Sheer Class? The Extent and Sources of Variation in the UK Graduate Earnings Premium

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CASEpaper54
March 2002

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Editorial Note and Acknowledgements

Robin Naylor and Jeremy Smith are both Readers in the Department of Economics, the University of Warwick. Abigail McKnight is the Toyota Research Fellow at the ESRC Research Centre for Analysis of Social Exclusion, London School of Economics. The authors are grateful to Wiji Arulampalam, Norman Ireland, Andrew Oswald, Jennifer Smith, Mark Stewart and Ian Walker for helpful comments. A number of people have given invaluable help in generating the dataset: in particular they would like to give special thanks to John McClure and Peggy Paull at UCAS, John McNeil in MIS at Warwick, and to staff at HESA, HEFCE, DfEE and the Schools Register. The authors acknowledge both the USR, as the original depositors, and the UK Data Archive for the use of the dataset SN:3456 Universities' Statistical Record. None of these individuals or organisations bears any responsibility for any of the analysis or interpretation presented in this paper.

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Abstract

In this paper, we use the individual-level USR data for the whole population of 1993 leavers from the 'old' universities of the UK to investigate the determinants of graduate occupational earnings. Among other results, we find that there are significant differences in the occupational earnings of leavers, according to: university attended, subject studied, degree class awarded, and Social Class of family background, *ceteris paribus*. Our results suggest that there is likely to be significant variation around the average rate of return to a first degree.

Keywords: graduate earnings, degree class, subject
JEL classification numbers: J3, J4, I2

1 Introduction

The funding of higher education in the UK is currently the subject of intense policy debate. In the last 10 years, the method of financing students through university has changed substantially, with a shift in the burden from tax-payers to students and their families. The first step in this process was the introduction of students loans in 1988 as a phased replacement of the system of local education authority maintenance grants. The second step was the introduction in Autumn 1998 of tuition fees for full-time UK students in higher education. Both of these policy changes followed extensive government inquiries, during the course of which evidence was presented showing substantial rates of return to university degrees. The 1988 White Paper introducing student loans quoted an average estimated rate of return to a first degree of about 25%, whereas the Report of the National Committee of Inquiry into Higher Education, Dearing (1997), cites evidence of an average rate of return of around 11% - 15%. Since the Dearing Report, and the subsequent legislation introducing fees, debate has tended to polarise between those, on the one hand, who argue that fees have deterred participation from poorer families and hence should be withdrawn, and those, on the other hand, who argue that the fixed-level fees should be replaced by 'top-up' fees which are differentiated by course and by university. The current paper attempts to inform this debate. In particular, we focus on the question of the extent to which graduates' earnings vary according to the characteristics of students and of their studies.

We exploit previously unused information from administrative records[1] for the whole population of students leaving the 'old' UK universities to analyse graduate occupational earnings.[2] Our interest focuses on the variance in graduates' occupational earnings. We show that the variation in earnings is large, and infer from this that there may be substantial differences across students in the expected rate of return to a degree. We then analyse the determinants of graduate occupational earnings and estimate the effects of factors such as: university attended, subject of study, degree classification, gender and other student and course-related characteristics. The importance of such an analysis is underlined in Dolton, Greenaway and Vignoles (1997) who call for estimates of how returns to degrees vary by subject studied. They argue that as university fees become the norm, this will be vital information for students. This will be particularly the case if flat-rate fees are replaced by differential fees across subjects and institutions, as recommended in Dolton and Vignoles (1997).

[1] Data come from the Universities Statistical Records for 1993-94.

[2] These data have been used before chiefly in the analysis of students' degree performance: see McNabb, Sarmistha and Sloane (1998) and Smith and Naylor (2000a).

Blundell, Dearden, Goodman and Reed (1997) and Blundell *et al.* (2000) using data from the National Child Development Survey (NCDS), estimate the *ceteris paribus* earnings premium to an undergraduate degree to be around 17% for men and 37% for women.[3] Our analysis in the current paper can be motivated as complementing the work of Blundell *et al.*. Compared to research based on NCDS data, analysis of Universities Statistical Records (USR) has both advantages and disadvantages. The major benefit of USR lies in its complete coverage of the whole cohort of university graduates in any one year. For 1993-94, for example, this means that the present analysis is based on a final sample of 44,814 employed graduates. This is, of course, much larger than the sample of graduates in the NCDS cohort. A second advantage of USR is that it contains high quality administrative data on students' academic characteristics: such as, university attended, subject of study, and degree class.[4] This enables us to analyse variation in earnings by these key variables of interest. Unlike NCDS data, however, the USR data do not contain information on a control group of students not entering higher education. Thus, we cannot estimate a *rate of return* to a first degree. Instead, our analysis produces estimates of the *additional premia* associated with particular degrees: e.g., the additional premium of a First Class degree, or that accruing to an Economics degree. If we calibrate each of these relative to the average student in the data-set, then we can interpret the additional premia as indicating the magnitude of variation in returns to a first degree *around the average*. These *additional* premia are to be interpreted as additional to the average premium estimated in work such as that reported in Blundell *et al.* (2000). Evidence of substantial variations around the average premium would indicate that the return to a first degree might be rather low for particular types of gradaute.

We are particularly interested in the question of whether there are significant additional premia associated with the class of degree awarded. Given that, on entering university, a student cannot accurately predict the degree class they will ultimately obtain,[5] it follows that investing in higher education is highly risky if the class of degree is an important determinant of graduate labour market prospects. The more risky is the investment, the more likely it is that increasing the costs of higher education will deter participation from poorer families. From a 1980 survey of one in six UK graduates, Dolton and Makepeace (1990) report that starting salaries are higher for graduates with a 'good' degree result. We also investigate

[3]These figures are not to be interpreted as private rates of return because they are not adjusted for tax or private cash costs of education.

[4]NCDS does contain respondents' information on subject studied for the sub-sample of university graduates.

[5]See, for example, Smith and Naylor (2000a) for evidence that only a small proportion of the variation in degree class can be explained in a statistical model of degree performance.

whether estimates of the additional premia associated with a particular class of degree vary by subject studied, university attended and other characteristics. Hence, we examine, for example, whether investing in a degree subject with a high *average* premium is particularly risky, in the sense of having a return which is highly sensitive to the class of degree awarded. If this is the case, then top-up fees for those degree courses associated with high earnings would be likely to have a particularly detrimental effect on the participation of students from poorer backgrounds, unless accompanied by appropriate exemptions and bursaries.[6]

The rest of this paper is organised as follows. In Section 2, we describe the data and our modelling approach. Section 3 presents the basic results and Section 4 considers the results of a more disaggregated analysis of the effects of degree class for particular universities and degree subjects. Section 5 closes the paper with conclusions and further remarks.

2 Data and modelling

Our data-set is based on the archived administrative records of the former depository for student records of the 'old' UK universities,[7] the Universities Statistical Record (USR). All university leavers are followed up six months after graduation with the First Destination Survey, with a response rate to the Survey of approximately 75%. The First Destination Survey does not collect information on employed graduates' personal salaries, but does contain detailed information on their occupation. We merge information from the First Destination Survey into the USR administrative records.

The population of 1993 leavers consisted of 117,801 students. Our interest focuses on the 99,569 students who were registered for a degree-level course and who left university for non-health related reasons. We omit Medical students, as there is essentially no variation in their reported main activity on leaving university: almost all these students enter the medical profession. Of the 52,327 male graduates, 69% responded to the First Destination Survey. Of these, approximately 18% were unemployed or inactive six months after graduation, 19% were in further study and 63% were in employment. Of the 42,250 females, 74% responded to the FDS. Of these respondents, 14% were unemployed or inactive, 13% were in further study, and 73% were employed. A total of 44,814 graduates in employment identified their particular occupation. For the purposes of our analysis, we have matched the individual's reported occupation to the corresponding gender-specific 3-digit SOC occupational earnings from the New Earnings

[6]It should be noted that the current system of fixed-level fees does include income-related exemptions.

[7]That is, those universities pre-dating the abolition of the binary divide in 1992.

Survey (1994).

In the current paper, we analyse the relationship between the individual graduates' occupational earnings and various sets of characteristics of the individual available to us from the USR data-set and from other matched data. The principal variables held on the USR undergraduate records can be categorised as follows.

Personal Information: date of birth, sex, marital status, country/county of domicile, country of birth, residence, overseas and fees status, occupation of parent or guardian.

Academic history: last full-time school attended, other education, GCE A-level or SCE higher grade results, course for which admitted.

Annual information: university, subject, duration, type of course, enrolment date, method of study (e.g., part-time or full-time status, qualification aimed for, source of fees, accommodation).

Leavers details: qualification obtained, class of degree, date of leaving, reason for leaving, first destination.

From the personal record, we have information on parental occupation which we have mapped to a socio-economic classification. We have also extended the data-set by merging in official Department for Education and Employment (DfEE) information on the characteristics of each student's previous school.

The use of occupational earnings information has advantages and disadvantages compared to the use of individual starting salaries. On the one hand, the earnings measure is not the individual's personal salary and hence we cannot capture systematic intra-occupational differentials arising between different types of university leaver. On the other hand, we avoid the problem associated with having information only on the leaver's starting salary, arising from the fact that graduate starting salaries are a misleading proxy for career earnings. This is because the pattern of inter-occupational earnings does not correlate well with the pattern of inter-occupational *starting* salaries for graduates. It is the former which provides a better measure of rates of return over the length of a career. Related work has investigated the extent to which information from the First Destination Survey is indicative of graduates' early career trajectories. With evidence from a follow-up survey of a large sub-sample of graduates three and a half years after graduation, McKnight (1999) concludes that the First Destination Survey gives a surprisingly reliable indication of the early career trajectories of new graduates. The study shows that graduates who were unemployed six months after graduation spent on average more than one year unemployed in the first three and a half years after leaving uni-

versity, compared with less than one month for graduates who were employed six months after graduation. In addition, graduates in non-graduate occupations at six months were more likely to have a poorer employment outcome at three and a half years (with a higher probability of being unemployed, in a non-graduate occupation, or receiving lower earnings) than graduates employed in a graduate occupation.

The USR data contain information only on students who have participated in higher education in the UK. There is no control group of non-students, and hence no possibility of modelling the process of selection into university. Consequently, our results are to be interpreted as conditional on university participation. This explains our focus on variations in the graduate earnings premium by various factors. The additional premia we estimate can be interpreted as additional to the average premium estimated elsewhere. Although we cannot model the process of selection into university, we do examine the process of selection into employment after graduation. This is discussed in more detail below.

2.1 Methodology

In this paper, we estimate gender-specific occupational earnings equations for the 44,814 1993 UK university leavers employed in an identified occupation six months after graduation. The dependent variable is the natural logarithm of the 3-digit SOC occupational earnings of the individual university leaver. The estimated earnings equations include a selection correction term, obtained from a multinomial logit analysis of the graduates' first destination outcomes, to correct for the fact that the employment outcome is not a random event.[8] The selection correction term is not significant in the male earnings regression and is only weakly significant in the female equation.

Summary statistics are provided in Tables 1 and 2 and in Figure 1. Table 1 presents summary statistics for the main explanatory variables used in our analysis. 81% of the sample took A-levels prior to university and scored an average of around 23 points. 47% (42%) of females (males) had attended a local education authority school and 25% (29%) an Independent school. Around 84% were aged less than 24 years at graduation. 7% (10%) of female (male) students graduated with a first class degree, 55% (45%) with an upper second class and 31% (33%) with a lower second class degree.

Table 2 shows the mean and standard deviation of earnings, disaggregated both by gender

[8]The underlying multinomial logit estimations distinguish between employment, unemployment, further study, inactivity and non-response. Results of the multinomial logit analysis are discussed in a longer working paper version of this article.

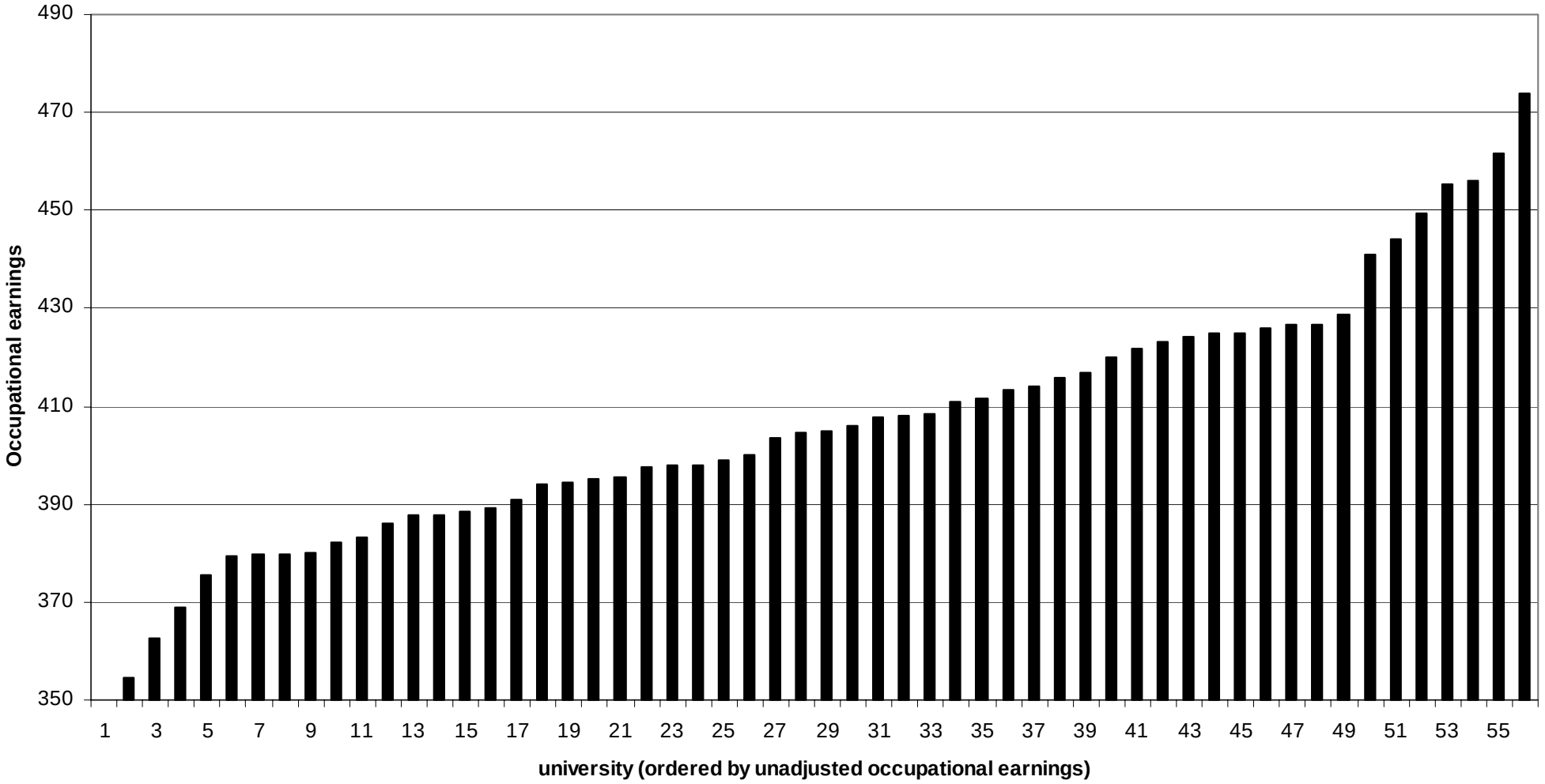
Table 1: Summary statistics

	FEMALES		MALES	
Variable	Mean	SD	Mean	SD
	Academic Background			
Previous quals				
A-levels	0.81	0.39	0.81	0.40
Highers	0.09	0.28	0.08	0.28
BTEC	0.02	0.15	0.05	0.22
No formal qual	0.06	0.24	0.05	0.22
Other	0.05	0.22	0.04	0.19
A-levels				
Score	22.52	9.58	24.04	10.45
Chemistry	0.24	0.43	0.33	0.47
English	0.43	0.50	0.21	0.40
Maths	0.34	0.47	0.58	0.49
Physics	0.15	0.35	0.43	0.50
Highers				
Score	11.22	3.75	10.92	3.92
Chemistry	0.55	0.50	0.67	0.47
English	0.97	0.18	0.91	0.29
Maths	0.72	0.45	0.83	0.38
Physics	0.38	0.48	0.70	0.46
School type				
LEA school	0.47	0.50	0.42	0.49
Independent school	0.25	0.43	0.29	0.45
FE college	0.11	0.31	0.10	0.30
Other school	0.18	0.38	0.19	0.39
Single sex school	0.26	0.44	0.25	0.43
Selective admissions	0.33	0.47	0.36	0.48
No. pupils in school	805.15	428.84	843.10	417.93
School points				
England +Wales	16.97	4.80	17.49	5.17
Ireland + Scotland	44.16	18.40	44.61	18.74
	Personal characteristics			
Age <24	0.84	0.37	0.83	0.37
Age 24-27	0.08	0.27	0.11	0.31
Age 28-33	0.03	0.17	0.04	0.19
Age 34+	0.05	0.22	0.03	0.16
Married	0.05	0.21	0.03	0.17
Overseas fee status	0.02	0.13	0.02	0.13
SC I	0.18	0.38	0.18	0.38
SC II	0.52	0.50	0.50	0.50
SC IIINM	0.11	0.31	0.11	0.32
SC IIIM	0.09	0.29	0.10	0.30
SC IV	0.05	0.23	0.06	0.24
SC V	0.01	0.09	0.01	0.09
SC Unemployed	0.10	0.30	0.09	0.28
Part-time	0.02	0.15	0.02	0.15
	Degree class			
First	0.07	0.25	0.10	0.30
Upper second	0.55	0.50	0.45	0.50
Lower second	0.31	0.46	0.33	0.47
Third	0.03	0.17	0.07	0.25
Other	0.04	0.19	0.05	0.22

Table 2: Average occupational earnings by degree subject group

	FEMALES			MALES		
Degree subjects	Mean	Std. Dev	N	Mean	Std. Dev	N
Medical related	370.53	70.87	1366	476.55	99.08	527
Biological science	330.63	110.84	2404	430.72	134.96	1266
Agriculture	276.58	82.34	350	398.99	93.03	371
Physical science	326.16	82.96	1245	432.44	116.21	2175
Math science	359.67	82.42	899	473.20	121.52	1307
Computing	415.56	102.40	191	500.62	91.38	1229
Engineering	346.04	69.32	686	458.59	95.34	3979
Technology	331.76	81.19	139	445.33	97.02	261
Architecture	330.54	62.49	170	429.79	75.57	500
Social studies	336.22	95.14	2632	468.33	144.85	2418
Law + Politics	429.20	110.51	2177	542.83	135.30	2176
Business admin.	351.70	80.06	1505	492.33	119.02	1689
Mass communication	338.31	82.68	114	418.23	110.45	63
Classics + Literature	329.74	92.11	2386	437.85	133.79	922
Modern Euro lang.	334.81	87.33	1853	462.92	130.24	547
Other languages	342.50	85.47	324	467.10	142.23	151
Humanities	322.40	92.45	1819	426.48	142.26	1633
Creative art	345.34	95.89	620	448.55	104.08	288
Education	364.07	57.60	784	427.27	75.90	236
Other	336.99	88.44	831	463.97	134.27	613
Total	347.53	96.70	22495	464.61	125.21	22351

Figure 1: Distribution of occupational earnings across universities



and by degree subject area. The table also shows the number of observations for each subject. For the whole sample, mean earnings of males were £464.61 per week, with mean earnings of females at £347.53, equal to just 76% of the mean for males. The standard deviation in earnings is very large and varies by subject: it is particularly large for graduates of biological sciences, for example. Degree subject fields associated with relatively high average weekly occupational earnings were: Medical-related studies, Computing, Law and Politics, Mathematics, and Business.[9] The ranking of subjects is rather similar for men and women. Figure 1 shows that there is substantial variation in mean occupational earnings across universities. Mean earnings of graduates from the university ranked lowest in the distribution were less than three-quarters of the level at the highest ranked university.

3 Results

Table 3 presents the results of the occupational earnings regressions for both male and female graduates. Table 3a reports the estimated coefficients on the variables relating to personal characteristics and academic background. Table 3b presents estimated coefficients for the degree subject and degree class variables.

From Table 3a it can be seen that graduate occupational earnings of females are increasing in the age at which the student graduated,[10] but there is no statistically significant effect of marital status for men or women. Earnings are higher for overseas fee-paying students: this is likely to reflect the choice by overseas students to take up employment in the UK conditional on commanding high earnings.[11] Students who studied part-time have occupational earnings after graduation which are no different from those of graduates who studied full-time. We note, however, that of 1993/94 undergraduate leavers from the old university sector, very few (i.e., just 2%) studied part-time.

The table shows a clear pattern of the effects of Social Class background on male graduates' occupational earnings. Compared to an otherwise equivalent male graduate from a Social Class II (technical or intermediate managerial occupation) background, a graduate from a family background described as either Social Class IIINM (skilled non-manual), Social Class IIIM

[9]The classification of degree subject used is highly aggregated. Much finer subject group disaggregations could be used to give a more accurate picture of differences across subjects. Considerations of space prevent such an analysis in the current paper.

[10]For males, age was used as one of the instruments in the multinomial selection model.

[11]Overseas students leaving the UK after graduation are typically not recorded in the First Destination Survey returns.

Table 3a: Regression results for earnings equations:
Dependent variable is log of graduates' occupational earnings

Variable	FEMALES Coeff	MALES Coeff
	Personal characteristics	
Age 24-27	0.006	-
Age 28-33	0.028**	-
Age 34+	0.040***	-
Married	0.011	-0.020
Overseas fee status	0.086***	0.045**
Part-time	0.021	0.018
SC I	0.008	0.005
SC IIINM	0.014**	-0.020***
SC IIIM	0.005	-0.015**
SC IV	-0.026***	-0.017**
SC V	-0.034	-0.022
SC Unemployed	-0.016	-0.013
	Academic background	
Previous quals.		
A-levels		
Number	-0.003	-0.009***
Score	0.001**	0.002***
Chemistry	-0.002	-0.002
English	-0.009*	0.007
Maths	0.036***	0.028***
Physics	0.007	0.002
Highers		
Number	-0.005	-0.009
Score	0.005**	0.007***
Chemistry	0.026*	-0.006
English	-0.022	0.010
Maths	-0.011	0.030
Physics	-0.001	-0.026
School type		
Independent school	0.023***	0.029***
FE college	0.005	-0.030***
Other school	-0.013**	-0.003
Single sex school	0.001	0.000
Selective admissions	-	-0.015*
School points		
England +Wales	-	0.001**
Ireland + Scotland	-	0.001**

*** significant at the 1% level, ** significant at 5% level, * significant at 10% level.

Table 3b: Regression results for earnings equations:
Dependent variable is log of graduates' occupational earnings

Variable	FEMALES Coeff	FEMALES Premia	MALES Coeff	MALES Premia
	Degree course			
Medical related	0.144***	10.60	0.063***	5.90
Biological science	-0.001	-4.29	-0.047***	-5.20
Agriculture	-0.076***	-11.19	-0.079***	-8.14
Physical science	0.012	-3.08	-0.045***	-4.94
Math science	0.041***	-0.17	0.008	0.18
Computing	0.212***	18.37	0.083***	7.99
Engineering	0.043***	0.00	-0.005	-1.08
Technology	0.059**	1.62	-0.016	-2.23
Architecture	0.013	-2.91	-0.064***	-6.77
Social science	ref	-4.20	ref	-0.60
Law + Politics	0.231***	20.64	0.155***	16.08
Business admin.	0.078***	3.60	0.071***	6.67
Mass communication	0.048*	0.56	-0.076**	-7.84
Classics + Literature	-0.016*	-5.72	-0.050***	-5.41
Modern Euro lang.	0.009	-3.33	-0.008	-1.43
Other languages	-0.006	-4.79	-0.028	-3.38
Humanities	-0.057***	-9.52	-0.097***	-9.76
Creative art	0.040***	-0.28	-0.015	-2.10
Education	0.143***	10.58	-0.011	-1.66
Other	0.035***	-0.74	-0.005	-1.06
	Degree class			
First	0.024***	2.43	0.032***	5.62
Upper second	ref	0.00	ref	2.32
Lower second	-0.044***	-4.28	-0.050***	-2.66
Third	-0.060***	-5.80	-0.088***	-6.34
Other	-0.116***	-10.93	-0.077***	-5.27

*** significant at the 1% level, ** significant at 5% level, * significant at 10% level.
ref – Default categories

(skilled manual), Social Class IV (semi-skilled) or Social Class V (unskilled) has graduate earnings which are around 2% less. There is no significant difference between students from Social Class II and Social Class I (professional) backgrounds. For female students, there is the similar finding that graduate occupational earnings are 2% to 3% lower for graduates from Social Class IV relative to Social Class II. Thus, there is some evidence, at least for males, that graduates from relatively more privileged backgrounds move into relatively high paying occupations after graduation. It does not necessarily follow from this that the rate of return from a first degree is higher for these students, as there may also be a social gradient in the counterfactual non-graduate earnings profile.

With respect to graduates' pre-university academic background, Table 3a shows that, even after controlling for degree subject and classification, graduate occupational earnings are influenced by A-level scores and subjects. An increase of six points in the A-level score (equivalent of BBB rather than CCC) is associated with 1.1% (0.6%) higher earnings in the case of male (female) graduates. Similarly, performance in Scottish and Irish Highers has positive effects on graduate earnings. There is a strong effect of having previously studied mathematics at A-level: graduates with A-level mathematics have around 3% higher earnings in the case of males and 4% in the case of females, *ceteris paribus*. This is consistent with evidence presented by Dolton and Vignoles (1999) who estimate a substantial earnings premium for individuals with mathematics A-level.

Table 3a also shows the effect of school characteristics on graduate occupational earnings. On school type, the table shows that relative to a graduate who had attended a local education authority (LEA) school prior to university, earnings are between 2% and 3% higher for graduates who had previously attended an Independent school. Dolton and Makepeace (1990) report a similar finding. Whether the result reflects differences in human capital or in social networks is not testable from information in our data-set.[12] It is noticeable, however, that the regression equation includes controls for university, subject, degree class and A-level scores. The male equation also includes controls for the average A-level point score in the school itself.[13] The estimated effect is positive. School performance against DfEE criteria cannot be taken simply as an indication of school quality as the criteria do not take account of school intake characteristics. Hence, our estimate of a postitive effect for males reflects a combination of school quality, peer pupil and neighbourhood effects.

[12]Further analysis of the independent school earnings premium can be found in Naylor, Smith and McKnight (2000).

[13]School points were used as one of the instruments in the female multinomial selection model.

Finally, on personal characteristics, we note that gender has a significant effect on university leavers' occupational earnings. In the raw data, female average earnings are about 76% of male average earnings. From the separate regression analyses by gender, we calculate the Oaxaca decomposition and find that only about 3 percentage points of the gender gap can be explained by differences in average characteristics. The remaining 21 percentage points are attributable either to discrimination or to gender differences in unobserved characteristics.

Table 3b shows the estimated coefficients both for degree subject studied and for degree class. The omitted dummies are for students studying a social studies degree and for students graduating with an upper second class honours degree, respectively. Hence, the estimated coefficient for Law and Politics implies that occupational earnings for a female (male) graduate in the Law and Politics subject group are, on average, 26% (16.8%) higher than the earnings of an otherwise identical Social Studies graduate.[14] As we argued in the introduction to this paper, our interest focuses on variations in graduates' earnings around the earnings of the average graduate. Accordingly, we transform the estimated coefficients on the degree subject and degree class variables to yield the *ceteris paribus* estimated additional premia associated with particular degree subjects and degree classes relative to the earnings of the *average* graduate in the population. Relative to this average benchmark, the additional premium associated with a degree in the Law and Politics subject group is 20.6% (16.1%) for females (males). It can be seen from the table that there is substantial variation in the estimated additional premia for different subjects. Law and Politics has the highest additional premia for both female and male graduates. Computing is second for both women and men with additional premia of 18.4% and 8%, respectively. For women, other large and positive additional premia are those associated with Medical related subjects (10.6%), Education (10.6%) and Business Administration (3.6%). Similar subjects are associated with positive additional premia for men: after Law and Politics and Computing come Business Administration (6.7%) and Medical-related (5.9%). Unlike for women, Education has a small negative additional premium for men. Large negative additional earnings premia are associated with Agricultural subjects, Classics and Literature, Languages, Humanities, Biological Sciences, Physical Sciences and, for women at least, Social Sciences.[15]

The regressions reported in Table 3 also included controls for university attended,[16] the

[14]The earnings differential is calculated as exp(β)-1, as the dependent variable is in logarthmic form.

[15]As indicated above, a further disaggregation of subjects would be of potential interest.

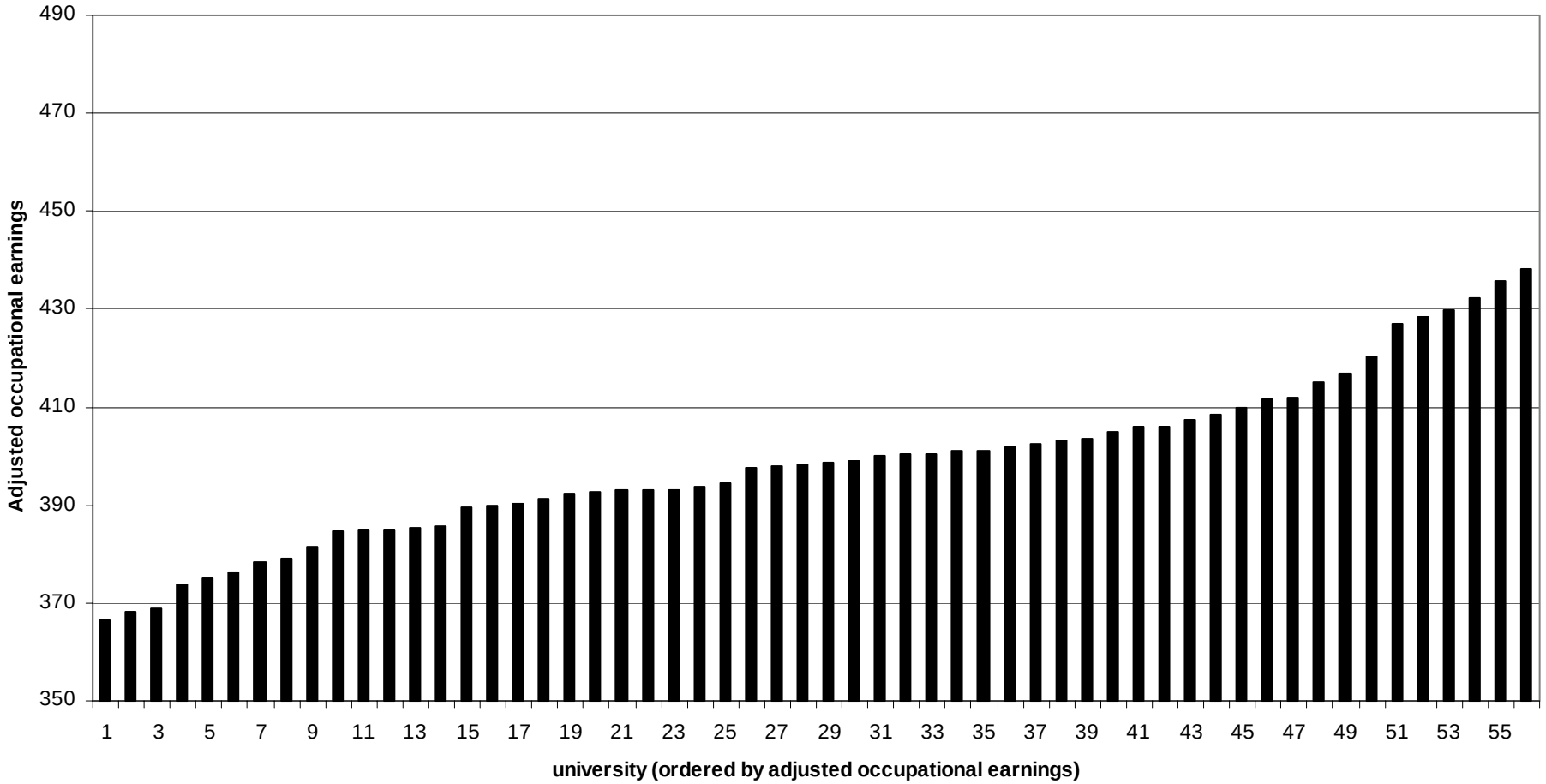
[16]The regressions reported in Table 3 also include controls for county of residence, course characteristics, other prior qualifications and characteristics of the relevant university department. A discussion of a fuller set of results can be found in the working paper version of this paper.

estimated coefficients of which were used to calculate adjusted graduate occupational earnings for each university: Figure 2 shows the distribution.[17] Comparison of the distribution shown in Figure 2 with that in Figure 1 for the raw earnings distribution reveals that the dispersion across universities in graduate earnings has narrowed after controlling for the other factors in the regression analysis. The standard deviation in graduate occupational earnings across universities fell from 26.5 in the distribution of raw earnings to 16.9 after adjustment. The ranking of universities by average graduate occupational earnings also changed substantially after adjustment for the factors included in the regression analysis: the correlation across the adjusted and unadjusted rankings of universities is just 0.55. Conversely, the ranking of subject groups by graduate occupational earnings changes very little after adjustment: the rank correlation is 0.9. Nonetheless, there is a much lower standard deviation (equal to 29.0) in the adjusted distribution of graduate earnings across subjects compared to that in the unadjusted distribution (equal to 40.0).

Table 3b also shows the estimated coefficients and additional premia associated with the class of degree awarded to the graduate. Each of the coefficients is significant at 1%. For male graduates, the additional premium associated with a first class honours degree is 5.6%, relative to the benchmark case of the average male student in the population. There is a positive additional earnings premia of 2.3% for an upper second and negative additional premia for a lower second class degree (-2.7%) and for a third class degree (-6.3%). Hence, there is a span around average earnings of about 12% between the earnings associated with a first and those associated with a third class degree, for the otherwise average male graduate. There is a smaller span for females, with an additional premium of 2.4% for a first and negative premia for a lower second (-4.3%) and for a third (-5.8%), relative to the average female student. The estimates of the additional premia associated with the individuals' class of degree are large. The most densely populated border between degree classes is that between an upper and a lower second class. The earnings differential between these two classes is itself large at 4% to 5%. Given that the individual's class of degree is not accurately predictable *ex ante*, we infer from our results that there is substantial uncertainty concerning the expected return to a degree. In other words, the decision to invest in a first degree is a risky one: one element of this risk is uncertainty over degree class outcomes which are a statistically significant influence on graduate occupational earnings.

[17] The requirements of institutional anonymity as a condition on the use of the data mean that we cannot provide a table of additional premia by named university.

Figure 2: Distribution of adjusted occupational earnings across universities



3.1 Variation over time

The analysis presented so far relates to one cohort of graduates leaving university in 1993/94 but the extent to which earnings premia associated with particular factors such as degree subjects or universities vary over time will also affect the riskiness of the investment in higher education. In this section of the paper, we replicate the analysis reported in the previous sections of the paper separately for the populations of students graduating in 1992 and 1991. A further reason for this analysis of time effects is to examine whether the results reported for 1993 graduates are representative or are subject to cohort-specific effects in the graduate labour market. In the short-run skill shortages can lead to high earnings premia associated with particular degrees or excess supply can lead to lower earnings premia. In 1993/94 graduate unemployment (and general unemployment) reached its peak among new entrants to the labour market and the proportion of young people attending Higher Education was still growing (around one-quarter of this age cohort entered HE in 1990/91). To assess the stability of our estimated earnings premia identical occupational earnings equations were estimated for cohorts of graduates leaving university in 1992 and 1991. In order to concentrate on the nature and type of occupations in which students gain employment, the same gender-specific NES 1994 occupational earnings are used.

Figure 3 plots the university earnings premia estimated for female[18] students leaving university in 1993 against the university earnings premia estimated for those students who left in 1991 and 1992. The figure shows that although there is a fairly strong relationship between university earnings premia between years there is also quite a lot of movement in positions over time. However, in general universities with large premia do maintain their position over time. In particular, five universities are in the top ten universities in each of the three years. Similarly, a few universities maintain their position at the lower end of the distribution. There are four (two) universities which appear in the top (bottom) ten universities for both men and women for all three years. The raw correlations are reported in Table 4 and show a moderate degree of correlation across a number of dimensions.

Figure 4 plots the degree subject earnings premia for females (relative to a Social Studies degree) across the three years. The correlations between years is remarkably high and indicates that at least in the medium term there is stability in returns to degree subjects. These results suggest that, at least over a three-year period, the graduate labour market is very consistent in its ranking of the value of degree subjects, though less so in the case of particular universities.

[18]The figure shows results only for females. Results for males are very similar.

Figure 3: Distribution of university premia over time (females)

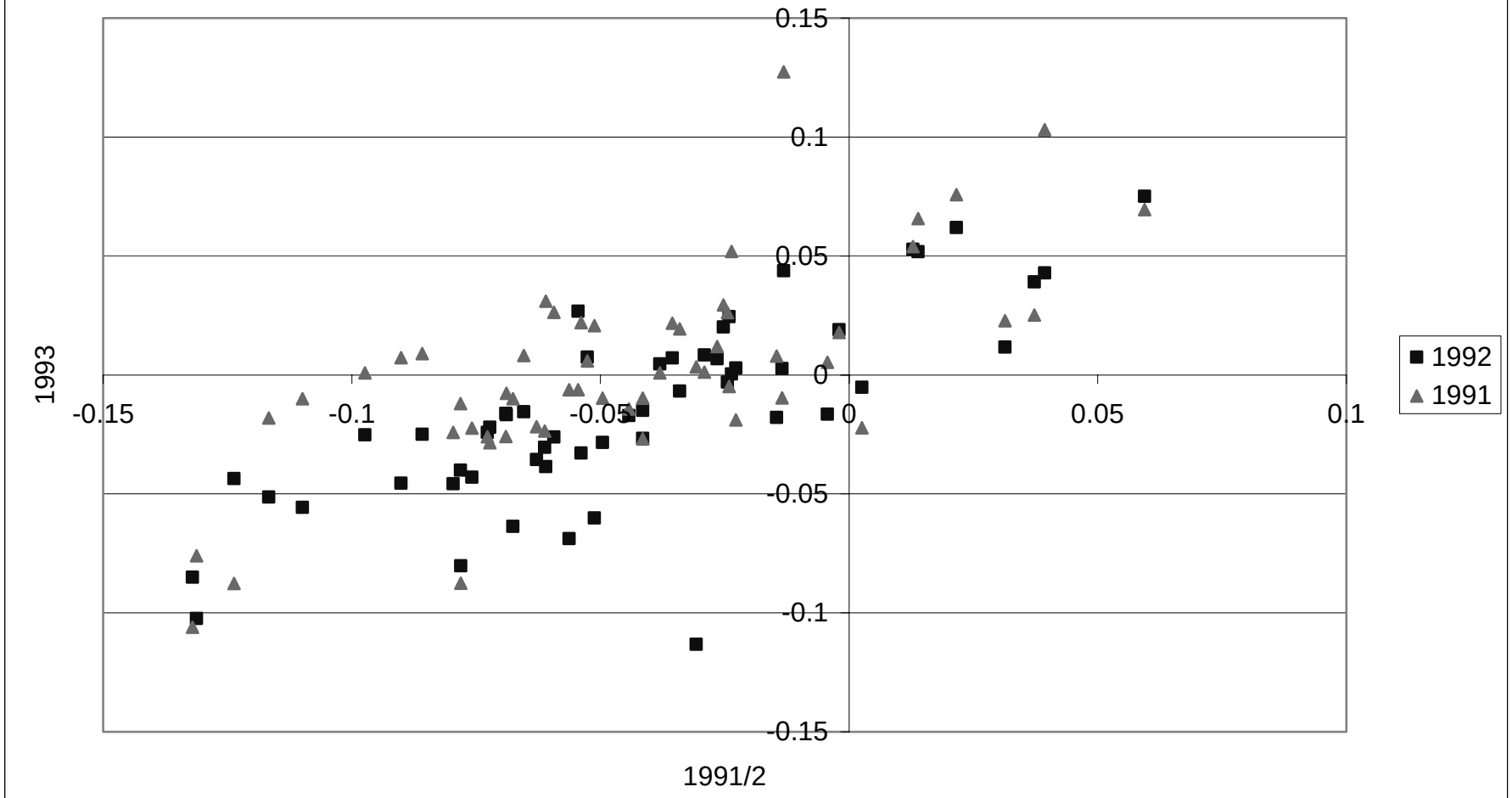


Table 4: Correlations over time between the earnings premia for each group of variables

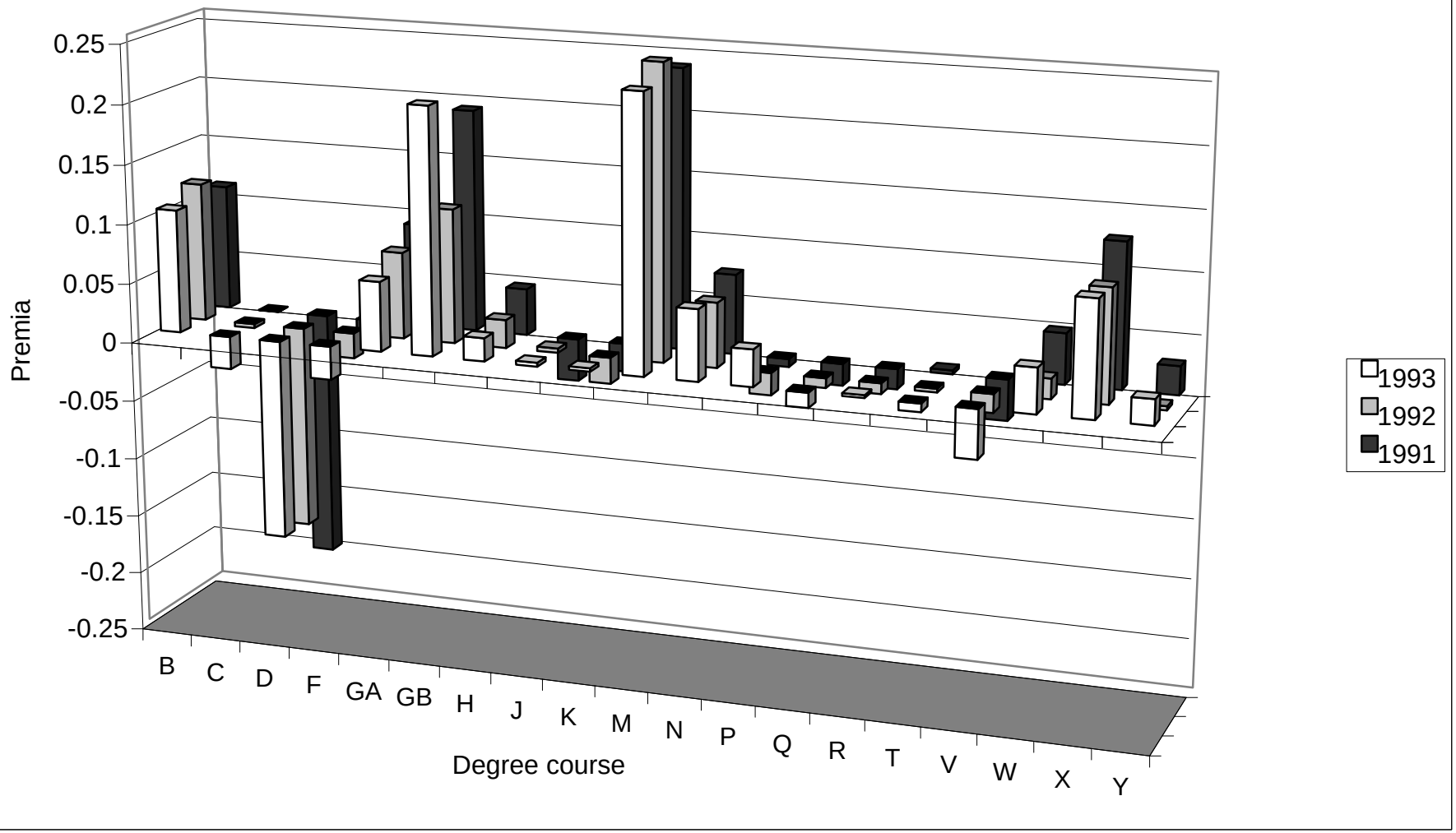
	Females		Males	
Variables	1993 vs 1992	1993 vs 1991	1993 vs 1992	1993 vs 1991
University	0.775	0.710	0.712	0.739
Degree course	0.948	0.974	0.913	0.914
Residence	0.022	0.186	0.492	0.214
Degree class	0.972	0.951	0.997	0.964
Social class	0.662	0.160	0.689	0.620

Table 5: Regression results for earnings equations for separate sets of university and degree subject groups: Dependent variable is log of graduates' occupational earnings

	FEMALES				MALES			
		Additional premia				Additional premia		
	R^2	1^{st}-2.1	2.1-2.2	2.2-3^{rd}	R^2	1^{st}-2.1	2.1-2.2	2.2-3^{rd}
University								
High earnings	0.015	4.59	6.23	1.98	0.031	4.42	8.45	3.90
Low earnings	0.015	5.00	4.28	0.40	0.018	4.76	5.16	4.70
p-values		0.802	0.082	0.086		0.804	0.001	0.002
Degree subjects								
High earnings	0.023	5.20	5.96	1.57	0.031	3.89	6.95	6.38
Low earnings	0.010	3.14	4.25	2.05	0.020	4.63	6.25	1.78
p-values		0.100	0.031	0.069		0.592	0.699	0.018

The p-values are probability values for F-tests of the equality across the two university (and, similarly, degree subject) types in the estimated additional premia. The underlying tests are distributed as F(1,n), F(2,n) and F(3,n), for the three sets of premia considered, where n=22470 (22320) for females (males).

Figure 4: Earnings premia to a degree course (relative to social studies) over time (females)



On this basis, it may be more feasible to attach differential fees to degree subjects than to individual institutions. At the extremes of the distribution of university effects, however, there is rather more stability: suggesting that the very top-ranked universities on this measure may have a more reliable basis for charging top-up fees. To assess this issue more thoroughly, it would be useful to construct a more extensive longitudinal analysis of the unversity effects. We leave this for further work.

The earnings premia associated with the graduate's class of degree are relatively stable over this three year period. The premium for a First relative to a Third class degree was estimated to be 10.6% in 1991, 11.2% in 1992 and 9.1% in 1993, for females, and to be 9.8% in 1991, 11.9% in 1992 and 11.8% in 1993 for male graduates. The premia associated with students' social class background is not as stable, although for males being from SC IIIM, SC III NM or SC IV relative to SC II is associated with a consistently lower earnings premia (1.5%). For females there is no consistently significant effect observed across all three years.

A number of other premia that are remarkably consistent over time are those associated with: attendance at an Independent school with an additional premium of 2-2.8% for males (but no significant effect for females), A-levels with 10 points corresponding to a 2% earnings premium for males (with more variation for females, but with an effect which is always positive and significant) and Mathematics A-level, with an additional premium of 1.4-3.2% for males. The analysis of the three separate graduate cohorts suggests stability in the key results established in Section 3. Even if the identity of the individual institutions in the ranking by university effects changes over time, the scale of the effects is remarkably constant. Furthermore, changes in the rankings over time serves only to add to the riskiness of the initial investment decision.

The next Section of the paper considers the further disaggregated analysis of the relationship between earnings and degree class.

4 Further analysis of the effects of degree class

The results reported in Section 3 suggest that there is substantial variation around average occupational earnings of graduates according to university attended, degree subject studied and class of degree awarded, *inter alia*. One conclusion to be drawn from this is that estimates of an average rate of return to a degree, as cited in the Dearing Report for example, are likely to conceal much variation around the average. The view that graduate earnings are likely to vary by institution and subject of study has led to calls for the introduction of differential or 'top-up' fees. Our evidence on the magnitude of differences in earnings by subject and institution may

be used by some as supporting the case for fee differentials. We would sound some cautionary notes, however. Our first point is that the regression models of graduate occupational earnings explain only a small proportion of the variance: the R^2 is only 15% for the female equation and 13% for the male equation. Furthermore, the partial R^2 associated with university attended is only 2% (1.4%) for females (males), and the partial R^2 for subject studied is only a little higher: at 5.4% (3.1%) for females (males). The partial R^2 for the class of degree awarded is only a little below that for institution of study: it is 0.9% (1.3%) for females (males). These results imply that university and subject of study explain only a small fraction of the differences in graduates' earnings profiles and re-inforce our view that investments in higher education yield uncertain rewards.

The risk and uncertainty associated with investments in higher education will tend to deter participation by students from poorer families with less favourable access to financial capital. It is likely that this problem will be exacerbated by an increasing shift towards student self-financing, unless fully offset by means-tested allowances and exemptions. Our data do not contain information on individuals not attending university. Hence, we cannot model the decision on whether or not to invest in higher education. We do, however, generate relevant results on both the extent of - and the sources of - variation around the average in graduate labour market outcomes.

In view of the current debate on the introduction of top-up fees, it is interesting to examine how indicators of uncertainty regarding graduate occupational earnings vary across different univerities and degree subjects. To address this issue, we identify a subset of universities and, similarly, a subset of degree subjects most likely to be associated with additional or 'top-up' fees if differentiation is permitted. Our selection of these subsets is made on the basis of the estimated additional earnings premia from the regression results reported in Section 3. We distinguish between a subset of 'high premium' and a subset of 'low premium' universities and then regress (gender-specific) graduate occupational earnings against degree class separately for the two subsets of universities. Similarly, we run separate regressions for subsets of 'high' and 'low' premium degree subjects. Table 5 presents the results.

From Table 5, it can be seen that, for females, the additional premium to a first class degree over and above an upper second, *ceteris paribus*, is 4.6% at universities associated with high earnings premia and 5.0% at universities with low earnings premia. There is a slightly greater premium for a first over an upper second for male graduates from 'high earnings' universities compared to males who graduated from 'low earnings' universities. The p-values show, however, that the differences between the two sets of universities are not statistically significant. From

Table 5, it can be seen that the additional premium to a first compared to a third class degree is greater at those universities with high earnings. Furthermore, this difference between the two sets of universities in the additional premium to a first class compared to a third class degree is statistically significant. Consider the case of females, for example. Summing across columns, the additional premia of a first over a third class degree is 12.8% at universities with high earnings and 9.7% at universities with low earnings. The p-value for the difference in these additional premia across universities is significant at 10%. For males, the additional premium of a first over a third is 16.8% (14.6%) at universities with high (low) earnings: and the difference is statistically significant at 1%.

With respect to differences across subject areas in the additional earnings premia associated with particular degree classes, Table 5 shows that the premium for a first class over a third class degree is greater for subject groups associated with relatively high earnings. The difference across the two sets of subjects in the first-third premium is significant at 10% for women and at 5% for men.

We conclude that there is evidence that the element of risk attaching to investments in higher education is greater at those universities and for those degree subjects associated with relatively high graduate occupational earnings: that is, at the universities and courses which are the most likely candidates for 'top-up' fees. This leads us to be concerned that the introduction of differential fees will have particularly strong disincentive effects on the participation of students from poorer families. If only better off students can afford the costs of relatively risky investments in those university courses associated with high mean occupational earnings, this will have adverse implications for inter-generational mobility and for equality of opportunity.

Finally, we note that there is complementary evidence that the risk and uncertainty of investments in higher education are particularly high for students from poorer family backgrounds. First, it has been shown both that the drop-out probability is higher and that there is a greater probability of academic failure for students from poorer family backgrounds (see Smith and Naylor (2000a) and Smith and Naylor (2000b)). Further, there is greater unconditional variation in degree class for students from poorer family backgrounds. The standard deviation in degree class for students from Social Class IIIM, IV or V backgrounds is 1.66 compared to 1.48 for all students. Furthermore, from the ordered probit regressions used in Smith and Naylor (2000a), a lower proportion of the variation in degree class is explained for students from lower social class backgrounds. The pseudo-R^2 for all females (males) is 0.074 (0.067) whereas for students from Social Classes IIIM, IV and V the pseudo-R^2 is 0.053 (0.045). Additionally, on average these students are around 15% less likely to obtain a good degree: that is, an upper

second class or better. Finally, there is also evidence that the probability of unemployment after graduation is greater for students from lower occupationally-ranked social classes (see Smith, McKnight and Naylor (2000)).

5 Concluding remarks

In this paper, we have exploited the individual-level USR data for 1993 leavers from the 'old' universities of the UK to investigate the determinants of graduate occupational earnings. We have found that there are substantial differences in likely earnings across students according to: the university at which they studied, the degree course taken, the class of degree awarded, personal characteristics, pre-university qualifications, the characteristics of the school attended prior to university, and the Social Class of the student's parental background. Consequently, it is likely that there will be substantial differences across students in the expected rate of return to a university degree. It has been estimated in previous work (see, for example, Blundell, Dearden, Goodman and Reed (2000)) that, *ceteris paribus*, there is a premium for a first degree of approximately 17% for men and 37% for women. Our analysis can be interpreted as examining the determinants of variations around these averages. Thus, our results yield estimates of the 'additional premium' associated with individual universities, particular degree subjects and with specific classes of degree award.

We show that there are large and significant differences in graduates' occupational earnings according to the degree class awarded. For the average male graduate, for example, the difference in occupational earnings associated with a first class degree rather than a third class is about 12%. That there are also large estimated earnings differences across universities and subjects studied may further encourage those calling for the introduction of differential fees. We have counselled caution against a policy of increasing fees for higher education, arguing both (i) that substantial variation around the average premium for a first degree will render the expected premium rather low for some students and (ii) that there is a significant degree of uncertainty about the expected returns to a first degree. In the presence of risk, students from poorer families are likely to be disproportionately deterred from participation in higher education by tuition fee increases, unless these are sufficiently offset by income-related exemptions and allowances.

Among other results, we have shown that gender has a significant effect on university leavers' occupational earnings, as does age in the case of females: but marital status at graduation does not. In the raw data, female average earnings are 76% of male average earnings. From the

separate regression analyses by gender, it emerges that 3 percentage points of this can be explained by differences in average characteristics and the remaining 21 percentage points can be attributed to differences in coefficients by gender. We have also found that the Social Class measure of parental background shows a significant effect on occupational earnings of university leavers, all other things equal. The individual's prior qualifications, such as their A-level score, have statistically significant effects on occupational earnings, as does school type, even with the inclusion of control variables for other school characteristics. Relative to attendance at a LEA school, attendance at an Independent school has a statistically significant positive effect on earnings: for the average student, the *ceteris paribus* earnings differential is between 2% and 3%.

There are a number of directions for further work. First, it would be interesting to analyse the effects on occupational earnings of interactions between class of degree and social and school characteristics of students in order to address the issue of how returns to educational qualifications vary with school background and family background (see Blundell *et al.* (2000), Dearden, Ferri and Meghir (1997), and Card and Krueger (1996)). A second direction in which to develop the current work, mentioned above, involves replicating our analysis for the previous university cohorts from the USR files dating from 1972-1992. It will be interesting to examine how the premia associated with the particular degree class awarded and the subject studied have behaved over time.

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