

ISSN 1471-0498



DEPARTMENT OF ECONOMICS

DISCUSSION PAPER SERIES

THE DETERMINANTS OF GRADUATE OVER-EDUCATION

Mary Silles and Peter Dolton

Number 127

November 2002

Manor Road Building, Oxford OX1 3UQ

The Determinants of Graduate Over-Education

Peter Dolton^a and Mary Sillés^b

^aDepartment of Economics, University of Newcastle, Newcastle upon Tyne, NE1 7RU, England.

^bSt. John's College, University of Oxford, Oxford, OX1 3JP, England.

Abstract

Several studies for the UK and other countries have shown that a significant number of university graduates are in jobs that do not require a university degree i.e., over-educated. This paper using data from one large civic university in the UK investigates the true incidence and determinants of over-education. The results indicate that previous studies have largely over-stated the extent of over-education in the graduate labour market. Various labour market constraints as well as the vocational orientation of educational qualification were shown to be among most important factors that influence graduate placement.

JEL Classification Numbers: I21, J31.

Keywords: educational economics, wage differentials.

1. Introduction

Over the last 25 years the rapid expansion of the education system in the UK resulted in large increases in the supply of highly educated workers. However, a growing literature on the economics of education has demonstrated widespread skill-shortages and deficiencies at the intermediate skill level, pointing to the neglected vocational element of education in the UK (Prais, 2001; DTI, 2000; McIntosh and Steedman, 2000). In addition, a related literature has shown that between 30 and 40 percent of university graduates have jobs that do not require a university degree (Dolton and Vignoles, 2000; Sloane et al., 1999). The link between these two important findings has come to be known in the literature as over-education or downward occupational mobility (see for an early discussion, Berg, 1970; Freeman, 1976). In this paper using the Newcastle Alumni Survey¹, which was especially commissioned to permit new research in this field, we examine how over-education could arise and attempt to verify whether or not a significant number of graduates are genuinely overeducated.

The synchronisation between university qualifications and the labour market has one of the most important bearings on the ability of graduates to enter graduate-level occupations. The extent to which learned skills can be transferred to the labour market varies markedly with the type of degree and the specialisation component of qualifications. In recent years, alongside the rapid expansion in higher education, there have been important changes in the types of qualifications being awarded by universities.

¹ This survey was funded by the Economics Department and the Alumni Office at the University of Newcastle Upon Tyne, and the Government Office North East.

While many of these new qualifications have emerged in response to changing economic needs, not all of them are career related.

Standards in education are also a critical concern to employers. If the quality of qualifications is perceived to have been “watered down”, firms may upgrade their educational requirements to ensure the recruitment of the most able graduates (Spence, 1973). Thus, over-educated workers could essentially be comprised of those who have non-professional qualifications, a low quality of education, or both. As a result of these changes, university graduates may be taking jobs today (requiring less than a university degree) that they would not have in the past.

Furthermore, there may be a trade off between schooling and other forms of human capital such as on-the-job training, years of experience and ability (Sicherman, 1991; Sloane et al., 1999). The discrepancy between required and acquired schooling may only be a short run phenomenon if graduates temporarily work in jobs that provide them with the skills to be used later in higher level positions. However, permanent ability differences between similarly educated workers could result in workers with similar levels of schooling having different wage profiles at all stages of the life cycle. Pryor and Schaffer (1999) showed that US workers who experienced downward occupational mobility generally had lower cognitive skills irrespective of educational credentials.

Several reasons may also be advanced to explain why over-education in future employment could be intrinsically linked with over-education initially. For instance, a

lower level position in first employment may be difficult to recover from due to the obsolescence of skills not being used. As already mentioned, ability differences, the career-orientation of qualifications, and the quality of education could also permanently place graduates in lower level occupations. These attributes of graduates create an unobservable factor that may have an effect on the probability of being over-educated in both first and later employment. In addition to separately modelling first and current employment using a simple probit, one of the most distinguishing features of this research is that over-education is also modelled using a bivariate probit in order to explicitly take into account the potential dependence between over-education in first and later employment.

Beyond all aspects of human capital and job characteristics, several factors may give rise to labour market rigidities that limit the capacity of the market to fully utilise and reward highly educated workers. Such constraints could arise from family commitments, regional immobility or restrictive work practices. The Newcastle Alumni Survey contains a wealth of information on individual family circumstances and personal commitments, which we will examine to see how far they may result in some graduates taking jobs that require less than their educational credentials.

The remainder of this paper is set out as follows. The next section briefly describes the Newcastle Alumni Survey and presents some descriptive statistics. Our results largely indicate that previous studies have over-stated the true incidence of over-education in the labour market. In section 3 we further the literature by exploring the

determinants of over-education using several estimation techniques. The empirical evidence is largely in line with the conventional wisdom that the career orientation of educational qualifications is of immense significant in terms of labour market placements. Finally, section 4 concludes the paper.

2. Newcastle Alumni Survey

This study uses data from the Newcastle Alumni Survey, which was collected at the University of Newcastle-upon-Tyne in 1998. The sample for this survey was selected using the Newcastle University Alumni Database of graduates and postgraduates. At the time the survey was carried out, 43,099 alumni were in this database. However, only 3,187 indicated their interest in participating in “careers research” and were posted the questionnaire. Overall, 2,434 members returned the questionnaire most of whom had graduated in the 1990s. Although a generally satisfactory response rate (76.37 percent) had been achieved, anything less than a perfect response raises the question of whether those who replied were representative of the university alumni population. The main causes of non-response are unknown as the survey was posted and no other contact was made.

Since we are only interested in the UK labour market our sample excludes all individuals living abroad during either their first or current job (i.e., 343 persons). In addition, we drop graduates from the faculty of medicine (i.e., 232 persons) and those who graduated before 1970 (i.e., 220 persons) since these individuals are unlikely to be

over-educated. Finally, we only focus on individuals who are currently in employment at the time of the survey. This leaves us with a final sample of 1,389 graduates, of which our estimation samples are 852 and 731. We lose a significant number of observations due to missing data. In take account of the uneven distribution of responses across years, we generated sample weights based on our samples of 852 and 731 persons. All descriptive statistics and regression analysis was performed using these weights. Table 1 provides the summary statistics of the variables used in this study for our samples.

The most distinguishing feature of the Newcastle Alumni Survey is that it is the only British data set that contains two direct questions measuring the extent of education under-utilisation. The first question is: “What is/was the minimum formal qualification level required for *entering* this job?” and the second question is: “What do you believe to be the education level required to *actually do* this job?” Answers to both questions are on a four-point scale as follows: postgraduate qualification, degree, sub-degree qualification, and no qualifications required. The first question provides a match between acquired and required qualifications to get the job, whereas the second question provides a direct measure of over-education in terms of job content.

Table 1. Summary Statistics

	N=852 Mean	Std. Dev.	N=731 Mean	Std. Dev.
Log of wage variable				
First job	9.646	0.754	9.64	0.753
Current job, mid-points	9.497	0.618	9.503	0.616
Over-education				
First job	0.462	0.499	0.459	0.499
Current job	0.194	0.395	0.196	0.397
Gender				
Female	0.347	0.476	0.345	0.476
Faculty				
Engineering & technology	0.182	0.386	0.189	0.392
Agric, science	0.314	0.464	0.303	0.46
Admin, bus, soc sc, prof'al, voc'al subjects	0.284	0.451	0.286	0.452
Languages	0.035	0.184	0.032	0.175
Arts & Humanities	0.155	0.362	0.161	0.368
Education	0.030	0.170	0.029	0.168
Class of degree				
First class	0.080	0.272	0.082	0.274
Second upper	0.386	0.487	0.386	0.487
Second lower	0.409	0.492	0.411	0.492
Third	0.057	0.232	0.06	0.238
Pass	0.067	0.250	0.06	0.238
Qualifications				
Professional qualification	0.426	0.495	0.437	0.496
Postgraduate degree	0.420	0.494	0.405	0.491
Employment characteristics				
Part-time	0.122	0.327	0.103	0.304
Self-employed	0.036	0.187	0.11	0.313
Sector				
Public admin	0.202	0.401	0.183	0.387
Education	0.147	0.354	0.176	0.381
Industry incl public utilities	0.220	0.415	0.222	0.416
Commerce	0.146	0.353	0.154	0.362
Self-regulating professions	0.087	0.282	0.085	0.279
Other	0.198	0.399	0.181	0.385
Firm size				
<25 employees	0.238	0.426	0.234	0.424
25-99 employees	0.225	0.418	0.209	0.407
100-499 employees	0.189	0.392	0.251	0.434
>500 employees	0.294	0.456	0.282	0.45
Occupation				
Manager	0.060	0.237	0.178	0.383
Professional	0.350	0.477	0.393	0.489
Associate professions	0.267	0.442	0.292	0.455
Other occupation	0.323	0.468	0.137	0.344
Labour market mobility				
Relocate for job	0.291	0.454	0.268	0.443
Relocate for job* female	0.059	0.235	0.062	0.241
Family commitments				
Partner prior to first job	0.084	0.278	0.089	0.284
Child prior to first job	0.315	0.465	0.304	0.46
Partner	0.728	0.445	0.719	0.45
Child	0.487	0.500	0.479	0.5
Debt commitments				
Debts>1000	0.236	0.425	0.231	0.421
On-the-job experience- current job only				
Training			0.659	0.474
Age (years)			36.85	7.99
Experience (years)			14.78	7.85
Unemployment (years)	0.357	1.077	0.379	1.139

The criticism most widely levelled at subjective measure of over-education is that of credentialism i.e., where the educational requirements to get a job exceed those to do the job. As all previous studies for the UK that we are aware of have replied on questions framed as in the first question, the incidence of over-education may have been over-estimated by past researchers for this reason. In this paper using the second question, over-education is a dummy variable coded 1 if a graduate requires a postgraduate qualification or a degree and 0 otherwise.

Table 2. Percent of Over-educated Workers

	First Job N=852	Current Job N=731
Total over-educated	52	22
Gender		
Male	51.92	24.41
Female	52.66	20.00

Table 2 demonstrates that between first and current employment, the percentage of workers who are over-educated fell from 52 percent to 22 percent. This suggests a considerably lower number of over-educated workers than previous studies. We find that similar shares of men and women are over-educated in both first and current employment, which is in line with earlier studies such as Dolton and Vignoles (2000).

3. The Determinants of Over-Education

Table 3 presents the results of a probit model for the determinants of over-education in first and current employment². One of the most important results is that

² A single asterisk means that the coefficient is statistically significant at the 10 percent level on a two-tailed test (i.e., the t-statistic is greater than 1.64) and two asterisks that the coefficient is significant at the 5 percent level on a two-tailed test (i.e., the t-statistic is greater than 1.96).

Table 3. The Determinants of Over-Education: Probit Model

	1 First		2 Current		3 Current	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Gender						
Female	0.037	0.151	0.077	0.166	0.077	0.172
Faculty – Engineering & technology						
Agric, science	0.197	0.196	0.379*	0.212	0.400*	0.223
Admin, bus, soc sc, prof'al, voc'al subjects	-0.223	0.201	0.035	0.221	0.127	0.245
Languages	-0.438	0.342	0.614*	0.37	0.718*	0.368
Arts & Humanities	0.114	0.258	0.594**	0.239	0.706**	0.258
Education	-1.486**	0.404	-0.503	0.458	0.097	0.518
Class of degree - default pass/third						
First class	-0.504*	0.302	-0.614*	0.356	-0.541	0.351
Second upper	-0.008	0.227	-0.393*	0.216	-0.433*	0.228
Second lower	0.055	0.224	-0.516**	0.219	-0.594**	0.225
Qualifications						
Professional qualification	-0.08	0.128	-0.065	0.14	-0.066	0.151
Postgraduate degree	-0.134	0.131	-0.496**	0.203	-0.488**	0.216
Employment characteristics						
Part-time	-0.129	0.165	0.371*	0.207	0.624**	0.210
Self-employed	-0.346	0.257	0.019	0.246	-0.088	0.268
Occupation - default (all the others)						
Manager	-0.334	0.296	-0.536**	0.22	-0.680**	0.238
Professional	-1.178**	0.168	-1.076**	0.204	-1.058**	0.218
Associate prof	-0.783**	0.168	-0.438**	0.175	-0.417**	0.190
Sector - default education						
Public admin	0.983**	0.256	0.141	0.293	0.129	0.303
Industry incl public utilities	0.991**	0.266	0.226	0.263	0.147	0.274
Commerce	1.535**	0.281	0.583**	0.275	0.571**	0.280
Self-regulating prof	0.282	0.319	-0.121	0.365	-0.070	0.370
Other	1.212**	0.266	0.395	0.274	0.253	0.283
Firm size- default <25						
25-99 employees	-0.426**	0.177	-0.281	0.208	-0.396*	0.224
100-499 employees	-0.381**	0.187	-0.217	0.183	-0.343*	0.198
>500 employees	-0.553**	0.168	0.12	0.193	-0.001	0.205
On-the-job experience (Years)						
Training			-0.119	0.141	-0.068	0.147
Age			0.036	0.124	0.069	0.138
Experience			0.032	0.131	0.028	0.147
Experience squared			-0.003**	0.001	-0.004**	0.001
Unemployment			0	0.141	-0.064	0.157
Mobility						
Relocate for this job	-0.587**	0.164	0.293*	0.176	0.392**	0.190
Relocate for this job* female	-0.513*	0.308	-1.168**	0.34	-1.265**	0.367
Family commitments						
Partner prior to first job	-0.102	0.209				
Child prior to first job	-0.285*	0.165				
Partner			-0.008	0.154	0.045	0.161
Child (0,1)			-0.107	0.191	0.013	0.198
Debt commitments						
Debts>1000	0.356**	0.149				
Cohort effects						
Participation rate	1.691	4.796				
Unemployment rate	-0.285	3.379				
Year of grad (1,2,..)	-0.005	0.021				
Past over-education						
Over-education in first job					1.122**	0.160
Constant						
Constant	-0.03	0.93	-1.102	2.708	-2.747	3.029
N		852		731		731
Log likelihood		-389.981		-278.829		-248.541

women are no more likely to be over-educated than men. Having spent some time in the labour market, arts and humanities graduates are less to find work commensurate with their qualifications than those of other faculties. However, irrespective of subject of study those who graduate with first class honours are more likely to find jobs commensurate with their qualifications. Undertaking a postgraduate degree also increases the probability of being in a graduate level job. Not surprisingly, we find that graduates in professional, associate professional and managerial occupations have a greater propensity to be in graduate level jobs than those in the base group³.

Graduates who work in the self-regulating professional or the education sector are less likely to be over-educated than in other sectors. This is perhaps because the majority of graduates in education are teachers and those in the self-regulating professional sector usually require a degree such as in accountancy. Graduates in part-time position or working in small firms are more likely to be over-educated than their otherwise similar counterparts.

Graduates who are over-educated at the start of their careers find it considerably more difficult to get graduate jobs later in comparison with those initially in jobs for which a degree is required. The effect of initial over-education on the probability of being over-educated in the future is statistically significant with on-the-job training and age making no discernible impact. However, experience has a significant effect with

³ The default category is comprised of clerical occupations, manufacturing crafts, personal and protective services, sales, plant and machine operatives, and other occupations.

higher levels of job experience decreasing the probability of over-education.

Relocating to take a first job increases the probability of being well matched, whereas relocating to take a current job decreases the probability. On interacting mobility with gender, however, women who relocate are for their current position are more likely to find work commensurate with their qualifications.

Looking at family commitment variables, having children prior to first job decreases (at the 10 percent level of significance) the probability of being over-educated. This clearly reflects the greater responsibility young parents bear and the greater need to get the highest possible return on their education. In contrast, our results show that children and marital status have no measurable effect on over-education in current employment. One might expect that this effect is different for women and men. However, our sample is not large enough to meaningfully interact family commitment variables with gender.

High debt commitments (i.e., debts in excess of £1000 upon leaving the University) raise the probability of being over-educated in the first employment. This could be due to the fact that debt may place pressure on graduates to find some work immediately thereby forcing them into jobs for which they are over-educated.

The probit specification assumes independence between unobserved factors that

Table 4. The Determinants of Over-Education: Bivariate Probit Model

	Coef.	First Std. Err.	Coef.	Current Std. Err.
Gender				
Female	0.076	0.162	0.025	0.179
Faculty - Engineering & technology				
Agric, science	0.074	0.189	0.474**	0.228
Admin, bus, soc sc, prof'al, voc'al subjects	-0.380*	0.217	0.12	0.248
Languages	-0.504	0.406	0.734*	0.403
Arts & Humanities	-0.118	0.238	0.708**	0.274
Education	-1.716**	0.83	-0.36	1.067
Class of degree - default Pass/Third				
First class	-0.301	0.321	-0.601*	0.334
Second upper	0.206	0.228	-0.391*	0.218
Second lower	0.281	0.216	-0.490**	0.217
Qualifications				
Professional qualification	-0.211	0.133	-0.146	0.149
Postgraduate degree	-0.108	0.139	-0.512**	0.211
Employment characteristics				
Part-time	-0.177	0.211	0.477*	0.246
Self-employed	-0.253	0.543	-0.066	0.274
Occupation - default (all the others)				
Manager	-0.127	0.240	-0.581**	0.225
Professional	-1.054**	0.177	-1.031**	0.201
Associate professional	-0.737**	0.166	-0.421**	0.18
Sector - default education				
Public admin	1.065**	0.296	0.277	0.294
Industry incl public utilities	0.939**	0.301	0.241	0.301
Commerce	1.458**	0.314	0.705**	0.305
Self-regulating professions	0.135	0.361	0.018	0.411
Other	1.143**	0.3	0.403	0.282
Firm size- default <25				
25-99 employees	-0.363**	0.181	-0.356*	0.211
100-499 employees	-0.371**	0.186	-0.298	0.211
>500 employees	-0.679**	0.168	-0.026	0.179
On-the-job experience (years)				
Training			-0.03	0.145
Age			0.037	0.101
Experience			0.032	0.105
Experience squared			-0.003**	0.001
Unemployment			-0.049	0.112
Mobility				
Relocate for this job	-0.585**	0.159	0.232	0.162
Relocate for this job* female	-0.419	0.3	-1.090**	0.482
Family commitments				
Partner prior to first job	-0.007	0.270		
Child prior to first job	-0.279*	0.167		
Partner			0.045	0.166
Child (0,1)			-0.089	0.171
Debt commitments				
Debts>1000	0.346**	0.137		
Cohort effects				
Participation rate	4.17	5.014		
Unemployment rate	-2.578	3.639		
Year of grad (1,2..)	-0.004	0.021		
Constant				
Constant	-0.581	0.967	-1.211	2.173
Disturbance correlation				
RHO(1,2)	0.666**	0.07		
N		731		
Log-likelihood		-578.51		

may influence over-education in both periods. However, several reasons may be advanced for a high degree of complementarity between over-education in both stages including the effects of unobserved characteristics, such as ability. For this reason, the results of modelling over-education as a bivariate probit are presented in table 4, where each outcome depends on a list of regressors and is affected through the error structure by the other decision.

The rho term displayed at the bottom of the table measures the correlation between the unobservables in both over-education states. These results show that there is a significant and positive correlation between the unobservables in the over-education equations. It could be the case that this unobservable difference is capturing an implicit division between career- and non-career related qualifications and/or some other form of heterogeneity among graduates. The other results from bivariate probit equations are very similar to those in the separately estimated probit models already discussed.

4. Conclusion

The first objective of this study was to investigate the true incidence of over-education in the graduate labour. Empirical work to date on over-education has almost exclusively defined over-education as a level of educational attainment which is greater than the educational requirements of the job. The educational requirements used in most studies have typically referred to the education level necessary to qualify for a job rather than to do a job and have suggested that over-education is as high as 30 or 40 percent.

Estimates of over-education generated from these statistics may incorporate an element of “qualification inflation” (i.e., where employers upgrade the educational requirements of the job but do not change its content), which may yield underestimates of the true incidence of over-education. By contrast, this research relies on data from the Newcastle Alumni Survey, especially commissioned for research into over-education in the graduate population, to employ a subjective measure based upon a question that measures the education level needed to do the job. Our descriptive statistics revealed that about one in five university graduates were not employed in graduate-level positions after spending some time in the labour force.

This research proceeded to understand discrepancies between acquired and required levels of education among highly qualified university graduates. The empirical work relied on bivariate probit modelling techniques as well as simple probits to capture unobserved factors determining over-education in both initial and later employment. Our findings suggested that the want of career-relevance of university qualifications could permanently hold graduates in lower-level occupations throughout their careers. In particular, we demonstrated that graduates of the faculty of arts and humanities are less likely to be in graduate level jobs than those of the faculty of technology and engineering.

Also, we showed that graduates who were initially over-educated found it considerably more difficult to enter graduate-level jobs later. After spending some time in work, there was no evidence that on-the-job training or later relocation improved the prospects of graduates. However, we found that there was a significant dependency between unobserved factors determining over-education in both initial and later

employment. Unobserved ability differences between similarly educated workers and the quality of education are usual conjectures offered to explain these findings. However, since the research presented here is based on one large civic university, differences in the quality of education across institutions cannot explain our findings. More needs to be understood about the fundamental factors that switch workers out of lower-level positions and into jobs commensurate with their qualifications, which is central to successfully alleviate the problem of over-education among existing graduates. Promising new lines of investigation are in the type of training received by similarly educated workers.

References

- Berg, I. (1970). *Education and Jobs: The Great Training Robbery*. Penguin: London.
- Dolton, P. & A. Vignoles (2000). Incidence and Effects of Overeducation in the UK Graduate Labour Market, *Economics of Education Review* 19 (2), 179-198.
- Freeman, R. (1976). *The Overeducated American*. Academic Press: New York.
- Green, F., Ashton, D., Burchell, B., Davies, B & Felstead, A. (2000). Are British Workers Becoming More Skilled? In: Borghans, L., de Grip, A. (Eds), *The Overeducated Worker? The Economics of Skill Utilization*, (pp. 77-108). Edward Elgar: Cheltenham.
- McIntosh, S., & Steedman H. (2000). *Low Skills: A Problem for Europe, Final Report to DGX11 of the European Commission on the NewSkills Programme of Research*.
- Prais, S. (2001). Developments in Education and Vocational Training in Britain: Background Note on Recent Research, *National Institute Economic Review* 178.
- Pryor, F., & Schaffer, D. (1999). *Who's Not Working and Why: Employment, Cognitive Skills, Wages, and the Changing U.S. Labor Market*, Gregory, M. ed., Cambridge University Press: Cambridge.
- Sloane, P. J., Battu, H., & Belfield, C. R. (2000). How Well Can We Measure Graduate Over-Education and Its Effects?, *National Institute Economic Review* 0 (171), 82-93.
- Sloane, P. J., Battu, H., & Seaman, P. T. (1999). Overeducation, Undereducation and the British Labour Force. *Applied Economics* 31 (11), 1437-1453.