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ABSTRACT

The Return to a University Education in Great Britain*

In this paper, we estimate the rate of return to first degrees, masters degrees and PhDs in Britain using data from the Labour Force Survey. We estimate returns to broad subject groups and more narrowly defined disciplines, distinguishing returns by gender and attempting to control for variations in student quality across disciplines. The results reveal considerable heterogeneity in returns to particular degree programmes and by gender, which have important policy implications for charging students for the costs of their education.

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1. Introduction

There has been a substantial increase in the number of individuals obtaining a degree in Britain, beginning in the 1960s, accelerating in the 1970s, slowing in the 1980s and speeding up again in the 1990s. Walker and Zhu (2003) show that the proportion of young people studying full-time in universities increased from 13% in 1980 to 33% in 2000 and the Labour Government has expressed a desire to see this figure rise to 50%. This in turn has raised the issue of how the increase in the age participation rates in higher education is to be financed. In the White Paper, *The Future of Higher Education* (2003) the Government announced its intention to introduce from 2006 a new Graduate Contribution Scheme under which universities would be allowed to charge fees up to £3,000 per year for each course with payments by students deferred until after they had graduated. Payments after graduation would be through the tax system, linked to ability to pay with the threshold at which graduates would have to start repaying their fee contribution and maintenance loan fixed at £15,000. These proposals have, at the time of writing, still to be ratified by parliament. In making the case for a greater contribution by students to the costs of their own education, reliance has been placed on estimates of the lifetime earnings differential of graduates over non-graduates. The Department of Education and Skills have calculated this to be as much as £400,000 (see Greenaway and Haynes, 2003). However, the proposed policy does not distinguish between different types of degree programmes, which may offer different potential returns or different institutions where the same considerations apply, though some institutions may choose not to increase fees to the maximum level allowed.

The purpose of this paper is to cast some light on these issues by estimating the current returns to different degree programmes, using the Labour Force Survey (LFS), by classifying degree programmes into broad groups, narrow disciplines and higher degrees. We cover the period 1994 to 2002, a time of sustained economic growth and falling unemployment in the UK, pooling the results to achieve more robust sample sizes. We then turn to gender differences in rates of return, which in part may result from differences in choices of degree programmes. Using decomposition analysis, we estimate

the effect of such choices on the gender wage gap. Finally, we draw some conclusions for policy.

In addition to using the most recent LFS data, we diverge from earlier studies by focussing on returns to particular undergraduate degree programmes, differentiated by gender, with controls for varying student quality and by examining returns to higher degree programmes, also at a disaggregated level in so far as sample size constraints allow.

2. Previous Work

Most studies do not control for field of study despite the fact that rates of return vary substantially across disciplines. This is at least in part a consequence of the fact that few data sets differentiate type as opposed to level of study. As Harkness and Machin (1999) note, returns to fields of study may be influenced by changes in the numbers entering particular degree programmes. Thus, while the number of graduates overall increased between 1980-2 and 1993-5, the proportion studying in Arts fell from 15 to 11% for men and from 38 to 25% for women. At the same time the proportion studying in Science and Engineering rose from 40 to 45% for men and from 15 to 24% for women. Subsequently, this pattern seems to have been reversed. An interesting question is whether these changes reflect changes in the demand for particular types of graduate or are independent of them, although this is not an issue that we address in this paper given the nature of our data set.

Blundell *et al*. (2000), using National Child Development Study data, found that males had rates of return which were particularly lower in Biology, Chemistry, Environmental Sciences and Geography than the base group (no information available), while for women the pattern was rather different, with higher returns in particular in Economics, Accountancy and Law. Chevalier and Walker (2000), using General Household Survey data over the period 1980/2 to 1993/5, found that returns to men rose across all subjects until the late 1980s and then fell for all disciplines other than Arts/Humanities, where the returns in any event were never significantly different from zero. For women, returns rose

in Arts/Humanities and in Science (including Medicine and Engineering) and decreased elsewhere. Blackaby, Murphy and O'Leary, using Labour Force Survey data for 1993-95, found that rates of return for men varied between 9.0% in Arts and 34.2% in Economics, Accountancy, Law and Management (with returns in Medicine at 51.5%). For women, rates of return varied between 26.2% in other Social Sciences to 46.9% in Architecture and Building (with Medicine at 55.4%). All their estimates are relative to those whose highest qualification is at least one A-level and control for a wide range of variables. Walker and Zhu (2003) conducted a similar analysis, using the Labour Force Survey over the period 1993 to 2001, finding that Law, Health, Economics and Business, and Mathematics had considerably higher returns than Arts, Education and other Social Sciences. Their results are not directly comparable to those of Blackaby *et al*. as the comparison is with those having at least two A-levels and excludes those living in Scotland, immigrants and those aged below 25 and above 59.[1]

As well as type of degree, other relevant explanatory variables are type of institution and class of degree obtained, but even fewer data sets include these variables. One such data set is a survey organised by the University of Birmingham for the Dearing Committee in the Winter of 1996 which included cohorts of graduates in 1985 and 1990 surveyed 1 year, 6 years and in the latter case 11 years after graduation. Using this data set Battu, Belfield and Sloane (1999) found that class of degree had a significant effect on graduate earnings both 1 year and 6 years after graduation with a first class degree having a premium of 8–13% over a lower second class honours. Similarly, the institution from which one graduated mattered, with those graduating from more established (pre-1992) universities earning 8–11% more than those graduating from former polytechnics; Chevalier and Conlon (2003) distinguish between three categories of university – the Russell Group (large research based universities), other old universities (pre-1992) and modern universities (post-1992). Male graduates from the Russell Group earn between 4% and 12% more than those from modern universities, *ceteris paribus*. There are

[1] These findings are not dissimilar to those reported in the USA. For an analysis of returns to studying economics see Black, Sanders and Taylor (2003). They find that economists do well whether or not they do a higher degree.

substantial disparities even with the Russell group. Comparing the returns to graduates from two high quality institutions with a control institution within the group it was found that graduates from the former two institutions earned between 9 and 10 per cent more than those from the latter. These factors may become even more important over time, as the higher education system expands.[2]

Part of the return to particular disciplines may reflect a quality effect, if more able students are attracted to particular disciplines and less able students to other disciplines.[3] Leslie (2003) hypotheses that the more able students will self-select into the more difficult subjects and using University College Admissions Service (UCAS) applications data over the period 1996-2001 develops a unidimensional measure of quality on a scale figure 0 (lowest) to 1 (highest) for a total of 170 broad subject groups. These rankings are based on the average success rate of each qualification in gaining entry. For 22 broad subject areas, the range is from 0.614 in the case of other General and Combined Studies to 0.863 in the case of Medicine and Dentistry. For all 170 subject groups, the range is 0.447 in the case of Social Work to 0.882 in the case of Pre-Clinical Dentistry.[4]

Two studies have attempted to deal directly with the heterogeneity of students and the sorting problem. Chevalier and Conlon (2003) note that if there were perfect sorting of the able into more prestigious institutions (disciplines) there would be a lack of common support problem. However, they argue that the application process will create some disparities between the academic ability of students and the quality of the institution

[2] As Bratti and Mancini (2003) put it, "As more individuals experience higher education, just holding a university degree becomes a weaker distinguishing mark for students and a less informative screening device for the talent at the disposal of employers, if not supplemented by information on the graduate's awarding university, field of study, or degree class obtained."

[3] Similar sorting may occur in relation to institutions, but in both cases class of degree should be affected if standards are similar across disciplines and institutions.

[4] He also uses a logit model that estimates the probability of acceptance controlling for social class, ethnicity, school background and time effects in addition to qualifications. There is, in fact, little difference in the two methods of analysis. We make use of these quality scales to adjust rate of return estimates in our analysis below.

(discipline) chosen, allowing for the use of propensity score matching (Rosenbaum and Rubin, 1983). This compares occupational earnings for individuals who graduate in one subject with matched individuals who studied for a different degree. The propensity score is defined as the conditional probability of receiving the treatment given an individual's characteristics. Their matching estimates range from 1 to 6% as opposed to 4 to 12% using OLS estimation. Neither OLS nor propensity score matching deal, however, with the problem of self-selection with respect to unobservable characteristics. Bratti and Mancini (2003) use OLS, propensity score matching and a simultaneous model of graduate earnings and subject choice, following Lee (1983), to analyse early occupational earnings of UK male graduates over the period 1980 – 1993. They define five broad disciplinary areas and control for family background, schooling and personal characteristics. They obtain very different results using the simultaneous model from those produced by OLS or propensity score matching. In particular, the last two of these methods seem to produce positive selection bias in relation to one of the five disciplinary groups (high tech). However, their data do not seem ideal. Their University Statistical Research data contain information on occupation six months after graduation, but no information on earnings. Their occupational data, with corresponding gender-specific 3 digit SOCs, are from the New Earnings Survey, with occupational earnings then computed as the average gross weekly pay of individuals employed full-time (in the same occupation) in the year following graduation. The literature on over- and under-education suggests, however, that the NES occupations will include substantial numbers of non-graduates in what are presumed to be graduate level occupations, and their approach provides no information on intra-occupational variations in pay.

In all disciplines, the returns to education are higher for women than for men as a consequence of the lower comparator group earnings in the case of women, but the differences tend to be greater for arts and education graduates. While the effect of higher education is to reduce the gender pay gap, women tend to select those disciplines which lead to lower lifetime earnings. Thus, Machin and Puhani (2003) found that controlling for subject of degree explained a significant part of the gender wage gap amongst graduates. Further, in their most detailed subject specification (124 subjects) the increase

in the part of the explained wage gap due to subject dummies doubles for the UK.[5] Chevalier (2002) argues that much of the unexplained component of the graduate gender wage gap may be accounted for by differences in tastes and socialisation. He utilises a 1996 survey of graduates which includes twenty questions on character traits, motivations and expectations. By including variables not typically included in wage decompositions he is able to explain 84% of the gender wage gap, which itself is only 12.4% in raw terms.

To summarise, there is considerable heterogeneity in the returns to undertaking a degree according to the discipline and the motivation and performance of the student, with differences also across these dimensions according to gender.

3. Methodology

Assume a standard OLS human capital model in which

$$LnE_{ij} = \sum_{j=1}^{J} S_{ij}\alpha_j + X_i\beta + \varepsilon_i \qquad [1]$$

where E_{it} are the hourly earnings of individual i who graduated is subject j (j=1...J), S_{ij} is a dummy variable which takes the value of 1 if individual i graduated in that subject and zero otherwise, α_j is the earnings premium of graduating from subject j relative to the default case, X_i is a vector of personal characteristics which affects both subject choice and occupational earnings, β is a conformable vector of estimated rewards to these characteristics and ε_i is a random error term. Without controls for ability, α reflects both the ability of particular disciplines to attract good students and the value placed on that discipline by the labour market. As outlined earlier, we therefore attempt to correct for this by utilising Leslie's degree acceptance quality variable (A). Thus we have:

[5] Some studies in the US have found that up to 40 or 50% of the gender pay gap can be explained by differences in degree subject. However, Joy (2003) finds that subject choice has been changing, with women now much more likely to study business, science, maths and engineering than in the past. According to her analysis of 1993/4 data, gender differences in choice of subject now account for less than 10% of the gender wage gap with labour market variables being much more important. Interestingly, women in the sample had a higher grade point average than men – 3.21 as opposed to 3.08.

$$LnE_{ij} = \sum_{j=1}^{J} S_{ij}\alpha_j + A_j\gamma + X_i\beta + \varepsilon_i \quad [2]$$

where γ will measure the return to student ability and α will now reflect only the market return to subject *j*. An inherent problem with using α to measure the return to subjects in this way, though, is that it imposes a constant estimated wage structure between subject *j* and the default case i.e. β and γ will be assumed constant between all subject groups and α will merely be picking up an OLS intercept shift. However, by allowing both intercepts and slope coefficients to differ in the estimation framework we can draw a true picture of the relationship between earnings and educational outcomes. Thus, assume that we are interested in comparing two degree subjects, who we shall refer to as subject 1 and subject *j* (*j*=2...*J*). Dropping the subscript *i* for ease of exposition, this will mean that we can estimate separate earnings relationships for individuals with degree subject 1 and individuals with degree subject *j* as follows:

$$LnE_1 = A_1\gamma_1 + X_1\beta_1 + \varepsilon_1 \quad [3]$$

$$LnE_j = A_j\gamma_j + X_j\beta_j + \varepsilon_j \quad [4]$$

By employing the popular framework proposed by Blinder (1973) and Oaxaca (1973), it is possible to obtain a measure of the hourly earnings markup subject *j* imparts over subject 1. More formally, the approach of Blinder and Oaxaca allows for the difference in average earnings between holders of degree subject 1 and holders of degree subject *j* to be decomposed into a component due to average characteristic (*X*) and average ability (*A*) differences, and a component due to the way such attributes are rewarded in the labour market. This latter component is taken as evidence of subject specific wage markups. Thus, by making a simple extrapolation from the standard Blinder-Oaxaca decomposition framework, we can isolate the percentage earnings markup to any degree subject (*Dj*) as:

$$D_j = (\exp[(\beta_1 - \beta_j)\overline{X}_1 + (\gamma_1 - \gamma_j)\overline{A}_1]) - 1).100 \quad [5]$$

where a bar represents an average value. All premiums for the *j* subjects are therefore measured relative to a constant baseline of subject 1 and will show the earnings advantage such subjects impart over this constant baseline.

Further, following Oaxaca and Ransom (1998), standard errors for [5] can be approximated by:

$$\text{se}(D_j) = \sqrt{(LnD_j + 1)^2 \overline{X}_j^{/} (\Sigma_1 + \Sigma_j) \overline{X}_1} \qquad [6]$$

where Σ is the variance-covariance matrix from the estimated OLS coefficient vectors in equations [3] and [4].

4. Data

The data used in this analysis come from the Labour Force Survey (LFS), a large-scale survey conducted by the *Office for National Statistics* (ONS). Switched from an annual to a quarterly basis in 1992, it aims to produce a sample of approximately 60,000 responding households in Great Britain every quarter. Over the course of the survey respondents are interviewed on five separate occasions, commencing in the quarter they enter the survey and then once more in each of the next subsequent four quarters. Following their fifth interview respondents are replaced by a new cohort. This rotating sample design means that within any one quarter approximately one-fifth of all respondents are being interviewed for the first time, one-fifth for the second time etc., all the way up to the fifth who are being interviewed for the final time. There is, therefore, an eighty per cent overlap of respondents from any one quarter to the next. To avoid any possible double-counting we ensure that individuals are only picked up once during their participation within the LFS. This is done by selecting respondents only after they have provided earnings information.[6]

The data used run from the Spring of 1994 to the Winter of 2002. The start date was chosen to provide a period of relatively stable economic growth to remove the potential influence of cyclical effects in the early 1990s and the end point was chosen as to provide a sufficiently large sample for the detailed analysis that follows. By pooling the separate quarters and after selecting only university graduates for whom there was no missing

[6] Between Winter 1992 and Winter 1996, respondents were only asked about their earnings once, and this was during their fifth interview. Since Spring 1997, however, respondents are now asked about their earnings on two separate occasions. These will be during their first (wave 1) and final (wave 5) interviews.

information, there were approximately 17,500 males and 15,200 females of working age remaining who had hourly earnings data available.

5. Results

Underlying the analysis and decomposition framework employed here is a wage equation that captures variation in the hourly wages paid to workers with differing levels of educational achievement. As such, we have controlled for individual-varying characteristics but not attributes associated with an individual's job, as these might be supposed to be influenced by the level of educational attainment.[7] Full details of all the variables used and their definitions may be found in the Appendix. While it is impractical to present results for all of the wage equations that were estimated or give a blow by blow account of the individual estimates, they were nonetheless consistently well-defined and conformed to a familiar pattern: hourly earnings increase with seniority (though at a decreasing rate) and job tenure; younger cohorts of workers face an earnings disadvantage relative to older cohorts; married (and co-habitating) individuals enjoy a wage premium over other marital states, as do healthy individuals relative to those with reported health problems; likewise, full-time work is associated with higher remuneration relative to working on a part-time basis; there are large regional variations in wage rates, with the highest rates being found in the South East of England and London; and finally, being of an ethnic origin other than 'white' substantially reduces hourly wage rates.[8]

Table 1 provides some background to the investigation that will follow and shows the return to educational qualifications for men and women.[9] Relative to having no formal educational qualifications, there are substantial returns to human capital investment, with

[7] As Pereira and Martins (2004) note, to obtain the full effect of education on earnings one should avoid the inclusion in the wage equation of covariates whose value can depend upon education. The education coefficient will decrease when extra covariates are used that can be considered as post-education decisions, such as firm or industry. One of the returns to education is to increase the number of options available to an individual.

[8] All such results are available from the authors on request.

[9] These results are calculated from two separately estimated earnings equations and reflect earnings markups as given by equation [5] in the methodology section.

returns to degrees being considerably higher for women than for men.[10] For example, a higher degree would provide an hourly earnings boost of 113.76 per cent for a man (relative to a similar man with no qualifications), while the comparable figure for a woman is 131.52 per cent. Likewise, higher premiums for degree-qualified men are also evident at the first (undergraduate university) and degree equivalent level.[11]

In contrast, the rewards associated with intermediate education levels favour men. Thus, education up to an A-level standard provides men with an hourly earnings premium of 30.03 per cent, but there is only a 25.33 per cent premium for women. At the O-level standard, the relativities are again fairly similar (27.01 and 23.24 per cent respectively). It is only in the bottom educational category that relative female advantage is restored. At this level, the rewards to education have been greatly reduced for both men (6.85 per cent) and women (9.01 per cent), but nevertheless remain significant.

Thus, in comparison to men, it would appear that women benefit in two ways from undertaking a degree: first, there is the higher absolute return relative to no qualifications; and secondly, there is the higher relative return compared to A-levels. This, though, does not tell the whole story. A common approach to measuring the returns to degrees is to base estimates relative to those who *could* have pursued further education but chose not to do so. This indicator role is filled by those individuals who have gained two or more

[10] Over the period of our analysis there has been a general upward movement in the proportions obtaining higher qualifications, but in general the rate of return to the investment in human capital has remained high. Indeed, these rates of return remain high compared to most other advanced industrial nations (see Blöndal, Field and Girouard, 2002). In keeping with the findings of Walker and Zu (2003), though, there is no evidence that this recent expansion in higher education has resulted in a significant decline in financial returns. For example, we split the sample into two periods, 1994-1996 and 2000-2002, and compared the returns to degree level qualifications. For men, returns to first degrees have remained roughly constant while the returns to higher degrees have risen marginally. However, there is the suggestion of a fall in the returns to both first and higher degrees for women of the order of about 7 and 5 percentage points respectively.

[11] Undergraduate degrees will include those awarded by both the pre- and post-1992 institutions. Meanwhile, degree equivalent qualifications will include qualifications such as HNC/HNDs, teaching and nursing diplomas and NVQs above level 3.

A-levels. Thus, the finding that women gain a greater advantage than men when pursuing education beyond sixth-form studies is reinforced when we distinguish between those who have only gained one A-level pass and those who have gained two or more A-level passes. Such results are shown in Table 2, which are again measured relative to comparable men and women with no formal qualifications. Naturally, the gender difference seen in Table 1 is again evident and returns increase from gaining additional A-levels. For men whose highest qualification is only a single A-level pass, an hourly earnings premium of 45.59 per cent is enjoyed over those men with no qualifications. This increases to 58.60 per cent for those men who have gained two or more A-levels. The comparable figures for women are 36.60 per cent for single A-level achievers and 45.46 per cent for multiple achievers. Thus, the potential penalty of not pursuing academic studies in higher education for those with the innate ability is that much greater for women than it is for men.

Table 3 explores further the issue of the returns to a university education.[12] Unlike the preceding tables, though, all returns are measured relative to the benchmark of a person who has obtained two or more A-levels. As such, the return to men from pursuing an undergraduate (first) degree is 20.23 per cent and for women it is 35.49 per cent.[13] This is a more direct way of looking at what we have stated previously, namely that the benefit of a university education on hourly wages is more apparent for women than it is for men. The table also shows that the greater female advantage to a university education extends into postgraduate studies, and indeed the scope of this advantage increases with additional study. So while there may be substantial rewards for men to gaining a masters degree (29.15 per cent) or a PhD degree (31.40 per cent), such returns are far lower than

[12] It is important to note that the results for Table 3 and all of the following tables examine the returns to degree level qualifications and will exclude degree-equivalent qualifications. As evidenced in Table 1, these have vastly different labour market outcomes. The focus here is firmly upon the returns to a university education.

[13] This means someone whose highest qualification is an undergraduate degree i.e. they have not gone on to pursue a postgraduate degree.

those afforded to women (at 54.00 and 60.02 per cent for masters and PhD qualifications respectively).

Although there are substantial rewards to a university education for both men and women, this finding disguises substantial variance in the returns to particular degree subjects. This is clearly shown in Table 4 for men and Table 5 for women. In these tables, we compare returns to broad groups of degrees at first degree level relative to those obtained from Arts degrees.[14] This is done with and without the Leslie index of student quality. Dealing firstly with the estimates for men without the quality index, the subject with the largest markup over Arts is Maths and Computing (31.97 per cent), closely followed by Medicine and Related (29.23 per cent) and then Engineering and Technology (27.04). At the other end of the spectrum are the subjects of Education (14.76 per cent) and Architecture and Related (13.84 per cent). It is noticeable, though, that even the returns to these broad degree subjects are far in excess of the baseline Arts category. This is consistent with the labour market offering greater rewards to men who have undertaken more quantitative degrees.

While the impact of introducing the index of student quality on the rate of return for men is not dramatic, it is nonetheless not insubstantial. In five cases the estimated return increases and in the other five it falls. Maths and Computing remains the subject with the highest premium relative to Arts (31.55 per cent), but the return to Medicine and Related has dropped to 23.43 per cent. This sees it slip to fourth in the ranking of subjects.[15] Those disciplines moving above it are Engineering and Technology (28.58 per cent) and Business and Financial Studies (27.34 per cent). Similarly moving up the rankings are Education (5th) and Architecture and Related (6th), where premiums of 21.37 and 19.54

[14] Arts degrees are chosen as the comparator as this is the group with the lowest returns – just 2.07 per cent for men in relation to someone with two or more A-levels, and 25.91 per cent in the case of women.

[15] Given the high entrance requirements into subjects such as clinical medicine and dentistry, this fall in the estimated premium is exactly what would have been anticipated. High calibre students (as proxied by A-level scores) would be expected to perform well in whatever field of study they chose to pursue. Once we have removed this difference in innate ability, what we are left with is a direct measure of the return to degree subjects.

per cent respectively have shown substantial increases. Their positions in the bottom two rankings above Arts have now been filled by Sciences (9th) and Languages (10th), where the magnitude of the fall in the premiums is comparable to the increases already discussed for Education and Architecture and Related. Nevertheless, the premium of 10.72 per cent for Languages is still well in excess of the comparator Arts group.

For women, the spread of premiums across broad degree subjects is again pronounced (see Table 5). Without the measure of student quality, the highest markups over Arts are for Medicine and Related (21.14 per cent) and Maths and Computing (19.26 per cent), the same two subjects found to dominate the analysis for men. Education is also a strong performer, whose premium of 16.59 per cent places it at a position of three in the discipline rankings.[16] Subjects faring not so well (in a relative sense), are Sciences (5.49 per cent), Languages (5.25 per cent) and Combined (3.91 per cent).

The effect of introducing student quality has a similar reordering effect as it does for men. Medicine and Related subjects continue to reward women well (a 21.36 per cent premium), but its place at the head of the rankings has been lost to Education where women can expect a markup of 22.42 per cent. Other areas where substantial premiums relative to Arts subjects can be found are Architecture and Related (16.66 per cent), Business and Financial Studies (15.52 per cent), Maths and Computing (14.82 per cent) and Engineering and Technology (12.21 per cent). Considerably less well rewarded are Combined subjects (3.52 per cent), Sciences (2.71 per cent) and Languages (a statistically

[16] In their analysis of the Labour Force Survey, Walker and Zu (2003) consistently found that Education occupied a much more lowly position. There are two probable causes for this. Firstly, they included a control for union membership in their analysis which, given the higher incidence of union membership in the public sector, is likely to be picking up this sectoral effect. The domination of the public sector in education provision would mean that the return to Education is likely to be biased downwards once public sector employment is controlled for. Secondly, their inclusion of degree-equivalent qualifications would have an unduly large effect upon Education because of the proliferation of LFS respondents with such qualifications at the *further* education level (as opposed to the *higher* education level examined here). We have already highlighted the markedly lower returns to degree-equivalent qualifications.

insignificant -0.14 per cent), all subject areas giving returns similar to those in Arts.[17] In contrast to the findings for men, though, the link between higher rewards and more quantitative degree programmes is less marked.

The academic groupings in the above tables have been relatively broad by design. To a large extent this is unavoidable as the number of sample observations available within more detailed subject areas would not allow for a meaningful analysis. Even within the broad groupings used, though, there is likely to be variation across subject areas and so in Table 6 (for men) and Table 7 (for women) we have selected more narrowly defined undergraduate disciplines where possible. This enables us to analyse 25 distinct subjects.[18] For men, this variation across groupings is clearly shown with reference to the baseline category of Arts degrees. Within this broad heading are the subjects of English and History, both of which offer substantial earnings advantage over the other subjects in the broader category. Taking the residual subjects in Arts as the comparator (i.e. excluding English and History), an English degree would afford an hourly earnings markup of 10.84 per cent and a History degree a markup of 11.69 per cent. These still, though, represent some of the lowest returns to any degree subject.

The ability to isolate more detailed subject classifications identifies Accountancy as the degree scheme with the most pronounced effect upon earnings. Relative to a graduate in the excluded Arts category, an undergraduate Accountancy degree confers and earnings

[17] It is worthwhile re-emphasising that there are still substantial gains to be had from women pursuing degrees in these subjects. For example, even though a degree in Languages offers the lowest return, a woman graduate in this field would still expect her earnings to be 25 per cent higher than a comparable woman with two or more A-levels.

[18] While Geography and Psychology are grouped under the heading of Sciences in Tables 6 and 7, some students would pursue these subjects as a social science and hence there might appear to be a discrepancy between the sample sizes between Tables 5 and 7 and between Tables 6 and 8. Thus, the classification of Geography in Tables 7 and 8, for example, will denote this subject regardless of whether it is studied as a science or as a social science.

advantage for men of 42.15 per cent.[19] This compares to a premium of 26.53 per cent in Business and Financial Studies, the broader group from which Accountancy would have previously featured. Also drawn from this broad heading is the discipline of Economics, where the reported mark-up of 28.57 per cent is again higher than the remaining subjects in the category.

Unlike Accountancy and Economics, subjects with higher returns than the broad categories within which they were encompassed, Nursing has appreciably lower returns than other disciplines in Medicine and Related. A 14.39 per cent markup in Nursing (at position 20 out of the 25) compares to a figure of 32.06 per cent for the disciplines left within Medicine and Related. While this represents an absolute improvement in the return to Medicine and Related (compared to Table 4 and the baseline comparator used there), such a figure is only the fifth highest in Table 6. Above it is not only Accountancy, which we have discussed already, and Maths and Computing (37.23 per cent) but now also a number of specific subject areas in Engineering and Technology. A markup of 40.73 per cent in Electrical Engineering is the second highest in the table, and a markup of 33.71 per cent in Mechanical Engineering is the fourth. Civil Engineering (29.25 per cent), while slightly behind Medicine and Related, still offers a substantial premium to its graduates, as do the residual subjects in Engineering and Technology (31.85 per cent).

It is in the sciences and social sciences that returns for men to some of the more traditional subjects appear to be less well rewarded. In the former category, Biology (15.87 per cent) and Psychology (18.66 per cent) stand out as modest performers, while

[19] Note that the baseline from which these estimates are calculated is different from that used for Tables 4 and 5. Excluding English and History graduates means that the subjects included within the baseline Arts category now offer no earnings advantage for men relative to two or more A-level qualifications. In fact, comparable men with 2+ A-levels could expect their hourly earnings to be 3.36 per cent *higher* than graduates from Arts disciplines. With the exception of this particular category, we already know that university degrees impart substantial earnings advantage. The important point of these tables is that they provide a ranking of degree subjects. For women, graduates in the baseline Arts category in Table 7 still enjoy a substantial earnings mark-up (19.29 per cent) over women with only two or more A-levels.

in the social sciences the returns to Sociology (10.83 per cent) and Politics (15.70 per cent) occupy similar roles.

For women (see Table 7), Accountancy again emerges as the most financially rewarding degree subject at the undergraduate level. Relative to the comparison Arts category, an earnings markup of 37.12 per cent is well in excess of the next highest figure, 27.52 per cent in Medicine and Related. Similarly high returns to this are also exhibited in Law (23.97 per cent) and Education (22.40 per cent), but those subjects in engineering found to be so lucrative for men now tend to offer more modest relative returns for women. The returns in Mechanical Engineering (13.84 per cent) and Civil Engineering (13.70 per cent), for example, are now only on a par with the return in Nursing (13.93 per cent).[20]

Mirroring the pattern for men, subjects that offer women substantially less earnings advantage are Biology and Psychology, which confer no statistically significant wage premium over an Arts degree. Likewise, the premiums for History and Politics are also insignificantly different from Arts, but these are all against a backdrop of a 19.29 per cent return to Arts relative to two or more A-levels. Thus, there is little doubt that even though there is substantial variation in the returns to undergraduate degree subjects, even the least well-rewarded subjects offer a substantial labour market reward to women.

In Table 8 (men) and Table 9 (women) we compare returns to higher degrees relative to undergraduate degrees. Due to limited sample sizes, we are unable to perform this analysis for detailed subject areas but instead use the broad subject groupings seen earlier. For men, the greatest rewards to postgraduate study at the masters level are in the area of Business and Financial Studies. A graduate with a first degree in this area could expect a return of 14.34 per cent from a masters degree. Architecture and Related (13.28 per cent) and Education (12.28 per cent) also offer substantial returns relative to study at the undergraduate level.

[20] It should be noted, though, that women are much less likely to take engineering degrees and the estimates reported are based upon relatively modest sample sizes.

By way of contrast to the returns available at the undergraduate level, a masters-level qualification in Arts imparts a not insubstantial premium of 9.11 per cent for men. This is higher, for example, than the returns to a masters degree in either Engineering and Technology (7.76 per cent) or Medicine and Related (a statistically insignificant 4.37 per cent). Conversely, there is no apparent additional benefit to studying Maths and Computing at the masters level, in spite of the substantial rewards that are available at the first-degree level.

At the doctoral level, sample sizes are rather small with subsequently higher standard errors (in some cases), but on the whole these indicate that doctoral study is a worthwhile investment over and above an undergraduate degree. Business and Financial Studies (20.21 per cent) again emerges as the subject attracting the greatest premium relative to undergraduate study, closely followed by Medicine and Related (17.81 per cent). Reasonable returns are also evident in Combined (11.16 per cent), Sciences (7.85 per cent) and Social Sciences (7.50 per cent), while lesser returns are on offer in Engineering and Technology (4.97 per cent), Maths and Computing (4.78 per cent) and Arts (4.48 per cent). It is interesting to note also that the returns to both Arts and Engineering and Technology PhDs are less than the rewards from gaining a masters-level qualification in these subjects.[21]

For women, the majority of the broad subject categories in Table 9 offer impressive rewards for a masters degree over and above a first degree. As with men, Business and Financial Studies imparts the greatest earnings benefit (19.52 per cent). Similarly high returns are also available in Engineering and Technology (16.47 per cent) and Social

[21] It is possible that the mix of subjects within these broad categories is different at the masters and doctoral levels and it is these composition effects that are being captured. To test this hypothesis, we compared masters-level and doctoral-level degrees in broad subject areas, but included additional controls for the narrow subject classifications shown in Tables 6 and 7. Such a procedure had no meaningful effect upon the results reported in Table 8. Alternatively, the finding could be the result of selection effects, where those students choosing to pursue doctoral studies are inherently different from those who leave education after a masters-level qualification.

Sciences (17.79 per cent). Indeed, it is only in Languages and Architecture and Related that the estimated advantage to a masters-level qualification is not statistically significant.

At the PhD level, sample sizes are again rather small. The highest return of 14.59 per cent is obtained in Medicine and Related, but elsewhere, statistically significant returns are to be had in all subjects except Languages and Engineering and Technology. Thus, the inescapable conclusion that can be drawn is that women have more to gain than men in a relative sense from a university education and that the gains that are available increase as women progress up the educational ladder.

Degree choice and its effect upon the gender wage gap

It has been clearly demonstrated that there is substantial variation in rewards across different degree programmes, but there is also clear evidence that patterns of degree choice differ markedly between men and women. Men, for example, are more heavily represented in the well-rewarded fields of Maths and Computing and Engineering and Technology, while women have a relative over-representation in the Arts.[22] As shown by Machin and Puhani (2003), such patterns will have implications for the gender wage gap. We have explored this issue too and the results of our analysis are shown in Table 10. Following Machin and Puhani, we have estimated the extent of gender discrimination facing female graduates within a standard decomposition framework and examined the impact of including controls for subject of degree.[23] For the sample as a whole (Table 10,

[22] Indeed, the Duncan Index of Dissimilarity for the sample of first-degree graduates is calculated at 0.325 (see Duncan and Duncan, 1955). This would suggest that over 32 per cent of women would have to choose an alternative degree course to achieve an equal distribution across subjects with men.

[23] Using the same notation from section 3, Oaxaca and Ransom (1994) show that the difference in average earnings between men (M) and women (W) can be decomposed as:

$$\overline{LnE}_M - \overline{LnE}_W =$$
$$(\overline{A}_M - \overline{A}_W)\gamma^* + (\overline{X}_M - \overline{X}_W)\beta^* + [\overline{A}_M(\gamma_M - \gamma^*) + \overline{A}_W(\gamma^* - \gamma_W) + \overline{X}_M(\beta_M - \beta^*) + \overline{X}_W(\beta^* - \beta_W)]$$

where a * refers to the Oaxaca-Ransom non-discriminatory wage structure that would exist in the absence of discrimination and the entire term in square parentheses is the part of the wage differential that is usually ascribed to discrimination. The remaining terms in the decomposition is the component of the earnings difference due to differences in average wage determining characteristics between men and women.

column 1), the effect of controlling for subject of degree is to explain an additional .031 log points of the gender wage differential.

Examining separate cohorts of men and women, though, reveals some interesting trends. For those men and women who graduated from university and entered the labour market before 1970, the influence of degree choice is at its most profound. The Duncan Index, calculated at 0.368, is greater than in any of the following cohorts and the effect of controlling for subject of degree is to explain an additional 0.044 log points of the gender wage differential. In the following two cohorts, those graduating between 1970-1989 and those graduating post-1989, the effect of degree choice has an identical outcome of explaining an additional 0.029 log points. These, though, have been periods over which a considerable convergence has been shown in the subject choice of men and women. As such, the Duncan Index falls substantially from 0.344 for the 1970-1989 cohort to 0.295 for the post-1989 cohort. But even though there is evidence of a recent change in the traditional patterns of men and women in the choice of what to study at university, there is no clear supporting evidence to suggest that continuing convergence towards a more balanced distribution of men and women across courses will lead to further erosion of the gender wage gap.[24] This reflects the fact that the gender pay gap for graduates is now quite small and student choices by gender are becoming more similar over time.

6. Conclusions

The evidence from this analysis of the Labour Force Survey suggests that there are still sizeable returns to be attained from undertaking a degree. However, focusing just on the returns to a degree relative to those without degrees can be misleading, since there are substantial differences in the return to different types of degree. Further, the types of degree offering the highest returns are different for men and for women. This suggests that as the numbers entering degree programmes continue to increase more attention should be paid to the type of degree programme that students enter. Further, there is a strong argument for variable graduate contributions, with higher fees set for programmes

[24] By *gender wage gap* we mean that part of the difference in men and women's earnings that cannot be explained by compositional differences.

which have a higher value in the marketplace. This logic might suggest that men and women should face differentiated fees for given disciplines. However, this would fall foul of equal opportunities legislation, so that variable contributions would need to be based on the mean returns to men and women combined.

Finally, in so far as education is treated as an investment rather than a consumption decision, regularly updated information on returns to different degree programmes can make an important contribution to the educational decisions of future students.

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Table 1
Percentage Returns to Qualifications for Men and Women:
LFS 1994Q1-2002Q4

	Men		Women	
	Markup	**SE**	**Markup**	**SE**
Higher degree	113.76^{+}	0.0111	131.52^{+}	0.0124
First degree	96.70^{+}	0.0090	101.64^{+}	0.0096
Degree equivalent	65.20^{+}	0.0072	70.30^{+}	0.0066
A-level (or equivalent)	30.03^{+}	0.0050	25.33^{+}	0.0055
O-level (or equivalent)	27.01^{+}	0.0063	23.24^{+}	0.0047
Other	6.85^{+}	0.0048	9.01^{+}	0.0039

Notes: all returns are measured relative to no qualifications;
$^{+}$ ($^{++}$) denotes statistical significance at the 95% (90%) confidence level.

Table 2
Percentage Returns to A-Levels for Men and Women:
LFS 1994Q1-2002Q4

	Men		Women	
	Markup	**SE**	**Markup**	**SE**
One A-level	45.59^{+}	0.0142	36.60^{+}	0.0107
Two or more A-levels	58.60^{+}	0.0104	45.46^{+}	0.0095

Notes: all returns are measured relative to no qualifications;
$^{+}$ ($^{++}$) denotes statistical significance at the 95% (90%) confidence level.

Table 3
Percentage Returns to First and Higher Degrees for Men and Women: LFS 1994Q1-2002Q4

	Men		Women	
	Markup	**SE**	**Markup**	**SE**
Undergraduate degree	20.23^{+}	0.0092	35.49^{+}	0.0104
Masters degree	29.15^{+}	0.0129	54.00^{+}	0.0164
PhD degree	31.40^{+}	0.0167	60.02^{+}	0.0291

Notes: all returns are measured relative to 2+ A-levels;
$^{+}$ ($^{++}$) denotes statistical significance at the 95% (90%) confidence level.

Table 4
Percentage Returns to Broad First Degree Subjects for Men:
LFS 1994Q1-2002Q4

	n	Markup	SE	rank	Markup	SE	rank
Medicine and related	361	29.23^{+}	0.0295	*2*	23.43^{+}	0.0301	*4*
Sciences	1644	18.77^{+}	0.0185	*6*	14.90^{+}	0.0195	*9*
Maths and computing	975	31.67^{+}	0.0232	*1*	31.55^{+}	0.0231	*1*
Engineering and technology	2267	27.04^{+}	0.0189	*3*	28.58^{+}	0.0192	*2*
Architecture and related	410	13.84^{+}	0.0235	*10*	19.54^{+}	0.0271	*6*
Social sciences	1357	19.34^{+}	0.0188	*5*	17.43^{+}	0.0187	*8*
Business and financial studies	1020	24.30^{+}	0.0219	*4*	27.34^{+}	0.0230	*3*
Arts	1323	(E)		*11*	(E)		*11*
Languages	110	16.36^{+}	0.0424	*8*	10.72^{+}	0.0421	*10*
Education	490	14.76^{+}	0.0235	*9*	21.37^{+}	0.0282	*5*
Combined	2529	16.88^{+}	0.0169	*7*	17.45^{+}	0.0169	*7*
Index of Student Quality	NO				YES		

Notes: all returns are measured relative to an Arts degree;
return to an Arts degree relative to 2+ A-levels is 2.07%;
$^{+}$ ($^{++}$) denotes statistical significance at the 95% (90%) confidence level.

Table 5
Percentage Returns to Broad First Degree Subjects for Women:
LFS 1994Q1-2002Q4

	n	Markup	SE	rank	Markup	SE	rank
Medicine and related	817	21.14^{+}	0.0188	*1*	21.36^{+}	0.0184	*2*
Sciences	1111	5.49^{+}	0.0164	*8*	2.71^{++}	0.0165	*9*
Maths and computing	346	19.26^{+}	0.0271	*2*	14.82^{+}	0.0273	*5*
Engineering and technology	168	10.90^{+}	0.0387	*6*	12.21^{+}	0.0392	*6*
Architecture and related	83	14.10^{+}	0.0334	*4*	16.66^{+}	0.0345	*3*
Social sciences	1376	7.15^{+}	0.0154	*7*	8.50^{+}	0.0156	*7*
Business and financial studies	786	13.29^{+}	0.0200	*5*	15.52^{+}	0.0206	*4*
Arts	1877	(E)		*11*	(E)		*10*
Languages	291	5.25^{++}	0.0287	*9*	-0.14	0.0288	*11*
Education	1283	16.59^{+}	0.0167	*3*	22.42^{+}	0.0202	*1*
Combined	3135	3.91^{+}	0.0124	*10*	3.52^{+}	0.0123	*8*
Index of Student Quality	NO				YES		

Notes: all returns are measured relative to an Arts degree;
return to an Arts degree relative to 2+ A-levels is 25.91%$^{+}$;
$^{+}$ ($^{++}$) denotes statistical significance at the 95% (90%) confidence level.

Table 6
Percentage Returns to Narrow First Degree Subjects for Men:
LFS 1994Q1-2002Q4

	n	Markup	SE	rank
Medicine and related	336	32.06^{+}	0.0474	*5*
-Nursing	25	14.39^{+}	0.0358	*20*
Sciences	1327	25.22^{+}	0.0335	*12*
-Biology	130	15.87^{+}	0.0482	*18*
-Psychology	125	18.66^{+}	0.0454	*17*
-Geography	298	23.42^{+}	0.0477	*13*
Maths and computing	975	37.23^{+}	0.0310	*3*
Engineering and technology	650	31.85^{+}	0.0313	*6*
-Civil engineering	411	29.25^{+}	0.0325	*7*
-Mechanical engineering	524	33.71^{+}	0.0339	*4*
-Electrical engineering	682	40.73^{+}	0.0313	*2*
Architecture and related	410	20.97^{+}	0.0288	*15*
Social sciences	132	14.20^{+}	0.0451	*21*
-Sociology	126	10.83^{+}	0.0394	*24*
-Politics	118	15.70^{+}	0.0477	*19*
-Law	315	28.04^{+}	0.0410	*9*
Business and financial studies	827	26.53^{+}	0.0266	*11*
-Economics	430	28.57^{+}	0.0445	*8*
-Accountancy	193	42.15^{+}	0.0470	*1*
Arts	804	(E)		*25*
-English	213	10.84^{+}	0.0423	*23*
-History	306	11.69^{+}	0.0410	*22*
Languages	110	19.22^{+}	0.0540	*16*
Education	490	26.73^{+}	0.0316	*10*
Combined	2529	22.41^{+}	0.0241	*14*
Index of Student Quality	YES			

Notes: all returns are measured relative to an Arts degree;
return to an Arts degree relative to 2+ A-levels is -3.25%$^{+}$;
$^{+}$ ($^{++}$) denotes statistical significance at the 95% (90%) confidence level.

Table 7
Percentage Returns to Narrow First Degree Subjects for Women: LFS 1994Q1-2002Q4

	n	Markup	SE	rank
Medicine and related	597	27.52^{+}	0.0305	*2*
-Nursing	220	13.93^{+}	0.0301	*9*
Sciences	696	6.13^{+}	0.0261	*17*
-Biology	188	1.60	0.0356	*22*
-Psychology	303	1.98	0.0262	*21*
-Geography	261	4.34	0.0398	*19*
Maths and computing	346	18.10^{+}	0.0370	*7*
Engineering and technology	97	13.54^{+}	0.0556	*12*
-Civil engineering	24	13.70	0.0950	*11*
-Mechanical engineering	19	13.84^{+}	0.0286	*10*
-Electrical engineering	28	19.04^{+}	0.0233	*5*
Architecture and related	83	18.70^{+}	0.0370	*6*
Social sciences	286	13.45^{+}	0.0313	*13*
-Sociology	269	6.50^{+}	0.0292	*16*
-Politics	72	-0.91	0.0508	*25*
-Law	302	23.97^{+}	0.0372	*3*
Business and financial studies	691	14.34^{+}	0.0234	*8*
-Economics	110	9.68^{++}	0.0508	*14*
-Accountancy	95	37.12^{+}	0.0504	*1*
Arts	1091	(E)		*24*
-English	468	6.65^{+}	0.0322	*15*
-History	318	0.95	0.0365	*23*
Languages	291	3.30	0.0386	*20*
Education	1283	22.40^{+}	0.0223	*4*
Combined	3135	5.58^{+}	0.0187	*18*
Index of Student Quality	YES			

Notes: all returns are measured relative to an Arts degree;
return to an Arts degree relative to 2+ A-levels is 19.29%$^{+}$;
$^{+}$ ($^{++}$) denotes statistical significance at the 95% (90%) confidence level.

Table 8
Percentage Returns to Broad Higher Degree Subjects for Men:
LFS 1994Q1-2002Q4

	Masters Degree				*PhD Degree*			
	n	**Markup**	**SE**	**rank**	**n**	**Markup**	**SE**	**rank**
Medicine and related	73	4.37	0.0536	*8*	100	17.81^{+}	0.0450	*2*
Sciences	265	2.74	0.0245	*9*	528	7.85^{+}	0.0192	*4*
Maths and computing	185	-1.15	0.0305	*10*	75	4.78	0.0375	*7*
Engineering and technology	290	7.76^{+}	0.0219	*6*	131	4.97	0.0354	*6*
Architecture and related	49	13.28^{+}	0.0456	*2*	4	-6.56	0.0495	*11*
Social sciences	253	7.62^{+}	0.0264	*7*	72	7.50^{++}	0.0411	*5*
Business and financial studies	406	14.34^{+}	0.0265	*1*	12	20.21^{+}	0.0378	*1*
Arts	284	9.11^{+}	0.0299	*4*	107	4.48	0.0478	*8*
Languages	21	-2.51	0.0711	*11*	9	1.19	0.1030	*9*
Education	245	12.28^{+}	0.0308	*3*	13	-0.99	0.0300	*10*
Combined	422	8.75^{+}	0.0202	*5*	109	11.16^{+}	0.0352	*3*
Index of Student Quality	YES				YES			

Notes: all returns are measured relative to an undergraduate degree in that subject;
$^{+}$ ($^{++}$) denotes statistical significance at the 95% (90%) confidence level.

Table 9
Percentage Returns to Broad Higher Degree Subjects for Women:
LFS 1994Q1-2002Q4

	Masters Degree				*PhD Degree*			
	n	**Markup**	**SE**	**rank**	**n**	**Markup**	**SE**	**rank**
Medicine and related	127	8.52^{+}	0.0305	*7*	59	14.59^{+}	0.0427	*2*
Sciences	112	8.37^{++}	0.0421	*8*	174	14.19^{+}	0.0335	*4*
Maths and computing	79	13.87^{+}	0.0544	*5*	10	12.39^{+}	0.0429	*=5*
Engineering and technology	28	16.47^{+}	0.0520	*3*	8	3.50	0.0892	*10*
Architecture and related	23	9.00	0.0747	*6*	1	-	-	-
Social sciences	280	17.79^{+}	0.0264	*2*	52	14.27^{++}	0.0752	*3*
Business and financial studies	140	19.52^{+}	0.0436	*1*	6	10.80^{+}	0.0428	*7*
Arts	245	8.13^{+}	0.0283	*9*	50	8.45^{++}	0.0527	*8*
Languages	18	5.25	0.0499	*11*	9	6.62	0.0604	*9*
Education	234	7.72^{+}	0.0258	*10*	12	12.39^{+}	0.0201	*=5*
Combined	288	15.29^{+}	0.0241	*4*	42	15.07^{+}	0.0544	*1*
Index of Student Quality	YES				YES			

Notes: all returns are measured relative to an undergraduate degree in that subject;
$^{+}$ ($^{++}$) denotes statistical significance at the 95% (90%) confidence level.

Table 10
Effect of Subject of Degree on the Gender Wage Gap:
LFS 1994Q1-2002Q4

	All Cohorts		**Pre-1970**		**1970-1989**		**Post-1989**	
	without subject	*with subject*	*without subject*	*with subject*	*without subject*	*with subject*	*without subject*	*with subject*
ΔY	0.1774		0.2195		0.1903		0.0705	
X	0.0904	0.1214	0.0755	0.1198	0.0942	0.1233	0.0297	0.0584
(%)	(50.96)	(68.43)	(34.40)	(54.58)	(49.50)	(64.79)	(42.13)	(82.84)
β	0.0870	0.0604	0.1440	0.1018	0.0961	0.0715	0.0409	0.0162
(%)	(49.04)	(31.57)	(63.60)	(45.42)	(50.50)	(35.21)	(57.87)	(19.16)
Δ X	0.0310		0.0443		0.0291		0.0287	
(%)	(17.47)		(20.18)		(15.29)		(40.71)	
DI	0.3245		0.3675		0.3444		0.2954	

Notes (see footnote 23):

ΔY refers to $\overline{LnE}_M - \overline{LnE}_W$;

X refers to $(\overline{A}_M - \overline{A}_W)\gamma^* + (\overline{X}_M - \overline{X}_W)\beta^*$;

β refers to $\overline{A}_M(\gamma_M - \gamma^*) + \overline{A}_W(\gamma^* - \gamma_W) + \overline{X}_M(\beta_M - \beta^*) + \overline{X}_W(\beta^* - \beta_W)$;

ΔX refers to the change in X from including degree subject controls;

DI refers to the Duncan Index of Dissimilarity (see Duncan and Duncan, 1955).

APPENDIX
Variable Definitions for Analysis

Variable	Variable description
Hourly earnings	The natural logarithm of gross hourly earnings from employment in Jan 2002 prices. Gross hourly earnings are defined as actual gross weekly earnings deflated by usual weekly hours worked excluding unpaid overtime.
Age	Age of respondent; entered in linear and quadratic form.
Ethnic origin	Dummy variable indicating that the respondent is of an ethnic origin other than white.
Health	Dummy variable indicating that the respondent has a long-term health problem.
Marital status	Set of dummy variables (3) denoting the marital status of the respondent.
Region of residence	Set of dummy variables (12) denoting the region where the respondent lives.
Job tenure	Set of dummy variables (4) denoting the number of years the respondent has been in their current job.
Employment status	Dummy variable indicating that the respondent is employed on a part-time basis.
Birth cohort	Set of dummy variables (7) denoting the decade in which the respondent was born.
Year of interview	Set of dummy variables (10) denoting the year in which the respondent completed their interview.