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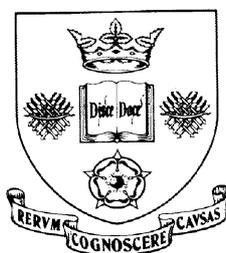


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# Overeducation across British Regions

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**DRAFT VERSION**

## ABSTRACT

This paper analyses levels of over-education and wage returns to education for males across eleven regions of the UK using Labour Force Survey data. Significant differences are found in the probability of being over-educated across regions; also, differences are found in the return to the ‘correct’ level of education in each region, in each case associated with flexibility of movement between and into particular regions, which determines the ease of job matching. Furthermore, evidence is found that, after controlling for the level of education acquired, there exists a premium to the ‘correct’ level of education, which varies across UK regions.

Keywords: education, returns

JEL classifications: I121; J24

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## INTRODUCTION

There has been much attention paid to the level of overeducation at the aggregate UK level: however, there has been a lack of research that examines overeducation at the regional level within the UK. Over the past decade there has been a significant increase in the number of young people choosing to enter higher education and also a dramatic increase in the proportion of individuals gaining a postgraduate qualification; indeed in 2004 the rate of increase in the demand for postgraduate courses was greater than that for undergraduate courses in 2004 (Barber *et al* 2004). Since the introduction of top up fees in the UK<sup>1</sup> 2006 the decision to enter higher education is more financially motivated than ever before and therefore obtaining the ‘correct’ job for one’s qualification is of paramount importance. Inter-regional mobility is greatest for individuals who are young and with higher levels of education with London and the South East have traditionally attracted highly qualified workers, increasing their social mobility often referred to as the ‘escalator effect’ (Fielding 1992; Champion and Coombes 2007). However, at the turn of the new millennium evidence appeared that there has been a reversal of this effect with British cities outside the South East having success in attracting workers with high level skills (Champion and Coombes 2007)<sup>2</sup>. The success of attracting highly qualified workers will increase competitiveness within a region if all workers are matched with suitable jobs. Regional development agencies have had varying success in increasing competitiveness and attracting highly skilled workers. In Scotland the ‘Fresh Talent’ scheme, set up in 2005 is aimed at keeping graduates from Scottish universities in Scotland by offering two year working visas after graduation. Evidence of Scottish success in attracting highly qualified workers and success in business enterprise research and development is documented (Department for Business Enterprise and Regulatory Reform 2008). In the light of the increase in highly qualified workers entering the labour market, by using up-to-date data, we focus on the probability of males being

overeducated for any level of education across eleven British regions and the wage penalty for being overeducated. There is a limit to the mobility of workers across UK regions due to a multiplicity of reasons, not only dependent on an individual's own education level<sup>3</sup> and psychic costs of moving but also the regional industry mix, occupational opportunities and demographic factors that influence the demand for highly educated workers with the consequence that each region has its own 'correct' level of education.

Overeducation is considered to exist where the level of qualification held by an employee is greater than that needed for the job.<sup>4</sup> There are four methods of measuring the incidence of overeducation in the literature; the 'expert' job analysis, the self assessment of the educational skills required to carry out ones job, the direct self assessment of whether the individual considers he is overeducated in his job, and the realised matches method which consists of a statistical analysis of the actual education compared to the mean or mode level within that occupation.<sup>5</sup> There is no one superior measure as they all have their advantages and drawbacks and often their use is driven by the data available. Here we use the statistical method which has been found to produce the lowest incidence of overeducation (Groot and Maassen van den Brink 2000). In this paper the 'correct' level of education at the regional level is examined, controlling for industry and occupation, and the probability of a male worker being overeducated is estimated along with the regional wage return to education levels.

There is a wide literature on overeducation in the labour market with many studies focussing on a specific measure of overeducation or a comparison of the methods of measuring overeducation (Sicherman 1991; Groot 1996; Sloane *et al* 1999; Groot and Maasen van den Brink 2000; and Rubb 2003) or the extent of overeducation of particular groups of individuals such as graduates (Chevalier 2000; Dolton and Vignoles 2000; Dolton and Silles 2001; Walker and Zhu 2007) or immigrants to the UK (Wheatley Price 2001; Battu

and Sloane 2002; 2004; Lindley and Lenton 2006 and Green *et al* 2007). Additionally, the level of overeducation found in the UK varies from 11% (Groot 1996) to 35% (McGuinness and Bennett 2007)<sup>6</sup> dependent on many factors, such as the method of measurement and the type of data used. Most of this existing literature of overeducation within the UK is based on an analysis of the ‘correct’ level of education measured at the UK level. More recently McGuinness and Bennett (2007) examine overeducation within Northern Ireland but as yet there has been a lack of analyses of overeducation rates and returns within regions across the UK. The earliest, and perhaps best known, regional study of education is the study of the regional returns to educational level (Bennet *et al* 1995) who, using data for 1985-88, found differences in the rate of return to various qualifications across UK regions, which they stated led to a disincentive to training for individuals in various regions. Additionally, they argued that the market for skilled labour is more mobile than unskilled. However, this study does not examine the regional rate of over-education or the wage return to the ‘correct’ amount of education within the job. Twenty years since the study of Bennet *et al* (1995) the UK has a much higher proportion of individuals holding a high level qualification (degree level or above) and it may be argued that the increase in communications technology has helped to reduce the psychic costs of moving, therefore workers are more mobile now. Within the regional productivity literature, spatial variation in earnings is found to be positively related to proximity to areas of economic mass. In other words the larger the ‘working’ area the greater the wage differential (Rice and Venables 2004) and so it is posited that highly qualified, and therefore more mobile, workers, would to move to cities where higher returns are expected. Webber *et al* (2009) find that the level of workforce skills is an important determinant in explaining regional productivity, therefore skills matching with the job is important, although Ramos *et al* (2009) in a study of productivity across European regions find that overeducation has played a large part in economic growth. Buschel and van Ham

(2003) examine regional labour market characteristics and job search for a sample of highly educated individuals in Germany and find that the smaller the size of the labour market the more likely the worker is to be overeducated.

If it is assumed that young and highly educated workers are more mobile than the rest of the workforce then regions that provide the greatest returns to high levels of education would be expected to contain a large proportion of these workers and would be most likely to have a high number of highly qualified overeducated workers. The most recent study of rates of return to higher education across British regions is that of O'Leary and Sloane (2009) who focus on eleven British regions using data from 2001 to 2004, however, this analysis does not take into account the influence on the return due to the correct matching of educational level with the job.

The theoretical framework which forms the point of departure for measures of overeducation is Gary Becker's (1964) model of human capital which makes the assumption that individuals will invest in education up to the point where their marginal returns to education are equivalent to their marginal costs. In what follows it is argued that what matters for determining the correct level of overeducation is the ease with which workers can be matched to jobs. Across regions, it is found that overeducation is with great regularity positively associated with membership of some occupational groups (sales, real estate, health and social work, and education itself) in which the matching of workers to jobs is relatively 'sticky', and negatively associated with membership of other occupational groups: especially managerial occupations, in which such matching is relatively rapid and flexible.

The structure of the paper is as follows. In the next section an overview of the Labour Force Survey data is provided and descriptive statistics presented. This is followed by a description of the method of measurement used to define whether an individual is undereducated, overeducated or has the correct amount of education for their job, along with

an overview of the econometric methodology. The empirical results are then presented, which reveal similarities and differences across regions in the influences on the probability of being overeducated along with the associated wage penalties. Conclusions are then drawn in the final section.

## **THE DATA**

The data are from the Quarterly Labour Force Survey (LFS) which is conducted by the Office for National Statistics (ONS) and pooled over the period 2002 through to 2008, which is the latest data set available. The data provides us with a large sample of over 90000 observations of males, ranging from around 4300 to 13000 observations in each region and thus permits the calculation of the amount of over-education for males in the British labour market at the regional level. This is a rolling sample survey whereby respondents are interviewed across five quarters and then are replaced by new respondents. Therefore, it is ensured that respondents are not double-counted by selecting only after wave 1 wage data has been reported.<sup>7</sup> For this purpose the LFS contains a rich amount of information on labour market status, earnings, employment characteristics and educational qualifications held in addition to the usual demographic characteristics. The paper focuses on males only. Tables 1 and 2 provide an overview of the occupation and the industry mix in each region for males only within the data.

[TABLES 1 AND 2 HERE]

Information provided on qualifications attained is used to assess the probability of being over-educated for one's job, following the existing over-education (ORU) literature that uses a distributional measure of over, required and under-education. Specifically, the estimation procedure uses the qualifications reported in the data, taking the modal National qualification framework (NQF) level for each individual's three-digit occupation within each industry and comparing this to the qualification level for each individual.<sup>8</sup> Ideally, a self-reported measure

of perceived over-education status would make a good comparison but this measure is unfortunately not available within the LFS data set. Table 3 reports the average of the modal education level within each of the regions in our analysis.

[TABLE 3 HERE]

From table 3 we observe that greater London and the south east have notably high average levels of modal education across all industries, which highlights the tendency of highly educated individuals to move into the city and surrounding region. Scotland also has a high average of modal educational level, which suggests that Scotland has been able to retain a high proportion of its graduates.

### **ECONOMETRIC METHOD**

In this paper, the statistical methodology of Verdugo and Verdugo (1989) is followed, with overeducation measured in terms of the highest qualification held. The self-reported qualifications are classified into their respective National Qualification Framework level (NQF).<sup>9</sup> For the modal qualification level of over-education, under-education and required education, the analysis follows the existing literature on mismatch between education and occupation and estimates a three-regime ordered logit model.<sup>10</sup> Over-education (under-education) is measured as one standard deviation or more above (below) the modal qualification level for each occupation within each region. Therefore these states are mutually exclusive and the probability of being in one of these categories is represented by the latent variable  $S_m^*$ . This takes one of the three discrete values, 0, 1 and 2 for the categories undereducated, required-education, and over-educated respectively. Table 4 illustrates the proportions of overeducated, undereducated and correctly educated males, within the eleven regions considered here, using this method.

[TABLE 4 HERE]

This table shows that Greater London has the largest proportion of overeducated males and the lowest proportion of ‘correctly’ educated whilst conversely Scotland has the lowest proportion of overeducated and highest proportion of ‘correctly’ educated males. The independent variables included are those considered within the existing literature to influence the probability of being over-educated, such as marital status, age, industry and occupation. A foreign-born dummy variable is also included as the UK has experienced a high influx of migrant workers from the EU across regions since 2004.

To examine the returns to education within each region two estimation methods are used. Firstly, estimates are obtained using the usual ‘over-required, required and under-required’ (ORU) specification (Hartog 1997; Groeneveld and Hartog 2004; Lenton and Lindley 2006) where human capital is measured using required education (here defined as the ‘corrected’ modal qualification level per three digit occupation of employment within each region). The earnings equation estimated is given as:

$$Y_i = X_{ik}\beta_k + \gamma_1 S^R + \gamma_2 S^O + \gamma_3 S^U + \varepsilon_i \quad (1)$$

where  $Y_i$  are log gross weekly earnings and  $X_{ik}$  is a vector of  $k$  covariates consisting of the usual socio-economic characteristics, such as, age, marital status, size of firm, industry, occupation, part-time work, ethnicity and whether the individual is an immigrant<sup>11</sup>. Following human capital theory  $S^R$  denotes those with the correct level of education i.e. to those with the modal NQF level for their occupation and industry within their region,  $S^O$  and  $S^U$  denotes those individuals who are over-educated (possessing a NQF level above the modal level required within their occupation and industry) and the under-educated (individuals with their highest qualification below the modal NQF required for their occupation and industry). This equation is estimated for each of the eleven regions in order to estimate a slope and intercept

for each region. In this model the parameter  $\gamma_1$  measures the return to the required education level. The parameter  $\gamma_2$  measures the return to a qualification above the required level and the parameter  $\gamma_3$  measures the return to holding a qualification below the required level. Following human capital theory it is expected that the parameter  $\gamma_1$  would be greater than the parameter  $\gamma_2$ , as the theory predicts that an over-educated worker will have a smaller return to their level of qualification compared to a worker with the required qualification level. Likewise, the value on  $\gamma_3$  is expected to be negative because this worker will exhibit lower returns compared to individuals with the required qualification level.<sup>12</sup> The socio-economic characteristics contained within  $X_{ik}$  include those traditionally found to influence wage returns such as age, age squared, married, ethnicity, occupation, industry, firm size, and tenure within the job. The robustness of the results is checked by estimation of equation (1) initially without the socio-economic characteristics contained in vector  $X_{ik}$  and then including the controls incrementally to build up the model.<sup>13</sup>

In the second earnings specification the regional return to qualification level is captured in addition to skills matching therefore a hedonic model is estimated (Lindley 2009) where under-education,  $S^U$  and over-education,  $S^O$  in the ORU specification are replaced by five dummy variables representing NQF levels, thereby producing an estimate of the returns to the ‘correct’ level of education for each occupation and industry that is over and above the return to the return to each NQF level. This model is estimated for each of the eleven regions.

## RESULTS

The qualification level reported by individuals in the data is used to construct a measure of overeducation, undereducation and required education by modal qualification in each occupational category in each industry within each region<sup>14</sup>. As illustrated in Table 4 above, for males in the UK the proportion of undereducated is around 30.5%, the proportion with the

correct level of education is 51.4% and 18.1% are overeducated. The proportion of correctly educated males is the same as found by Sloane *et al* (1999) although the proportions of undereducated and overeducated appear to have swapped places, this may be due to the different method of calculating educational mismatch<sup>15</sup> as they use the self assessment measure of overeducation which is known to produce a higher level of overeducation compared to the statistical method. Alternatively the difference in the incidence of overeducation may be due to the timeframe analysed with the evidence shown that regional mobility has greatly changed over the past twenty years.<sup>16</sup> The increase in the number of UK graduates and postgraduate qualification holders entering the British labour market over the past decade has increased substantially which would increase the modal education level of employees, especially in professional and skilled occupations, therefore there may be a higher proportion of older workers now classified as undereducated using this method.

#### *The determinants of over-education across regions*

In Table 5 the marginal effects are reported on the probability of being overeducated for the key variables of interest in the ordered logit models for the UK and for each of the eleven regions. The base male individual in the model is white, unmarried, working full-time in a skilled manual occupation within the manufacturing industry. The fundamental finding is that inter-regional differences in overeducation levels are correlated with ease and flexibility of movement into and between regions. Three factors associated with ease and flexibility of movement are particularly important: occupation, demographics and immigrant origin.

[TABLE 5 HERE]

*Occupational category.* In all regions individuals in managerial occupations, requiring high levels of transferable training, are less likely to be overeducated when compared to the base which suggests good skills matching in all regions, although the probability varies across regions. Those regions which have a high density of managerial groups, in particular

London and the South-East, have particularly high and significant negative marginal effects on the probability of being overeducated (-0.09 for greater London and -0.095 for the south-east, in relation to a UK average of -0.079). Similarly, in most areas individuals in the wholesale and retail industry and the hotel industry, where again skills are highly transferable, are least likely to be overeducated.

By contrast, for occupations which require lower levels of transferable training, such as sales, the expectation of being overeducated is increased. For those individuals in sales occupations the probability of being overeducated is increased in all regions compared to the base although the magnitude of the effects vary across regions, with sales people in the south east, south west and greater London having the highest increase in percentage points ( 18, 21 and 17, respectively)<sup>17</sup>. In addition, and somewhat surprisingly, those individuals in professional occupations in many areas have a slightly higher probability of being overeducated, for example individuals in greater London, the South East and the North West have an increased probability of being overeducated of around 3 percentage points. This may be indicative either of individuals' obtaining a high level qualification pre-entry to their profession in order to signal to employers their high level of productivity; alternatively, this result may be indicative of individuals gaining postgraduate professional qualifications post-entry to their job. Additionally in all regions individuals in the education industry itself are the most likely to be overeducated (marginal effects ranging from 32 percentage points in Yorkshire and Humberside to 18 percentage points in Wales). The hypothesis is that within the education sector, there are relatively high costs associated with transfer of skills between regions which diminish the flexibility of, and incentives to, movement.

*Demographics.* Age is, everywhere, positively associated with overeducation: the coefficient of age on overeducation is everywhere positive and, except in Wales and Greater

London, significant. This is not surprising as older people are less mobile between regions, and even more so internationally.

*Immigration.* The effect of immigration on overeducation, is almost universally positive, and significantly so except in Wales, the North-West and the East Midlands. In the North, Yorkshire, Scotland, and all southern regions especially London (11 percentage points) there is a statistically significant probability of being overeducated. The hypothesis is that many immigrants experience difficulties, sometimes transient and sometimes long-term, in matching themselves with suitable niches in the labour market, difficulties which reflect themselves in a high incidence of overeducation. These difficulties are exacerbated in the case of immigrants whose access to information about domestic job markets is imperfect, for example because of poor language skills or deficient information networks.

#### *The regional wage returns to education*

In Table 6 the key estimates of interest from the ORU specification are reported, which are estimated separately for each of the eleven UK regions under consideration compared with the UK as a whole<sup>18</sup>. The reference group consists of a white male, single, working full-time in a skilled manual occupation, in a small company within the manufacturing industry, where he has worked for over five years. In all regions the results are consistent with human capital theory in that a correct match of educational level to job provides the greatest return, whilst the wage return to over-education is smaller but still positive and the wage return to those individuals who are under-educated for their job is negative.

[TABLE 6 HERE]

Interestingly, although the education variables are calculated at the regional level, there exist differences in the rate of return to matched education across the regions. Looking at the returns to matched education within the UK as a whole, shown in column 1 of Table 6, a

wage return of around 11.9% (0.112 log points) to the correct level of education is found, 6% to being overeducated and -6.3% to being undereducated. However, across the regions greater London has the greatest return to the correct level of education at 15.7% (0.146 log points), with Scotland also providing high returns at 13.8%. Slightly lower returns to the correct level of education are found in the Northern regions with the North producing the lowest return at 11%. Over the time period analysed the unemployment rate increased in the Northern regions and decreased in both the South and in Scotland (Department for Business Enterprise and Regulatory Reform 2008), hence this result is suggestive of an influence from unemployment which we are unable to include in our models here because of multicollinearity. In Scotland there is a much lower proportion of individuals in the manufacturing industry compared to the northern English regions and a slightly higher proportion in the financial industry, which may explain the higher rate to the correct level of education there and as mentioned earlier the Scottish 'Fresh Talent' scheme appears to have been successful in keeping talent in the region and thus increasing regional productivity. The return to over-education, always smaller than that to the correct level of education, is greatest for London at 8%, (0.78 percentage points) whereas in the south west it is only 2.8% (0.028 percentage points), and in general it is least in the least urbanised regions, South-West, Scotland and Wales, where the obstacles, in terms of both demography and infrastructure, to flexibility are greatest. These are also the regions furthest away from the areas of economic mass, in the South-East and continental Europe, whose proximity makes job matching easier. Perhaps the best way to view the price to the individual of over-education is to look at the penalty to over-education (the difference between the coefficients on the correct education and over-educated). Looking across the regions it is seen that there is a penalty of 9.5% for being overeducated for one's job in Scotland, 8% in the south west and 7% in London yet just a 4% penalty in the North. Therefore the regions with the greatest return to matched

education have the largest penalties to being overeducated. The returns to under-education are always negative ranging from -8.6% in London and -6% in Scotland to -3.8% in East Anglia.

Attention is now drawn to the estimates from the Hedonic specification which are reported in Table 7. In all regions the expected ordering of the size of returns to educational level is found with the returns increasing as the educational level increases. Additionally, a positive return to the correct level of education over and above the return to each qualification level in all regions is found.

[TABLE 7 HERE]

The return to the correct education-job match in the UK is around 9%, which is in the same ballpark as other estimates for the UK (Lindley 2009). However, differences are found in the return to the correct level of education for one's job after accounting for qualification level. Once again large returns are found in greater London and now also in the South East, (12.2% and 10.6%, respectively) with the return to each qualification level being greatest in these two regions, especially for graduates and postgraduate qualification holders. Overall the higher wage return to each qualification level along with the correct educational level for the job in greater London and the south east regions demonstrates the higher propensity to move for the correct job by individuals holding higher educational qualifications.

## **CONCLUSION**

In this paper the probability of being over-educated for males across eleven regions of the UK is examined along with their return to the correct skills-job match. Greater London has the highest incidence of overeducation for males. This may be due to the larger proportion of individuals with higher education qualifications nowadays compared with the 1990s who

move to London to take up job offers, which in turn would imply that younger workers in greater London are more likely to be overeducated. Scotland has the lowest incidence of overeducation which supports initial evidence that the escalator effect of the social mobility of highly qualified workers is now reversed (Champion and Coombes 2007) and that Scotland's 'Fresh Talent' scheme may have helped keep young graduates in Scotland and matched to appropriate jobs. We suggest that more research is undertaken on the effect of this scheme which removes barriers to mobility. Using the statistical method of classifying overeducation, correct education and undereducation (Verdugo and Verdugo 1989), where the modal educational level within each occupation and industry in each region to identify the correct level of education is used, the evidence suggests that the fundamental factors determining overeducation levels across regions is the ease and flexibility with which individuals with any particular level of qualification can be matched with the demand for that qualification. This is variable by sector (with generally high overeducation rates in sales, professional occupations and education itself, and low overeducation rates in managerial occupations), by age, and by incidence of immigration. Returns to overeducation are strongly associated with returns to matched education: the regions with the greatest return to matched education have the largest penalties to be overeducated, and the lowest returns to overeducation are in Scotland, Wales and the Southwest – the more remote regions of the United Kingdom, where the obstacles to flexibility and thus to easy matching of qualification-holders to the demand for them is greatest. With the increase in the number of graduates entering the labourforce each year attention needs to be paid to matching them with the appropriate job for their skill and policy needs to be aimed at removing barriers that lead to a lack of mobility. These considerations point towards the removal of informational and other obstacles to skill matching as the most promising routes to reducing the costs and inefficiencies associated with overeducation and to increase regional competitiveness.

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Table 1. The proportion of industry types within each region

Years 2002-2008	UK	North	Yorks & Humber	North West	East. Midlands	West. Midlands	East Anglia	Greater London	South East	South West	Wales	Scotland
Primary industry	1.69	1.38	1.51	0.89	2.23	0.97	2.13	0.52	1.56	1.83	1.01	4.59
Manufacturing	22.59	24.88	27.05	25.65	29.49	30.63	22.63	9.90	19.29	21.99	26.92	18.58
Utilities	1.33	1.80	1.14	1.44	1.11	1.65	1.19	0.49	1.45	1.51	1.58	1.69
Construction	9.42	12.11	9.96	9.54	9.42	8.63	9.10	6.65	8.70	9.40	9.66	12.50
Wholesale/ retail	12.87	11.40	13.50	14.19	13.85	12.94	14.06	10.36	13.47	13.82	12.88	10.77
Hotel and restaurant	2.89	2.55	2.47	3.16	2.35	2.14	2.75	4.04	2.85	2.68	3.21	3.20
Transport and storage	10.48	9.14	10.06	10.20	11.53	10.23	11.78	12.84	10.68	9.15	8.20	9.49
Financial intermediation	4.15	1.73	3.60	3.36	1.90	2.58	3.48	10.68	3.54	4.35	2.52	4.62
Real Estate	10.88	8.23	8.54	9.08	8.24	9.54	11.62	17.72	14.57	9.66	7.43	8.76
Public Administration	8.29	9.33	7.67	7.36	6.23	6.38	6.61	9.82	8.55	11.20	9.87	8.58
Education	5.61	6.23	5.68	5.43	5.01	5.48	5.48	5.17	6.17	5.58	5.33	5.95
Health and social work	9.80	11.22	8.82	9.70	8.64	8.83	9.17	11.81	9.17	8.83	11.39	11.27
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table 2. The proportion of broad occupation types within each region

Years 2002-2008	UK	North	Yorks & Humber	North West	East. Midlands	West. Midlands	East Anglia	Greater London	South East	South West	Wales	Scotland
Managerial	19.07	13.77	16.32	17.78	17.48	18.16	19.97	25.99	22.45	19.25	15.81	15.80
Professional	14.27	12.37	12.18	12.65	11.20	13.01	15.04	17.86	16.89	14.40	13.06	14.33
Associate Professional	13.64	11.86	12.21	12.91	11.60	12.20	13.39	18.23	14.32	14.01	12.65	13.81
Clerical and administration	5.19	5.28	5.12	5.65	4.23	4.84	5.05	7.09	4.61	5.08	4.49	4.97
Skilled manual	15.73	18.14	17.54	15.86	18.16	17.24	15.63	8.33	14.31	16.99	17.72	17.86
Protective services	2.60	3.24	2.55	2.92	2.25	2.22	2.39	2.51	2.47	2.50	2.75	3.12
Sales and related	3.82	5.01	3.99	4.54	3.22	3.15	3.83	3.74	3.59	3.56	3.84	3.94
Plant/machine operatives	13.53	16.85	16.83	15.18	17.37	17.09	12.71	6.92	10.11	11.73	16.77	13.72
Other operatives	12.18	13.48	13.26	12.52	14.49	12.08	11.99	9.33	11.24	12.48	12.90	12.46
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Note: These are broad occupation types. The measure of overeducation in the paper is calculated at the 3 digit level which is a much higher level of disaggregation.

Table 3. Average of UK and regional mode education levels in each industry

Years 2002-2008	UK	North	Yorks & Humber	North West	East. Midlands	West. Midlands	East Anglia	Greater London	South East	South West	Wales	Scotland
Primary industry	2.07	2.74	2.57	2.40	1.35	2.17	2.51	3.31	2.63	2.68	2.60	3.20
Manufacturing	2.30	2.71	2.80	2.72	1.61	2.55	2.89	3.32	3.19	3.00	2.55	3.19
Utilities	2.95	2.89	3.13	3.14	2.32	3.21	3.21	3.28	3.16	3.33	3.15	3.37
Construction	2.46	2.66	2.84	2.74	2.68	2.76	2.84	3.08	2.96	2.90	2.48	3.07
Wholesale/ retail	2.41	2.57	2.79	2.64	2.59	2.43	2.77	2.95	2.82	2.80	2.48	3.04
Hotel and restaurant	2.01	2.17	2.62	2.31	2.19	2.24	2.47	2.49	2.41	2.54	2.39	2.97
Transport and storage	2.36	2.32	2.47	2.12	1.87	1.86	2.29	2.85	2.65	2.58	2.13	2.99
Financial intermediation	3.67	2.88	3.46	3.17	2.62	3.58	3.52	3.76	3.61	3.53	3.56	3.59
Real Estate	3.17	2.88	3.19	3.07	2.12	3.23	3.43	3.49	3.50	3.42	3.11	3.45
Public Administration	3.51	3.27	3.36	3.30	2.46	3.36	3.46	3.66	3.60	3.55	3.45	3.59
Education	3.63	3.47	3.61	3.60	3.50	3.62	3.75	3.78	3.72	3.65	3.80	3.78
Health and social work	2.86	2.78	3.05	2.78	2.93	3.08	2.93	3.43	3.17	3.18	2.96	3.22

Note: The NQF education levels range from 0 to 5.

Table 4. The proportions of undereducation, correct education and overeducation measured within each region

Years 2002-2008	undereducated	Correct education	overeducated	Total	Total N
North	28.07	53.66	18.27	100	4510
Yorkshire/Humberside	31.67	52.21	16.13	100	9221
North West	28.68	51.58	19.74	100	10141
East Midlands	28.62	53.83	17.55	100	7110
West Midlands	29.38	51.20	19.42	100	7957
East Anglia	32.43	49.13	18.44	100	7206
Greater London	30.35	47.43	22.22	100	10235
South East	33.27	49.39	17.34	100	13245
South West	30.94	52.48	16.58	100	8068
Wales	27.57	52.93	19.49	100	4294
Scotland	30.85	54.77	14.38	100	8879
Total	30.52	51.36	18.12	100	
Total N	28291	48020	17121		90884

Table 5. The probability of being overeducated by region.

Years 2002-2008	UK		North		Yorkshire/Humber		North West		East Midlands		West Midlands	
	N=90884		N = 4510		N = 9221		N = 10141		N = 7110		N = 7957	
Age	0.006***	(0.001)	0.009***	(0.002)	0.008***	(0.001)	0.006***	(0.002)	0.009***	(0.002)	0.001	(0.002)
Age sq	-0.000***	(0.000)	-0.000	(0.000)	-0.000***	(0.000)	-0.000***	(0.000)	-0.000***	(0.000)	-0.000	(0.000)
Managerial occupation	-0.079***	(0.002)	-0.069***	(0.011)	-0.070***	(0.007)	-0.081***	(0.007)	-0.105***	(0.006)	-0.080***	(0.008)
Professional	0.024***	(0.004)	-0.012	(0.016)	0.007	(0.011)	0.029**	(0.012)	-0.004	(0.012)	0.027*	(0.014)
Associate professional	-0.096***	(0.002)	-0.098***	(0.010)	-0.081***	(0.007)	-0.087***	(0.008)	-0.099***	(0.007)	-0.085***	(0.008)
Administrator/ secretarial	0.031***	(0.005)	0.141***	(0.033)	0.008	(0.014)	0.149***	(0.022)	0.003	(0.017)	0.028	(0.018)
Protective services	-0.002	(0.006)	0.007	(0.028)	0.082***	(0.026)	0.054**	(0.024)	0.005	(0.024)	0.033	(0.026)
Sales and related	0.123***	(0.008)	0.190***	(0.036)	0.029*	(0.017)	0.074***	(0.020)	0.137***	(0.031)	0.174***	(0.032)
Plant and machine	0.044***	(0.004)	-0.004	(0.013)	0.026***	(0.009)	0.035***	(0.011)	0.095***	(0.013)	0.169***	(0.015)
Other operatives	0.174***	(0.005)	0.211***	(0.024)	0.046***	(0.012)	0.324***	(0.018)	0.208***	(0.018)	0.321***	(0.020)
Primary industry	-0.029***	(0.008)	-0.087***	(0.024)	-0.026	(0.022)	-0.065***	(0.022)	-0.033	(0.021)	0.027	(0.037)
Utilities	0.032***	(0.009)	-0.013	(0.029)	0.042	(0.028)	0.005	(0.023)	0.055	(0.037)	0.096***	(0.032)
Construction	-0.014***	(0.003)	-0.010	(0.013)	0.020**	(0.010)	-0.006	(0.010)	-0.022**	(0.010)	-0.002	(0.011)
Wholesale/Retail sales	-0.039***	(0.003)	-0.062	(0.011)	-0.012	(0.008)	-0.048***	(0.008)	-0.040***	(0.008)	-0.021**	(0.009)
Hotel and restaurant	-0.013**	(0.005)	-0.012	(0.057)	0.038*	(0.022)	-0.038***	(0.014)	0.004	(0.021)	0.021	(0.023)
Transport and storage	-0.000	(0.003)	0.014	(0.016)	0.022**	(0.010)	0.009	(0.010)	-0.016*	(0.009)	0.012	(0.011)
Financial intermediation	0.023***	(0.005)	-0.007	(0.032)	0.058***	(0.019)	0.027	(0.018)	0.042	(0.027)	-0.015	(0.019)
Real Estate	0.046***	(0.004)	0.048***	(0.019)	0.076***	(0.014)	0.047***	(0.013)	0.048***	(0.014)	0.028**	(0.013)
Public administration	0.020***	(0.004)	0.002	(0.018)	0.057***	(0.014)	0.008	(0.013)	0.048***	(0.017)	0.028*	(0.015)
Education	0.235***	(0.008)	0.244***	(0.035)	0.315***	(0.026)	0.211***	(0.024)	0.235***	(0.029)	0.259***	(0.027)
Health and Social work	0.075***	(0.005)	0.073***	(0.020)	0.103***	(0.015)	0.070***	(0.014)	0.074***	(0.016)	0.091***	(0.016)
immigrant	0.055***	(0.005)	0.070**	(0.034)	0.059***	(0.016)	0.022	(0.016)	-0.005	(0.013)	0.028*	(0.015)
Part-time	0.053***	(0.009)	0.132***	(0.051)	0.096***	(0.028)	0.026	(0.027)	0.036	(0.027)	0.024	(0.028)
Job tenure up to 1 year	0.025***	(0.003)	0.013	(0.011)	0.028***	(0.007)	0.032***	(0.008)	0.012	(0.008)	0.013	(0.008)
Job tenure 1 to 5 years	0.020***	(0.002)	0.014	(0.010)	0.018***	(0.007)	0.016**	(0.007)	0.008	(0.007)	0.004	(0.007)
Year 2003	0.015***	(0.003)	-0.035***	(0.013)	-0.004	(0.009)	0.075***	(0.012)	-0.031***	(0.010)	0.041***	(0.012)
Year 2004	0.013***	(0.003)	0.024	(0.016)	0.028***	(0.010)	0.041***	(0.011)	0.009	(0.011)	0.005	(0.011)
Year 2005	0.021***	(0.003)	-0.042***	(0.013)	0.041***	(0.011)	0.014	(0.011)	-0.059***	(0.008)	0.058***	(0.013)
Year 2006	0.002	(0.003)	-0.035***	(0.013)	0.082***	(0.012)	0.015	(0.010)	-0.037***	(0.009)	-0.015	(0.010)
Year 2007	0.013***	(0.003)	-0.035***	(0.013)	0.026***	(0.010)	0.007	(0.010)	-0.026***	(0.009)	0.026**	(0.011)
Year 2008	-0.007***	(0.003)	-0.015	(0.015)	0.042***	(0.012)	-0.021**	(0.010)	-0.050***	(0.009)	-0.023**	(0.010)
Log Likelihood	-86480.131		-4187.5634		-8710.4661		-9463.55		-6453.5022		-7301.2959	
LR chi2(40)	11332.45		656.06		978.98		1759.72		1268.58		1643.45	

...continued Table 5. The probability of being overeducated by region

Years 2002-2008	East Anglia		Greater London		South East		South West		Wales		Scotland	
	N = 7206		N = 10253		N = 13245		N = 8068		N = 4294		N = 8879	
Age	0.004**	(0.002)	0.002	(0.002)	0.003***	(0.001)	0.011***	(0.001)	0.002	(0.003)	0.004***	(0.001)
Age sq	-0.000***	(0.000)	-0.000**	(0.000)	-0.000***	(0.000)	-0.000***	(0.000)	-0.000	(0.000)	-0.000***	(0.000)
Managerial occupation	-0.064***	(0.009)	-0.090***	(0.010)	-0.095***	(0.005)	-0.019**	(0.009)	-0.071***	(0.012)	-0.063***	(0.006)
Professional	0.022*	(0.013)	0.034**	(0.015)	0.027***	(0.009)	0.024**	(0.012)	0.020	(0.019)	0.021**	(0.010)
Associate professional	-0.077***	(0.009)	-0.111***	(0.010)	-0.109***	(0.005)	-0.098***	(0.007)	-0.092***	(0.012)	-0.072***	(0.006)
Administrator/ secretarial	0.117***	(0.024)	0.034*	(0.018)	-0.005	(0.011)	-0.056***	(0.010)	0.042	(0.028)	0.020	(0.014)
Protective services	0.026	(0.025)	-0.061***	(0.018)	-0.052***	(0.011)	0.021**	(0.018)	-0.027	(0.027)	0.001	(0.016)
Sales and related	0.108***	(0.027)	0.166***	(0.029)	0.182***	(0.024)	0.209***	(0.031)	0.092***	(0.035)	0.079***	(0.021)
Plant and machinery	0.147***	(0.017)	-0.024*	(0.014)	0.015*	(0.009)	-0.002	(0.010)	0.087***	(0.018)	-0.003	(0.008)
Other operatives	0.262***	(0.021)	0.247***	(0.022)	0.218***	(0.015)	0.064***	(0.013)	0.208***	(0.025)	-0.028***	(0.008)
Primary industry	0.002	(0.024)	-0.011	(0.067)	-0.008	(0.018)	-0.017	(0.025)	-0.001	(0.059)	-0.047***	(0.013)
Utilities	0.031	(0.032)	0.033	(0.049)	0.032	(0.021)	0.031	(0.027)	-0.039	(0.029)	0.036	(0.022)
Construction	-0.022**	(0.011)	-0.032***	(0.013)	-0.024***	(0.007)	-0.009	(0.010)	-0.020	(0.015)	-0.023***	(0.007)
Wholesale/Retail sales	-0.036***	(0.009)	-0.067***	(0.011)	-0.033***	(0.007)	-0.042***	(0.008)	-0.043***	(0.013)	-0.049***	(0.007)
Hotel and restaurant	-0.018	(0.019)	-0.051***	(0.015)	-0.016	(0.012)	0.015	(0.020)	-0.094***	(0.015)	0.000	(0.015)
Transport and storage	-0.014*	(0.010)	-0.005	(0.013)	-0.004	(0.008)	0.029**	(0.012)	-0.010	(0.016)	-0.031***	(0.008)
Financial intermediation	0.061***	(0.023)	0.026*	(0.014)	-0.021*	(0.011)	0.001	(0.015)	-0.004	(0.029)	0.010	(0.013)
Real Estate	0.042***	(0.013)	0.031**	(0.013)	0.042***	(0.009)	0.043***	(0.013)	0.009	(0.019)	0.045***	(0.012)
Public administration	0.007	(0.015)	0.006	(0.014)	0.002	(0.009)	0.032***	(0.012)	0.051***	(0.020)	-0.007	(0.010)
Education	0.246***	(0.028)	0.200***	(0.025)	0.238***	(0.019)	0.211***	(0.025)	0.177***	(0.035)	0.203***	(0.022)
Health and Social work	0.082***	(0.016)	0.070***	(0.016)	0.081***	(0.012)	0.052***	(0.014)	0.045**	(0.019)	0.045***	(0.011)
immigrant	0.042***	(0.014)	0.110***	(0.010)	0.054***	(0.010)	0.048***	(0.015)	-0.004	(0.024)	0.057***	(0.017)
Part-time	0.046	(0.028)	0.064**	(0.032)	0.045**	(0.022)	0.029	(0.024)	0.136***	(0.047)	0.220	(0.174)
Job tenure up to 1 year	0.038***	(0.009)	0.048***	(0.009)	0.031***	(0.006)	0.008	(0.008)	0.004	(0.012)	0.147**	(0.058)
Job tenure 1 to 5 years	0.025***	(0.008)	0.049***	(0.008)	0.020***	(0.005)	0.018***	(0.007)	0.013	(0.011)	0.169***	(0.169)
Year 2003	0.079***	(0.014)	-0.020*	(0.012)	0.009	(0.008)	0.052***	(0.012)	-0.028**	(0.014)	-0.040***	(0.007)
Year 2004	0.032***	(0.012)	-0.003	(0.011)	-0.014**	(0.007)	0.028***	(0.011)	0.044**	(0.018)	-0.007	(0.008)
Year 2005	0.054***	(0.014)	-0.020*	(0.012)	0.009	(0.008)	0.142***	(0.015)	0.063***	(0.019)	-0.027***	(0.008)
Year 2006	0.034***	(0.013)	-0.042***	(0.010)	-0.008	(0.007)	0.037***	(0.012)	-0.011	(0.015)	-0.014*	(0.008)
Year 2007	0.039***	(0.012)	-0.039***	(0.012)	0.013*	(0.007)	0.022**	(0.010)	-0.052***	(0.013)	0.017**	(0.009)
Year 2008	-0.004	(0.012)	-0.006	(0.011)	-0.008	(0.008)	-0.014	(0.010)	0.048***	(0.019)	-0.009	(0.009)
Log Likelihood	-6807.1272		-9852.1444		-12180.88		-7624.888		-4066.7265		-8203.22	
LR chi2(40)	1174.57		1824.85		2615.11		874.78		546.32		844.24	

Notes: (i) All coefficients are marginal effects from the ordered logit model with standard errors in brackets. (ii) \*, \*\* and \*\*\* denote significance at 10%, 5% and 1% levels, respectively. (iii) Controls not reported here include; ethnic dummies and marital status. (iv) The base group is single white male who has worked in a skilled manual job for over five years in a manufacturing company, employing 500 plus workers, year 2002.

Table 6. The regional wage returns to undereducation, overeducation and the ‘correct’ level of education

Years 2002-2008	UK		North		Yorkshire/Humber		North West		East Midlands		West Midlands	
	N=90884		N = 4510		N = 9221		N = 10141		N = 7110		N = 7957	
Correct education	0.112***	(0.006)	0.104***	(0.023)	0.109***	(0.020)	0.108***	(0.019)	0.116***	(0.021)	0.110***	(0.020)
overeducated	0.058***	(0.003)	0.064***	(0.013)	0.042***	(0.010)	0.066***	(0.011)	0.068***	(0.013)	0.069***	(0.013)
undereducated	-0.065***	(0.002)	-0.072***	(0.010)	-0.053***	(0.007)	-0.059***	(0.008)	-0.056***	(0.009)	-0.059***	(0.009)
Age	0.083***	(0.002)	0.072***	(0.008)	0.079***	(0.006)	0.082***	(0.007)	0.092***	(0.007)	0.073***	(0.008)
Age sq	-0.001***	(0.000)	-0.001***	(0.000)	-0.001***	(0.000)	-0.001***	(0.000)	-0.001***	(0.000)	-0.001***	(0.000)
Managerial occupation	0.969***	(0.014)	0.961***	(0.053)	0.929***	(0.041)	0.943***	(0.046)	0.893***	(0.052)	1.004***	(0.052)
Professional	0.925***	(0.016)	0.923***	(0.061)	0.929***	(0.049)	0.960***	(0.054)	0.825***	(0.061)	0.895***	(0.061)
Associate professional	0.745***	(0.015)	0.719***	(0.059)	0.734***	(0.044)	0.710***	(0.051)	0.663***	(0.058)	0.844***	(0.058)
Administrator/ secretarial	0.344***	(0.018)	0.483***	(0.069)	0.410***	(0.051)	0.386***	(0.059)	0.334***	(0.070)	0.366***	(0.070)
Protective services	0.174***	(0.024)	0.309***	(0.085)	0.274***	(0.070)	0.132*	(0.078)	0.239**	(0.096)	0.256***	(0.099)
Sales and related	0.071***	(0.020)	0.085	(0.072)	0.220***	(0.056)	0.062	(0.064)	0.243***	(0.080)	0.098	(0.085)
Plant and machine	-0.216***	(0.013)	-0.113***	(0.045)	-0.137***	(0.036)	-0.220***	(0.044)	-0.174***	(0.052)	-0.212***	(0.055)
Other operatives	-0.340***	(0.016)	-0.286***	(0.061)	-0.218***	(0.041)	-0.321***	(0.059)	-0.427***	(0.060)	-0.299***	(0.064)
Primary industry	-0.014	(0.034)	-0.255*	(0.149)	-0.143	(0.095)	0.838***	(0.133)	0.013	(0.109)	-0.042	(0.143)
Utilities	0.280***	(0.030)	0.420***	(0.099)	0.462***	(0.091)	0.277***	(0.096)	0.063	(0.121)	0.319***	(0.104)
Construction	-0.090***	(0.013)	-0.149***	(0.046)	-0.057	(0.036)	-0.116***	(0.043)	-0.048	(0.048)	0.001	(0.051)
Wholesale/Retail sales	-0.016	(0.012)	-0.084*	(0.049)	0.064*	(0.034)	0.004	(0.040)	0.099**	(0.043)	0.049	(0.046)
Hotel and restaurant	-0.411***	(0.022)	-0.258***	(0.087)	-0.302***	(0.065)	-0.332***	(0.069)	-0.433***	(0.088)	-0.524***	(0.094)
Transport and storage	-0.028**	(0.013)	-0.098**	(0.050)	0.014	(0.036)	0.025	(0.042)	-0.002	(0.045)	0.053	(0.048)
Financial intermediation	0.254***	(0.019)	0.202**	(0.104)	0.297***	(0.056)	0.166**	(0.067)	0.408***	(0.095)	0.348***	(0.086)
Real Estate	0.191***	(0.013)	0.222***	(0.055)	0.235***	(0.040)	0.175***	(0.045)	0.211***	(0.052)	0.259***	(0.051)
Public administration	0.048***	(0.015)	0.090*	(0.056)	0.215***	(0.042)	0.036	(0.051)	0.089	(0.059)	0.073	(0.060)
Education	-0.141***	(0.018)	-0.112*	(0.067)	-0.087*	(0.052)	-0.077	(0.060)	-0.132*	(0.069)	-0.109	(0.069)
Health and Social work	-0.064***	(0.014)	-0.043	(0.051)	0.025	(0.040)	-0.033	(0.046)	-0.022	(0.052)	-0.049	(0.054)
Part-time work	-0.540***	(0.027)	-0.334***	(0.107)	-0.398***	(0.072)	-0.664***	(0.099)	-0.694***	(0.098)	-0.830***	(0.104)
Firm tenure up to 1 year	-0.261***	(0.009)	-0.289***	(0.035)	-0.273***	(0.026)	-0.298***	(0.031)	-0.324***	(0.035)	-0.289***	(0.036)
Firm tenure 1-5 years	-0.092***	(0.008)	-0.099***	(0.033)	-0.058**	(0.024)	-0.056**	(0.028)	-0.135***	(0.031)	-0.132***	(0.032)
Year 2003	0.071***	(0.012)	0.090*	(0.049)	0.014	(0.035)	0.042	(0.041)	0.176***	(0.049)	0.094**	(0.047)
Year 2004	0.128***	(0.013)	0.038	(0.048)	0.127***	(0.036)	0.242***	(0.041)	0.186***	(0.049)	0.159***	(0.048)
Year 2005	0.215***	(0.013)	0.127***	(0.049)	0.215***	(0.036)	0.224***	(0.042)	0.288***	(0.050)	0.307***	(0.048)
Year 2006	0.364***	(0.013)	0.325***	(0.050)	0.373***	(0.042)	0.352***	(0.044)	0.493***	(0.048)	0.350***	(0.051)
Year 2007	0.339***	(0.012)	0.358***	(0.047)	0.332***	(0.034)	0.253***	(0.039)	0.456***	(0.046)	0.357***	(0.047)
Year 2008	0.397***	(0.013)	0.423***	(0.051)	0.404***	(0.037)	0.255***	(0.043)	0.644***	(0.050)	0.271***	(0.049)
Adjusted R2	0.40		0.42		0.39		0.33		0.37		0.33	

...continued Table 6. The regional wage returns to undereducation, overeducation and the 'correct' level of education.

Years 2002-2008	East Anglia		Greater London		South East		South West		Wales		Scotland	
	N = 7206		N = 10253		N = 13245		N = 8068		N = 4294		N = 8879	
Correct education	0.109***	(0.018)	0.146***	(0.023)	0.110**	(0.018)	0.108***	(0.021)	0.110**	(0.026)	0.129***	(0.027)
overeducated	0.040***	(0.012)	0.078***	(0.008)	0.066***	(0.008)	0.028***	(0.011)	0.050***	(0.015)	0.038***	(0.011)
undereducated	-0.039***	(0.008)	-0.090***	(0.007)	-0.086***	(0.006)	-0.046***	(0.008)	-0.048***	(0.011)	-0.062***	(0.008)
Age	0.089***	(0.008)	0.084***	(0.007)	0.086***	(0.005)	0.082***	(0.006)	0.079***	(0.009)	0.084***	(0.006)
Age sq	-0.001***	(0.000)	-0.001***	(0.000)	-0.001***	(0.000)	-0.001***	(0.000)	-0.001***	(0.000)	-0.001***	(0.000)
Managerial occupation	0.891***	(0.047)	0.894***	(0.051)	1.124***	(0.037)	0.966***	(0.042)	0.905***	(0.067)	0.872***	(0.049)
Professional	0.722***	(0.055)	0.802***	(0.056)	1.068***	(0.041)	0.880***	(0.052)	0.874***	(0.080)	0.970***	(0.054)
Associate professional	0.557***	(0.053)	0.673***	(0.054)	0.873***	(0.041)	0.731***	(0.049)	0.665***	(0.073)	0.730***	(0.049)
Administrator/ secretarial	0.388***	(0.064)	0.294***	(0.054)	0.279***	(0.046)	0.325***	(0.059)	0.194***	(0.086)	0.274***	(0.057)
Protective services	0.085	(0.089)	0.132*	(0.075)	0.215***	(0.060)	0.192***	(0.077)	-0.040	(0.107)	0.091	(0.071)
Sales and related	0.140**	(0.072)	0.049	(0.067)	-0.034	(0.053)	-0.010	(0.067)	-0.013	(0.093)	0.078	(0.064)
Plant and machine	-0.191***	(0.050)	-0.356***	(0.054)	-0.289***	(0.035)	-0.202***	(0.042)	-0.228***	(0.057)	-0.250***	(0.040)
Other operatives	-0.289***	(0.056)	-0.381***	(0.067)	-0.406***	(0.047)	-0.325***	(0.047)	-0.338***	(0.069)	-0.406***	(0.043)
Primary industry	-0.133	(0.094)	-0.388*	(0.223)	-0.144**	(0.074)	-0.030	(0.103)	0.644***	(0.213)	-0.132	(0.093)
Utilities	0.190*	(0.113)	0.309**	(0.146)	0.283***	(0.070)	0.299***	(0.089)	0.352***	(0.126)	0.113	(0.085)
Construction	-0.027	(0.048)	-0.059	(0.050)	-0.104**	(0.034)	-0.049	(0.042)	-0.026	(0.061)	-0.278***	(0.039)
Wholesale/Retail sales	-0.013	(0.043)	-0.144***	(0.046)	0.020	(0.031)	-0.047	(0.039)	-0.065	(0.057)	-0.165***	(0.042)
Hotel and restaurant	-0.384***	(0.079)	-0.402***	(0.061)	-0.438***	(0.054)	-0.400***	(0.071)	-0.645***	(0.098)	-0.522***	(0.067)
Transport and storage	-0.001	(0.044)	-0.003	(0.043)	-0.011	(0.032)	-0.121***	(0.042)	-0.059	(0.063)	-0.197***	(0.042)
Financial intermediation	0.093	(0.071)	0.400***	(0.045)	0.152***	(0.049)	0.302***	(0.058)	0.149	(0.105)	0.017	(0.057)
Real Estate	0.214***	(0.045)	0.185***	(0.040)	0.227***	(0.030)	0.223***	(0.044)	0.181*	(0.105)	-0.100**	(0.045)
Public administration	0.029	(0.055)	-0.016	(0.046)	0.040	(0.036)	0.106***	(0.042)	0.172***	(0.063)	-0.156***	(0.045)
Education	-0.085	(0.063)	-0.259***	(0.058)	-0.097**	(0.042)	-0.158***	(0.056)	-0.000	(0.084)	-0.304***	(0.055)
Health and Social work	-0.088*	(0.050)	-0.066	(0.044)	-0.071**	(0.035)	-0.078*	(0.045)	0.047	(0.060)	-0.261***	(0.042)
Part-time work	-0.669***	(0.091)	-0.454***	(0.083)	-0.642***	(0.069)	-0.307***	(0.078)	-0.288**	(0.115)	-0.546***	(0.087)
Firm tenure up to 1 year	-0.271***	(0.034)	-0.208***	(0.029)	-0.198***	(0.023)	-0.291***	(0.029)	-0.311***	(0.043)	-0.198***	(0.030)
Firm tenure 1-5 years	-0.131***	(0.029)	-0.051**	(0.025)	-0.058***	(0.020)	-0.142***	(0.026)	-0.116***	(0.039)	-0.109***	(0.027)
Year 2003	0.026	(0.045)	0.081**	(0.037)	0.084***	(0.031)	0.017	(0.039)	0.051	(0.057)	0.120***	(0.040)
Year 2004	0.076*	(0.044)	0.093**	(0.038)	0.108***	(0.031)	0.139***	(0.038)	0.101*	(0.058)	0.101***	(0.039)
Year 2005	0.214***	(0.045)	0.170***	(0.037)	0.152***	(0.031)	0.294***	(0.041)	0.261***	(0.058)	0.206***	(0.040)
Year 2006	0.326***	(0.047)	0.373***	(0.037)	0.377***	(0.032)	0.390***	(0.043)	0.330***	(0.057)	0.312***	(0.045)
Year 2007	0.298***	(0.042)	0.321***	(0.035)	0.344***	(0.029)	0.299***	(0.037)	0.288***	(0.055)	0.438***	(0.039)
Year 2008	0.317***	(0.046)	0.378***	(0.038)	0.429***	(0.031)	0.415***	(0.040)	0.390***	(0.059)	0.473***	(0.042)
Adjusted R2	0.33		0.39		0.45		0.40		0.39		0.37	

(i) Standard errors reported in brackets. (ii) \*, \*\* and \*\*\* denote significance at 10%, 5% and 1% levels, respectively. (iii) Controls not reported include 8 ethnicity dummies, firm size and immigrant worker. (iv) The base group is single white, has worked for over five years in a large manufacturing company, employing 500 plus workers, year 2002.

Table 7. The regional wage returns to educational job matching and NQF level.

Years 2002-2008	UK	North	Yorkshire/ Humber	North West	East Midlands	West Midlands	East Anglia	Greater London	South East	South West	Wales	Scotland
	N=90884	N = 4510	N = 9221	N = 10141	N = 7110	N = 7957	N = 7206	N=10253	N=13245	N=8068	N=4294	N=8879
Correct education	0.086***	0.087*	0.080***	0.084***	0.076*	0.097**	0.082*	0.115***	0.101***	0.079*	0.093**	0.090**
	(0.013)	(0.051)	(0.036)	(0.045)	(0.042)	(0.044)	(0.049)	(0.043)	(0.036)	(0.045)	(0.056)	(0.041)
NQF level 1	0.078***	0.056	0.133***	0.048	0.063*	0.062	0.004	0.118*	0.106**	0.117*	0.095	0.041
	(0.019)	(0.071)	(0.049)	(0.067)	(0.063)	(0.070)	(0.069)	(0.062)	(0.049)	(0.060)	(0.085)	(0.062)
NQF level 2	0.119***	0.109*	0.188***	0.163***	0.100*	0.121**	0.094*	0.140**	0.115***	0.114**	0.151**	0.126**
	(0.016)	(0.063)	(0.045)	(0.052)	(0.053)	(0.052)	(0.056)	(0.051)	(0.041)	(0.053)	(0.067)	(0.051)
NQF level 3	0.202***	0.233***	0.207***	0.238***	0.126***	0.144***	0.144**	0.247***	0.233***	0.279***	0.260***	0.163***
	(0.016)	(0.065)	(0.046)	(0.055)	(0.053)	(0.055)	(0.058)	(0.050)	(0.041)	(0.055)	(0.074)	(0.054)
NQF level 4	0.389***	0.393***	0.411***	0.380***	0.400***	0.388***	0.274***	0.499***	0.490***	0.389***	0.409***	0.366***
	(0.019)	(0.074)	(0.052)	(0.062)	(0.070)	(0.073)	(0.068)	(0.060)	(0.053)	(0.061)	(0.079)	(0.058)
NQF level 5	0.517***	0.409***	0.587***	0.412***	0.450***	0.490***	0.405***	0.619**	0.575***	0.510***	0.556***	0.476***
	(0.019)	(0.083)	(0.056)	(0.069)	(0.076)	(0.073)	(0.071)	(0.052)	(0.044)	(0.065)	(0.086)	(0.062)
Adjusted R2	0.39	0.40	0.38	0.32	0.35	0.32	0.32	0.38	0.44	0.39	0.39	0.36

Notes:

(i) Standard errors reported in brackets.

(ii) \*, \*\* and \*\*\* denote significance at 10%, 5% and 1% levels, respectively

(iii) Controls not reported include age, age squared, 10 occupation dummies, 12 industry dummies, 8 ethnicity dummies, 5 firm size dummies, part-time work, 3 work tenure dummies, year and immigrant worker.

(iv) The base individual is a single white male who has worked for over five years in a large company, employing more than 500 workers, where he is a skilled manual worker, in the manufacturing industry.

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<sup>1</sup> In the academic year 2009/10 the maximum top-up fee for English BA/BSc students studying at an English University was £3225 and £1820 if studying in Scotland whilst for Scottish students studying in Scotland there was no fee.

<sup>2</sup> Champion and Coombes (2007) focus on 5 cities, Birmingham, Glasgow, Liverpool, Manchester and Newcastle.

<sup>3</sup> Individuals with high level qualifications are found in the literature to be more mobile than those individuals with low level or no qualifications.

<sup>4</sup> In this paper the ‘correct’ level of education for each job is measured as the mode National Qualification level observed within each job title within each industry.

<sup>5</sup> For an overview of all methods, their drawbacks and results see Groot and Maasen van Groot (2000), Dolton and Vignoles (2000) and Verhaest and Omey (2009).

<sup>6</sup> McGuinness and Doyle (2005) focus on the overeducation of graduates.

<sup>7</sup> Respondents report their wage information in the (wave 1) and (wave 5) interviews. However, 20% of respondents may be present in both waves so we select respondents from wave 1 only.

<sup>8</sup> We have followed the existing literature and used the ‘corrected mode’ to ensure that we have enough observations within each occupation category.

<sup>9</sup> Level 0 denotes no formal qualifications; level 1 denotes any qualifications held that are equivalent to 4 GCSE’s at grade A-C or below; level 2 denotes qualifications equivalent to 5 or more GCSEs grade A-C; level 3 denotes qualifications equivalent to 2 Advanced levels; level 4 denotes a bachelor’s degree or equivalent higher education diploma; and level 5 denotes any postgraduate qualification.

<sup>10</sup> We additionally estimated multinomial logit models. Our results reveal that the ordered logit model proves qualitatively more robust to the choice of error structure, therefore report these estimates here. The multinomial estimates are available from the author on request.

<sup>11</sup> The use of year dummies excludes the inclusion of an unemployment variable due to multicollinearity.

<sup>12</sup> The ORU model provides an alternative to the Mincer ‘human capital’ approach. The ORU approach accommodates the Mincer equation as a special case when  $\gamma_1 = \gamma_2 = -\gamma_3$  in equation (1). When these equalities do not hold this allows for demand side variables to play a role through required schooling.

<sup>13</sup> These results are not reported here but are available from the author upon request.

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<sup>14</sup> Northern Ireland is excluded from this analysis due to missing information in a large number of observations making estimation infeasible.

<sup>15</sup> Sloane *et al* (1999) use SCELLI data where respondents answer directly what qualifications would be needed to obtain their job.

<sup>16</sup> Sloane *et al* (1999) use data from 1986-87.

<sup>17</sup> This may be indicative of highly qualified individuals moving south toward the city where traditionally they expect better job prospects and a higher return to the investment their in education, entering this occupation until a better offer is made. This implies that the positive probability of being overeducated for an individual in sales may be only transitory in nature.

<sup>18</sup> A full set of estimates is available from the author upon request.