaled before over-educated workers may prove very productive and desired by the employers. Those however who were not offered jobs because of their over-education are not included in our sample. Therefore we have to account for selectivity into employment.¹⁴

From the supply side, job characteristics enter workers' utility function. Workers value job stability and the quality of the match. And so their acceptance of contracts with specific characteristics regarding duration of employment and required levels of skills are products of utility optimization. Therefore we can state that a pair (\tilde{y}_1^*, y_2^*) reflects both the firm's and the worker's optimal decision with respect to contract quality and required level of skill for the job. Variables \tilde{y}_1^* and y_2^* are unobserved latent variables denoting the length of employment pronounced in the contract and the amount of over-education respectively. Even though the optimization problem for a worker limits to contract quality and the match quality (in reality it entails many more variables) we assume that the employer took into account workers match to the job on offer and so the contract offered reflects this evaluation. Therefore

¹⁴ We have controlled for selectivity into employment of workers using 2-step Heckman selection procedure. Given the relative weakness of this procedure and limitations of our data the control for selectivity into employment should be regarded as rather weak.

for the variable \tilde{y}_1^* it holds that: $\tilde{y}_1^* = y_1(y_2^*)$. Variable \tilde{y}_1^* denoting contract permanency is assumed to be a function of over-education y_2^* . We observe however only the binary realizations of variables \tilde{y}_1^* and y_2^* , that is, the incidence of over-education y_1 and the incidence of permanent contract y_2 . This yields the following specification:

$$\begin{aligned} y_1^* &= \boldsymbol{\beta}'_1 \mathbf{X}_1 + \varepsilon_1 = \theta_2 y_2^* + \boldsymbol{\theta}'_1 \mathbf{Z}_1 + \varepsilon_1 & y_1 &= 1 \quad \text{if } y_1^* > 0, & 0 & \text{otherwise} & [1] \\ y_2^* &= \boldsymbol{\beta}'_2 \mathbf{X}_2 + \varepsilon_2, & y_2 &= 1 \quad \text{if } y_2^* > 0, & 0 & \text{otherwise} & [2] \end{aligned}$$

where error terms are bivariate normally distributed and satisfy $E[\varepsilon_1] = E[\varepsilon_2] = 0$, variances of error terms equal $Var[\varepsilon_1] = Var[\varepsilon_2] = 1$ and covariance between error terms is given by the ρ parameter $Cov[\varepsilon_1, \varepsilon_2] = \rho$. The $\boldsymbol{\beta}_1$ and $\boldsymbol{\beta}_2$ denote vectors of coefficients of equations 1 and 2 of the above model respectively, while \mathbf{X}_1 and \mathbf{X}_2 stand for matrices of explanatory variables in the above equations. In our case the \mathbf{X}_1 and \mathbf{X}_2 matrices contain both the following variables: sex, immig, age, tenure, and \mathbf{F} fields vectors enumerated in the previous section. Additionally matrix \mathbf{X}_1 contains variable *fsize* denoting firm size of the enterprise in which individuals work.

In the above bivariate probit model the ρ parameter is telling us the degree of endogeneity. If the ρ parameter is significantly different from zero (tested with likelihood-ratio test) then equations [1] and [2] are correlated and endogeneity is present in the model.

Our research hypothesis assumes that contract type depends on over-education and over-education in turn is shaped by the same set of explanatory variables as the contract itself entailing firm's and worker's characteristics.

In this model we account for self-selection of individuals into employment. Individuals observed in our sample are not a random group. They are only those who are currently employed. Selection into employment in the young age group like ours (16-29) is dependent not only on gender, immigration status, but also on the marital status and often still on the parental income. We do not have information on parental income in our data. As we have discussed in the previous chapter parental education is a good predictor of their financial status. Income is very volatile while the level of education once achieved remains stable. It is the highest level of education of the more educated parent that we introduce as a control in the selection probit. This way we want to proxy the economic statuses of the parental households to which the young individuals in our sample may still belong. This is done so because we want to rule out the possibility that young workers from poorer

families have more incentives to quit schooling and begin working earlier than offspring of better off parents. The selection probit is identified by marital status in this case. Apart from aforementioned variables we introduced the size of the municipality (*degurba*) in order to proxy the size of the local labor market. In larger municipalities there may be wider possibilities of employment and this can significantly affect the composition of our working sample.

We introduce the inverse Mill's ratio in order to control for workers' self-selectivity into employment (Heckman, 1979).¹⁵ In order to obtain the selection hazard variable (inverse Mill's ratio) we estimate the following selection probit:

$$Prob[s = 1 | \mathbf{S}_i] = \Phi(\mathbf{S}_i \boldsymbol{\gamma}) \quad [3]$$

where \mathbf{S}_i is the vector of variables explaining the selection (here these are: fields of study controls, sex, age, immig, *degurba*, *married*, *iscd* and *ISCED-Parent*) and $\boldsymbol{\gamma}$ is a vector of selection probit parameters. From equation [3] we obtain the inverse Mill's ratio expressed as follows:

$$m_i = \frac{\phi(\mathbf{S}_i \hat{\boldsymbol{\gamma}})}{\Phi(\mathbf{S}_i \hat{\boldsymbol{\gamma}})} \quad [4]$$

where $\hat{\boldsymbol{\gamma}}$ stands for estimated selection probit parameters. The inverse Mill's ratios are then introduced into matrices of independent variables in equations [1] and [2] yielding $\tilde{\mathbf{X}}_1 = [\mathbf{X}_1, m_1]$ and $\tilde{\mathbf{X}}_2 = [\mathbf{X}_2, m_2]$. Introducing the matrices $\tilde{\mathbf{X}}_1$ and $\tilde{\mathbf{X}}_2$ into equations [1] and [2] we obtain their reformulated versions:

$$y_1^* = \tilde{\boldsymbol{\beta}}_1' \tilde{\mathbf{X}}_1 + \varepsilon_1, \quad y_1 = 1 \quad \text{if} \quad y_1^* > 0, \quad 0 \text{ otherwise} \quad [5]$$

$$y_2^* = \tilde{\boldsymbol{\beta}}_2' \tilde{\mathbf{X}}_2 + \varepsilon_2, \quad y_2 = 1 \quad \text{if} \quad y_2^* > 0, \quad 0 \text{ otherwise} \quad [6]$$

If the coefficient from the inverse Mill's ratio proves significant then we know that selection into employment is present and needs to be corrected for. Certainly this does not exhaust all the possible selection processes which may drive our results, with the ability selection in the first place. Innate ability as

¹⁵ The inverse Mill's ratio correction for selection is known to be a weak tool. Other methods like propensity score matching would be more recommendable here, however, we lack proper data to conduct such analysis.

well as other skills are not accounted for in this model and this may potentially bias our results. The EU LFS data does not permit for controlling individuals' ability or other skills. It is important to bear in mind that over-educated workers may be over-educated because their employers may value more other unmeasured skills in their workers. In such a case they may employ individuals with an excess of schooling for the present job to compensate for their lack of desired skills. Alternatively over-educated workers may be of low ability and may therefore need more education to perform the same tasks as other more able workers with less education. Both aforementioned cases may bias our results.

4. Results

This section discusses the results obtained from the econometric estimation. We employ a binary probit methodology for the case where a probit model contains an endogenous dummy explanatory variable. The results presented in Table 2.1 include probit coefficients. Firstly, we estimate a biprobit model with an endogenous dummy variable representing over-education. The biprobit coefficients for the over-education equation are presented in column 1 (Model 1). In column 2 we present coefficients for the biprobit equation for contract permanency. The dependent variables in both equations were defined 1 when over-educated, permanent respectively and 0 otherwise (see previous section on description of econometric framework). See the columns in models 1 and 2, respectively.

Both models include gender, age, immigrant status, experience, educational level and public sector dummy as explanatory variables. Apart from these variables we introduce fields of study dummies into both equations as controls. Moreover in both models 1 and 2 we introduce firm size as an explanatory variable in the equations on contract permanency. The difference between models 1 and 2 is that Model 2 includes ISEI score in the over-education equation. Moreover, Models 1 and 2 differ significantly when we focus on the degree of endogeneity. The endogeneity in both models is measured by the parameter ρ which stands for covariance of error terms of both equations. In the first model there is significant and large degree of endogeneity present measured by the ρ parameter ($\rho = -0.306^*$). After introducing ISEI into the model 2, the endogeneity degree declined sharply to roughly 0.12. It could perhaps be decreased further had we had controls for

individuals' selectivity into fields of studies by ability. ISEI measures the occupational status (Ganzenboom et al., 1992). It is clear that over-education is less frequently observed in top occupations than in the lower ones (thus the negative sign for the ISEI coefficient). Also as shown by Budria and Moro-Egido (2008) the economic penalty associated with being over-educated is not as large in the top occupations as in the lower ones. Therefore it could be stipulated that ISEI score brings into our analysis some information about wages of the individuals which were suppressed in the data due to anonymization.

In the first model, presented in Table 2.1, over-education is positively associated with permanent contracts. This could suggest that there is a tradeoff between job stability and the job match quality for young workers in Spain. However, after controlling for the occupational status (using ISEI) in model 2 (and after removing a significant part of endogeneity from the model), we see that over-education is negatively associated with permanent contracts. We observe therefore that over-educated workers are likely to be employed on a temporary rather than permanent basis. Furthermore job experience with the present employer in model 2 leads to an increased likelihood of being over-educated and simultaneously it leads to an increased probability of obtaining a permanent contract. While over-educated workers, by remaining with the present employer, increase their chances of obtaining permanent employment they also risk remaining over-educated. This suggests that employers may be willing to retain (at least some) over-educated workers and offer them permanent jobs. In such situation over-educated workers face the hypothesized tradeoff between the job match quality and the job stability. At the same time we observe that age has a negative influence on over-education while a positive effect on contract permanency. This result is consistent with standard economic literature claiming that young workers by acquiring more job experience in different firms achieve better matches.

The coefficients for gender (coded as female=1) and immigrant status in both models indicate that young women and young immigrants in the Spanish labor market have an increased likelihood of becoming over-educated and employed in fixed-term jobs than men and non-immigrants respectively.¹⁶ There can be several explanations provided for these results. Firstly women and immigrants may suffer labor market discrimination. Employers may prefer to offer them

¹⁶ Note, however, that in Model 2 the coefficient for the immigrant variable is insignificant in the equation of job permanency.

temporary jobs which are relatively easier to terminate. Also employers may value less the education of women and immigrants than the education of men and non-immigrants. Employers may require women and immigrants to signalize stronger their productivity with higher educational levels which may exceed the job requirements. Secondly, the results for women and immigrants can be explained referring to their aspirations. If women and immigrants would reveal low levels of aspirations it could result in the situation where they opt for jobs below their formal qualifications.

Results reveal that all fields of study are associated with lower likelihood of being over-educated and a higher probability of having a permanent job than the reference field – humanities. Only for health and welfare the probability of permanency is not significantly different from the reference field. Most likely because of the specificity of the health sector, entailing long internships before obtaining stable employment. Moreover we can observe that fields of study form a ranking in terms of their likelihood of becoming over-educated. By far the best field for not becoming over-educated is Health and welfare, followed by Agriculture, then Engineering. Natural sciences are fourth in this ranking followed by Social sciences in the fifth position. The least attractive field in terms of odds of becoming over-educated is the Teacher training which decreases the likelihood of over-education only slightly over the reference Humanities. There is not such clear ranking observed in terms of fields' influence on contract permanency.

The public sector dummy reveals that while the public sector recognizes well educational credentials and is less likely than private sector to employ workers in over-educated jobs it is also less likely to give them permanent employment during their early career stages. The coefficients for the levels of education being positive in both equations in Model 2 come as no surprise. It is obvious that more educated individuals are more likely to be over-educated. At the same time, as predicted by human capital theory, more educated workers are offered more stable employment (given their higher productivity). From the results in Table 2.1 we should also note that larger firms offer less permanent contracts than smaller enterprises. A tentative explanation could be offered here claiming that larger firms enjoy economies of scale in recruitment and the searching costs appear lower to them than to smaller companies. Therefore we may expect larger labor turnover in big firms and increased likelihood for temporary contracts in such firms. Importantly in both models 1 and 2 in Table 2.1 we observe that selectivity of individuals into employment is significant in our sample except for the permanency equation in Model 2.

Table 2.1. Results of bivariate probit on contract permanency with endogenous over-education dummy.

	Model 1		Model 2	
	Over-education	Permanency	Over-education	Permanency
Sex	0.406*** (5.48)	-0.259*** (-3.16)	0.529*** (5.25)	-0.186** (-2.33)
Immigrant	0.958*** (7.30)	-0.420*** (-2.61)	0.390** (2.08)	-0.227 (-1.52)
Age	-0.161*** (-12.40)	0.0735*** (4.26)	-0.0994*** (-5.68)	0.0431*** (3.07)
Experience	0.000109 (0.23)	0.0363*** (33.20)	0.00116* (1.80)	0.0373*** (56.40)
Public	-0.484*** (-8.46)	-0.316*** (-4.33)	-0.396*** (-5.01)	-0.420*** (-7.04)
ISCED	0.278*** (20.36)	-0.0249 (-1.03)	0.948*** (44.07)	0.0268* (1.88)
General	-1.687*** (-9.67)	0.772*** (3.58)	-1.420*** (-5.85)	0.448** (2.37)
Teacher training	-1.060*** (-9.43)	0.413*** (2.93)	-0.497*** (-3.01)	0.208* (1.67)
Social sciences	-1.692*** (-10.59)	0.855*** (4.27)	-1.212*** (-5.44)	0.540*** (3.11)
Natural science & math	-1.373*** (-13.06)	0.485*** (3.35)	-1.678*** (-11.22)	0.222* (1.95)
Engineer. & Construct.	-2.289*** (-10.32)	0.856*** (3.06)	-2.141*** (-6.94)	0.421* (1.75)
Agriculture & vet	-0.929*** (-7.09)	0.556*** (3.69)	-2.488*** (-14.62)	0.384*** (2.73)
Health & welfare	-2.296*** (-12.31)	0.673*** (2.69)	-3.385*** (-13.07)	0.240 (1.19)
Services	-1.199*** (-7.23)	0.691*** (3.63)	-0.949*** (-4.14)	0.477*** (2.65)
Over-education		0.412* (1.82)		-0.187*** (-4.87)
Firm size		-0.000796*** (-2.97)		-0.000741*** (-2.70)
Constant	7.419*** (9.73)	-4.428*** (-4.48)	7.394*** (7.11)	-2.751*** (-3.34)
Selection	-11.80*** (-11.56)	3.307** (2.47)	-8.238*** (-5.95)	1.055 (0.96)
ISEI			-0.149*** (-55.75)	
<i>N</i>	12937		12937	
LR(Chi2)	5057.3		7611.4	
rho	-0.296*		0.128***	

t statistics in parentheses

* $p < 0.10$, ** $p < 0.01$, *** $p < 0.001$

Reference field of study: Humanities & arts. Data source: EU LFS 2003-2005.

5. Conclusions

Our aim in the present study was to investigate on the relationship between over-education and contract permanency. Our initial expectations about the sign of the influence of over-education on contract permanency were not clear. On the one hand we could expect that employers value higher educational attainment (and thus higher productivity) of job candidates and thus offer them more permanent jobs in order to attract and retain them. On the other hand over-educated workers have been shown to be more prone to quits, less motivated and frustrated which may prove to be counterproductive. This may make them less attractive to employers who may offer them temporary jobs for further screening.

We have concentrated our analysis on young workers aged 16-29, controlling for selectivity into employment. Selection into employment is important here since we claim that workers who are mismatched will be most likely laid off. We control for selectivity into employment and so to some extent we also account for non-random composition of the labor force.

We have tested whether over-educated workers are more likely to receive temporary or permanent employment. Over-educated workers by the fact of being over-educated (other things being equal) are less likely than non-over-educated (matched) workers to receive permanent employment. These results might change for a sample of older individuals. Had we chosen a sample of individuals aged 16-39 or even 16-49, we would probably observe much more evident the tradeoff between over-education and permanency of the contract. In the multivariate analysis we have controlled for various worker's and job characteristics such as education, age, experience, gender, field of study, public sector employment, firm size, occupational position (ISEI). Our observations on experience and age reveal another interesting dimension of job mismatch. Workers who are older are less likely to be mismatched, and more likely to be employed in permanent jobs. However workers who remain with the same employer for prolonged time period increase their chances for being over-educated and for permanent employment. This observation is especially interesting for workers who were employed in temporary over-educated jobs. In their case it is external mobility that gives them a chance to correct their mismatch. Remaining with the present employer may enhance their chances of getting a permanent job. It does not help them improve upon

their job match. Our results suggest that for young workers it is the external mobility that helps correct the mismatch, exactly as modeled by Smith (2007). Direct testing of this claim however would require longitudinal data where subsequent employment contracts could be analyzed.

Fields of study in general display very clear pattern of improving workers' market productivity signals compared to the reference field. All fields of study lead to a decreased likelihood of becoming over-educated and simultaneously increase chances for permanent employment with respect to humanities.

The objective of this study was to extend our understanding of the nature of temporary employment of educationally mismatched (over-educated) workers in their early jobs. It is important to observe that our results, while confirming the well-known view that early temporary employment is a stepping stone in workers' careers, it also reveals the possibility that workers may end up in over-educated permanent positions. Given the scarcity of permanent jobs in Spain, workers may opt for permanent positions even if this implies a poor match. Our results impede drawing a clear conclusion on this issue as we have no information about external possibilities of the workers in over-educated jobs. That is to say that we do not know whether they stay in their present jobs for the contract permanency or for inability to find a better match.

Therefore the results presented in this study are of an explorative nature, and call for further research on the employment chances and long-term rewards of over-educated workers in Spain.

Appendix A

Table A.1 Results from selection probit estimation.

	employed
Sex	-0.174*** (-8.66)
Age	0.0303*** (18.53)
Immigrant	-0.0513 (-0.54)
Married	-0.0623 (-1.06)
Degurba	0.0151 (1.38)
ISCED	0.0152 (1.49)
General	0.375*** (8.21)
Teacher training	0.177*** (3.24)
Social sciences	0.330*** (7.47)
Natural science & math	0.150*** (2.76)
Engineer. & Construct.	0.516*** (10.43)
Agriculture & vet	0.127 (1.57)
Health & welfare	0.391*** (7.37)
Services	0.333*** (5.51)
Parental ISCED	-0.0122** (-2.35)
<i>N</i>	20198

Chapter 3

Why would over-educated workers still need more training? Evidence from Spain.

Abstract

This article reviews the human capital theory's thesis that over-educated workers should receive less training in their current jobs than matched individuals in the same jobs as they are more prone to quits. Using a special Life-Long Learning 2003 module in the European Labor Force Survey it is demonstrated that indeed Spanish workers in over-educated jobs are less likely than their matched peers to receive training related to their work. Moreover it is observed that under-educated workers are more likely to receive training than the matched ones. An argument about skill transferability is advanced as explanation of the results. The argument holds also for female workers and it extends to different fields of study.

Introduction

Training after formal education and work experience constitute the most important source of skills. Skills acquired in education are useful in many firms. In contrast, skills acquired through training may have more limited applicability across firms. When skills are useful in many companies we call them *general* while the ones which can be applied only in one enterprise are named *specific*. In reality, a large literature demonstrates that skills obtained through educational process are also much more general than those acquired in the job but both types are usually useful in more than one firm (Hansson, 2008, Leuven, 2004, Blundell et al., 1999, Descy and Tessaring, 2005). Such skills which can be applied in at least two firms can be called *transferable*. The more there are firms potentially interested in workers' skills the more transferable the skills are (Booth et al., 1996). This approach to training has its roots in the human capital model (Becker, 1993). The only modification of Becker's model here consists in the introduction of frictions in the labor market (imperfect information) which in turn originates in matching models (Jovanovic, 1979). The literature on training following Becker's work has concentrated mostly on wage rewards associated with two types of training: firm-specific and general (Barron et al., 1993, Barron and Berger, 1999, Booth, 1993, Frazis and Loewenstein, 2005, Loewenstein and Spletzer, 1998, Loewenstein and Spletzer, 1999). The major conclusion which can be drawn from this research is that firms pay a significant part of the cost of training and it is usually fairly general in its type confirming that we may expect to observe mostly transferable training in the labor market (Evertsson, 2004).

On the other hand there exists a large body of literature on educational mismatches which also primarily concentrates on earnings of workers (McGuinness, 2006, Hartog, 2000, Groot and Brink, 2000). Here the main view is that mismatched workers receive lower returns to their educational attainment than they would otherwise obtain in matched positions.

However, on the intersection of these two general strands of literature a growing body of studies pays attention to training of educationally mismatched workers (Heijke et al., 2003, Barron et al., 1989, Buchel and Mertens, 2004, Smoorenburg and Velden, 2000).

This chapter aims at contributing to the literature on training of educationally mismatched workers by presenting results on the likelihood of obtaining job-related training in Spain. Over-education is understood just as in the previous

chapter as inadequacy of job held by a worker to his/her level of education and is therefore a special case of general educational mismatch.

Using the special module on Life-Long Learning 2003 from the European Labor Force Survey we investigate the probability of participating in job-related training by Spanish workers aged 16-49.¹⁷ We claim that the transferability of skills acquired in both education and job-related training determines whether workers will receive or not job-related training. Skills acquired in education are deemed to be highly transferable across different firms while skills acquired in the job-related training are thought to be less transferable. Therefore over-educated workers have an excess of easily transferable skills and this makes them potentially more mobile across firms. To the contrary, under-educated workers have a deficiency of general skills compared to the job they hold and this limits their mobility and binds them to their present employer. Consequently we should expect that over-educated workers by having more options outside their present jobs may be more prone to quits and therefore less attractive to the employer in terms of training. Following this argument, under-educated workers should appear more attractive in terms of training to their present employer as they are deemed to have little incentives to move to other employers.

Another view is that employers look for over-educated workers in order not to have to invest in training. Since over-educated workers possess more skills than the job requires they may not need any training to be productive. This argument precisely as the previous one predicts that over-educated workers should be less likely than their matched peers to be trained.¹⁸ The under-educated workers, however, need training since their skills are below the requirement of the job. For them we should expect positive likelihood to get trained. This view is especially appealing if one considers the fact that majority of training provided in Europe is apparently of a general nature (which is in major part covered by employers). Employers have therefore reasons to look for workers who would not require training in order to save on this investment.

Contrary to that we one could expect that over-educated workers who have higher than necessary human capital for the job in question should be also cheaper to train for this job. This should make them more attractive to employers and consequently their likelihood of getting trained should be

¹⁷ We reproduced the multivariate analyses for larger sample of economically active workers aged 16-62.

¹⁸ This can be verified with the ORU model presented in this chapter.

higher than for the matched workers. In contrast under-educated workers who lack skills for their present jobs would be less likely than matched to receive training since their training is too costly.

In the following sections we present the above argument and verify the hypotheses with econometric analysis. The paper is organized in the following way. The next section describes the main theories explaining on-the-job training and over-education, putting emphasis on the mechanisms leading employers to hire over-educated workers as well as the workers' rationale for accepting over-educated jobs in light of skills transferability. Section 3 describes the data and econometric methodology applied in this paper. Results are presented and discussed in Section 4, while Section 5 concludes and presents remarks for further research.

2. Theoretical Background

Human capital theory (Becker, 1993) puts training as a central way of achieving higher stocks of human capital and increasing workers' productivity, and consequently increasing their wages. It is highly desirable under HCT to obtain the highest possible educational levels and maximum training as long as it is efficient in terms of rewards. Education and training, being complements in human capital model, are treated as an investment which has to pay off.

It follows therefore that the main issue for a firm when deciding whether to train or not a matched as well as an over-educated worker is the time horizon of this investment. If the employer thinks that the worker will remain with the firm for a considerable time, then the investment horizon is longer, making the investment costs spread over a longer period of time, and the stream of returns from this investment consequently become larger. On the other hand if a worker is thought to be prone to quit soon then the horizon of investment in his/her training narrows. Following this argumentation, over-educated workers would not receive training in human capital theory because this investment would not be profitable enough for the firm to carry it out. This hypothesis finds confirmation in the empirical literature on over-education.

A growing number of empirical studies on over-education have demonstrated that over-educated workers are known to be less likely to stay in the firm (Hersch, 1995, McGuinness and Wooden, 2007, Sicherman and Galor, 1990, Sicherman, 1991, Green and McIntosh, 2007). They receive less training than "more stable" matched employees (Barron et al., 1989, Buchel and Mertens, 2004, Hersch, 1995, Robst, 1995, McGoldrick and Robst, 1996, Smoorenburg and Velden, 2000). If over-education would be only a temporary phenomenon or a transient incident in workers' labor market careers the issue of such a mismatch could be regarded as unimportant. However over-education been shown to be rather persistent, leading scholars to question Becker's view of the labor market regarding educational mismatches (Dolton and Vignoles, 2000, Frenette, 2004, McGuinness and Wooden, 2007, Sloane et al., 1999, Smoorenburg and Velden, 2000). In such a situation over-education has an important impact on workers' careers. It is not only a short-lived experience but it may persist across a significant part of workers' careers. If, furthermore, it would influence their likelihood of obtaining training then it would have consequences for the whole working careers of people and perhaps the economy as a whole (Guironnet and Jaoul-Grammare, 2007). This stresses the

importance of investigation on the likelihood of receiving a job-related training by over-educated workers.

Many scholars have questioned the human capital model's plausibility for explaining the incidence of training in the labor market since the two ideal-typical types of training (general and firm-specific) in the human capital model are in reality very difficult, if not impossible, to observe. Instead we can see a milieu of different training arrangements which can be characterized with different degrees of transferability.¹⁹ Transferable skills obtained through job training are such that can be utilized by at least one external firm besides the one providing it to the worker. The least transferable skills will therefore be useful to only one external employer (who may then be interested in poaching the worker). Fully transferable skills coincide with perfectly general type of training as defined by human capital model (Becker, 1993).

According to the human capital model it is general training that is fully utilizable across many firms. Interestingly, the empirical literature finds that the majority of training courses in the labor market are general in nature. Hansson (2008) reviews the literature on training arrangements and concludes that on average 60-90% of all training provided in the USA is general in nature (highly transferable) while in Europe these estimates oscillate around 80-90% (Barron et al., 1997, Booth and Bryan, 2002, Evertsson, 2004, Descy and Tessaring, 2005). If employers decide to provide workers with general training the human capital model only claims that this type of training will be financed by workers themselves while firm-specific training would be financed by employers. By the same token training providing workers with highly transferable skills would have to be financed by workers (to a major degree) while training offering very narrow skills, with very limited transferability could be sponsored by employers.

The human capital model is however challenged by the vast body of empirical research which demonstrates that firms provide mostly general training and they sponsor it (Acemoglu and Pischke, 1998, Acemoglu and Pischke, 1999, Autor, 2001, Barron et al., 1989, Barron et al., 1997, Bassi and Ludwig, 2000,

¹⁹ Becker allows for the existence of different mixtures of his two ideal-typical types of training: general and firm-specific. In fact the human capital model applied to empirical data could be sustained on the grounds that each training event provided by firms may be decomposed into general and firm-specific components. However the disaccord of the literature quoted here lies in the fact that empirically it is immensely difficult to decompose training into the two types claimed by human capital model causing scholars to look for other possible explanations of their empirical findings.

Barron and Berger, 1999, Booth and Bryan, 2002, Descy and Tessaring, 2005, Evertsson, 2004, Veum, 1995).

The literature proposes several explanations for the fact that firms provide free general training to their workers. Firstly firms may be interested in investing in general training as a way of rewarding workers and therefore a means to attach them to the enterprise (Glick and Feuer, 1984). The second view is that employers commit to a future minimum wage before the training takes place. This way the cost of general training today can be recovered by paying a future wage above the minimum, but below the real productivity of the worker (Loewenstein and Spletzer, 1998). The third possible mechanism, presented by David Autor, claims that firms offer general training in order to induce self-selection of workers into that training and thus reveal their ability. The argument here is that more able workers willingly self-select into training provided by the employer while the less able more often opt out (Autor, 2001). Two other accounts explaining provision of free general training come from the matching framework where my argument is rooted as well. Both allow for imperfect competition in the labor market caused by information asymmetries. On one hand firms are myopic and may not be able to recognize the skills of a worker who attained training in other firms (even general ones) and thus may not be able to reward adequately workers' increased productivity (Katz and Ziderman, 1990). On the other hand workers may not be able to easily locate firms which would recognize their skills and this may reduce their mobility from the employer who provided them with free general training making that investment profitable to employers (Lazear, 2003). It is crucial here to understand that the more transferable the skills attained through job-related training, the less likely the employer is to finance it. The argument is just the same as in the human capital model – workers with more transferable skills have more options of employment outside the firm (and are more attractive for poaching) while those whose skills are less transferable have a narrower set of alternatives outside the present firm and hence are thought to be more stable. In any case transferable training does not have to be fully financed by employers and workers may share the costs of this training with the firm. Some empirical work signals that such situations are possible (Barrett and O'Connell, 2001, Dearden et al., 2000, Groot, 1999).

The argument presented in this chapter follows the theoretical considerations of Stevens (1996) (Booth et al., 1996). We stipulate that employers have expectations about the time that workers will stay within the firm and, just as in the human capital model, they decide whether to train them or not. Unlike

the human capital model we assume that workers may possess different stocks of differently transferable skills. Schooling is thought to provide the most transferable type of skills. It is meant to prepare workers for participation in the labor market without defining any particular destination of where these skills should be applied. On the other hand on-the-job learning and experience may equip workers with less transferable, more specific skills. Over-educated workers are therefore thought to be in possession of excess of transferable skills, while under-educated workers should have a deficiency of transferable skills with respect to their present job. Such mismatch must be understood as maladjustment of job to the workers' qualifications and not the opposite.

Therefore we should expect that over-educated workers should receive less training than matched ones. Under-educated workers, on the other hand are expected to be more likely to receive training.

Field of education of workers is also strongly embedded into our theoretical argument. If education provides workers with mostly transferable skills then the field of studies acts as limiting factor of this transferability. We should expect that workers from more narrowly defined fields such as medical or engineering should receive more specific (read less transferable skills) and hence they should be more likely to receive training. To the contrary, workers with a humanities or social science background, which are known to be transversal and much less defined in terms of labor market applicability, should receive on average less training as their skills are more transferable making them more prone to change jobs easier. The argument presented here, as noted before, has its roots in the matching framework where information asymmetries in the labor market result in mismatches. Firms however may opt, contrary to our argument, to fire mismatched workers instead of even considering (re-)training them. It is therefore immensely important to control for the composition of the labor force in our sample as these may be the workers who were not laid off by employers and therefore could not obtain training in their jobs. It is to say that selection into employment must be accounted for in our modeling strategy. Non-random composition of the employed sample creates one source of bias; however the other comes from fields of study selectivity. It has been hypothesized in the literature that students self-select into more demanding fields by average ability (Arcidiacono, 2004). Students of hard fields like natural sciences, engineering or science are on average more able than students of so called "soft fields" like humanities, services, social sciences. This refers primarily to quantitative skills but may include verbal skills as well (however to a much more limited degree).

It affects later the graduates' propensity to obtain jobs as the more able job candidates should be expected to get better jobs and obtain them quicker than their less able colleagues. We have to control therefore for students' average (quantitative ability) in selectivity into employment in our modeling strategy.²⁰ It must be stressed that even by controlling for different levels of quantitative ability across fields of study we do not control for ability in the sense discussed by Heckman and Krueger (Heckman and Krueger, 2003). It may be the case that individuals in our sample are selected by unobserved ability (both cognitive and personal traits) and our results may be driven (at least partly) by this fact. Unfortunately scarcity of adequate data which would allow us to control for unobservable skills or even quantitative abilities at the individual level impedes further insight into these issues in the present study. The importance of field of study cannot however be underestimated since most of the recent studies on over-education and labor market outcomes regarding educational attainment accounts for the influence of fields of study recognizing them as an important explanatory variable (Allen and Velden, 2001, Dolton and Vignoles, 2000, Finnie and Frenette, 2003, Frenette, 2004, Green and McIntosh, 2007, McGuinness and Wooden, 2007, Werfhorst, 2002, Werfhorst and Kraaykamp, 2001).²¹

Standard economic theory suggests that big firms benefit from economies of scale in terms of training facilities and personnel (Booth, 1993). We should therefore expect a positive relationship between firm size and the odds of training. Note however that even if the enterprise is very large the basic principles of investment in human capital of employees hold, implying that over-educated individuals should still receive less training than others even after controlling for the size of the firm.

Our main hypothesis in this article can therefore be restated as follows. Over-education is expected to be negatively associated with the odds of firm training for both men and women. Moreover, taking into account that women are typically the group of workers who are more prone to job interruptions (for maternity), they could then be expected to have also even lower odds of being trained while over-educated (Bassanini et al., 2005, Booth, 1993, Brunello, 2001, Evertsson, 2004). All these results are expected to hold while controlling

²⁰ See section on Data and Methods for more detail below.

²¹ This quotes only the very small sample of existent literature on fields of study. For more transversal view of this literature see Special Issue on Fields of Study of the International Journal of Comparative Sociology vol. 49 (2008).

for selection into employment by typical demographical factors as well as average quantitative ability proxied by the field of study.

3. Data and Methods

3.1 Sample

The present study relies on the data from the special module on Life-Long Learning (LLL) of the European Labor Force Survey (EULFS) available for the year 2003²². Most of the files in the aforementioned special module refer to the second quarter of the year 2003. In the present analysis we used the data for Spain only. The working sample 26000 observations; with an average training incidence of 13% for individuals currently in employment for whom the field of study and other major controls used in the model were known. This remains roughly in line with the finding of Checchi who reported an 11% training incidence for Spain (Checchi, 2006).

The dependent variable “Training” has been created on the basis of 3 sub-variables, each of which measures incidence of training among employed individuals in our sample. Each of the 3 sub-variables measured the participation in 1, 2, or 3 training activities during last 12 months preceding the survey date. All these activities have been treated as on-the-job training if and only if the respondent replied that they were of “Mostly job-related, professional purpose”. Furthermore all individuals currently in apprenticeships have been excluded from the sample as we wanted to concentrate only on the individuals who have already completed their schooling and their training is not part of their formal education which was assumed to be the source of most transferable skills.

Training incidence has been coded 0 if the individual was employed (not apprentice) and has not received any training for professional purposes during last 12 months and 1 if he/she participated in 1 or more training activities during last year (disregarding their duration).

We have included in the analysis all individuals aged 16-49 who were currently employed. In the second step we have replicated the analysis for an older sample of individuals aged 16-62. We have also controlled through Heckman selection probit for individuals’ self-selection into employment (Heckman, 1979). As it was argued earlier individuals forming our sample are only the

²² The author is grateful to the Data Commission of the EQUALSOC Network for provision of the anonymized datasets on which this study is based.

employed ones. However, matching theory predicts that mismatched workers instead of being trained by employers would rather be laid off in the first place. This creates the situation where our sample contains non-randomly selected group of individuals who were not fired from their jobs while mismatched. Since our prime research interest lies in the likelihood of training of over-educated (mismatched) workers, we find it necessary to account (at least to some extent) for the non-random composition of the labor force.

3.2 Independent variables

We have used a series of independent controls in our models in order to capture various aspects of theoretical relevance. We have constructed the 6-level adjusted ISCED (*isced6l*) categories which in our opinion reflect best the Spanish educational system (Ortiz, Kucel 2008). The levels of education included in the classification are the following: (1) primary, (2) lower secondary, (3) lower vocational, (4) upper secondary, (5) higher vocational, (6) tertiary. It is especially important to create the higher vocational category of education since, as it will be discussed later, this category is the borderline for over-education of the clerical occupational group, which is particularly large in Spain.

The 9-category classification of fields of study has been applied in the present study. We distinguished the following fields of education: (I) Teacher training, (II) Humanities and arts, (III) Social sciences, business & law, (IV) Natural sciences, mathematics and computing, (V) Engineering and construction, (VI) Agriculture and veterinary studies, (VII) Health and welfare, and (VIII) Services. The EULFS data also include a field called "General" (IX) which is meant to provide basic reading, computing and communicative skills.

Using the above fields' categories we have constructed a proxy for an average quantitative ability. We claim to have proxied only the average ability as the whole concept relies on the virtue of self-selection of less able individuals into less demanding "softer" fields of study. We have coded as zero the general field; as one the humanities, teacher training, social sciences, and services; and as two the remaining fields – engineering, natural sciences, health and agriculture, thus reflecting different levels in average quantitative ability of students across the fields of study in our data. We claim here that fields of study providing more training in quantitative subjects (mathematics, statistics,

physics, chemistry, formal logic, etc.) attract on average more quantitatively gifted (oriented) students than other fields which do not provide so much quantitative training. The average ability measure constructed here proved to be statistically significantly and positively related to employment probability when estimating employment selection probits.

In the next step we have defined the over-/under-education variables. The measure used to create the over-education variable is the same as in the previous chapter, although here it was applied to two age groups. Individuals were decided to be over-educated if their educational level exceeded the level of the 70th percentile of the workers in his/her occupation (according to ISCO88 classification of occupations). Percentiles of educational levels across occupations were measured separately for 2 age groups of 18-36 and 37-62 years-old. This let us control in a way for the educational expansion which took place in 80s and 90s in Spain. It was evident in the sample that educational levels of the 70th percentile workers in the “young” age group were one degree higher than those in the “old” group. This reflects the presence of educational expansion in the Spanish labor market.

The over-education variable was first coded for each age group separately and only then merged into one variable. The coding was binary, with 1 indicating over-education and 0 a match. We assume that there is no over-education in the top three occupations: Legislators and Senior Officials, Professionals, and Technicians and Associated Professionals. In fact the Professionals group did not contain any over-education so our assumption refers to Legislators and Technicians groups only. Over-education is defined for individuals from clerical occupations down to the lowest occupation (in the ISCO88 coding). If the level of education of an individual observed in the sample was lower than the level of 30th percentile worker in the occupation then under-education was defined 1. Otherwise it was 0. In this way, we have obtained 3 groups of employed individuals. Individuals with education higher than bottom 30% within each occupation, and lower or equal to that of 70th percentile were decided to be matched. Those below the 30th percentile level of ISCED were defined as under-educated, and those whose level of education exceeded 70th percentile of education levels within given occupation were decided over-educated.²³

Apart from that we have used the typical controls used in training analyses (Buchel and Mertens, 2004), such as *sex* (coded 0=male, 1=female), *tenure* (measured in months of work in current employment), *immig* (immigrant

²³ For further discussion on the methods of measuring of over-education see chapter 1.

status), *degurba* (degree of urbanization of the place where respondent lives), *fsize* (firm size – measured with the number of employees currently working in a given enterprise). We have also introduced a control for public sector employees, since it is well known that the public sector attracts workers for its employment stability and possibility of reconciling family life with careers. Furthermore, as in a standard Mincerian model we have introduced labor experience with the present employer in a linear and a quadratic form. Experience was expected to produce positive coefficient in its linear and a negative coefficient in its quadratic form. It is so, because in time experience may substitute training.

In order to address the question of possible gender discrimination with respect to training among over-educated women, we introduce two dummies. The first measures the effect of the level of education of women on the chances of getting firm training. The second measures the probability of getting into training for over-educated women. Apart from the negative coefficient for gender typically associated with a gender training gap, we expected to observe positive returns to education for women, and a negative probability for getting into training activity among over-educated women. Below we explain the econometric framework applied in this paper.

3.3 Econometric framework

The multivariate analyses presented in this article are all based on the following probit model with sample selection correction. There are at least two possible specifications which could be applied to analyze the impact of over-education on training (McGuinness, 2006). Firstly one can estimate an ORU-type model (Over-Required-Under-educated) based on the years of education of the worker. Over-education and under-education in this model are measured with years of surplus or deficit of education for the present job, respectively. The coefficients standing by the variable measuring over-education in the ORU model measure the difference in training likelihood between the over-educated worker and the matched worker in the same job. Different from that is the use of dummy variables in the model of training and over-education. If over-education is measured with the dummy variable then the coefficient standing by this variable measures the difference in the likelihood of obtaining training between the over-educated worker in the present job and the same identical worker in the job matching his/her skills. Therefore, we could say, that the ORU model compares the over-educated

worker with his/her peers in his/her present job and the dummy-based specification compares the over-educated worker with other identical workers but in matched jobs. In this chapter we apply both approaches.

In the ORU model the over-education and under-education variables come from the following equation:

$$AE = RE + OE - UE,$$

where AE stands for acquired education, RE is the required education for the job, OE is the excess of education for the job, and UE represents the under-education. In our case the ORU specification is built using levels of education within occupations instead of the commonly used years of education by occupation (Duncan and Hoffman, 1981). We cannot estimate model based on the years of education because this variable has been suppressed in our data during anonimization.

The probit model assumes the following latent relationship:

$$y_i^* = \mathbb{x}_i \boldsymbol{\beta} + u_{1i},$$

where the dependent latent variable y_i^* is observed only if $y_i^* > 0$, with value 0 otherwise. We observe training (without knowing the real amount of it) only in a binary way, where:

$$\begin{cases} y_i = 1 & \text{if } y_i^* > 0 \\ y_i = 0 & \text{otherwise.} \end{cases}$$

We observe over-education only if individuals are employed. Therefore our dependent variable (training) is observed only if the following selection equation holds:

$$y_i^{sel} = (\mathbb{z}_i \boldsymbol{\gamma} + u_{i2} > 0),$$

where \mathbb{x}_i and \mathbb{z}_i are vectors of individual characteristics influencing individual's training and selection into employment, respectively. The above selection

equation contains the following controls: age, sex, immigrant status, marital status, level of education and average quantitative ability.²⁴

We assume that the following holds with respect to the error terms u_{i1}, u_{i2} :

$$\begin{aligned}u_1 &\sim N(0,1) \\u_2 &\sim N(0,1) \\corr(u_1, u_2) &= \rho.\end{aligned}$$

The parameter ρ depicts the strength of the selection. If $\rho \neq 0$ is significant, then a standard probit model for odds of training would yield biased results. The labor force in our sample is not a random group. Since our interest locates primarily in answering the question whether over-educated workers are more or less likely than the matched to receive training we are concentrating on a group of mismatched individuals. As predicted by matching theory mismatched workers are rather laid off and new search is resumed by companies instead of offering them training. So included in our sample are only those workers who managed to obtain employment despite being mismatched. Consequently then, we expect that the selection into employment is significantly affecting the odds of being trained in the work (especially for mismatched workers) and so we assume that the parameter ρ is significantly different than zero. The estimation results were further transformed into marginal effects computed at the variables' means. The interaction parameters' marginal effects obtained through standard Stata procedures would not be correct. Using the *inteff* command created by Norton and colleagues we have obtained correct marginal effects for interaction terms (Norton et al., 2004). The section below presents the results of our analysis, which in the following section are discussed in terms of existing theories regarding training.

²⁴ Average quantitative ability relies on the notion that more quantitatively oriented fields of study like engineering, health, or natural sciences attract more quantitatively able (and also more quantitatively oriented) students. Courses requiring quantitative skills are much more often offered in the above fields of study than in humanities or teacher training. Consequently we expect that students self select by quantitative skills into quantitative fields. Our classification applied in this model is meant to resemble this assumption. It must be noted however that the results presented do not change significantly if the measure of average quantitative ability is substituted with fields of study dummies in the selection equation.

4. Results

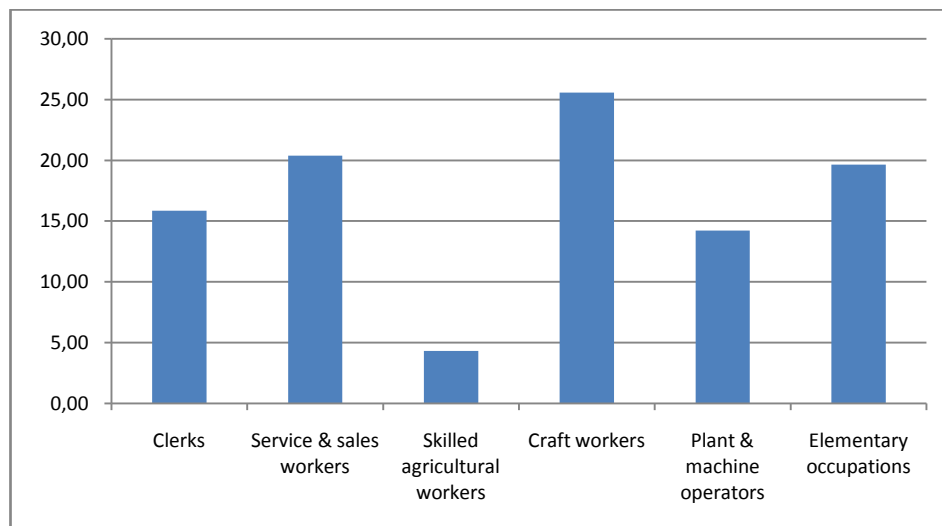
The results obtained in the multivariate analyses are presented below. We have estimated various models explaining the odds of participation in training. The main descriptive statistics concerning most important controls are presented in Table 3.1 below.

Table 3.1. Descriptive statistics for major controls used in the Heckman selection probits.

Variable	Obs	Mean	Std. Dev.	Min	Max
sex	175209	.5138891	.4998085	0	1
married	175209	.4938787	.499964	0	1
immig	175209	.0219395	.1464865	0	1
tenure	67823	123.8783	126.6013	0	725
fsize	59529	35.48969	31.83646	5	80
degurba	175209	1.927555	.8812068	1	3
iscd6l	148990	2.487845	1.804501	0	6
public	67823	.0719372	.2583859	0	1
overed	76444	.1247187	.3304019	0	1

Over-education level determined in our data reached 29% of all employed workers. However its distribution is heavily unequal across occupations. Figure 3.1 presents the distribution of over-education across different occupations.

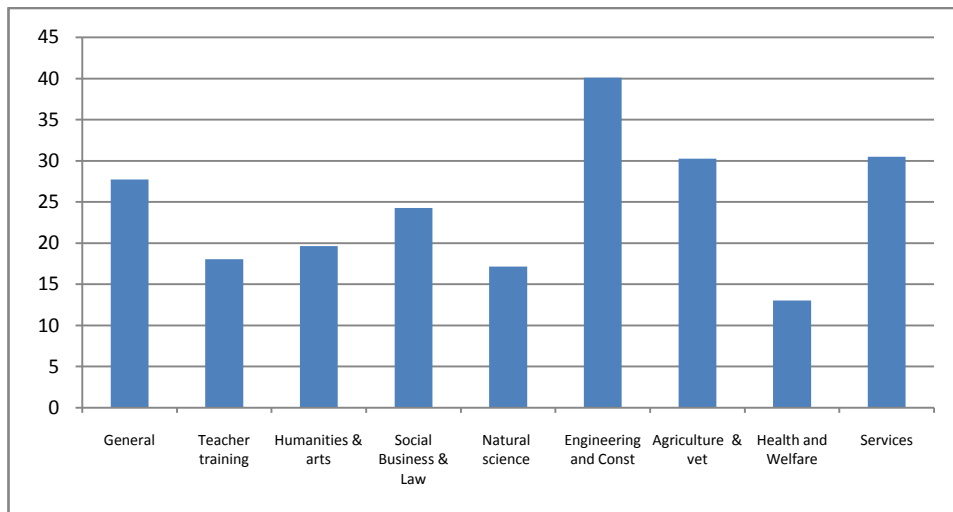
Figure 3.1. Distribution of over-educated workers across major occupations.



In Figure 3.1 we observe that the majority of over-educated workers belong to craft occupations followed by service and sales employees and elementary occupations.

The distribution of over-education across fields of study is presented in Figure 3.2. Here the greatest incidence of over-education is observed in Construction followed by Services and Agriculture. The lowest incidence of over-education is observed in fields such as Health and Welfare, Teacher training and Natural sciences. The high incidence of over-education in Engineering and Construction field is mostly due to the construction workers and not to university graduates in engineering. Engineers in Spain enjoy a very high prestige as an occupational group while construction workers with vocational qualification in construction, though well rewarded during the construction boom of recent years, are mostly over-educated. There is a high incidence of over-education among General field graduates. These are mostly upper secondary graduates who did not continue their education at university levels. They have relatively high level of education but it is very unspecific and they often end up as administrative workers in low level occupations where their education exceeds that of the 70th percentile workers.

Figure 3.2. Distribution of over-educated workers across major fields of study.



In a multivariate framework we had a number of expectations regarding the coefficients estimates. Firstly, we expected to find a negative coefficient for the over-education variable and a positive coefficient for the under-education

variable. It was argued in the theoretical section that over-educated individuals have an excess of easily transferable skills and are therefore less likely to be trained in the jobs. Under-educated workers on the other hand either will be trained or laid-off. Secondly, we assumed, in line with other research on training, that women are a group prone to job interruptions, which makes them less attractive for employers to be trained. Therefore we expected the gender coefficient to be negative. Finally, it is predicted by the human capital model that more education makes individuals more attractive to employers in terms of their signaled productivity.

A multivariate probit model with dummy variables measuring under- and over-education was estimated in Models 1 and 2. Both include correction for self-selection of individuals into employment. The selection equation has been identified by including the degree of urbanization and the marital status of individuals. Degree of urbanization may be thought to be a proxy of the size of the local labor market. The larger the municipality the more possibilities of employment individuals may have. The control for marital status is especially important for women. If as we have stated before a mismatched woman is being laid off from her job she may decide to dedicate herself to family tasks instead of looking for another job. On the other hand men who get married may experience higher pressures on being employed. In such a case men, when married, are thought to be more prone to look for employment after being fired from mismatched jobs than women. These two variables have not been included in the training equation.

Table 3.2 presents the marginal effects of the probit coefficients estimated at variables' means. The reference field of study in Table 3.2 is Humanities and arts. Some fields of study, due to the fact that they entail very heterogeneous types of professions, have been decomposed into tertiary and non-tertiary levels (indicated in Table 3.2 with t/nt).

The results in Table 3.2 reveal that our expectations regarding probability of obtaining training for over-educated workers were right. In both models 1 and 2 the coefficient (expressed as a marginal effect) for over-educated workers is negative. Over-education leads to lower likelihood of getting training than the worker would have had s/he been matched. Under-educated workers are more likely to get training in Spain than if they were matched. The coefficient for under-education dummy is positive in both models.

Furthermore we see in both Models 1 and 2 that higher levels of education increase chances for obtaining job training of the matched workers. The coefficient for gender is surprising however. In Model 1 it is positive and

significant indicating that women are more likely to obtain job training than men. Once we introduce the interactions of educational level with gender, and over-education with gender, the odds of training of higher educated workers become insignificant [see the coefficient for the variable Sex*ISCED in model 2]. It is evident that the variance captured by gender in model 1 is overtaken in grand scale by the interaction terms of gender and level of education, and gender interacted with over-education in model 2. The coefficient for gender*over-education variable in the sample aged 16-62 (presented in the Appendix B) is significant at 0.1 level indicating that over-educated women are less likely to get training than over-educated men. It may be a signal of gender discrimination in training. The educational level for women did not however prove to be a significant factor influencing the likelihood of training.

Big firms were expected to be more prone to train workers, and it is so in both models presented in Table 3.2. The impact of firm size on the probability of obtaining training is positive. Larger firms, as expected, enjoy economies of scale and train workers cheaper than smaller enterprises. The public sector dummy received positive and significant coefficient in our regression. This indicates that workers in the public sector receive on average more training than workers in private enterprises. Furthermore age has no significant effect on the likelihood of training.

The immigrant status dummy obtained a negative and significant coefficient in both models presented in Table 3.2. Immigrants in Spain are less likely than indigenous people to be trained. It may be interpreted as a signal of discrimination against immigrants.²⁵

The fields of study controls included in Models 1 and 2 do not differ importantly between these two models. The fields which increase the worker's likelihood of obtaining training are: Teacher training, tertiary Health and Welfare, and non-tertiary Services. These fields are thought to equip their workers with very concrete skills applicable in limited number of jobs. Primarily these would be schools for teachers, healthcare for medical staff and simple services such as hairdressers for non-tertiary services. Transferability of their skills is lower than for the graduates of Social sciences and the General fields which have a negative impact on the likelihood of training. Engineering and construction at the non-tertiary level also decreases the likelihood of training. This field, however, entails mostly workers of construction whose skills are

²⁵ However to clearly state that conclusion one would need to apply an Oaxaca-type decomposition of the immigrant variable's coefficient.

applicable in virtually any construction site. Taking into account the size of the construction sector in Spain we can claim that these workers have very transferable skills since there exists a very large number of companies willing to employ them.

Observe also, that the rho coefficient determining whether self-selection of individuals into employment was present in our sample is high (-0.817 in Model 1 and -0.731 in Model 2) and it is statistically significant in both presented models. This coefficient demonstrates that accounting for self-selection of individuals into employment is necessary in order to achieve unbiased estimators of the probit parameters (Heckman 1979).²⁶ We have controlled here for selectivity into employment to control for the fact predicted by matching theory, that mismatched (under-/over-educated) workers will be laid off by employers and new search for matched workers will be initiated. Only those workers who were retained by employers (and who did not quit their mismatched jobs) were observed in terms of training in our sample. This fact caused that the group of workers presently in employment could be non-random and therefore this compositional effect should be accounted for by Heckman selection mechanism. We display the selection probit results in the Appendix B.²⁷

²⁶ The coefficients still can be biased due to unobservable self-selection of individuals into employment (for instance by ability) for which we did not control in the selection probits as discussed in the theoretical section.

²⁷ During the model selection part time vs. full time employment was included in various specifications and did not prove significant. This effect might be due to controlling for self-selection of individuals into employment which takes over the variance associated to such types of employment. The same holds for permanency vs. temporality of contracts. A temporary contract dummy was insignificant in all specifications and was dropped from the final specification. Neither temporary nor part-time dummies had any significant effect on the rest of coefficients in the models and they were dropped from the models.

Chapter 3. Why would over-educated workers still need more training?

Table 3.2 Multivariate probit models of probability of training in Spain (ages 16-49).
The dummy controls specification.

	Model 1	Model 2
Age	-0.00454 (-1.19)	-0.00251 (-0.61)
(Age) ²	0.0000406 (0.79)	0.0000199 (0.37)
Immigrant	-0.0668*** (-4.18)	-0.0734*** (-4.68)
Experience	0.000314*** (3.35)	0.000314*** (3.29)
(Experience) ²	-0.000000764** (-2.53)	-0.000000775** (-2.54)
Sex	0.0374*** (4.40)	-0.0122 (-0.39)
ISCED	0.0154*** (3.53)	0.0130*** (2.76)
Over-education	-0.0620*** (-10.92)	-0.0541*** (-7.25)
Under-education	0.0435** (1.97)	0.0447* (1.93)
Public sector	0.0308*** (3.87)	0.0307*** (3.81)
Firm size	0.000691*** (8.36)	0.000701*** (8.40)
General Field	-0.0343*** (-2.69)	-0.0342*** (-2.63)
Teacher training	0.0459*** (3.12)	0.0458*** (3.06)
Social Business & Law nt	-0.0401*** (-3.15)	-0.0380*** (-2.90)
Social Business & Law t	-0.0159 (-1.33)	-0.0150 (-1.24)
Natural & math	-0.0201 (-1.45)	-0.0180 (-1.28)
Engineering & Construction nt	-0.0258* (-1.90)	-0.0281** (-2.04)
Engineering & Construction t	-0.00152 (-0.10)	0.00338 (0.21)
Agriculture & Vet	0.00629 (0.29)	0.00744 (0.34)
Health & Welfare nt	-0.00345 (-0.20)	0.00519 (0.27)
Health & Welfare t	0.0280* (1.91)	0.0264* (1.78)
Services nt	0.0425** (1.98)	0.0493** (2.16)
Services t	-0.00128 (-0.06)	0.00154 (0.07)
Sex*ISCED		0.0126 (0.008)
Sex*Over-education		-0.0131 (-1.066)
N	26270	26270
LR(Chi2)	607.2	583.1
rho	-0.817***	-0.731***

Notes. Marginal effects presented; *t* statistics in parentheses. Sex 0=male, 1=female. Reference field of study =Humanities. For interaction dummies Sex*ISCED and Sex*Over-education z-statistics are presented in parentheses (interactions were computed using *inteff* script for STATA 9.2). The * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. For the sake of clarity coefficients from selection equations are not displayed. The *t* denotes tertiary level of the respective field, *nt* stands for non-tertiary levels

Table 3.3 Multivariate probit model of probability of training in Spain (ages 16-49).
The ORU specification.

	Model 3
Age	-0.00501 (-1.32)
(Age) ²	0.0000483 (0.95)
Immigrant	-0.0602*** (-3.62)
Experience	0.000312*** (3.33)
(Experience) ²	-0.000000766** (-2.55)
Sex	0.0370*** (4.35)
RE (Required education)	0.0168*** (3.83)
OE (Over-education)	-0.0170*** (-3.69)
UE (Under-education)	0.00600 (0.54)
Public sector	0.0302*** (3.81)
Firm size	0.000702*** (8.51)
General Field	-0.0355*** (-2.81)
Teacher training	0.0471*** (3.20)
Social Business & Law nt	-0.0394*** (-3.09)
Social Business & Law t	-0.0181 (-1.52)
Natural & math	-0.0205 (-1.48)
Engineering & Construction nt	-0.0232* (-1.70)
Engineering & Construction t	0.000115 (0.01)
Agriculture & Vet	0.00742 (0.34)
Health & Welfare nt	-0.00622 (-0.36)
Health & Welfare t	0.0280* (1.91)
Services nt	0.0390* (1.85)
Services t	-0.00482 (-0.21)
<i>N</i>	26270
LR(Chi2)	618.9
rho	-0.825

Marginal effects; *t* statistics in parentheses. Sex 0=male, 1=female.

Reference field of study =Humanities.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Next, we present the results for the ORU model displayed in Table 3.3. The main difference with the previous model is the interpretation of the results on under-/over-education. The OE variable included in Table 3.3 stands for over-education while the RE denotes the required level of education. The UE variable measures the under-education.

We obtain that the higher the required level of education the higher the probability of receiving training. Moreover, we observe that for each level of education above the required level (over-education) the probability of getting training decreases.²⁸ This means that over-educated workers are less likely to obtain training than their matched co-workers in the same job. The results for under-education are insignificant in the ORU specification. Other coefficients remain the same between the ORU model and the Models 1 and 2 in Table 3.2.

5. Conclusions

The aim of this chapter was to show the probability of being trained in Spain when in an under- or over-educated job position. Using the special ad hoc module on Life-Long Learning issued in 2003 additionally to European Labor Force Survey, we have presented results on the likelihood of obtaining training for over-educated and under-educated workers in Spain. To our knowledge this is the first study on this issue with recent data for Spain.

We have relied on a measure of over-education introduced firstly in Ortiz & Kucel (2008) which uses levels of education (ISCED) instead of years of education as a measure of adequacy of human capital for each occupation (ISCO88). We assumed, following human capital view, that if workers are prone to quit when over-educated (as demonstrated by the empirical literature) then they should have lower probability (than matched workers) to receive training. It follows that the coefficient for over-educated workers should be negative in our model. Alternatively, one could expect that over-educated workers do not receive job-related training because employers assume that they do not need it. Being over-educated means having more human capital than the current job requires and so there is no need for further training. On the other hand under-

²⁸ Note that we present marginal effects from the probit model estimation. Therefore these results do not allow for computing of the total effects of education on the likelihood of training. The fact that over-education decreases the likelihood of training does not mean that total effect of education on the probability of obtaining training could become negative.

educated workers who have a deficit of skills for the present job need training and so we should expect a positive sign by the under-education control.

Indeed our expectations proved to be correct. Over-education decreases chances to obtain training in all models. Over-educated workers are less likely to get training than their matched co-workers in the same jobs, and also they are less likely to get training than if they were matched themselves in other jobs. Under-educated workers proved on the other hand more likely to receive training than if they were matched. However as compared to their matched co-workers under-educated workers are not significantly more likely to get training.

Smooenburg and Velden (2000) posed a question whether firm training is complementary to human capital (as proposed by Becker) or substitutive to it (as advanced by matching theory)²⁹. Using Dutch employee-employer matched data their major observation was that over-educated workers are less likely than others to receive job training. However workers in jobs which didn't match their field of education were more likely to receive training and this observation seems as supporting the matching theory. The authors claimed then that they had found confirmation of both complementarities of training and education in terms of firm size, education level's positive influences on training likelihood and substitutability of them as in the case of "field mismatch". Our results complement the view presented by Smooenburg and Velden (2000).

What we propose here is rather a new argument to explain why over-educated workers should receive less training (as observed) and under-educated workers more training than the matched ones. Our argument, rooted in matching theory, diverges from the view presented by Smooenburg and Velden (2000). Their main claim was that matching theory would suggest that mismatched workers (in terms of their field of education) should be more likely to receive training (if retained by the employer) in order to bridge their possible skill gaps and achieve a match.

We argue that over-educated workers are in possession of an excess of transferable skills (education is the source of most transferable skills) and under-educated workers have a deficiency of transferable skills with reference to their present job. This implies that over-educated workers may find their market value higher outside their present firm and thus have incentives to

²⁹ We do not explicitly control for horizontal educational mismatch, where worker's field of study does not match their field of job.

change jobs and search for better matches. On the contrary under-educated workers having deficiency of transferable skills in their present jobs are in comparably privileged position towards outside options in the labor market and their value outside their present employment is lower than in their job right now. Therefore they have no incentives to change jobs. Here we come back to the human capital investment horizon argument. Employers knowing that over-educated workers have incentives to quit evaluate their tenure to be short and, thus, do not offer them training. On the other hand, under-educated staff seems to be much more loyal and interested in retaining their present jobs and thus appear very stable. The employer knows this and offers them training. That explains both the negative odds for training of over-educated and positive odds for training of under-educated workers.

Our argument is in line with the empirical findings of other studies. We established in the theoretical section that the majority of training received in Europe is of mostly general nature. This type of training endows workers with highly transferable skills. Moreover we have shown that majority of training is employer-sponsored. This is rather incompatible with the human capital model where the general training is always paid by the workers. If employers provide training which endows workers with very transferable skills then our argument regarding the investment horizon should not hold. Note however that we have demonstrated that over-educated workers who have excess of transferable skills are not receiving training from employers. Only those who lack transferable skills are likely to receive training, namely the under-educated workers.

The above reasoning finds also confirmation when one looks at the coefficients attached to fields of study dummies in the multivariate models. It is evident there that more transversal fields like social sciences, and general field are less likely to receive training with reference to humanities. On the other hand fields which equip their graduates with more specific skills like tertiary health or non-tertiary services increase their graduates' likelihood to receive training. This is so because less transferable skills increase the cost of job search and make it more difficult for workers to change jobs easily thus making them more "stable". The negative coefficient for non-tertiary construction and engineering seems to be contrasting with our argument. However regarding the fact that the construction sector in Spain is especially large the skills of these workers are highly transferable across this immensely large sector.

Finally it should be noted that the results obtained in this study are consistent with similar research for other countries (apart from the results obtained by

Smooenburg and Velden (2000)). Buchel and Mertens (2004) using German data find that over-educated workers are less likely to receive job training. Similarly, Hersch (1995) finds for USA that over-educated workers are less likely than the matched ones to receive job training.

An alternative explanation to our results could be offered. Employers select over-educated workers because this way they do not need to offer them training. Given that majority of training is of a general nature and knowing that employers partly or even totally cover the costs of such training we could expect that employers will intend to avoid this investment. This argument is somewhat more opaque, however, if we look at the under-educated workforce. Here employers do have to invest in training since these workers have a deficit of skills with respect to their jobs. According to this argument employers should not be interested in hiring and training of under-educated workers.

The major contribution of this study is therefore to draw attention to a conceptually new explanation for the probability of training of over-educated individuals. This explanation entails elements of both human capital model and the matching model which were reclaimed by Smooenburg and Velden (2000). The advantage of the argument presented here is that it aims to explain both the decreased likelihood of obtaining training of over-educated workers and increased of those who were retained in under-educated jobs. It also explains some findings observed for particular fields of study included in our models. This argument however requires further testing and research and should be treated as theoretical proposal only.

This research should be extended with the analysis of the duration of training with respect to under-/over-education. So far we have established only that some groups of mismatched workers are more or less likely to participate in training. How much of it they receive once they manage to obtain it is another question which should be addressed in further research.³⁰

³⁰ We could not address the duration of training in this chapter because the data at our disposal did not permit it. The duration of training in our data suffered from very important amount of missing cases and the final sample would not meet the minimal requirements of Eurostat with regards to Labor Force Survey.

Appendix B

Table B.1 Multivariate probit models of probability of training in Spain (ages 16-62).

	Model 3	Model 4
Age	0.00745*** (2.83)	0.00894*** (3.32)
(Age) ²	-0.000136*** (-4.54)	-0.000149*** (-5.03)
Immigrant	-0.0648*** (-4.23)	-0.0704*** (-4.86)
Experience	0.000283*** (3.91)	0.000281*** (3.85)
(Experience) ²	-0.000000458** (-2.47)	-0.000000461** (-2.47)
Sex	0.0361*** (4.16)	-0.00473 (-0.16)
ISCED	0.0134*** (3.17)	0.0119*** (2.69)
Over-education	-0.0600*** (-11.46)	-0.0520*** (-7.62)
Under-education	0.0345* (1.64)	0.0352 (1.56)
Public sector	0.0293*** (4.04)	0.0291*** (3.99)
Firm size	0.000615*** (8.13)	0.000615*** (8.04)
General Field	-0.0320*** (-2.74)	-0.0321*** (-2.73)
Teacher training	0.0476*** (3.59)	0.0471*** (3.51)
Social Business & Law nt	-0.0386*** (-3.29)	-0.0366*** (-3.05)
Social Business & Law t	-0.0136 (-1.25)	-0.0126 (-1.14)
Natural & math	-0.0230* (-1.81)	-0.0212* (-1.66)
Engineering & Construction nt	-0.0208 (-1.64)	-0.0228* (-1.79)
Engineering & Construction t	-0.00223 (-0.16)	0.00193 (0.13)
Agriculture & Vet	0.000240 (0.01)	0.00109 (0.05)
Health & Welfare nt	0.000862 (0.05)	0.00871 (0.49)
Health & Welfare t	0.0330** (2.46)	0.0317** (2.35)
Services nt	0.0372* (1.82)	0.0422** (1.97)
Services t	-0.00673 (-0.32)	-0.00439 (-0.21)
Sex*ISCED		0.01006 (0.007)
Sex*Over-education		-0.01723* (-1.64)
<i>N</i>	30447	30447
chi2	776.9	755.4
rho	-0.767***	-0.665***

Notes. Marginal effects presented; *t* statistics in parentheses. Sex 0=male, 1=female. Reference field of study =Humanities. For interaction dummies Sex*ISCED and Sex*Over-education *z*-statistics are presented in parentheses (interactions were computed using *inteff* script for STATA 9.2). The * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. For the sake of clarity coefficients from selection equations are not displayed. The *t* denotes tertiary level of the respective field, *nt* stands for non-tertiary levels

Table B.2 Results from selection probit estimation.

	employed
Sex	-0.368*** (-18.96)
Age	0.0248*** (21.11)
Immigrant	-0.212*** (-4.52)
Married	0.224*** (9.83)
Degurba	-0.00291 (-0.26)
Quant. Ability	0.0440*** (3.34)
ISCED	0.0658*** (7.80)
<i>N</i>	36396

Chapter 4

Are over-educated people insiders or outsiders? A case of job search methods and over-education in UK.

(co-authored with Delma Byrne, ESRI Dublin)

Abstract

The aim of this paper is to investigate whether job search methods significantly influence the probability of being over-educated. Using British Quarterly Labor Force Survey data we demonstrate that there exist significant differences across job search methods in their likelihood to result in over-educated jobs. The results suggest that institutional support in job search in the UK increases significantly the likelihood of becoming over-educated. Moreover it is shown that graduates of so called “soft fields” of study, as compared with the graduates of “hard fields”, have significantly worse personal networks in the job market. It is theorized that asymmetric information in the labor market defines graduates of “soft fields” as outsiders of privileged information about matching jobs. Graduates of the “hard fields” on the other hand are said to be the insiders and holders of better information about job market.

Introduction

There is substantial empirical evidence that over-education can be a persistent rather than transient phenomenon (Dolton and Vignoles, 2000, Frenette, 2004, McGuinness and Wooden, 2007, Sloane et al., 1999, Smoorenburg and Velden, 2000). Furthermore, it has been established that some fields of study lead significantly more often than others to over-educated jobs (Frenette, 2004, McGuinness, 2003, Ortiz and Kucel, 2008b), that is, pursuing some fields of study lead to a higher probability of obtaining a job which requires a lower educational qualification than the one actually possessed.³¹ The relationship between over-education and field of study has attracted much attention, with studies indicating that over-education is less frequently observed in fields of study that provide access to narrowly defined labor markets, which are in turn determined by a country's general labor market structure as well as its educational system. As a consequence, we expect that the pursuit of employment upon completion of different fields of study will result in differences in the ease/difficulty of finding an appropriate job. While the over-education literature has considered job search processes, it has tended to focus on the constraints of geographical job search (Sloane, 2003) or job search while in employment (Groot and van den Brink, 2003). Much less attention has been paid to the job search channels through which entry into over-educated jobs are obtained.

This paper seeks to address this gap in the literature. Using Quarterly Labor Force Survey data for the UK, this paper considers the relationship between over-education, field of study and job search methods. Specifically, we are interested in whether formal channels of job search such as finding a job through a newspaper advertisement, employment agency or direct application to an employer leads to a relatively higher or lower incidence of over-education than informal (the use of personal contacts) methods of job search. Furthermore, we hypothesize that fields of study which are characterized by strong education-labor market signals evoke the use of formal methods of job search while fields with weak education/labor market signals lead to a greater use of informal, personal networks. This is thought to be due to the strength of the productivity signal sent by potential employees and their selectivity into more/less productive networks. On this note, it has been demonstrated that

³¹ In the present research we use expressions: college major and field of study as synonyms.

more able individuals self-select into more demanding and more narrowly defined disciplines, such as engineering and health, while those with lower ability negatively select into more transversal fields such as humanities and services (Arcidiacono, 2004). Finally, the very selection into employment conditions the observation of over-education, and this is accounted for in this paper. Individual characteristics such as gender, immigrant status, and marital status and level of education attained are used to control for the self-selection of individuals into employment. The paper is organized as follows. In section 2 we discuss the major theories relevant to our research question. Section 3 presents the data and methods used to verify the working hypotheses. Results are presented in Section 4 and section 5 provides an overview of the results and conclusions.

2. Theoretical Background

To our knowledge there has not been any attempt to formally address the issue of job-search methods and the incidence of over-education associated with those methods. We aim at filling this gap in the present research. The theoretical background which we propose in this paper does not challenge any of the standard economic theories explaining the existence of over-education, which were discussed in the introduction to this thesis. Rather, it is an attempt to complement them with yet another hypothetical mechanism which could act as a catalyst of over-education. We base our theoretical framework on the foundations levied in the work of George Stigler's article from 1962 entitled "Information in the labor market" (Stigler, 1962). According to Stigler; the more educated a worker is the more refined is his/her set of possible adequate jobs.³² Workers with lower levels of education should therefore have larger sets of possible jobs than highly skilled engineers (i.e. those with higher levels of education). This phenomenon is associated with the information that workers have about the job market and the available information about them in the market. However, nobody possesses full information either about all possible job offers in the market or about all characteristics of jobs. Moreover, search for information about jobs is costly. In such a scenario, a rational actor has it easier when his/her set of alternatives are smaller since he/she can evaluate with greater ease all possible alternatives. With the growth of sets of

³² By "adequate jobs" we understand jobs which are matching worker's skills in terms of both the level and type.

alternative jobs, the amount of information to be acquired grows, causing the choice to be rationally bounded.³³ This in turn leads to inequality in the endowment of information among workers. That is, the higher the level of education, the better defined the set of alternative jobs that a worker can obtain and the better information they will have about the labor market. This view does not contradict either the human capital model or matching theory, as it addresses the issue of asymmetric information about jobs in the labor market.

An important question which then arises is how to distinguish between sizes of sets of alternatives among workers with the same levels of education. Because of educational expansion there are now many workers with tertiary levels of education – how should we differentiate among them? The field of study an individual has completed can support our theoretical construct. Workers with more narrowly defined fields of study will face smaller and better defined sets of job alternatives while workers from more transversal fields will have less clearly defined possible jobs and therefore larger sets of alternative jobs. This translates again into inequality in information about the labor market positions available to different individuals. For example, engineers will see their labor markets as being more structured while humanists will often encounter a decision as to which job or sector would be adequate for them.

Job information networks (Ioannides and Loury, 2004) or as others prefer to call it, social capital (Coleman, 1988), may offer support to those workers who face vast sets of alternative jobs for two reasons. Firstly, workers with education in more narrowly defined fields of study will find it easier to look for jobs due to better information about their job alternatives; while workers with more broadly defined fields will have to resort to personal networks in order to acquire more information about the possible alternatives awaiting for them in the labor market. Secondly, it has been shown that individuals self-select into particular networks according to their status in terms of education, gender or ethnicity (Rosenbaum et al., 1999, Smith, 2000). In our framework this means that workers with more narrowly defined fields of study (e.g. engineering, health) will form networks with their peers and so they will exclude from them the individuals with lower stocks of information about the labor market.

³³ Incomplete information puts the bound on rationality of the decision since it is not possible to compare all alternatives due to lack of information about them (or their existence). Recall that a rational decision is such, where individual is able to compare all alternatives and rank them in terms of her utility associate to each of them. Only then rational individual may make her choice and choose always the utility maximizing option.

Our view of the labor market in terms of job information networks is not entirely new. Similar concepts have been already been proposed in the literature on job information networks. Lin proposes a theory of social networks where individuals connect into a network only with their peers in terms of their social position, and only exchange with them information about jobs in the labor market (Lin et al., 1981a, Lin et al., 1981b). What makes our approach new is the application of these concepts to the question of over-education. One may claim that over-educated people obtain their jobs mostly through the use of inadequate networks which do not provide sufficient information about labor market opportunities, which in turn leads to making suboptimal decisions about careers. It has been demonstrated that the problem does not lie only in the choice of college major/degree. Individuals choosing college majors have fairly good information about the wage prospects associated with those majors (Montmarquette et al., 2002). The problem arises when one needs to screen the labor market for adequate positions. The amount of information necessary to achieve a good match is positively related to the width of scope of the college major. The most transversal majors require a lot of information in order to make rational decisions about which job to choose. Such workers will therefore refer much more to networks than will workers whose college major (and/or level of education) narrows their job alternatives, making the market more transparent.

Therefore we find ourselves in a situation where on the one hand, the labor market provides inadequate information about possible jobs, and on the other individuals self-select into networks which may in fact further limit access to adequate information about jobs. This second issue arises when one considers that individuals self-select to networks according to their gender (Mencken and Winfield, 2000), race (Holzer, 1987a), or geographical location (Elliott, 1999) among other characteristics. Furthermore, different probabilities of over-education have already been linked to having studied different fields of study (Ortiz and Kucel, 2008b)

We expect to find significant differences in the use of job information networks among over-educated individuals coming from various fields as compared with the population of the not over-educated workers. We stipulate here that workers with education from fields with the lowest incidence of over-education, which at the same time are known to be narrowly defined such as engineering or health, form groups of matched insiders impeding outsiders to enter their internal labor markets by withholding information

about jobs from their networks. On the other hand, job candidates with education from transversal fields such as humanities belong to networks that are not connected with the networks of graduates from hard fields. This way the soft fields' graduates are excluded from participation in sharing of internal information about their respective sectors of the labor market possessed by the hard fields group. This leads to an uneven distribution of over-education across individuals with different college majors as regards the job search methods.

3. Data and Methods

Considering the influence of job search methods on over-education requires sequential information on the job search process. A dataset that includes this information is the UK Quarterly Labor Force Survey. This nationally representative survey collects information from a random sample of individuals regarding their current labor market status. For the purpose of this paper, data from every 5th quarterly dataset between 2003 and 2005 was merged in order to avoid duplicates³⁴, thus providing a pooled cross sectional sample. Importantly, the UK QLFS collects detailed information on the primary job search method used by employees to access their current employment, as well as detailed information on individual and firm level characteristics. This data has been collected for those who have been in employment with their current employer for twelve months or less, thus our dataset comprises observations of individuals who (a) were in the labor market at the time of the survey and (b) who had been with their current employer for twelve months or less.

Respondents who were in employment with their current employer for twelve months or less were asked: 'How was your current job obtained?'. Respondents were presented with several different answer categories and asked to pick one from the following list: Replying to a job advertisement, job centre/job market, careers office, private employment agency or business, hearing from someone who worked there, direct application, and 'some other

³⁴ The survey has a quasi-longitudinal capacity. Each individual is interviewed for 5 consecutive quarters, thus every 5th quarter was used in compiling the pooled cross-sectional sample.

way'.³⁵ Those reporting that they had obtained their current job through either a job centre/job market or a careers office were conceptualized as having had 'state institutional support' in gaining employment, while those who reported that they had obtained their current job through hearing from someone who worked there were conceptualized as having used a personal contact.

The UK QLFS data also contains detailed information on the educational attainment and field of study of all respondents.³⁶ Educational level attained was obtained by converting QLFS data on educational qualifications into the 5-level ISCED97 categorization of educational attainment for the UK. The levels identified are defined as follows; (1) No formal education or below ISCED 1 (2) Lower secondary or 2nd stage of basic education (3) Upper secondary (4) Tertiary level (diploma/degree/masters) and (5) Higher Degree (Doctorate). Field of study was also included in the analysis and the following fields were identified: medicine, natural sciences, engineering, social science, humanities and art, teacher training education, business and law, agriculture and veterinary, services and general.³⁷ Furthermore, a distinction was made in the models between those pursuing a 'hard' and 'soft' field.³⁸ 'Hard' fields included medicine, natural sciences, engineering, agriculture and veterinary while 'soft' fields included social sciences, humanities and art, teacher training, business, law, and services. What we intend to manifest by this distinction is that 'hard' fields entail more quantitative oriented courses and require higher mathematical skills than otherwise 'soft' fields which tend to be qualitatively oriented and require more verbal abilities. The distinction is made to resemble the basic difference in mathematical skills of the graduates of each 'type' of fields. Another important aspect of this distinction is that 'hard' fields tend to have more narrowly defined (in our opinion) labor markets than the soft fields. Certainly if one considers horizontal mismatches (inadequacy between field studied and field of work performed) then narrowly defined or more transversal fields become even more salient. Our data however does not

³⁵ We do not know job search methods are used in the category 'some other way'. Indeed, it is likely that this may include personal contacts which people did not want to reveal directly in the questionnaire or it may also indicate that there exists a method which should be investigated upon and deliberately included in the questionnaire. This calls for further investigation and perhaps more detailed categorization of job search methods in the QLFS in the UK.

³⁶ Field of study is available for the majority of respondents

³⁷ The general field comprised less than 1% of respondents and was dropped from the analysis as a residual category.

³⁸ The distinction between hard and soft fields is disputable and arbitrary.

permit us to address the horizontal mismatch so we had to limit our analysis here to the question of over-education.

The dependent variable is a measure of over-education. Over-education is defined as 1 when an individual has an ISCED level of education higher than the 70th percentile worker in his/her respective occupation and 0 otherwise. This measure coincides with another more commonly used measure based on the mean level of education within each occupation and its standard deviation. The over-educated individuals under the 'mean-based' measure are those whose level of education exceeds the mean plus one standard deviation level within their respective occupation. Our measure presented here is however less vulnerable to outliers, and above of all it is more intuitive and easy to interpret.³⁹

Apart from the variables described above, a number of variables which have been shown to influence over-education were included in the models, representing individual and firm level characteristics. These control variables were gender, ethnicity,⁴⁰ marital status,⁴¹ number of years in continuous employment (labor market experience), contract permanency (temporary/permanent), whether they live and work in same area, sector of employment (public/private) and firm size. We did not include age of the worker in the regressions as they would be collinear with the labor market experience.⁴²

The analyses were conducted using logistic regression techniques and two models were identified. In order to consider selection into employment, the first stage of the analyses included all labor market entrants, including those who were currently employed and those who were currently unemployed (n=8515) and a two stage Heckman was used to consider selection into employment. We have estimated a selection probit using gender, ethnicity, marital status, level of education, age of the person and hard/soft field

³⁹ Certainly one may claim it is a very arbitrary measure but in fact so is the 'mean-based' measure. Also it should be noted here that measures commonly used in the literature on over-education rely on years of education of the individual instead of their level of education. We preferred to use level of education since years of education not necessarily have to mean that a diploma of a corresponding level of education has been obtained.

⁴⁰ Ethnicity was defined as a binary variable 1=non-white (including mixed, Asian or Asian British, black or black British, Chinese, other ethnic group) 0=white.

⁴¹ Marital status was coded 1=currently married, 0=not married including those who have separated/divorced or whose spouse has died. Marital status was included in the selection equations controlling for the selection into employment (see the results in Appendix).

⁴² In all subsequent analyses experience² came out insignificant and so we dropped it from the final specification. Removing it added to significance of the linear experience component.

distinction. The first model then considered the effect of all independent variables on the probability of being over-educated. At this stage (Model 1 Table 4.2) we display the results for the general sample taking into account all variables but without taking into account the field of study.⁴³ In the second model all independent variables are entered into the model, including field of study and method of job search interactions to specify whether differences in job search methods vary according to field of study. The Heckman correction for self-selectivity did not alter the coefficients' magnitudes during our research. It did however yield smaller standard errors with more narrow confidence intervals and hence produced more accurate estimation of statistical significance of the parameters displayed in Table 4.2. We do not display the results for the Heckman procedure for the sake of brevity and keeping attention on the major hypothesis of our model (see appendix C). In any case the coefficient for inverse the Mill's ratios came out significant in all our models indicating the presence of self-selectivity of individuals into employment in UK (see Table 4.2).

4. Results

We begin by presenting the descriptive statistics for the major controls used in the models. Table 4.1 below displays means, standard deviations and the number of observations (among other characteristics) for our set of control variables. The sample sizes for each of the variables in Table 4.1 are significantly higher than the working samples in our multivariate models presented in Table 4.1 below. It is obvious that by only taking into account the working population we significantly narrowed our sample, but the real difference on the sample size was influenced by taking into account the field of study of the respondent. Importantly, however, in all our analyses we obtained samples of magnitude greater than 6000 cases required by the survey in order to keep results representative.

⁴³ However the type of field of study (hard/soft) was accounted for in the selection probit.

Model 1 considers the effects of all independent variables on the probability of being over-educated.⁴⁴ Here we see that females are slightly more likely to be overeducated than males. However the results for gender are insignificant in any of the multivariate models presented in Table 4.2. Race other than white seems to increase significantly the chances of being over-educated as is indicated by an odds ratio of 1.231 for Model 1 and 1.348 for Models 2-5 in Table 4.2, and this is consistent with previous research. Interestingly living and working in the same local district may help in avoiding over-education (the odds ratio 0.529). This may be due to the fact that in local areas the labor market is more transparent to its incumbents and hence, provides better information in facilitating good job matches. Individuals living and working in the same municipalities have better networks and know better the local specificity than the labor markets in other areas.

Table 4.1. Descriptive statistics for major individual and firm level controls.

Variable	Obs	Mean	Std. Dev.	Min	Max
Individual level controls					
Gender	217042	0.4976226	0.4999955	0	1
Marital Status	216884	0.5114485	0.4998701	0	1
Ethnicity	217042	0.0898536	0.2859725	0	1
Experience	160879	96.85694	104.6131	0	636
Conditions of employment	140732	0.9457835	0.2264453	0	1
Field of study	85367	1.479694	0.4995904	1	2
Firm level controls					
Live & work in same area	155365	1.397528	0.4893885	1	2
Sector of employment	161147	0.2491576	0.4325266	0	1
Firm size	144873	185.6506	217.3055	5	600

⁴⁴ The sample size is significantly larger than for the sample where field of study is included. This is due to significant amounts of missing data on the field of study question because of two reasons. Firstly workers with a level of education below upper secondary level do not have a defined field of study. Secondly there is missing data on the field of study question for others, despite having a level of education higher than secondary level. Any of those two issues may diminish representativeness of our results.

Furthermore, those who are permanent in their job, public sector workers and those who are longer in continuous employment are less likely to be over-educated. Model 1 also indicates that the method of job search used significantly influences the probability of being over-educated for all of the five methods presented when the reference category is 'used a personal contact'. It is immediately evident from this model that by replying to an advertisement issued by an employer, applying for a job through a private employment agency, as well as applying directly for the job diminishes the probability of being over-educated relative to those who used a personal contact. In this model, these three methods should therefore be considered more efficient job search methods than institutional support. The last category among job search methods called 'some other way' also diminishes the likelihood of being over-educated with respect to using personal contact. However, the definition of this method is opaque and we should treat it with caution.

The major result from Model 1 is that institutional support can be considered by far the worst job search method in terms of the quality of the job match. This method assumes using governmental help in finding jobs and it seems that this help is by and large inefficient in the UK. It is therefore a matter for public concern.

What happens to these differences in job search methods used when we account for the field of study pursued?

In Models 2 and 3 we introduce the controls for type of the field of study, hard and soft, respectively. The hard fields, as hypothesized decrease the likelihood of becoming over-educated and the soft fields increase it. All other variables remain roughly the same as in Model 1. We do not observe significant differences between job search methods in Models 1-3.

Chapter 4. Are over-educated workers insiders or outsiders?

Table 4.2. Results of multivariate analyses of job search methods' influence on probability of getting over-educated.

	Model 1	Model 2	Model 3	Model 4	Model 5
	No fields	Ref: Soft field	Ref: Hard field	Ref: Soft field	Ref: Hard field
Female	1.052	0.983	0.983	0.984	0.984
<i>Ref. Male</i>	(0.88)	(-0.29)	(-0.29)	(-0.27)	(-0.27)
Non-white	1.231*	1.348***	1.348***	1.348***	1.348***
<i>Ref. White</i>	(1.95)	(2.75)	(2.75)	(2.75)	(2.75)
Level of education	2.736***	2.693***	2.693***	2.701***	2.701***
	(32.27)	(31.64)	(31.64)	(31.68)	(31.68)
Contract permanency	0.662***	0.665***	0.665***	0.663***	0.663***
<i>Ref. Temporary</i>	(-5.63)	(-5.57)	(-5.57)	(-5.60)	(-5.60)
Firm size	1.000*	1.000	1.000	1.000	1.000
	(-1.79)	(-1.44)	(-1.44)	(-1.46)	(-1.46)
Live and work in the same area	0.529***	0.530***	0.530***	0.529***	0.529***
<i>Ref. Live and work in different areas</i>	(-11.12)	(-11.09)	(-11.09)	(-11.10)	(-11.10)
Experience	0.962***	0.961***	0.961***	0.961***	0.961***
	(-5.14)	(-5.14)	(-5.14)	(-5.16)	(-5.16)
Public sector worker	0.562***	0.563***	0.563***	0.564***	0.564***
<i>Ref. Private sector worker</i>	(-8.24)	(-8.20)	(-8.20)	(-8.17)	(-8.17)
				Net effects of methods for the reference field	
				Reference: Soft field	Reference: Hard field
Reply to advertisement	0.781***	0.778***	0.778***	0.637***	0.895
<i>Ref. Personal contact</i>	(-3.12)	(-3.16)	(-3.16)	(-3.71)	(-1.08)
Institutional support	1.422***	1.416***	1.416***	1.246	1.559***
<i>Ref. Personal contact</i>	(2.92)	(2.88)	(2.88)	(1.13)	(2.88)
Private agency	0.567***	0.562***	0.562***	0.418***	0.686***
<i>Ref. Personal contact</i>	(-5.68)	(-5.77)	(-5.77)	(-5.56)	(-2.94)
Direct application	0.796**	0.804**	0.804**	0.730**	0.863
<i>Ref. Personal contact</i>	(-2.45)	(-2.35)	(-2.35)	(-2.24)	(-1.19)
Some other way	0.534***	0.529***	0.529***	0.540***	0.519***
<i>Ref. Personal contact</i>	(-6.18)	(-6.24)	(-6.24)	(-4.06)	(-4.83)
Hard fields		0.760***		0.935	
		(-4.59)		(-0.54)	
Soft fields			1.317***		1.070
			(4.59)		(0.54)
				Interaction effects of fields and methods	
F*Reply to advertisement				1.405**	0.712**
				(2.16)	(-2.16)
F*Institutional support				1.251	0.799
				(0.91)	(-0.91)
F*Private agency				1.640**	0.610**
				(2.47)	(-2.47)
F*Direct application				1.182	0.846
				(0.90)	(-0.90)
F*Some other way				0.961	1.040
				(-0.20)	(0.20)
Employment selection hazard	0.0789***	0.0274***	0.0274***	0.0272***	0.0272***
	(-3.08)	(-4.20)	(-4.20)	(-4.21)	(-4.21)
N	8515	8515	8515	8515	8515
LR(Chi2)	2030.4	2051.5	2051.5	2061.9	2061.9

Odds ratios presented; *t* statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Next we explore whether the relationship between over-education and job search method used varies by field of study. Models 4 and 5 in Table 4.2 present results for multivariate logistic regressions with the field of study variable included, and the effect of job search method by field of study is introduced using interaction terms. Models 4 and 5 are symmetric in that they differ only with the reference category for the field of study. In Model 4 the reference category for the fields of study is soft fields. In Model 5 the reference category is hard fields. All job search methods have the same reference category in Models 4 and 5 as in Model 1 and it is 'personal contact'. We find that relative to the reference category the graduates from the soft fields benefit more from any job search method than their peers from the hard fields. The net effects presented in the middle of Table 4.2 show these results. We observe for instance that 'using private agency' for the soft fields' graduates implies larger decrease in the likelihood of becoming over-educated than for the graduates from the hard fields. The last category of searching for the job using 'some other way' is the opposite case. As it was mentioned before, this category is not clearly defined in the survey and therefore we cannot succinctly interpret its coefficient. Observe that the field type controls are insignificant in Models 4 and 5 but some of their interactions with the job search methods are significant. The interpretation here is that the field type itself does not influence significantly the likelihood of becoming over-educated once the job search method by the field type is accounted for. These findings in a way confirm our assumption that studying hard fields places workers within "good" informal job information networks (recall that the base category is 'personal contact' here) while graduates from soft fields should benefit from other than informal (friends) networks comparably more to graduates of hard fields.

Figure 4.1. Odds ratios of becoming overeducated by field of study and job search method.

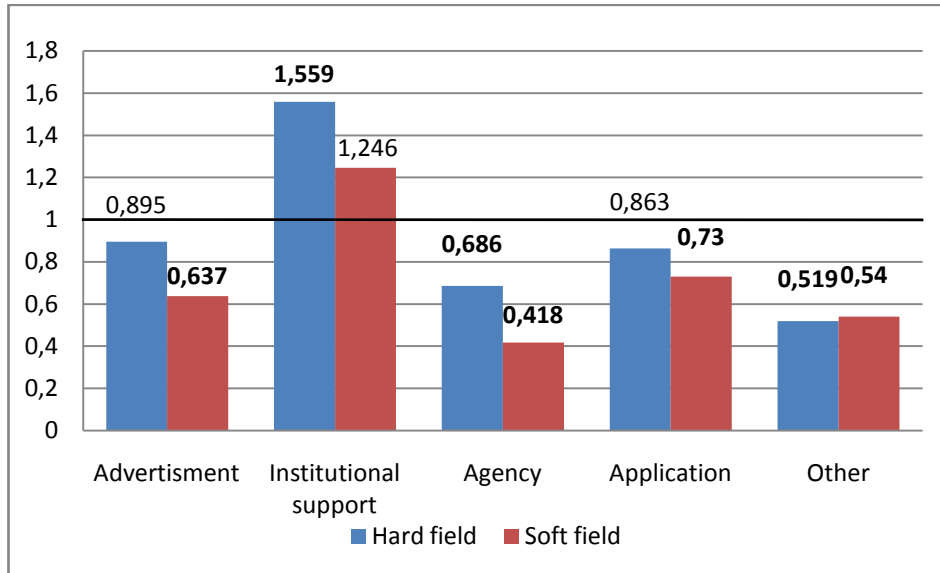


Figure 4.1 above details the jobs search method variations in the net effect of those who pursued a ‘hard’ field of study compared to those who pursued a ‘soft’ field of study, calculated from the table above. The dark bar is the net effect of hard versus the light bar for the soft field by method of job search. It is clear that differences between those who pursue a hard field of study and those who pursue a soft field of study exist.

From Figure 4.1 above we can readily observe that our hypothesis regarding types of fields of study has been partially confirmed. We can see differences in the probabilities of being over-educated associated with different methods to be fairly similar for both types of fields across all methods. All job search methods other than ‘institutional support’ lead to a lower likelihood of being over-educated relative to the base category (personal contact). The largest differences are observed for those who replied to an advertisement, applied through a private employment agency and who used institutional support. At the same time we observe that institutional support (even though not significant for soft fields) leads to an increased probability of being over-educated for graduates of hard fields (see Table 4.2 Model 4).

Interesting, however, is the relative position of the bars representing hard and soft fields in Figure 4.1. One can notice that relative to the base category (personal contact) any method other than 'some other way' leads to a lower probability in becoming over-educated for graduates of soft fields than for graduates of hard fields. Institutional support increases the chances of becoming over-educated for both groups, but more for graduates of hard fields (however this has not reached significance). Any method other than institutional support leads to a lower likelihood of becoming over-educated for graduates of soft fields compared with personal contact. Our results moreover suggest that workers who graduated from soft fields have comparably worse personal networks than workers who graduate from hard fields. Disregarding for a moment the 'some other way' job search category we can state that workers from hard fields have much higher odds of being over-educated using other methods rather than 'personal contacts' compared to workers from soft fields. Put differently their relative gain from using other method than the 'personal contact' benefits them less than the graduates from the soft fields. For workers from soft fields it is beneficial in most of cases to look for jobs through other methods than 'personal contacts'. Finally, we should note that other results concerning controls implemented in the general Model 1 presented in column 1 of Table 4.2 remained largely the same for Models 2-5.

5. Conclusions

The main aim of this chapter was to investigate the possible influences of job search methods on the likelihood of becoming over-educated. In doing so, we have analyzed a sample of actively working individuals aged 16-65 using Quarterly Labor Force Survey pooled samples for years 2003-2005 for the United Kingdom.

Firstly we expected that job search methods affect the probability of getting over-educated jobs. This expectation has been largely confirmed by our multivariate logistic regression results. Even controlling for self-selection of individuals into employment according to gender, marital status, level of education and ethnicity we still observe that the type of information about the labor market matters for a good match. It has been demonstrated that applying for jobs through specialized private employment agencies, as well as replying to employers' advertisements one can secure a better job match than by relying on personal contacts. Importantly, we have also discovered that other forms of job search not directly recognized by the survey lead to a relatively better match. This calls for a more detailed specification of job search methods than that used in the Quarterly Labor Force Survey.

In the second step of our analysis we made a distinction between hard and soft fields of study. We hypothesized that graduates of a hard field of study have better personal networks than graduates of soft field of study. This hypothesis has been confirmed with the results obtained in further modeling (Models 2 and 3 in Table 4.2 and Figure 4.1). All job search methods other than 'some other way' lead graduates of a soft field of study to a better match than graduates of hard fields relative to the base category – 'personal contact'. We therefore indirectly demonstrated that workers from hard fields form networks which provide them with comparably better information about the labor market than workers who graduated from soft fields. This finding indirectly confirms the presence of our main observation that workers who obtain their education in hard fields may be labeled as insiders of their labor markets which tend to be better defined than for graduates of soft fields whom we could consequently label as outsiders of the labor market. This in turn we claim is largely due to the asymmetric distribution of information about the labor market. Workers from hard fields have their possible sets of jobs better defined and therefore their personal networks may be more productive than for workers from soft fields (hence higher odds ratios than for

soft fields' workers in Figure 4.1). Consequently workers from soft fields having no access to good information about labor market through their personal networks obtain better matches when they resort to other job search methods. That is, relative to those who pursued a hard field of study, those who pursued a soft field of study experience a better outcome from using job search methods other than personal networks. All these results are supported by the fact that studying hard fields proved to be negatively associated with over-education.

Finally it is worth noting that the least desirable outcome in terms of estimating the probability of over-education is associated with using institutional support when finding a job. It seems that state institutions in the UK do not provide workers with adequate information about the job market and this in turn may lead to a higher incidence of over-education than when personal contacts are used. This is a matter for concern to public agencies responsible for matching workers to jobs in the UK labor market.

Appendix C

Table C.1. Results from selection probit estimation.

	employed
Age ^a	0.0282*** (6.38)
Female	0.0886*** (4.58)
<i>Ref. Male</i>	
Non-white	-0.410*** (-14.18)
<i>Ref. White</i>	
ISCED	0.0815*** (12.17)
Married	0.397*** (19.00)
<i>Ref. Not married</i>	
Soft/Hard field	0.103*** (5.30)
<i>N</i>	73623

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Age coded as age-bands of 5 years (anonimization procedure)

Conclusions

The leading theme of this thesis is the phenomenon of over-education. A worker is thought to be over-educated when s/he is employed in a job which requires less education than the worker has. This situation, as some authors claim, poses “ceiling” on worker’s productivity because their skills are not fully utilized in their present occupation, and they could be perhaps applied better elsewhere (Tsang and Levin, 1985, Tsang et al., 1991, Rumberger, 1987). This should be treated as an opportunity cost to individuals and hence should be undesirable for them. Moreover workers in such circumstances have decreased productivity which can also be considered forgone benefits for the firm (Tsang, 1987). Tsang studied that firms belonging to the Bell Corporation suffered 8.32% loss of output production due to one year of over-education of their personnel. Unfortunately the question of productivity of over-educated workers has not been much researched. A recent study on French data revealed that over-education is significantly negatively associated with GDP growth and hence the micro-scale losses to the firms may translate into sizable losses of productivity for the whole economy (Guironnet and Jaoul-Grammare, 2007). This makes over-education an economy-wide important issue.

Our chief intention in this thesis was to study other possible factors influencing workers’ situation associated with being over-educated. While the majority of studies on over-education concentrate on the wage effects associated with being over-educated, very little attention has been paid to other issues. We examine some of these issues by studying three different phenomena which are related to over-education.

In the second chapter we focus on temporary contracts and ask whether over-education significantly affects the type of contract that workers obtain: permanent or temporary. Our theoretical argument stems from the matching models where heterogeneous workers are matched to heterogeneous jobs through a costly and lengthy process of job-search (Smith, 2007). Our dependent variable was temporary contracts and we hypothesized that if employers decide to employ a young over-educated worker this will be more likely on a temporary than permanent basis. It is so, because as Smith (2007) observes, firms and workers are time constrained in their candidates/jobs-searches. The best candidates who can signal their high productivity very

clearly obtain matched jobs quickly and are usually offered permanent employment. However workers whose skills are more opaque to possible employers may not manage to obtain the matched job and will be offered potentially mismatched employment. Since employers cannot read the productivity signals of these workers clearly enough they will offer them temporary employment which is meant to test their productivity (Loh, 1994, Wang and Weiss, 1998). When the temporarily employed, over-educated (mismatched) workers may not prove as productive as the firm expected them to be and they will be laid off. The search in such a case will be resumed by both the unemployed worker and the firm. Importantly the temporary employment helped both the firm and the worker to wait until the market got replenished with new workers and new vacancies thus increasing their likelihoods for possible matches. Such an iterative process can explain why over-educated workers exhibit higher turnover and why they are offered temporary contracts.

The alternative hypothesis was that employers may actually value over-educated workers' high human capital and offer them permanent jobs. In such a case we should expect the over-education to be positively related to permanent contracts.

However an interesting situation may arise if an over-educated worker, after the temporary probationary period, is being offered permanent employment (without correcting for the mismatch) and the worker accepts it. There are two possible theoretical reasons why a worker might accept this offer. Firstly it may be that the worker does not care about being formally over-educated. Alternatively, workers in over-educated jobs may not be able for some reason (geographical constraint, information asymmetry etc.) to find matching jobs and so they may prefer not to change employers, especially if in their present jobs they may obtain permanent contracts. Secondly it may be that the worker values so much the permanent contract that s/he is willing to sacrifice the job match quality for the stability of employment. From the side of the employer the situation looks similar. Either the worker proves to be productive enough, and the Tsang and Levin's (1985) "productivity ceiling" does not affect the present tasks the worker performs, or search for a better worker results more costly than retaining the present employee given the job characteristics and state of the labor market. This explanation belongs to larger family of assignment models (Sattinger, 1993).

In our analysis of temporary contracts among young over-educated workers we found a negative significant association between permanent contracts and

over-education, net of other effects such as age, experience, gender or type of field of study. We assumed deliberately that over-education might be endogenous to other controls. We therefore estimated a simultaneous equations models with one endogenous dummy variable (over-education) using biprobit models. This type of model has proven to be highly recommendable for such situations (Monfardini and Radice, 2008). We found that young over-educated Spanish workers in the years 2003-2005 (pooled cross-section samples) were unlikely to be employed in permanent positions. Moreover, we also found that women and immigrants were far more likely to be both over-educated and consequently employed on temporary contracts than Spanish men.

This issue has not been addressed neither in the literature on over-education nor in the literature on contract quality.⁴⁵ We find it however important since both those literatures have demonstrated that both over-educated workers and workers employed on temporary contracts earn less than matched workers and workers in permanent jobs, respectively (Groot and Brink, 2000, McGuinness, 2006, Booth et al., 2002). The data used in our study was of a cross-section character. We had no access to adequate longitudinal data. Moreover the EULFS files which we worked on were anonymized by Eurostat and information on wages was suppressed.⁴⁶ Given the limitations of our data, our findings may shed light only on the sign of the relationship between temporary employment and employment of over-educated workers. We have not addressed at least three very important questions which arise from this research:

1. What is the impact of being temporarily employed in an over-educated job on worker's wages? Do the negative effects of a temporary contract and over-education merge into a negative wage effect or do they act separately?
2. What is the possible horizon of such employment given the fact that temporary contracts in Spain cannot exceed a 3-year period? Are over-

⁴⁵ An exception could be considered the work of Ortiz who analyzed temporary employment in the context of over-education in Spain, Italy and France using European Community Household Panel. However his analysis did not address the issue of endogeneity of over-education neither the role of fields of study in the likelihood of obtaining temporary contracts. For details see: ORTIZ, L. (2007) Not the right job, but a secure one. Over-education and temporary employment. *DEMOSOC Working Papers*, 23.

⁴⁶ In fact more information was suppressed from the data due to anonimization: the year of birth, years of education, information whether respondents had children or not... The lack of relevant variables prohibited employing a more interesting analysis for over-education using for instance ORU-type models introduced by Duncan and Hoffman (1981).

educated workers eventually employed in permanent positions? Do their matches improve in permanent jobs?

3. Does temporary employment in an over-educated job have any long-term effects on the wage of workers, their likelihood of training in the work and their possibilities for promotion?

Depending on the answers to the above questions important policy implications may arise. If over-educated temporary jobs are only stepping stones out of unemployment for young workers and they do not affect their future work prospects then the whole issue of temporality of mismatched workers may be disregarded. If however the incidence of having worked in a temporary over-educated job would affect wages in the long-term then this may lead to significant increase in inequality where matched workers obtain permanent jobs while over-educated labor gets penalized not only in terms of worse employment conditions but also in terms of future wage prospects. This way we could observe polarization of some workers into primary well paid, stable and prosperous labor market and some, perhaps less able, into a secondary, precarious and mismatched market (Dekker et al., 2002).

The quality of employment of over-educated workers is however not as the sole unexplored area concerning educational mismatch. In the third chapter of this thesis we looked at the likelihood of obtaining training by over-educated workers. We asked a question: why would over-educated workers still need more training? The answer to this question however is not trivial. Firstly, from human capital model we learn that individuals acquire skills through education. Later on this human capital, when applied to work tasks, marks the level of worker's productivity (Becker, 1993). More human capital should therefore increase productivity. More productive workers are also more valuable to employers and are therefore better rewarded. The reward may be pecuniary but it may also be embodied in a higher likelihood of training. Employers are more likely to invest in training of workers with higher human capital because their training is cheaper than training for those who have less human capital and the return from such an investment is then larger.

Another well known fact from the human capital model is that there are two types of training: general and firm-specific. General training equips workers with skills useful in many other companies outside the present firm. On the contrary firm specific training is useful only in the present firm and thus workers with firm-specific skills have no incentive to look for employment outside their present firm since it would lower their productivity and consequently their wage. General training is normally financed by workers as a

part of their present wage. The firm-specific training's financial burden relies entirely on the employers and they reap most of the profits associated with this investment. Specific training is rewarded to workers only in their present firm. Other firms cannot utilize the skills from specific training acquired in other companies and do not reward it.

The empirical literature on training presents two puzzling observations. Firstly, the majority of training provided in Europe is general in its nature (Barron et al., 1997, Booth and Bryan, 2002, Evertsson, 2004, Descy and Tessaring, 2005). The estimates oscillate around 80-90% of all job related training. Furthermore it is the employers who finance the majority of these training activities (Acemoglu and Pischke, 1998, Acemoglu and Pischke, 1999, Autor, 2001, Barron et al., 1989, Barron et al., 1997, Bassi and Ludwig, 2000, Barron and Berger, 1999, Booth and Bryan, 2002, Descy and Tessaring, 2005, Evertsson, 2004, Veum, 1995). These two observations lead us to ask whether over-educated and under-educated workers are also likely to participate in these training activities or are they excluded from them for some reason? If so much general training is provided for free to workers then it must be that these workers cannot for some reason immediately change their employers and reap profits from their just increased human capital. Margaret Stevens proposed the term "transferable skills" to explain the observed irregularities with respect to training (Booth and Snower, 1996). She claimed that transferable skills obtained through training are such that can be applied in some firm outside the present employer but not in infinitely many of them. The more transferable the skills are, the more firms are willing to utilize them outside the present firm. Alternatively, a perfectly non-transferable skill would be the ideal-typical type of firm-specific skill defined by Becker. Transferability of skills depends on the proper type of skills as well as on other labor market asymmetries. These can be either information asymmetries like in the matching model where workers cannot localize the firms which can utilize his/her skills or the opposite. These can also be geographical constraints where workers know of other firms which could make use of their increased human capital but they are located too far for the worker to move there (the costs of mobility outweigh the benefits from higher pay for increased human capital level).

If we want to know whether under/over-educated workers will receive training, one has to identify which types of skills they possess before the training is given and this will demarcate their likelihood of changing employers once the training is completed. We claim that education endows workers with

skills that are generally highly transferable. Students are being educated to function in the labor market and not in one specific company. They receive skills, which can be applied in a wide body of companies across the labor market. Certainly graduates of particular disciplines have their skills more narrowly defined depending on the discipline. We should expect that say engineers may be more likely to be trained on the job because their possible set of alternative employers is narrower than the set of possible employers for an accountant. However the skills of both are highly transferable.

Based on these premises we expected therefore that over-educated workers who possess (at least formally) an excess of easily transferable skills are more likely to move to another employer once they receive training than educationally matched workers. On the contrary under-educated individuals have no incentive to look for other employment as they suffer a deficit of transferable skills and should therefore be more likely to obtain job training. The literature on training of over-educated workers is not large. The few studies published on this topic reveal however that we should expect over-educated workers to be less likely than the matched ones to receive training while the under-educated should be more likely to receive training (Barron et al., 1989, Buchel and Mertens, 2004, Hersch, 1995, Robst, 1995, Dekker et al., 2002, McGoldrick and Robst, 1996, Smoorenburg and Velden, 2000). Smoorenburg and Velden (2000) took their analysis even a step further asking if horizontally mismatched workers whose field of education does not comply with the field of their work are more or less likely than the matched workers to receive training. They found that such workers are significantly more likely to receive training than matched workers.

Our hypothesis was therefore that over-educated workers are going to be less likely and under-educated more likely to receive training than their matched peers. The alternative hypothesis was that employers actually do value the higher human capital of over-educated workers and should be more likely to offer them training. It is so, because workers with higher human capital are cheaper to train. In the multivariate analyses we have rejected the alternative hypothesis. Over-education proved to lower workers' chances for obtaining job training while under-education lead to increased likelihood for receiving such training as compared to the matched labor force. Higher levels of education showed an increased likelihood of obtaining training which could confirm Heckman's observation that human capital is synergistic and its acquisition cost declines the more human capital one initially possesses (Heckman and Krueger, 2003).

In both chapters two and three we controlled for selectivity of individuals into employment. Our predictions were based predominantly on stylized versions of matching models. Matching models, however, usually assume that mismatched workers will be laid off and search for a better match will resume. We had to control for the fact that perhaps our sample is biased and we observe only those individuals who happened to be retained by employers despite their mismatch. We have therefore applied Heckman selection procedures in both analyses in chapter two and chapter three. We found that women were less likely than men to be employed. Immigrants were also less likely than the local people to find employment. Furthermore we observed that persons with more education are more likely than their less educated peers to be employed. Also graduates of more quantitative disciplines like engineering or natural sciences are more likely to find jobs than graduates of humanities or teacher training.

Again our conclusions in chapter three are severely limited since our data was not longitudinal. We cannot therefore claim anything about future prospects of those workers who have obtained or not any job training. Also we did not know who was financing the training. We could only observe its incidence and see whether some groups were more or less likely to participate.

However our results reveal several interesting directions for further research. Firstly our chief theoretical argument should be directly tested. It should be checked whether over-educated workers do not receive training really because they can change employers easily or perhaps because they have lower ability⁴⁷ and employers are reluctant to invest in low ability workers. Secondly one should ask if over-educated workers despite the fact that they are less likely to receive training than matched or under-educated ones, they are more likely to be promoted than other workers. Eventually job mobility theory assumes that workers may accept temporarily over-educated positions in order to acquire work experience and skills (if not through training then maybe through learning-by-doing) and be promoted within or outside the firm (Dekker et al., 2002, Groeneveld and Hartog, 2004, Sicherman, 1991, Sicherman and Galor, 1990). Eventually one should look at the wage profiles of over-educated workers who got promoted to matching jobs but had no training and compare them with the wage profiles of workers who obtained training but did not get

⁴⁷ It could be stipulated that some workers need more education to perform the job correctly precisely because they have lower ability and need more education than other employees.

promotions. This would reveal whether the fact of not getting training by over-educated workers is harmful for them at all or even perhaps they do not need it to begin with. Perhaps over-educated workers' excess of human capital for the job creates the situation where not only they do not need training but where they actually should be promoted. Similar are the observations of job mobility theory (Sicherman and Galor, 1990, Sicherman, 1991).

Eventually our study gave rise to an observation that women while over-educated are yet less likely than men to obtain training. This suggests a discriminated position of women as regards educational mismatch. Yet as the literature demonstrates even not over-educated women are less likely than men to receive job training. This calls for further research and perhaps policy intervention to correct for the gender gap in training (Booth, 1993).

In the fourth chapter we investigated yet another dimension of over-education: how do people get over-educated jobs. Using the British Quarterly Labor Force Survey we estimated logistic models with over-education as a dependent variable and methods of job search as explanatory variables.

In our theoretical conceptualization we departed from research on the economics of information initiated by Stigler (Stigler, 1962, Stigler, 1961). We assumed, following Stigler's point that the more educated a worker is the more refined is his/her set of possible jobs. Furthermore we claimed that graduates of more transversal fields of study (soft fields) such as humanities, law, social sciences or teacher training face wider sets of possible jobs than do graduates of more narrowly defined disciplines (hard fields), such as engineering, health, natural sciences etc. It follows then that work candidates from so called "hard fields" such as engineering, health or natural sciences have better information about their respective job markets than do individuals who graduated from "soft fields" such as humanities. Having assumed that we have further claimed following network theories that workers with diplomas from hard fields tend to cluster together while workers with diplomas from soft fields form another cluster in the labor market. It is so because individuals tend to form job information networks with peers who resemble themselves. And so engineers will tend to cluster with engineers and humanists with humanists. Note however that it was engineers that had better refined sets of possible jobs while humanists had them more disperse. It follows that graduates from hard fields should enjoy comparatively better informal job information networks than their peers from soft fields. Moreover it is not assumed that engineers cannot occupy jobs of soft fields' graduates and so they may also possess information useful to graduates from soft fields. In

contrast soft fields' graduates usually cannot perform the jobs of hard fields' graduates (medicine, engineering) and so they will hardly be interested in gathering job information on such. This creates an informational asymmetry where hard fields graduates are the keepers of privileged information while the soft fields' graduates are outsiders to the circles of hard fields' graduates. Such a situation has affinities with the classical insider-outsider distinction.

In the multivariate regressions we have showed that the hard fields' graduates even though they may use similarly various job search methods to soft fields' graduates their personal networks are better than the networks of their peers from soft fields in terms of not becoming over-educated.

Certainly this relies heavily on the assumption that the soft fields' graduates by no means can perform jobs of hard fields' graduates which not always must be true. Take for instance an IT business where anthropologists sell mainframe computers in line with IT engineers. A similar situation can exist in programming. A programmer who is able to demonstrate his/her skills does not necessarily have to graduate from a hard field to perform the job of a programmer. An innate talent is enough to obtain the correct match. Furthermore one should control for ability selection into each type of field. This issue in fact pervades all three chapters of this thesis and by the limitation of our data could not be addressed in any of them. It has been hypothesized theoretically and successfully tested empirically that individuals self-select into fields of study by ability (Arcidiacono, 2004). Students with higher quantitative skills sort into engineering, natural sciences, health studies, while students with lower quantitative ability (and usually also lower verbal ability!) sort into soft fields such as humanities or social sciences. It certainly does not mean that one cannot find extraordinarily gifted students in humanities or underperforming students in the medical school. On top of the verbal and quantitative abilities one also has to take into account the mix of personality traits (Heckman et al., 2008, Heckman and Rubinstein, 2001). The psychology literature on personality traits distinguishes a Big Five of personality factors: openness, conscientiousness, extraversion, agreeableness, and neuroticism (OCEAN). These five factors are thought to describe the personality of individuals. As Heckman et al. (2008) stress it is very difficult to disentangle which personality traits may influence which cognitive traits and vice versa. What remains clear however is that the root of people's relative life success or failure is in their families (Heckman and Krueger, 2003). Therefore assuming that more able students self-select into hard fields while less able into the soft ones may prove to be a long shot if one could demonstrate that it is for

instance the role models that define largely which field of study one chooses. If cognitive ability is fully formed by the age of 8 and basic personality traits despite being more malleable are formed by the age of 16 then what we observe as self-selection of individuals into particular fields of study may be only a mirror reflection of their parental background and not truly their ability and/or skills. Furthermore as Heckman and Krueger (2003) stress, schools do not correct eventual ability deficiencies but rather catalyze them and reproduce them. So if in fact students are pre-selected into fields of study by their family background and moreover the fields only reinforce the pre-existing differences then our observations, in chapter four of this thesis, are merely shadows of what really happens with the choice of the fields of study and later in the labor market. Perhaps then a correctly addressed question should be not how hard vs. soft fields sort workers into over-educated or matched jobs but how different family backgrounds predestine their offspring for different performance in schools and later in the labor market.

This could not be addressed in this thesis given the non-longitudinal character of our data. One should bear in mind therefore that the mechanisms proposed here cannot be directly tested with cross-section data and need further research on adequately rich datasets.

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