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Are Over-educated People Insiders or Outsiders?
A Case of Job Search Methods and Over-education in UK

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1. Introduction

There is substantial empirical evidence that over-education seems to be a persistent rather than transient phenomenon (Dolton and Vignoles, 2000: 179, Frenette, 2004: 29, McGuinness and Wooden, 2007: 1, Sloane et al., 1999: 1437, Smoorenburg and Velden, 2000: 207). Furthermore, it has been established that some fields of study lead significantly more often than others to over-educated jobs (Frenette, 2004: 29, McGuinness, 2003: 1943, Ortiz and Kucel, 2008). 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 possessed¹. 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 labour 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, this literature 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 Labour 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 characterised by strong education-labour market signals evoke the use of formal methods of job search while fields with weak education/labour 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. On this note, it

has been demonstrated that 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: 343). Eventually 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 among others 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

The economic and sociological literature places education as a central issue in the process of intergenerational mobility (Breen and Jonsson, 2005: 223, Solon, 2002: 59). 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 artefact 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 labour 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 labour market for job offers and firms screen the labour 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 for under 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 2007ⁱⁱ; Sloane, Battu and Seaman 1999; Smoorenburg and Velden 2000). This in turn brings us to alternative theories which either extend the existing ones such as Job Mobility Theory or (Sicherman 1991:101, Sicherman and Galor 1990:169) or propose a completely alternative view of educational attainment such as that put forward by Assignment Theory (Sattinger 1993:851) 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. According to this theory, over-educated workers remain in an over-educated position only for a short period of timeⁱⁱⁱ 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: 611). 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: 355-374).

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 (worst paid) 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.

Finally, Sattinger's Assignment Theory forms an intermediate step between the human capital perspective and the job competition model. 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^{iv} 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, 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.

However it has been observed that despite being rewarded for their over-education positively (Groot and Brink, 2000: 149). over-educated workers tend to demonstrate significantly high levels of dissatisfaction and frustration (Rumberger, 1987: 24, Tsang and Levin, 1985: 93). This puts into question whether over-education is a phenomenon that can be harmlessly tolerated in the labour market. Thus, understanding how people get into over-educated positions becomes a key question to be addressed.

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 aforementioned theories. 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: 94-105). According to Stigler; the more educated worker is more refined is his/her set of possible jobs. 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 alternative jobs, the amount of information to be acquired grows, causing the choice be rationally bounded^v. 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 labour 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 labour 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 majors/fields of study will reveal smaller and better defined sets of job alternatives while workers from more transversal fields of study will have less clearly defined possible jobs and therefore larger sets of alternative jobs. This translates again into inequality in information about the labour market positions available to different individuals. For example, engineers will see their labour 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: 1056-1093) or as others prefer to call it social capital (Coleman 1988:S95) 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 of study will have to resort to personal networks in order to acquire more information about the possible alternatives awaiting for them in the labour market. Secondly, it has been proven that individuals self-select into particular networks according to their status in terms of education, gender or ethnicity (Rosenbaum *et al.*, 1999: 179, Smith, 2000: 509-537). In our framework this means that workers with more narrowly defined fields of study (e.g. engineering, health) will form networks with their peers, thus excluding them from individuals with lower stocks of information about the labour market.

Our view of the labour market in terms of job information networks presented here 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 labour market (Lin *et al.*, 1981: 393-403, Lin *et al.*, 1981: 1163-1181). 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 incorrect networks which do not provide sufficient information about labour 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: 543). 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 lots 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 labour 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 2000:847-864), race (Holzer 1987:446) or geographical location (Elliott 1999:199-216) among other characteristics. Furthermore, different probabilities of over-education have already been linked to having studied different fields of study (Ortiz and Kucel, 2008).

We expect to find significant differences in the usage of job information networks among over-educated individuals coming from various fields as compared with the population of matched 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 labour 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 entirely excluded from participation in sharing of internal information about their respective sectors of the labour market. This leads to an uneven distribution of over-education across individuals with different college majors.

3. Data and Methods

Considering the influence of job search methods used in gaining current employment on over-education requires sequential information on the job search process. A dataset that includes this information is the UK Quarterly Labour 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 duplicates^{vi}, 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, jobcentre/jobmarket, careers office, private employment agency or business, hearing from someone who worked there, direct application, and ‘some other way^{vii}’. Those reporting that they had obtained their current job through either a jobcentre/jobmarket or a careers office were conceptualised 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 conceptualised 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^{viii}. Educational level attained was obtained by converting QLFS data on educational qualifications into the 5-level ISCED97 categorisation 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^{ix}. Furthermore, a distinction was made in the models between those pursuing a ‘hard’ and ‘soft’ field^x. ‘Hard’ fields included medicine, natural sciences, engineering, agriculture and veterinary while ‘soft’ fields included social sciences, humanities and art, teacher training education, 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) labour 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 permit a correct addressing of 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^{xi}.

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^{xii}, marital status^{xiii}, number of years in continuous employment, tenure (temporary/permanent), whether lived and worked in same area, sector of employment (public/private) and firm size.

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 labour market entrants, including those who were currently employed and those who were currently unemployed (n=17040) and a two stage Heckman was used to consider selection into employment. The first model then considered the effect of all independent variables on the probability of being over-educated. At this stage (Model 1 Table 2) we display the results for the general sample taking into account all variables but without taking into account the field of study. In the second model all independent variables including field of study 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.

4. Results

We begin the description of our results by presenting some descriptive statistics for the major controls used in the models. Table 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 1 are significantly higher than the working samples in our multivariate models presented in Table 2 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.

Table 1: Descriptive statistics for major individual and firm level controls.

Variable	Obs	Mean	Std. Dev.	Min	Max
<i>Individual level controls</i>					
Gender	217042	0.49	0.04	0	1
Marital Status	216884	0.05	0.49	0	1
Ethnicity	217042	0.08	0.28	0	1
Tenure	160879	96.8	104.6	0	636
Conditions of employment	140732	0.94	0.22	0	1
Field of study	85367	1.47	0.49	1	2
<i>Firm level controls</i>					
Live & work in same area	155365	1.39	0.48	1	2
Sector of employment	161147	0.24	0.43	0	1
Firm size	144873	185.6	217.3	5	600

Model 1 considers the effects of all independent variables on the probability of being over-educated^{xiv}. Here we see that females are less likely to be overeducated than males. Race other than white seems to increase very significantly the chances of being over-educated as is indicated by odds ratio of 22.7 in Table 2, and this is consistent with previous research. Interestingly living and working in the same local district may help in avoiding over-education. 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. Furthermore, those who are married, 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 three out 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 as well as applying for a job through a private employment agency diminishes the probability of being over-educated relative to those who used a personal contact. In this model, these two methods should therefore be considered more efficient job search methods than institutional support or direct application. What happens to these differences in job search methods used when we account for the field of study pursued?

Table 2: Results of multivariate analyses of job search methods' influence on probability of getting over-educated

	Model 1	Model 2	Model 3
	All independent variables, no field of study	Soft field is reference category	Hard field is reference category
Female <i>Ref: Male</i>	0.603 (0.029)***	0.715 (0.041)***	0.715 (0.041)***
Married <i>Ref: Not married</i>	0.062 (0.005)***	0.104 (0.010)***	0.104 (0.010)***
Non white <i>Ref: White</i>	22.720(2.238)***	15.311 (1.815)***	15.311 (1.815)***
Experience	0.972 (0.006)***	0.969 (0.007)***	0.969 (0.007)***
Permanent position <i>Ref: Temporary position</i>	0.523 (0.031)***	0.599 (0.042)***	0.599 (0.042)***
Live and work in same area <i>Ref: Live and work different areas</i>	0.671 (0.032)***	0.636 (0.035)***	0.636 (0.035)***
Public sector worker <i>Ref: Private sector worker</i>	0.674 (0.040)***	0.629 (0.043)***	0.629 (0.043)***
Firm size	1.000 (0.000)	1.000 (0.000)	1.000 (0.000)
<i>Net effects of methods within fields^a</i>			
Reply to advertisement <i>Ref: Personal contact</i>	0.857 (0.054)**	0.919 (0.090)	0.726 (0.084)***
Institutional support <i>Ref: Personal contact</i>	1.137 (0.110)	1.543 (0.226)***	1.245 (0.231)
Private agency <i>Ref: Personal contact</i>	0.633 (0.054)***	0.742 (0.092)**	0.527 (0.080)***
Direct application <i>Ref: Personal contact</i>	1.012 (0.074)	0.981 (0.116)	0.866 (0.117)
Some other way <i>Ref: Personal contact</i>	0.609 (0.051)***	0.592 (0.078)***	0.609 (0.088)***
Hard fields <i>Ref: Soft field</i>		0.819 (0.096)*	
Soft fields <i>Ref: Hard field</i>			1.220 (0.143)*
<i>Crude effects of fields and methods^b</i>			
Field of study*Reply to advertisement		1.267 (0.190)	0.789 (0.119)
Field of study*Institutional Support		1.239 (0.292)	0.807 (0.190)
Field of study*Private agency		1.408 (0.274)*	0.710 (0.138)*
Field of study*Direct application		1.133 (0.203)	0.883 (0.158)
Field of study*Some other way		0.973 (0.190)	1.028 (0.201)
Observations	17040	8515	8515

Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

^a Comparisons of relative positions of methods across field types can be made

^b Only comparisons within each method of search can be made across fields.

Over-education by Job Search method: variation by field of study

Next we explore whether the relationship between over-education and job search method used varies by field of study. Models 2 and 3 in Table 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. In Model 2 personal contact is the reference category and here, those who pursued a 'hard field' of study are significantly less likely to be overeducated, and in Model 3,

those who pursued a ‘soft field’ of study are more likely to be overeducated. These findings in a way confirm our assumption that studying hard fields should be beneficial for good job matches while studying a soft field should provide worker with higher probability of getting vertically mismatched in their job. In Model 3, the ‘main effects’ for job search method used indicate that, compared to obtaining a job through personal contacts, those who applied for the job through a private employment agency, by replying to an advertisement or used any other method are less likely to be over-educated. More interesting for us is whether the difference between job search used varies by field of study^{xv}. Here the significant interaction term for private agency indicates that the gap between those who pursue a hard field and a soft field is greater for those who use private agencies than other methods of job search^{xvi}. Other job search methods do not differ significantly from the use of personal contacts in this regard.

Net effects

Figure 1: Odds ratios of becoming overeducated by field of study and job search method

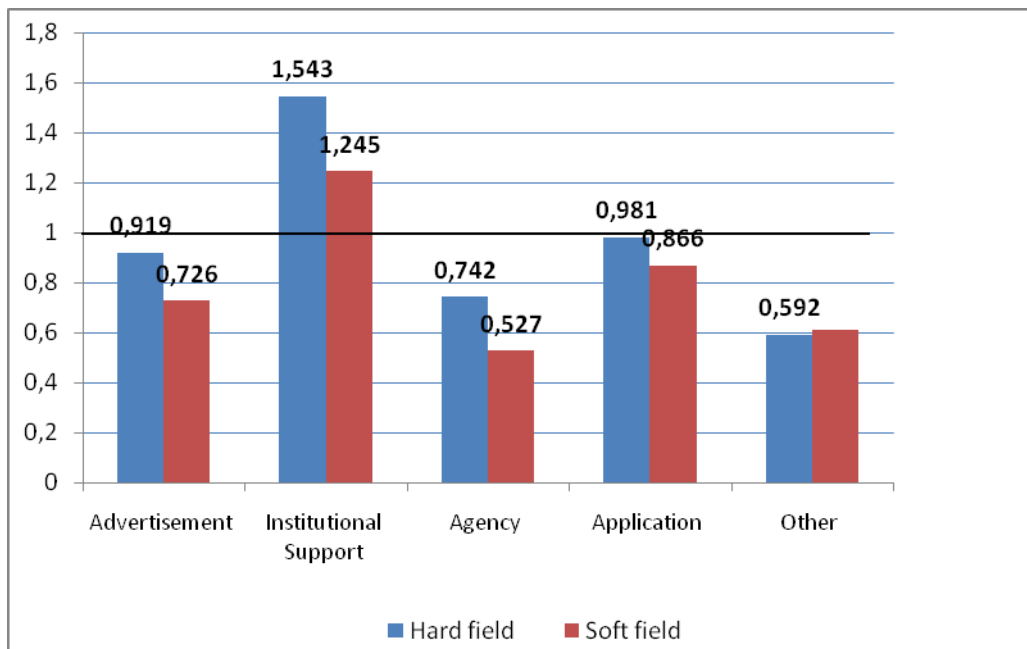


Figure 1 above details the jobs search method variations in the net effect of those who pursued a ‘hard’ field of study compared to those who pursued a ‘soft’ field of study, calculated from the table above. The dark bar is the net effect of hard versus soft by

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 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 hard fields) leads to increased probability of getting over-educated for graduates of soft fields (see Table 2 Model 3).

Interesting, however, is the relative position of the bars representing hard and soft fields in Figure 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. It is therefore confirmed with the above results 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-education using other methods rather than 'personal contacts' compared to workers from soft fields. For workers from soft fields it is beneficial in most of cases (particularly than for workers from hard fields) 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 2 remained largely the same for Models 2 and 3.

5. Conclusions

The main aim of this research 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 Labour Force Survey pooled samples for years 2003-2005 for the United Kingdom.

Firstly we expected that job search methods affect the odds 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 labour market matters for a good match. It has been demonstrated that applying for jobs through specialised 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 better more detailed specification of job search methods used for obtaining employment in the Quarterly Labour Force Survey.

In the second step of our analysis we have 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 modelling (Models 2 and 3 in Table 2 and Figure 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 labour 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 labelled as insiders of their labour markets which tend to be better defined than for graduates of soft fields whom we could consequently label as outsiders of the labour market. This in turn we claim is largely due to the asymmetric distribution of information about the labour 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 1). Consequently workers from soft fields having no access to good information about labour 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 labour market.

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- ⁱ In the present research we use expressions: college major and field of study as synonyms.
- ⁱⁱ McGuinness and Wooden (2007) based their analysis on over-skilling rather than over-education. It should be noted that skills are not synonymous with educational credentials. One may possess certain advanced skills even without high educational level while the opposite case is also feasible, namely highly educated individuals may lack certain skills.
- ⁱⁱⁱ Here a question arises what should be understood by short time.
- ^{iv} In HCT worker decides to invest in education as long as its marginal productivity is high enough to make this investment profitable
- ^v 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.
- ^{vi} 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.
- ^{vii} We do not know job search methods are used in the category 'some other way'. Indeed, it is likely that thus 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.
- ^{viii} Field of study is available for the majority of respondents
- ^{ix} The general field comprised less than 1% of respondents and was dropped from the analysis as a residual category.
- ^x The distinction between hard and soft fields is disputable and arbitrary.
- ^{xi} 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.
- ^{xii} 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.
- ^{xiii} Marital status was coded 1=currently married, 0=not married including those who have separated/divorced or whose spouse has died.
- ^{xiv} We see that 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.
- ^{xv} To analyse the interaction between these variables, it is necessary to create product terms in which all the dummy variables for one of the variables are multiplied by all the dummy variables for the other variable. This yields five product terms (Jaccard 2001).
- ^{xvi} From model 3 we can see that the odds ratio for field of study for those who got their job through an advertisement is 1.267 times larger than that for those who got their job through a personal contact and so on.

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