SHEER CLASS?
THE IMPACT OF DEGREE PERFORMANCE ON GRADUATE LABOUR MARKET OUTCOMES

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Abstract

We exploit individual-level administrative data for whole populations of UK university students for the leaving cohorts of 1985-1993 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, and degree class awarded, *ceteris paribus*. We also find that the premium associated with the award of a high degree class increased between 1985/6 and 1993/4, a period of substantial expansion in the graduate population. We suggest that this is consistent with a signalling model of the returns to higher education qualifications.

Keywords: Graduate earnings, degree class, subject.

JEL Classification numbers: J3, J4, I2

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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. A significant step in this process was the introduction of student loans in 1988 as a phased replacement of the system of local education authority maintenance grants. A 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 to which evidence was presented showing high rates of return to university degrees. For example, 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%. This figure derives from analysis reported in Blundell, Dearden, Goodman and Reed (2000). Since the Dearing Report, and the subsequent legislation introducing tuition 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those, on the one hand, who argue that fees have deterred participation from poorer families and hence should be withdrawn, and those, on the other hand, who argue that fixed-level fees should be replaced by 'top-up' fees which are differentiated by course and by university.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 by addressing the question of the extent to which first destination post-university outcomes vary according to graduates' characteristics such as subject studied, university attended and, in particular, degree class awarded. We exploit individual student-level data for complete cohorts of university graduates to analyse the determinants of graduates' first destination average occupational earnngs. 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 factors such as subject studied and institution attended. They argue that if university fees become the norm, evidence on returns will be vital information for students, particularly if flat-rate fees evolve into differential fees by subject and institution, as recommended in Dolton and Vignoles (1997): see also Greenaway and Haynes (2003).

Our focus on the impact of degree class on graduates' occupational outcomes is motivated by several considerations. First, there is an extensive literature examining the determinants of students' educational performance, see, for example, Smith and Naylor (2001a), Smith and Naylor (2001b), Bratti (2002), and McNabb, Sarmistha and Sloane (2003). This body of work shows that degree performance varies significantly by factors such as prior qualifications, previous schooling, gender and the social class background of students. This analysis of university educational outcomes is important in its own right, but has further significance the greater the

impact of academic performance on graduates' labour market outcomes.

A second and related reason for our interest in degree class stems from the observation that graduate employers make employment offers which are often conditional on a certain minimum level of attainment at university. For example, it is common for employers to require graduate job applicants to obtain at least an upper second class honours degree.[1] It is less common for employers to make the formal requirement of a first class degree. Nonetheless, student prospects may increase monotonically with the class of degree awarded.[2] Third, it is likely that student effort, and hence degree performance itself, will be influenced by students' perceptions of the premia associated with higher classes of degree. For example, previous research has shown that female students are more likely to obtain a good degree than are male students. One hypothesis to explain this would be that if the premium to a good degree is higher for females than males, then this might lead female students to higher effort than males.

Fourth, over the last two decades the size of the graduate population in the UK has grown significantly following the accelerated implementation of a policy commitment of the 1979 Government to raise the proportion of the 18-21 year old cohort in higher education from around 10% to 30% within a 10-year period. The current government is committed to raising the participation rate to 50% for people aged less than 30. As the proportion of graduates in each cohort of young adults has grown, it is interesting to examine how the sensitivity of graduate labour market outcomes to the level of performance in higher education has changed. One hypothesis would be that as the graduate population has grown, it has become more important for students to distinguish themselves by a high level of attainment at university. In the current paper, we examine this question from both theoretical and empirical perspectives, focussing on the question of whether the premium for a first class degree has changed over time.

Finally, the data we exploit in the current paper contain higher education administrative data for the full cohorts of undergraduate students between 1985 and 1993, matching data on graduate labour market outcomes to a rich set of detailed information on the characteristics of students, such as the officially recorded class of degree award. Thus, the data provide a particularly good basis for the analysis of the impact of degree performance on graduates' post-university first destination outcomes. Other data-sets which have been used to analyse graduate returns contain more detailed information on graduate pay. But no other data-set provides such detailed information on course characteristics and degree outcomes for entire

[1] We will follow the custom of referring to an upper second or first class degree as a 'good' degree.

[2] 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.

cohorts of university graduates. We describe the relative advantages and disadvantages of different datasets in Section 3 below.

The rest of this paper is organised as follows. In Section 2, we present the theoretical framework for the interpretation of our subsequent empirical findings. In Section 3, we review briefly the evidence on graduate pay from analyses based on different datasets. We discuss the relative merits of the alternative data. In Section 4, we describe our own data in some detail and present the results of a detailed analysis for the 1993 graduating cohort, focussing on the effects of institution, course and class of degree. Section 5 presents specific results for earlier cohorts and discusses observed trends over time in the estimated effects. Section 6 considers some robustness checks of the basic empirical model and Section 7 closes the paper with conclusions and further remarks.

2 Theoretical framework

A particular focus of our empirical analysis concerns the occupational earnings premium associated with a graduate's degree performance. We are also interested in how any premium for a good performance has behaved over a time period in which both (i) the size of the graduate population has grown considerably and (ii) the proportion of students awarded good degrees has increased. Accordingly, in this section, we consider the theoretical reasons for a link between a student's degree classification and their graduate labour market prospects. We also derive predictions regarding the likely impact of expansion in the graduate population on any effects of degree class on graduate occupational earnings. Similarly, we analyse the effects on graduate occupational earnings of changes in the distribution of degree classifications. We consider the predictions both from a signalling framework and from a human capital approach.

As the proportion of individuals graduating from any given age cohort rises, it is likely to be the case that the average returns to a degree will fall, *ceteris paribus*. This can be demonstrated from the perspectives of both human capital and signalling models. Within a human capital approach, a higher percentage of a cohort acquiring the human capital associated with a university degree will imply an outward shift in the relative supply curve of graduate-level workers. *Ceteris paribus*, this shift will cause a fall in the earnings premium associated with the possession of a degree. Of course, there will be a counterveiling force if the relative demand for graduates is rising contemporaneously for exogenous reasons. Within a signalling model, it is also likely that an expansion in the proportion of graduates within a cohort will be associated with a reduction in the graduate earnings premium: see Bratti, Naylor and Smith

(2003) for a formal treatment of this.

But how might an expansion in the size of the graduating cohort impact on any premium attaching to a good level of performance? Suppose that some proportion, d, of graduates are awarded a distinction.[3] Why might there be an earnings premium for graduates awarded distinctions? In any education or training course, there is likely to be variation in the level of student input and learning. This is typically overlooked in the standard human captial model in which the time duration of study (or the number of qualifications) is taken as a measure of embodied human capital. If, however, student effort does vary so that students graduating from a course have acquired different amounts of human capital, then the measure of the differential human capital is likely to be correlated with the scores awarded to students at the completion of the course. Under a human capital model, then, one might interpret a premium for a distinction as arising from a greater investment in human capital. Assume that, as the size of the graduate population expands, the proportion of graduates obtaining a distinction does not change. This might be the case, for example, if the distribution of graduates by their propensity towards study effort does not change as the population changes. Then the human capital model would predict there to be no change in the magnitude of the earnings premium associated with a distinction: essentially, there is no change in the relative supply of labour between those with and those without distinctions.

What is the equivalent prediction that would be produced within a signalling framework? In a signalling model, the award of a distinction can be regarded as a signal that the recipient is of higher ability than the individual who graduates without a distinction. The distinction will hence command an earnings premium, the magnitude of which will depend on (i) the difference in signalled ability between graduates with and without distinctions and (ii) the relationship between ability and productivity. The impact on the premium of an increase in the size of the graduate population will then depend upon how a change in the size of the graduate population impacts on the ability difference signalled by a distinction. We now consider this more formally for particular assumptions regarding the underlying ability distribution.

Consider a model in which a degree - and its classification - act as signals of an individual's underlying ability and hence of potential labour market productivity. We assume that ability is private information to the individual. Suppose further that there is some continuous latent ability distribution and that the marginal cost to the individual of acquiring any given level of educational signal is negatively correlated with the individual's ability. We assume that

[3] In our theoretical treatment we assume a binary outcome in which students graduate with or without distinction. In the empirical analysis, the degree outcome is polychotomous.

all individuals in the labour market receive earnings which reflect the ability their education level signals. Thus, for example, the earnings of an individual without a degree are a function of the median ability of the population of non-graduates. In any signalling equilibrium, the individuals attaining a degree will all have higher latent ability than those choosing not to acquire a degree. Similarly, those with a distinction will have higher average ability than those graduating without distinction.

Suppose initially that the underlying ability distribution of all individuals is uniform on the support (0, 1) and that in equilibrium a proportion g of the cohort graduate with a university degree. We assume throughout that $g < 1/2$. Assume further that an equilibrium proportion d of graduates obtain a distinction.

Then, the average level of ability, a, of non-graduates is given by

$$\bar{a}_{1-g} = (1-g)/2. \tag{1}$$

Similarly, the average ability of graduates with a distinction is given by

$$\bar{a}_{dg} = 1 - \frac{dg}{2}, \tag{2}$$

and the average ability of those graduating without distinction is

$$\bar{a}_{(1-d)g} = 1 - \frac{(1-d)\,g}{2}. \tag{3}$$

We now specify the earnings function to be

$$\log w_{ij} = \alpha \bar{a}_j \tag{4}$$

where j denotes the group (non-graduate, graduate with/without distinction) to which the individual is signalled to belong.

It follows from equations (2), (3) and (4) that, among graduates, the earnings premium for a distinction will be given by

$$p_d = \frac{w_{dg} - w_{(1-d)g}}{w_{(1-d)g}} = \frac{w_{dg}}{w_{(1-d)g}} - 1 = \exp\left\{\frac{\alpha g}{2}\right\} - 1 > 0. \tag{5}$$

Thus, it follows that

$$\frac{d\,(p_d)}{dg} = \frac{\alpha}{2}(p_d + 1) > 0. \tag{6}$$

Hence, an increase in the proportion of graduates in the population will raise the earnings premium associated with the award of a distinction. The intuition for this result is that under the assumption of the uniform distribution of ability, the ability gap between graduates with and without distinctions is given by $g/2$. Thus, an increase in g raises the average ability gap

and with it the earnings premium for a distinction. The result also holds under a variety of other distributional assumptions. It can be shown, for example, that the result holds under the assumption that ability is normally distributed.[4]

Thus, the human capital and signalling models generate different predictions regarding the possible effects on the premium for a distinction associated with an increase in the graduate population, under the assumption that the proportion of graduates awarded distinctions does not change. The human capital model predicts no change in the premium, while a signalling approach predicts a rise in the premium for a distinction. However, we observe in the UK that during the time in which the graduate population has expanded, there has also been an increase in the proportion of distinctions awarded. How might this have affected the premium accruing to a distinction? Under a human capital approach, we might regard an increase in the proportion of graduates with a distinction as a rise in the relative supply of more highly skilled graduates and hence predict a fall in the magnitude of any premium associated with a distinction. It would be difficult to obtain the opposite prediction from a human capital approach.

Within a signalling model, the effect of an increase in the proportion, d, graduating with distinction will depend on the nature of the underlying ability distribution. If ability is distributed uniformly then - for given g - an increase in d will have no effect on the earnings premium for a distinction. To see this, notice that in the expression for the premium for a distinction in equation (6) above, p_d is independent of d. The intuition for this result is that, under the uniform distribution, the average ability gap between those with and without a distinction is independent of d. This is because a higher d lowers the average ability of those with distinctions in the same proportion that it lowers the average ability of those graduating without distinction, leaving the ability gap unaffected. This is a special property of the uniform distribution. For any non-uniform single-peaked distribution, for given $g < 1/2$, a higher d will reduce the average ability gap and hence reduce the earnings premium associated with a distinction.

It follows that, within a signalling approach, a rise in both g and d will have an ambiguous effect on the earnings premium for a distinction. The rise in g will raise the premium, but an increase in d will be likely to cause the premium for a distinction to fall - unless ability is uniformly distributed. Under a human capital approach, on the other hand, it is likely that increasing both g and d will cause a fall in any earnings premium associated with a distinction. In our empirical analysis, we estimate the premium associated with a distinctive

[4]Calculations available from the authors on request.

level of performance at university - as measured by the award of a high degree classification. We also examine how any such premium has behaved during a time period in which both g and d have been rising. Based on our theoretical discussion, evidence that any premium for a distinctive level of performance has decreased would be consistent with both signalling and human capital approaches. Conversely, finding an increase in an earnings premium for graduating with distinction would be consistent with a signalling model, but more difficult to reconcile with a human capital approach.

3 Data and evidence on graduate earnings

As noted above, evidence on the private returns to higher education have been influential in shaping policies towards the funding of university students in the UK. Current policy discussions on differential fees are being informed by analysis of variation in returns by degree subject. Estimation of the returns to a degree has been based on a variety of datasets, including: (i) cross-sectional surveys (some with panel elements), such as the General Household Survey (GHS), the Family Expenditure Survey (FES), the Quarterly Labour Force Survey (QLFS), and the British Household Panel Survey (BHPS) and (ii) Longitudinal Studies, such as the National Child Development Survey (NCDS), the Youth Cohort Survey (YCS) and the British Cohort Survey (BCS70). Examination of how returns to a degree might vary by factors such as institution attended, subject studied and degree class awarded is hampered by lack of sufficient data on these characteristics in most of these data-sets. Typically, either the appropriate questions are not asked or the samples are too small to sustain significant estimated effects. See, for example, Chevalier, Conlon, Galindo-Rueda and McNally (2002) for a detailed description of the problems associated with estimating returns by subject from these datasets.

In order to overcome the problem of small samples of graduates or of limited information on student characteristics, the richest data by far are administrative data held by the Universities Statistical Records (USR) and, since 1994, the Higher Education Statistics Agency (HESA). These data comprise detailed information on full cohorts of students leaving a UK university since 1972. The data include information, for all students, on personal characteristics (including age, gender, social class background), pre-university qualifications (such as A-level subjects and grades, including school attended), and university and course-related information (including specific subject studied and class of degree awarded). In addition, graduates are sent a First Destination Survey (FDS) asking for information on their employment and occupation status in their first year after graduation. The response rate to this survey is typically around 75%. FDS

information on graduates' self-reported occupations is coded into 3-digit Standard Occupational Classification, to which information on gender-specific average occupational earnings can be merged from sources such as LFS and the New Earnings Survey (NES). Potentially, analysis of the determinants of occupational earnings based on the USR-FDS (or HESA-FDS) data has both advantages and disadvantages relative to other data-sets. The main advantages are (i) the extent of coverage of each graduate cohort and (ii) the detailed administrative nature of the educational data. The main weakness is that the information relates only to the early career path of graduates.

In addition to the USR/HESA data on full cohorts of graduates, there is also a series of follow-up surveys conducted on samples of graduates from particular graduate cohorts. Chevalier *et al.* (2002) review the evidence on the self-reported earnings of samples of graduates from the (typically quinquennial) graduate cohorts. The most recent data are those for the 1995 cohort. This is close in time to the most recent cohort - that of 1993 - for which USR-FDS data are available. In contrast to the USR-FDS data, the follow-up sample survey of the 1995 cohort contains information on the actual salary of graduates three and a half years after graduation. However, the target sample size was only 5% of all graduates and the response rate only 27%. Furthermore, unlike previous graduate cohort sample surveys, the 1995 sample omits key variables such as age, marital status and geographic region. Furthermore, the data are not matched to administrative student-level information, as does occur in the case of the USR-FDS data.

We conclude that there is a variety of datasets which one might exploit in order to analyse graduates' post-university labour market earnings. The only data-set which has not so far been exploited for this purpose is the USR(HESA)-FDS dataset, which has recently become available.[5] We believe that the USR(HESA)-FDS data have both advantages and disadvantages compared to other data sets which have been used to analyse graduate earnings and that analysis of the USR(HESA)-FDS data can potentially complement results from previous work and extend our understanding of the determinants of graduates' earnings. As we noted above, the main drawback of the data are that they provide information only on the early career path of graduates. Many graduates are likely to change occupation through their working life. Nonetheless, early career outcomes are likely to be an important factor shaping career development and hence analysis based on first destinations is valuable. A related problem with

[5]USR data has been used to analyse students' performance at university (see, for example, Smith and Naylor (2001a), Smith and Naylor (2001b), Bratti (2002) and McNabb *et al.* (2003)) and to examine the determinants of graduate employment status (see Smith, McKnight and Naylor (2000)).

first destination evidence is that starting salaries might not be highly correlated with career earnings within an occupation. We overcome this problem by using gender-specific average occupational earnings. We discuss this in more detail below.

4 Empirical analysis

We exploit information from administrative data from the Universities Statistical Records (USR) for the full graduating cohorts of 1985 through to 1993 to analyse graduates' first destination occupational outcomes. The data combine student records with responses to the first destination follow-up survey (FDS) of all graduates. From this survey we have information on each responding graduate's employment status in the first year after graduation, including the classification of the individual's occupation at the 4-digit SOC level. This we match to 3-digit gender-specific data on median occupational earnings from the New Earnings Survey. Our dependent variable is then the median occupational earnings of graduates for their first destination occupation after graduation.

Our analysis is complementary to previous work on the determinants of graduates' earnings, as we have discussed above. Our concern is not with the extent of the returns to a degree: we do not have data on any control group of non-graduates. Instead, we analyse how graduate earnings vary with specific graduate characteristics. Blundell, Dearden, Goodman and Reed (1997) and Blundell *et al.* (2000) use data from the National Child Development Survey (NCDS) to estimate the *ceteris paribus* earnings premium for an undergraduate degree to be around 17% for men and 37% for women. Our aim is to analyse variations around the average premium, focusing, for example, on the premia associated with particular subjects, institutions and with the graduate's academic performance as measured by the class of degree awarded. This has policy relevance in that evidence that there are significant premia for certain subjects or institutions might be used to support the argument for differential fees. Conversely, any evidence of significant variation by other characteristics, such as by class of degree, might indicate a level of risk in the higher education investment decision that could exacerbate fears that higher fees might deter applications from students from less affluent socio-economic backgrounds.

Our dependent variable is the log of the graduate's 3-digit SOC gender-specific occupational earnings. We are particularly interested in the effect of the class of degree awarded on graduates' earnings. Given that we attribute to each individual their median occupational earnings, we do not capture intra-occupational differences in earnings across graduates. These differences are unlikely to be randomly assigned and hence there is the potential that estimated effects on

occupational earnings are biased estimates of effects on actual earnings. One of the advantages of our focus on the effects of degree class is that we can be reasonably confident of the likely direction of any bias in this case, as it is unlikely that intra-occupational earnings differences are negatively correlated with degree performance. Hence, we interpret our estimates of the effects of degree class as lower-bound estimates of their effects on graduates' earnings.

4.1 Summary statistics

The principal variables held on the USR undergraduate records can be categorised into four main groups. (i) *Personal Information*: including, date of birth, sex, marital status, country/county of domicile, country of birth, residence, overseas and fees status, occupation of parent or guardian, (ii) *Academic history*: including last full-time school attended, other education, GCE A-level or SCE higher grade results, course for which admitted, (iii) *Annual information*: such as 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, and (iv) *Leavers details*: including, qualification obtained, class of degree, date of leaving, reason for leaving, first destination.

Our analysis is based on university students who were registered for a degree-level course.[6] Initially, our analysis examines data for 1993 graduates and their first destinations in 1994. Subsequently, we examine the data on previous graduate cohorts for 1985 to 1992.[7] Of the 47,388 male graduates in 1993, 71% responded to the First Destination Survey. Of these, approximately 20% were unemployed or inactive six months after graduation, 22% were in further study and 58% were in employment. Of the 38,381 female graduates in 1993, 76% responded to the FDS. Of these respondents, 15% were unemployed or inactive, 16% were in further study, and 68% were employed. A total of 39,454 graduates in employment identified their particular occupation. For the purposes of the analysis of the 1993 graduates, we have matched the individual's reported occupation to the corresponding gender-specific 3-digit SOC median occupational earnings from the New Earnings Survey (1994).

Summary statistics for the 1993 graduates are provided in Tables 1 and 2. Table 1 presents summary statistics for the main explanatory variables used in our analysis. We note that of those in employment, 80% had taken A-levels prior to university and scored an average of around 25 points. 47% (47%) of both females (males) had attended a local education authority

[6] We include all courses which typically lead to a classified degree. We exclude overseas students as only a small and unrepresentative sample respond to the FDS.

[7] In Section 5, we also present results based on an analysis of data for 1998 university leavers.

school and 22% (25%) an Independent school. Around 87% 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, 32% (33%) with a lower second class and 3% (7%) with a third class degree.

Table 2 shows the mean and standard deviation of occupational earnings, disaggregated both by gender and by area of degree subject. The table also shows the number of observations for each subject. For the whole sample, mean earnings of males were £450.28 per week, with mean earnings of females at £333.10, 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 Politics, Classics and Literature and Humanities, for example. Degree subject fields associated with relatively high average weekly occupational earnings were: Law, Computing, Economics and Mathematics.[8] The ranking of subjects is rather similar for men and women.

Table 2 also shows summary statistics for occupational earnings by degree class by gender. For male graduates, the raw differential for a first relative to an upper second degree class is 3.2%, while that for a lower second is -7.0% and that for a third class degree is -12.2%. For female graduates, relative to an upper second degree class, the raw differential for a first is 3.8%, that for a lower send is -4.7% and that for a third class degree is -5.7%.

With respect to changes across the cohorts between 1985 and 1993, we note that there was a growth in the overall number of students leaving university from 74,953 to 93,613 an overall growth rate of 25% or an average annual growth rate of 2.8%. Overall, the number of female students leaving university rose by 37% and the number of male students by 16%, with the proportion of females rising from 40% in 1985 to 45% in 1993. With regard to degree class breakdowns, 7.5% of males were awarded firsts in 1985 (compared to 9.6% in 1993) and 4.7% (6.9%) of females received firsts in 1985 (1993). Upper second class degrees were awarded to 31.1% (35.7%) of males in 1985 (1993) and to 36.5% (46.6%) of females. Lower second class degrees were awarded to 30.3% (27.7%) of males in 1985 (1993) and to 36.1% (28.0%) of females and thirds were awarded to 8.9% (6.8%) of males in 1985 (1993) and to 5.1% (3.1%) of females.

The breakdown of students by social class background has remained relatively stable over the period with 62.4% (60%) of female (male) students coming from social class I or II in 1985 compared to 60% (59%) in 1993. The proportion of students coming from an Independent school background has grown steadily over the period, increasing from 16% (21%) of female

[8]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.

(male) students in 1985 to 22% (25%) in 1993.

The raw occupational earnings premium for a first over an upper second degree was zero for male students in 1985 compared to the figure of 3.2% in 1993. For women the raw premium for a first relative to an upper second rose from 2.9% to 3.8% between 1985 and 1993. The raw (negative) premium for a lower second for men, relative to an upper second, changed from -2.8% to -7.0% and for women from -4.0% to -4.7% over this period. The equivalent premium for a third changed from -4.4% to -12.2% for men and from -4.7% to -5.7% for women. The main focus of section 5 is to examine how the *ceteris paribus* earnings premia by degree class behaved over time.

4.2 Results

Prior to analysing occupational earnings for the group of 39,454 students for whom we had information on occupation after graduation, we estimated a model of the first destination outcomes of these students in terms of whether they are observed (i) in employment, (ii) in further study, (iii) in a state of unemployment (or out of the labour force) or (iv) as not responding to the FDS. We model this outcome in a multinomial logit framework and correct the occupational earnings equation for possible self-selection by using a maximum-likelihood equivalent of the standard Heckman (1979) two-step procedure (see Lee (1983)).[9] We note, however, that the p-values on the correlation term are not significant at even the 10% level in any of the cohort years analysed here. As a consequence of this finding all results reported in the rest of this paper are based on OLS.

In this section of the paper, we report results from estimating gender-specific occupational earnings equations for the 39,454 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 median occupational earnings of the individual university leaver. In the following section of the paper, we re-estimate the occupational earnings equations using data for other cohorts.

Table 3 presents the results of the occupational earnings regressions for the 1993 university leavers for both males and females. From the table, it can be seen that graduate occupational earnings of females are increasing in the age at which the student graduated, whereas this is not true for males. Similarly, marital status is associated with a significant earnings premium only for females. 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

[9]The multinomial logit results are available from the authors on request.

of 1993 undergraduate leavers from the old university sector, very few (i.e., just 2%) studied part-time. There are no effects on occupational earnings associated either with accommodation type or with whether the course had a sandwich (vocational placement) element (not reported in the Table).

Table 3 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 occupational) background, a graduate from a family background described as either Social Class IIINM (skilled non-manual), Social Class IIIM (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 around 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 affluent 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, the table shows that, even after controlling for degree subject and classification, male graduates' occupational earnings are influenced by A-level outcomes. For males, an increase of six points in the A-level score (equivalent of BBB rather than CCC) is associated with 0.6% higher occupational earnings. There are no significant effects of A-level scores for women. Performance in Scottish Highers does not have significant effects on graduate earnings. There is a strong effect of having previously studied Mathematics at A-level: graduates with A-level Mathematics have over 1% higher earnings, *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. We also know that degree performance itself is positively associated with having Mathematics A-level, see Smith and Naylor (2001a): thus there are both direct and indirect influences of pre-university Mathematics on graduates' labour market outcomes.

Table 3 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 non-selective local education authority (LEA) school prior to university, earnings are 4.5% (2.4%) higher for male (female) 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 formally testable from information in our data-set. In a related analysis, Naylor, Smith and McKnight (2002) show that the Independent school effect is not constant across Independent schools, but is greatest in schools charging the highest fees.

We note that there is a significant gender difference in graduates' occupational earnings. In the raw data, female average earnings are about 75% 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 22 percentage points are attributable either to discrimination or to gender differences in unobserved characteristics.

The regressions reported in Table 3 also included controls for university attended. Discussion of university effects is left to the next section of the paper where we address the issue of the stability over time in the rankings of the estimated university effects. Table 3 shows the estimated coefficients for the degree subject studied. The omitted dummy variable is for the case of a student studying for a Language degree. Hence, the estimated coefficient for Law implies that occupational earnings for a female (male) Law graduate are, on average, 35.0% (24.1%) higher than the earnings of an otherwise identical Language graduate. For females there are also highly significant and positive coefficients associated with Medical-related, Computing, Education, Mathematics and Creative Arts. For male graduates there are significant and positive effects associated with Economics and Business, relative to Languages, and significant negative effects for Biology, Physics, Engineering, Humanities, Classics and Literature and Social Science (excluding Law, Economics and Busieness).

Turning to the main variable of interest, Table 3 shows the estimated coefficients and additional premia associated with the class of degree awarded to the graduate. The benchmark is a student graduating with an upper second class honours degree. Each of the coefficients is significant at 1%. For male graduates, the additional premium associated with a first class honours degree is 3.9%, relative to the case of a student with an upper second class degree. Relative to an upper second, there are (negative) earnings premia of -5.5% for a lower second and of -9.9% for a third class degree. Hence, for male graduates, there is a span of about 14% between occupational earnings associated with a first and those associated with a third class degree. There is a smaller span for females, with a premium of 3.6% for a first relative to an upper second class degree and negative premia of -4.2% for a lower second and of -5.3% for a third class degree, relative to an upper second. Thus, for females there is a span of about 9% between the occupational earnings of a first and those associated with a third class honours degree. Hence, this evidence is not consistent with the hypothesis that better performance at

university by females stems from higher marginal returns to degree performance.

The estimates of the additional premia associated with the individuals' class of degree are therefore substantial. 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 about 4% to 5%. However, there are significant additional premia associated with each class of degree. In the next section of the paper, we examine how these premia have behaved over time by replicating our analysis for other graduate cohorts.

5 Time trends in premia by degree class, course and university

The analysis presented so far relates to one cohort of graduates leaving university in 1993, but the magnitude of earnings premia associated with particular factors such as degree class awarded are not necessarily constant over time. In this section of the paper, we replicate the analysis reported in the previous sections of the paper separately for the each of the cohorts of students graduating between 1985 and 1992,[10] in which we use a period during which there was a significant growth in the numbers of students graduating from UK universities. It is also the case that the proportions of students in each degree class were not constant over this period. Hence, it is interesting to analyse how the premia by degree class behaved in these contexts and to relate our findings to the theoretical discussions reported in Section 2 of the paper.

Table 4 reports the estimated degree class earnings premia relative to an upper second class degree, for men and women respectively. The results are also represented graphically in Figures 1a and 1b, and reveal the increasing spread in the returns associated with the graduate's class of degree. Whereas in 1985 the added premium for a first class degree over a lower second class degree was 2.1% (4.1%) for males (females) (with the premium for a first over an upper second class degree insignificant), this premium increased so that in 1993 the premium for a first over a lower second was 9.2% (7.9%) for males (females).

The most recent leaving cohort for which the USR data are in the public domain is the 1993 cohort. Subsequent data are held by HESA and are not generally available. We have obtained data for the 1998 leaving cohort by special permission. The figures for 1998 (reported in Table 4), are based on HESA data for 1998 university leavers. It is interesting to consider the 1998 data as during the period 1993-98 the number of university students continued to expand: by about 10% if one considers only the pre-92 universities. Furthermore, the period

[10] For each cohort year we use the appropriate 3-digit gender-specific data on median occupational earnings from the contemporaneous New Earnings Survey.

was one in which the proportion of students with good degree continued to increase: from about 45% (54%) in 1993 to 48% (60%) in 1998 for male (female) students. We note that the HESA data are not entirely compatible with the earlier USR data. For example, the HESA data do not include information on either the school attended nor the A-level subjects of the students, although it does include information on each graduate's overall A-level score in their best three subjects.

Based on the 1998 HESA data, we estimate the gap between a first and a lower second class degree to be 9.4% (11.2%) for males (females). These data cover all Higher Education Institutions in the UK, including all of the former Polytechnics. However, restricting the analysis to solely pre-1992 ('old') universities makes very little difference to these estimates. Given that the HESA data do not include as much information as is available from the USR data, we have examined the sensitivity of the results to the set of control variables included by re-estimating the occupation earnings equation for the 1993 cohort of university leavers using only variables available in the HESA data set. The estimated effects remain essentially unchanged.

The theoretical section of this paper considered predictions arising from human captial and the signalling models in a context of increasing numbers of graduates and an increasing proportion of graduates awarded distinctions. Over the period from 1985 to 1993, the university sector experienced an increase of approximately 25% in the number of students leaving university each year and an increase in the proportion of students obtaining either a first (or upper second) class degree. The empirical results show us that over this period of analysis, the premia for a first over an upper second class degree and for an upper second relative to a lower second class degree to have increased markedly. From our analysis of the 1998 HESA data, it also emerges that the same pattern continues to hold for the period 1993 to 1998. As we discussed in Section 2, these findings are consistent with the predictions of the signalling model, but are harder to reconcile with those derived from a human capital model.

We now consider the estimated university effects and their stability over time. Figures 2a and 2b plot the rank position of seven (of the 57) universities, based on the estimated earnings premia (for males and females, respectively) estimated for students leaving university in each of the cohorts 1985 through to 1993. We also include the evidence from the equivalent analysis based on the HESA data for 1998. What is clear is the stability of the rank of these selected universities. For male students, with the exception of two universities, none of these seven universities is ranked outside the top 13 universities in terms of the university premia based on occupational earnings. The stability of the university rank positions based on female students is markedly less stable, but it is still that case that of the seven universities four are never

ranked outside the top ten. We also note that six of the universities are common across males and females. However, despite the evidence of the stability of the rank positions of universities with the largest effects on earnings, we note that the rank positions of other universities are less stable over time, such that the correlation of university rank positions over consecutive years is on average only 0.7, falling to an average of around 0.6 over a three-year horizon.

The ranking of degree subjects according to the earnings premia is quite stable over time, with Law, Business, Economics, Computing and Mathematics always ranked as the top five subjects. The correlation in the ranking across all degree subjects over consecutive years is very high. The correlation over the whole period from 1985 to 1993 is 0.8 and indicates that at least in the medium term there is stability in returns to degree subjects. These results suggest that the graduate labour market is very consistent over time in its ranking of the value of degree subjects: more so than in the case of particular universities. On this basis, it may be more feasible to attach differential fees to degree subjects than to individual institutions. However, for some top-ranked universities the institution effects are quite stable: suggesting that the very top-ranked universities on this measure may have greater market credibility in charging differentiated fees.

A number of other premia are remarkably consistent over time. Attendance at an Independent school is consistently associated with an additional premium of 2.4-4.5% for males and 0.9%-2.4% for females. For male students, the effect of coming from one of Social Class IIINM, IIIM, IV or V has the effect of lowering earnings by around 1% compared to a student from Social Class II. There are few significant effects of social class background for female students. A-level score has a consistently significant effect, with an additional 10 points corresponding to a 1% earnings premia for males. There is more variation in the effect for females, but the estimated coefficient on A-level score is always positive and significant. The effect of having Mathematics A-level is also largely consistent over time, conveying an additional premium of 1.0-1.6% for males and 1.0%-3.4% for females.

6 Robustness

There is an issue of whether the widening span in the occupational earnings associated with degree class indicates a growing tendency over time for a first class degree to enhance graduates' first destination employment outcomes - in the sense of raising median occupational earnings - or whether it reflects a widening inequality in the underlying distribution of median occupational earnings within the merged NES data. The econometric results reported in the previous sections

used current occupational earnings from contemporaneous NES data. In this section, we report the results on the detailed premia by degree class for each year from 1985 to 1993 attributing to each 3-digit occupation the gender-specific median earnings averaged over the 9 years.[11] The results for the premia by degree class over time are represented in Figures 3a and 3b for men and women, respectively. Comparing Figures 3a and 3b with Figures 1a and 1b reveals that the results are remarkably similar. In other words, the pattern of change over time in the estimated degree class premia reflects the changing impact of degree class on the probability that a graduate will enter a high-paying occupation and does not arise simply because of changes over time in the underlying distribution of average occupational earnings.

We also examine the robustness of the results of our analysis of first destination occupational earnings data in two further ways. First, using BCS70 data we estimate the additional premia by degree class, for those students who went to university, based on their reported hourly gross wage at age 30. We find for males (females) the premia to a first class degree over a lower second class degree is 14.7% (26.0%), although due to small cell sizes in BCS70 (31 (33) males (females) obtained a first class degree) few of the estimated coefficients on the degree class variables are signficant.[12] These figures are bigger than those of 9.2% (7.9%) based on occupational earnings for males and females, respectively, as reported in Table 3 for 1993 university leavers observed in USR data. We note that the USR data for 1993 relate to a time period close to that in which the BCS70 cohort would have been leaving university. We conclude that there is evidence in support of our earlier argument that the results based on the USR data can be regarded as providing lower-bound estimates of degree class effects on earnings. We also underline the benefit of the USR data which provides such a large sample of graduates that we are able to obtain very precisely estimated coefficients.

Second, within BCS70, we compare estimates of degree class effects using actual gross hourly wage with estimates of the degree class effect when we assign to each individual median occupational earnings based on their 3-digit social occupation code. For males the use of occupational earnings reduces the premia for a first relative to a lower second class degree to 3.3%, (compared to that of 14.7% based on actual gross hourly wages) again supporting our argument that the use of occupational earnings gives a lower bound of the premia to degree class. However, for females there are only very slight differences between the premia to degree class based on gross hourly wages (26.0%) and that based on median occupational earnings

[11] We also report the results for the 1998 cohort.

[12] Controls include parental SEG, parental education, parental interest in child education, region of residence, BAS (ability) score, ethnicity, house property, presence of father/mother at age 16, degree subject.

(30.7%).

7 Concluding remarks

In this paper, we have exploited the individual-level USR data for 1993 UK university leavers to investigate the determinants of graduate occupational earnings. It has been estimated in previous work (see, for example, Blundell *et al.* (2000)) that, *ceteris paribus*, there is an earnings 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 particular factors. We have shown that there are significant occupational earnings differences across graduates according to the university attended and the subject studied. Furthermore, we have demonstrated that the ranking of degree subjects in terms of their estimated effects on graduates' earnings are remarkably stable over time. This is less true of the ranking of universities, with the exception of a small number of universities which are consistently associated with the greatest estimated earnings premia.

This evidence on university and subject effects might be taken as supporting the argument for the introduction of differential fees. However, our other results suggest that there is likely to be substantial variation around the average premium for a degree according to factors such as degree class, prior qualifications, previous schooling, and family background. In particular, our analysis shows 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 over a third class degree is about 12%. Among other results, we have shown that, relative to having previously studied at a state-sector 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 5% for males. These results indicate that although - as previous work has demonstrated - the *average* premium for a degree might be substantial, the expected premium is likely to be quite small in many cases, exacerbating the risk that higher costs will deter participation in higher education, especially for potential students for whom the marginal costs of education are relatively high. Our analysis also suggests that, with the ongoing expansion of student numbers, there are likely to be increasingly strong incentives to achieve a good degree class at university.

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Table 1: First destination outcomes and summary statistics for those in employment based on the 1993 cohort

	Males		Females	
Variable	Mean	SD	Mean	SD
FDS outcomes				
Out of labour force/Unemployed (OLFU)	0.14	0.35	0.11	0.32
Further study	0.16	0.36	0.13	0.33
Employment	0.41	0.49	0.52	0.50
Non-response	0.29	0.45	0.24	0.43
Sample size (n)	47388		38381	
Previous qualifications				
A-levels	0.80	0.40	0.79	0.41
Scottish Highers	0.07	0.26	0.07	0.26
Other qualifications	0.08	0.28	0.07	0.26
No formal qualification	0.05	0.21	0.06	0.24
A-level information				
A-level score	25.7	8.9	24.1	7.8
A-level subjects				
Chemistry	0.33	0.47	0.24	0.42
English	0.21	0.41	0.45	0.50
Maths	0.59	0.49	0.34	0.48
Physics	0.44	0.50	0.15	0.36
Scottish Higher information				
Higher score	12.94	4.79	12.64	4.26
School type				
LEA school	0.47	0.50	0.47	0.50
Grammar school	0.11	0.31	0.12	0.33
Independent school	0.25	0.44	0.22	0.41
FE college	0.09	0.29	0.10	0.30
Other school	0.07	0.26	0.09	0.29
Part-time	0.02	0.15	0.02	0.15
Age groups				
<24	0.87	0.34	0.86	0.34
24-27	0.08	0.27	0.06	0.23
28-33	0.03	0.18	0.03	0.17
33+	0.02	0.15	0.05	0.22
Married	0.03	0.17	0.05	0.22
Social class				
SC I	0.18	0.38	0.17	0.38
SC II	0.41	0.49	0.42	0.49
SC IIINM	0.12	0.32	0.11	0.31
SC IIIM	0.10	0.31	0.10	0.29
SC IV	0.06	0.24	0.05	0.23
SC V	0.01	0.09	0.01	0.09
Unemployed	0.08	0.27	0.10	0.30
Degree class				
I	0.10	0.30	0.07	0.25
II.1	0.45	0.50	0.55	0.50
II.2	0.33	0.47	0.32	0.47
III	0.07	0.25	0.03	0.18
Other	0.05	0.22	0.03	0.18
Sample size (n)	19476		19978	

Table 2: Average occupational earnings by subject field for the 1993 cohort

	MALES			FEMALES		
	Mean	Std. Dev	n	Mean	Std. Dev	n
ALL	450.28	115.91	19476	333.10	96.27	19978
Degree subject						
Medical related	440.98	90.29	491	363.77	73.15	1302
Biological science	411.15	121.70	1045	306.56	90.72	2067
Agriculture	403.70	107.55	197	299.73	79.18	193
Physical science	414.67	107.88	1840	311.36	86.11	1097
Math science	458.42	113.94	1197	338.61	83.60	838
Computing	455.25	81.04	1145	381.59	89.35	175
Engineering	427.06	83.35	3487	320.80	66.26	615
Technology	422.08	86.83	230	309.87	82.11	132
Architecture	420.70	76.50	337	329.71	64.41	125
Social science	413.34	123.39	876	308.35	88.91	1780
Law	580.19	92.35	1375	456.88	96.58	1547
Business Administration	479.50	107.27	1535	311.34	74.92	1356
Classics + Literature	435.60	124.81	860	320.05	95.05	2280
Language	468.42	122.25	521	321.55	89.85	1673
Humanities	435.14	127.58	1377	313.50	94.23	1631
Creative art	450.47	104.20	248	341.59	108.71	579
Education	442.63	66.28	190	369.72	51.31	726
Other	458.34	123.85	565	317.51	87.49	765
Economics	482.95	133.22	1314	325.24	86.20	617
Politics	433.31	130.58	646	315.34	98.12	480
Degree Class						
I	480.14	102.37	1909	351.31	87.89	1309
II.1	465.25	115.34	8791	338.44	97.47	10982
II.2	432.62	116.50	6471	322.58	94.93	6381
III	408.41	110.02	1344	319.06	92.21	642
Other	431.57	113.13	961	323.36	95.95	664

Table 3: Results of occupational earnings equation for the 1993 cohort

Variable	MALES Coeff	FEMALES Coeff
Personal		
Age groups		
<24 (default)		
24-27	0.008	-0.002
28-33	-0.003	0.036***
33+	-0.016	0.041***
Married	0.021	0.032**
Part-time	0.027	-0.007
Social class		
SC I	0.005	0.011*
SC II (default)		
SC IIINM	-0.023***	0.009
SC IIIM	-0.022***	0.009
SC IV	-0.024***	-0.033***
SC V	-0.024	-0.038
Unemployed	-0.012	-0.009
Academic background and schooling		
A-level score	0.001***	0.000
A-level subjects		
Biology	-0.010	0.002
Chemistry	0.001	0.005
English	-0.003	-0.002
Maths	0.012**	0.011*
Physics	-0.002	0.010
Higher score	0.001	0.003*
School type		
LEA (default)		
Grammar	0.017**	-0.001
Independent	0.045***	0.024***
FE	-0.013*	0.015**
Other	0.036***	0.047***

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

Table 3 (cont'd): Results of occupational earnings equation for the 1993 cohort

Variable	MALES Coeff	FEMALES Coeff
Degree class		
I	0.038***	0.037***
II.1 (default)		
II.2	-0.054***	-0.042***
III	-0.094***	-0.053***
Other	-0.080***	-0.079***
Degree subject		
Medical related	-0.003	0.134***
Biological science	-0.097***	-0.053***
Agriculture	-0.084***	-0.051**
Physical science	-0.080***	-0.033***
Math science	0.004	0.051***
Computing	0.024	0.178***
Engineering	-0.050***	-0.004
Technology	-0.054**	-0.027
Architecture	-0.066***	0.045*
Social science	-0.101***	-0.043***
Law	0.241***	0.350***
Business Administration	0.061***	-0.019*
Classics + Literature	-0.073***	-0.009
Language (default)		
Humanities	-0.065***	-0.032***
Creative art	-0.009	0.057***
Education	-0.010	0.161***
Other	-0.014	0.001
Economics	0.038***	0.007
Politics	-0.060***	-0.015

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

Table 4: Degree class coefficient estimates for the 1985-1993 and 1998 cohorts

		1985	1986	1987	1988	1989	1990	1991	1992	1993	1998 (All)	1998 (Old)
Males	I	0.003	0.006	-0.007	-0.006	0.001	0.027***	0.027***	0.042***	0.038***	0.046***	0.046***
	II.1 (default)											
	II.2	-0.018***	-0.011***	-0.015***	-0.025***	-0.020***	-0.031***	-0.035***	-0.052***	-0.054***	-0.050***	-0.049***
	III	-0.030***	-0.029***	-0.032***	-0.056***	-0.038***	-0.058***	-0.071***	-0.092***	-0.094***	-0.094***	-0.096***
Females	I	0.012	0.012	0.018	0.028	0.026	0.033***	0.025***	0.053***	0.037***	0.066***	0.067***
	II.1 (default)											
	II.2	-0.029***	-0.032***	-0.028***	-0.026***	-0.030***	-0.023***	-0.038***	-0.039***	-0.042***	-0.046***	-0.046***
	III	-0.058***	-0.052***	-0.040***	-0.059***	-0.049***	-0.045***	-0.065***	-0.072***	-0.053***	-0.087***	-0.065***

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

Figure 1a: Coefficients on degree class variables over time (current earnings) - Males

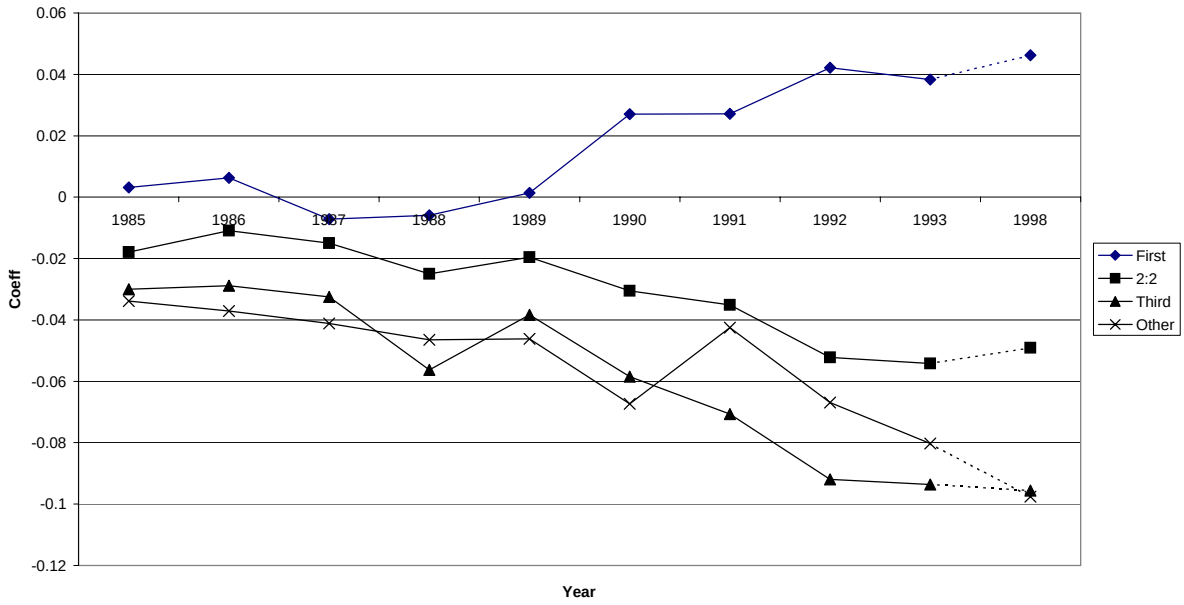

Figure 1b: Coefficients on degree class variables over time (current earnings) - Females

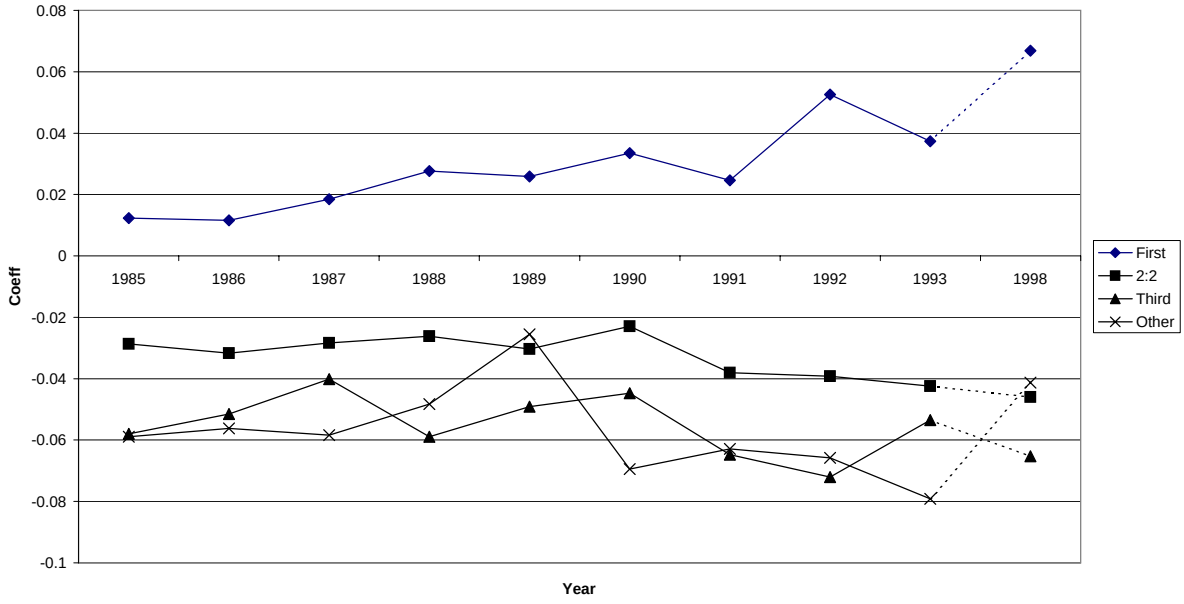

Figure 2a: University ranks over time based on earnings premia - Males

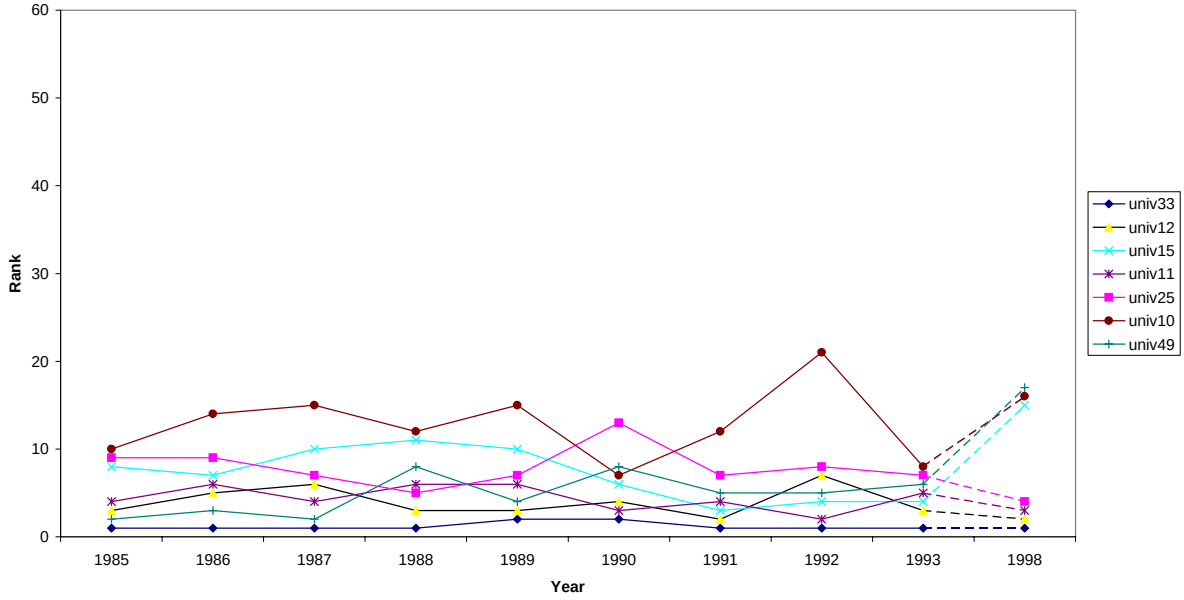

Figure 2b: University ranks over time based on earnings premia - Females

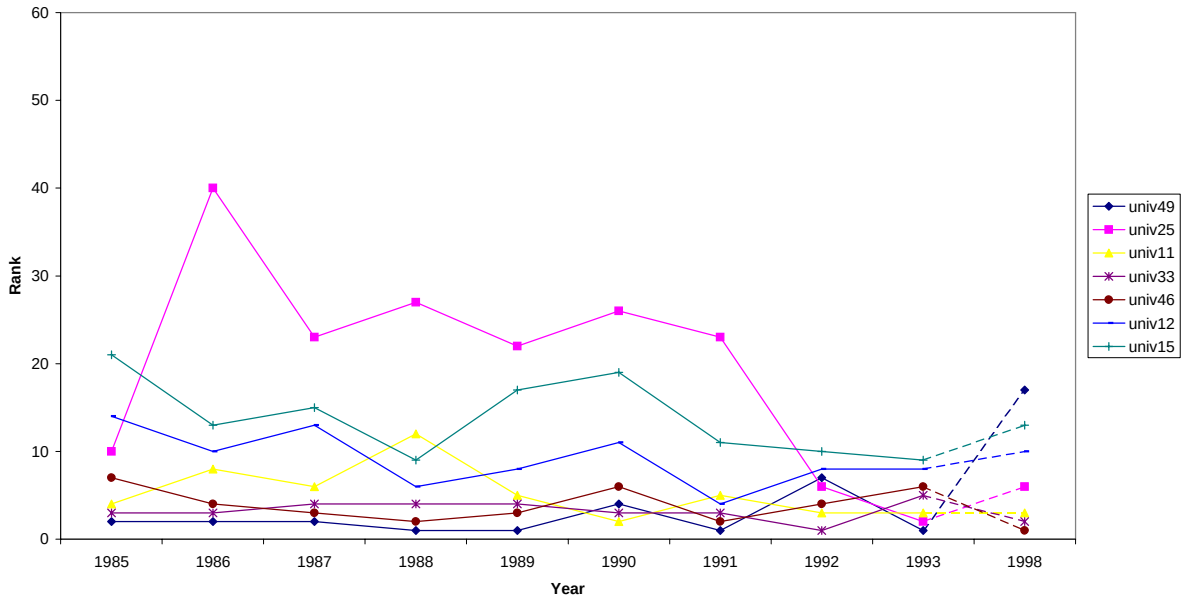

Figure 3a: Coefficients on degree class variables over time (constant earnings) - Males

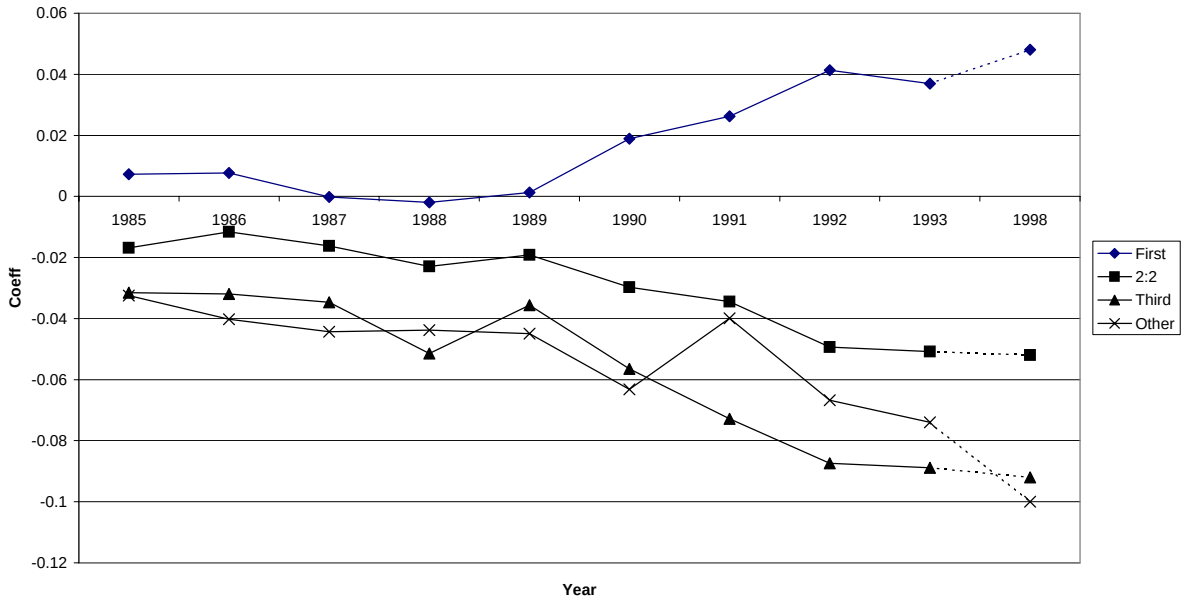

Figure 3b: Coefficients on degree class variables over time (constant earnings) - Females