How English domiciled graduate earnings vary with gender, institution attended, subject and socio-economic background

EXECUTIVE SUMMARY

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How English-domiciled graduate earnings vary with gender, institution attended, subject and socio-economic background

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Executive Summary

Graduates from wealthier family backgrounds earn significantly more after graduation than graduates from poorer backgrounds, even after completing the same degrees from the same universities. Those studying medicine and economics earn far more than those studying other degree subjects, even taking their higher A-level achievement into account. There is also considerable variation in graduates' earnings depending on the university attended. These are some of many findings from this research which looks at the link between earnings and students' background, degree subject and university attended.

Background and Methodology

The research sets out to document and explain some of the differences between graduates' earnings. To what extent is the observed variation driven just by prior attainment as opposed to course or institution of study? To what extent does family background influence future earnings even given course and institution? Answers to these questions matter to students choosing a degree as well as to government, universities and employers. Of course, students go to university for many reasons other than for pecuniary gain and many graduates do socially valuable jobs that are not necessarily higher paying. However, pay and employment are both aspects that students do consider and hence information on graduates' earnings is important.

Investigating how graduates' earnings vary by institution of study has been particularly challenging to research due to inadequate data. We use a new database that, for the first time, provides administrative longitudinal data on English graduates' annual earnings. Specifically, we link two complex administrative data sets, namely data from the Student Loans Company and from HM Revenue and Customs (HMRC) PAYE and self-assessment

databases.[1] These data enable us to analyse how graduates' earnings vary according to the university they attended and what subject they studied.[2] The research used anonymised tax data and student loan records for 260,000 students up to ten years after graduation. The data set includes cohorts of graduates who started university in the period 1998–2011 and whose earnings (or lack of earnings) are then observed over a number of tax years. In the paper, we focus on the tax year 2012/13. Since the data include information on how much each student borrowed, and given that the amount one can borrow depends on parental income, we can construct an indicator of whether or not the student comes from a richer family. When we talk about a graduate being from a richer background, we are referring to them being from approximately the top 20% of households of those applying to higher education in terms of family income, and we are comparing them with the other 80% of students.

This is the first time a 'big data' approach has been used to look at how graduate earnings vary by institution of study, degree subject and parental income.

The data are also linked to Higher Education Statistics Agency (HESA) data at course level to enable us to allow for differences in student intake across subjects and institutions. For example, in our model, we can allow for differences in mean HESA tariff scores of students taking different subjects at different institutions. This enables us to say something about the relative earnings of students attending a particular institution or taking a particular subject as compared with students who are likely to be quite similar on average but who have taken different degree options.

Students are admitted into degree courses on the basis of prior achievement and, despite the fact that we allow for average differences in student intake, we cannot fully account for differences in student ability – we have no measure of student IQ, for example. This means that our estimates are not necessarily going to tell us about the *causal* impact of a particular

[1] We were granted access to records in a secure HMRC data enclave after all identifying material in the data had been anonymised. Team members who use these data have been subject to the same strict confidentiality and data protection requirements as HMRC staff and are liable to legal penalties for breaches.

[2] We can only identify graduates who have borrowed money from the Student Loans Company. This is around 85% of English graduates in the period under consideration. There are therefore some graduates for whom there are no data, but we have reason to believe that they are likely to be higher-earning graduates, on average. As a result, if anything, the administrative data are likely to underestimate graduates' earnings.

degree on earnings but we can gain a useful understanding of how graduates' earnings differ across *similar* institutions and *similar* courses with *similar* student intakes.

Key Findings

Graduates versus non-graduates

Graduates are much more likely to be in work, and earn considerably more than non-graduates. For example, non-graduates were twice as likely to have no earnings as were graduates ten years on (30% against 15% for the cohort commencing their studies in 1999 and observed in 2011/12). Partly as a result of this, half of non-graduate women had earnings below £8,000 a year at around age 30. Only a quarter of female graduates were earning less than this. Half were earning more than £21,000 a year.

Among those with significant earnings (which we define as above £8,000 a year), median earnings for male graduates ten years after graduation were £30,000. For non-graduates of the same age, median earnings were £22,000. The equivalent figures for women with significant earnings were £27,000 and £18,000[3].

Differences in earnings by parental income

Graduates from richer family backgrounds earn significantly more after graduation than other graduates, even after completing similar degrees from similar universities. The average gap in earnings at the median between students from higher-income households and the rest was £8,000 (£5,300) a year for males (females), ten years after graduation.

Specifically, the raw gap between those from a higher-income background and the rest is around 30% for males and 24% for females at the median. Even after taking account of subject studied and the characteristics of the institution of study, the average student from a higher-income background still earned about 10% more than the other students at the median. Hence much of the explanation for the higher earnings of those from richer

[3] See also Britton et al. 2015 http://www.ifs.org.uk/publications/7997

backgrounds is down to their subject choice and the characteristics of their institutions, and this is truer for males. Nonetheless, subject and institution choice do not explain all of the earnings gap. The gap is also bigger for higher-paid graduates – the 10% highest-earning male (female) graduates from richer backgrounds earned about 20% (14%) more than the 10% highest earners from more modest backgrounds *even after taking account of subject and the characteristics of the university attended.*

Differences across universities

There are particularly big differences in graduates' earnings from different universities. This is in large part driven by differences in entry requirements, but the numbers are very striking. For instance, more than 10% of male graduates from LSE, Oxford and Cambridge were earning in excess of £100,000 a year ten years after graduation, with LSE graduates earning the most. LSE was the only institution with more than 10% of its female graduates earning in excess of £100,000 a year ten years on.

Even if we do not focus on the very top, a large number of institutions (36 for men and 10 for women) had 10% of their graduates earning more than £60,000 a year ten years on.

At the other end of the spectrum, there were some institutions (23 for men and 9 for women) where the median graduate earnings were less than those of the median non-graduate ten years on. It is important to put this in some context though. Many English higher education institutions draw a significant majority of their students from people living in their own region. Given regional differences in average wages, some very locally focused institutions may struggle to produce graduates whose wages outpace England-wide earnings, which include those living in London etc. To illustrate regional differences, employment rates in the period under consideration varied between 66% in the North East and 75% in the East of England,[4] and data from the Annual Survey of Hours and Earnings suggests that average full-time earnings for males were approximately 48% higher in London than in Northern Ireland, and

[4] Office for National Statistics, Regional Labour Market Statistics, July 2012, http://webarchive.nationalarchives.gov.uk/20160105160709/http://ons.gov.uk/ons/dcp171778_272411.pdf.

around 34% higher for females.[5] Regional differences are therefore important and we take account of region in our analysis of graduates' earnings. However, we cannot construct a more natural benchmark for these locally focused institutions, such as an estimate of the quantiles of the earnings of *non-university* people in their region, because the data we received from HMRC on *non-graduates* do not have that regional indicator and so we are unable to carry out that comparison.

Differences across subjects

Differences in earnings according to subject studied are also very substantial. There are some obvious high-earning subjects, as seen in Table 1 which shows the salaries of graduates at the 20th, 50th (median) and 90th percentiles about a decade after graduation by subject. Medical students were easily the highest earners at the median some ten years out, followed by those who studied economics. For men, median earnings for medical graduates were about £50,000 after about ten years, and those for economics graduates were about £40,000. The next-highest earners – graduates in engineering and technology – earned over £10,000 less than that on average but substantially more than graduates in some other subjects.

There are also differences across subjects in terms of the percentage achieving very high earnings, illustrated in Table 1 by considering the wages of graduates at the 90th percentile of the distribution. Here too, economics and medicine were high-earning subjects though the earnings premium that economists have at the very top of the earnings distribution is much greater. For example, at the 90th percentile, female earnings for those who studied economics were around £94,000, compared with £69,000 for medics. To put this in context, it is estimated that approximately 12% of male and 9% of female economics graduates earned above £100,000 some ten years after graduation; by contrast, about 6% (1%) of those studying medicine and 6% (3%) of those studying law were in that position.

[5] Annual Survey of Hours and Earnings: 2012 Provisional Results, http://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/bulletins/annualsurveyofhoursandearnings/2012-11-22#regional-earnings.

Some of these earnings differences are, of course, attributable to differences in student intake since students with different levels of prior achievement at A level take different subject options. When we account for different student intakes across subjects, only economics and medicine remain outliers with much higher earnings than one would expect given A-level performance as compared with their peers in other subjects. After allowing for differences in the characteristics of those who take different subjects, male medical graduates earn around £13,000 more at the median than similar engineering & technology graduates; the gap for females is approximately £16,000. Both male and female medical graduates earn around £14,000 more at the median than similar law graduates. For medicine, male graduates earn a premium of £21,000 at the median over those taking the subject that attracted the lowest earnings, namely creative arts, and the comparable figure for female medical graduates is £22,000. For economics, male graduates earn a premium of £14,000 at the median over those in creative arts, and female graduates a premium of £20,000. These differences between the highest- and lowest-paying subjects are sizeable in relation to the median earnings across all subjects of £26,600 for males and £22,900 for females.

Implications of the Findings

This research has shown the extent of the inequality in graduate earnings, even between graduates from similar institutions and taking the same subjects. There is no doubt that a degree offers a pathway to relatively high earnings for a large subset of graduates, from across a range of institutions, and certainly graduates earn more than non-graduates by some considerable margin in most cases.

The main finding from this paper is that graduates' family background, and specifically whether they come from a lower- or higher-income household, continues to influence graduates' earnings long after graduation, even when they experience the same higher education.

Our research also reveals significant differences in graduate earnings by degree subject and institution. Subjects such as medicine and economics have particularly high earnings relative to other subjects. At the other end of the scale, graduates in creative arts earn relatively less. Over the period we observe in our data, the proportion of students taking subjects such as economics, law and maths & computer science has reduced marginally, and more take subjects such as creative arts. It is too early to determine whether this is a trend, although Universities UK data do suggest stronger growth between 2002 and 2011 in business & administrative studies, biological sciences, education, social studies and creative arts & design and rather weaker growth in law, mathematical sciences and computer science, to name but a few.[6] We must be mindful that graduates who study subjects such as creative arts tend to earn less and if the numbers taking these subjects increase disproportionately, this may bring down the aggregate graduate earnings premium. We cannot assume, however, that changes in subject choice are entirely driven by changes in the demand from students for different subjects. It may also be that universities have expanded the number of places available in some subjects that are cheaper to teach than others. Whether driven by student demand or university decisions, if we expand subjects that attract lower earnings, the level of public subsidy for these graduates will be greater than that for graduates in other subjects. Making this explicit when considering the shape of higher education, and in particular where any further expansion might take place, would seem important. To the extent that expansion of higher education may draw in students from poorer backgrounds, it is also crucial that we understand the implications of the degree choices that these students will make for their economic success.

This research also clearly shows the potential value of providing some useful information that might inform students' choice of degree, and particularly to assist students from more disadvantaged backgrounds who might find it harder to navigate the higher education system. We recognise, of course, that many other factors, such as intrinsic interest, will and should drive student choice. However, it would seem important to ensure there is adequate advice and guidance given that graduates' future earnings are likely to vary depending on the institution and subject they choose, with implications for social mobility.

[6] Figure 13 of Universities UK, Patterns and Trends in UK Higher Education 2012, http://www.universitiesuk.ac.uk/highereducation/Documents/2012/PatternsAndTrendsinUKHigherEducation2012.pdf.

Table 1: Graduate earnings (£000s) by subject of degree (includes those without earnings)

	Female Percentile			Male Percentile		
	20th	50th	90th	20th	50th	90th
Medicine	23.7	45.4	68.8	33.0	55.3	84.7
Economics	20.3	38.2	93.9	6.6	42.0	121.4
Engineering & technology	1.2	23.2	48.3	7.3	31.2	58.4
Law	4.8	26.2	62.8	3.5	30.1	79.5
Physical sciences	6.0	24.8	46.5	9.0	29.8	56.2
Education	7.6	24.4	38.6	9.7	29.6	41.8
Architecture	5.4	22.5	42.6	6.1	28.6	49.4
Subjects allied to medicine	4.2	22.1	40.6	7.1	27.9	49.1
Missing LEM	1.4	21.0	46.4	1.8	27.1	61.9
Maths & computer science	3.3	22.0	53.3	6.4	26.8	57.5
Business	4.1	22.0	48.9	6.9	26.5	58.6
History & philosophy	2.6	23.2	50.0	2.8	26.5	64.2
Social sciences	4.4	20.5	40.9	4.5	26.2	56.8
Biological sciences	5.5	23.8	41.7	4.0	25.2	46.5
Euro languages and literature	0.0	26.4	58.1	0.0	25.0	78.1
Linguistics and classics	5.0	23.2	43.2	3.9	24.1	52.9
Missing STEM	3.6	21.1	46.1	2.7	23.2	46.4
Missing other	2.3	19.2	39.5	3.5	22.8	44.4
Veterinary & agriculture	2.7	18.9	39.4	5.1	21.4	44.2
Mass communication	3.4	18.1	38.4	1.7	19.3	42.7
Creative arts	0.3	14.5	35.3	2.7	17.9	37.4

Note: Female and male 20th, 50th and 90th percentile earnings (£000s) for the 1999 cohort in 2012/13. Some institutions are small and hence it is potentially disclosive to identify an individual's precise subject of degree. These individuals will appear in one of the following categories, depending on the subject area in which their degree is located: Missing LEM, Missing STEM or Missing Other. LEM – Law Economics and Management. STEM – Science Technology Engineering Mathematics.