Socio-economic differences in university outcomes in the UK: drop-out, degree completion and degree class

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There are large socio-economic gaps in higher education participation. But returns to education in the UK derive largely from the attainment of qualifications rather than years of study, and additionally vary by institution, subject and degree class for graduates. This paper provides new evidence on what happens to young people from different backgrounds once they arrive at university, exploring socio-economic differences in drop-out, degree completion and degree class. We find that the large raw differences in university outcomes between individuals from different socio-economic backgrounds can largely be explained by the fact that they arrive at university with very different levels of human capital. Comparing individuals on the same course makes relatively little difference to the remaining socio-economic gaps in university outcomes, with those from higher socio-economic backgrounds still 3.4 percentage points less likely to drop-out, 5.3 percentage points more likely to graduate and 3.7 percentage points more likely to graduate with a first or 2:1 than those from lower socio-economic backgrounds. These findings are in stark contrast to similar analysis by school characteristics (e.g. Crawford, 2014), which shows that, amongst students with the same grades on entry to university, those from worse-performing schools are less likely to drop-out, more likely to complete their degree and more likely to obtain a first or 2.1 than those from better-performing schools. This suggests that it is more challenging for universities interested in using contextual data to inform their admissions policies to predict those with high potential based on socio-economic background than based on school characteristics.

Key words: higher education, socio-economic gaps, drop-out, degree class, contextual admissions

JEL codes: I23, I24

1 Introduction

Education is an important link between the socio-economic circumstances in which individuals are raised and their own socio-economic circumstances in adulthood (e.g. Blanden et al. 2007). This arises because there are substantial returns to the acquisition of qualifications (e.g. Blundell et al., 2005; Dickson and Smith, 2011) – and in particular to high grades in particular subjects studied at certain institutions (e.g. Bratti and Manchini, 2003; Chevalier, 2011, 2014; Chevalier and Conlon, 2003; Feng and Graetz, 2013; Hussain et al., 2009; Walker and Zhu, 2011) – but large differences in the likelihood of acquiring these qualifications by socio-economic background (e.g. Blanden and Macmillan, 2014).

Socio-economic differences in the acquisition of higher education (HE) in particular could be driven by the fact that young people from disadvantaged backgrounds are less likely to go to university in the first place, but could be exacerbated if these individuals are also more likely to drop out – and less likely to acquire the highest degree classifications – once they are there.

The UK is often regarded as a country with relatively high barriers to university entry and relatively low drop-out rates from an international perspective, although there have been marked changes in degree acquisition relative to other countries over time. For example, Blundell et al. (2014) show that there has been a huge increase in the proportion of individuals from different birth cohorts with a degree in the UK, while the change in the US has been much less marked: amongst those born 1960-64 in the UK, 16% had acquired a degree by age 30, while amongst those born twenty years later, this figure had risen to 44%. The equivalent figures for the US are 24% and 34%.

It is still the case, however, that the UK has lower entry rates and higher completion rates than the US. For example, Table C3.1a of OECD (2013) shows that 64% of pupils in the UK are expected to enter higher education to study for a first degree at some point during their lifetime, compared to 72% of pupils in the US. Of those who enter, Table A4.1a of OECD (2013) shows that just under 80% are expected to complete their degree in the UK compared to just under 65% in the US.

In common with many other countries, however, there are steep socio-economic gradients in university entry, drop-out and degree class in the UK (e.g. Chowdry et al., 2013; Johnes and McNabb, 2004; McNabb et al., 2002; Smith and Naylor, 2001a,b; Vignoles and Powdthavee, 2009), which have been recognised in recent policy discussions.[2] For example, the latest figures from the Department for Business, Innovation and Skills suggest that 21% of students who are eligible for free school meals (an indicator for low family income) enter university by age 19, compared to 39% of those who are not eligible for free school meals.[3] Similarly, HEFCE (2013) shows that, amongst those in university between 2005-06 and 2010-11, students from the fifth of areas with the highest HE

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[2] See, for example,
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/299689/bis-14-516-national-strategy-for-access-and-student-success.pdf and
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/80188/Higher-Education.pdf

[3] Source: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/328475/widen-partic-HE-2014v2.pdf. 15-20% of students are eligible for free school meals in any given year (see https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/335176/2014_SPC_SFR_Text_v101.pdf).

participation rates are around 4 percentage points less likely to drop-out of university within one year of entering than those from the fifth of areas with the lowest HE participation rates.

Previous research has shown that prior attainment plays a key role in helping to explain why some young people are more likely to go to university than others (and why some perform better than others once they are there) (e.g. Smith and Naylor, 2001a; Gayle et al., 2002; McNabb et al., 2002; Galindo-Rueda et al., 2004; Chowdry et al., 2013). It has also shown that university progression and performance measures vary by both subject and institution (e.g. Johnes, 1990; Johnes and Taylor, 1989; Smith and Naylor, 2001b). This suggests that both the human capital with which individuals enter university and their institution and subject choice are likely to be crucial determinants of their subsequent educational decisions and performance.

What is less clear from existing evidence, however, is the extent to which differences in human capital on entry to university, and institution and subject choice, can help to explain why young people from poorer backgrounds are more likely to drop-out, less likely to complete their degree and less likely to be awarded the highest degree classifications than young people from richer backgrounds. This paper sheds new light on this issue, using rich individual-level administrative data on cohorts starting university in the mid 2000s.

This data enables us to follow all English-domiciled students attending higher education in the UK since 2004-05 (English-domiciled students make up approximately 80% of all students attending UK universities[4]), providing information on where and what they study, and how well they do in their degree. It also provides detailed information on the human capital they have acquired prior to entering university, enabling us to account for a very rich set of measures of attainment in national tests at ages 11, 16 and 18, as well as a limited set of demographic characteristics.

We find sizeable differences in the likelihood of dropping out of university within two years and completing a degree within five years, and in the probability of graduating with a first or a 2:1 (the two highest degree classifications in the UK), between individuals from different socio-economic backgrounds (defined using a combination of individual and neighbourhood measures of disadvantage). A substantial proportion of these raw differences – between 55% and 80% - can be explained by the fact that individuals from different socio-economic backgrounds enter university with different levels of human capital. This suggests that a key part of any strategy to reduce socio-economic inequalities in degree acquisition and performance should be to increase the attainment of those from the poorest families earlier in the school system.

We do not have access to information on the resources and approaches that universities apply to increasing retention and improving performance amongst their students. Given previous evidence that drop-out, degree completion and degree class vary by subject and institution, we can, however, use a fixed effects approach in order to compare individuals from different socio-economic backgrounds on the same courses (i.e. at the same institutions studying the same subjects).

Doing so makes little difference to the socio-economic gaps in university outcomes that remain after accounting for differences in human capital on entry to university. Moreover these differences do

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[4] Source: Authors' calculations based on Table 4 of HESA Statistical First Release 197: http://www.hesa.ac.uk/index.php?option=com_content&task=view&id=3103&Itemid=161.

not vary dramatically according to the type of institution that an individual attends: there are significant differences in the likelihood of dropping out, completing a degree and graduating with a first or a 2:1 even within relatively high status universities that are likely to attract only the highest achieving students from lower socio-economic backgrounds. Our results suggest that young people from the most deprived backgrounds are still 3.4 percentage points more likely to drop-out, 5.3 percentage points less likely to complete their degree and 3.7 percentage points less likely to graduate with a first or 2:1 than those from the least deprived backgrounds.

This is in stark contrast to analysis of the differences in degree outcomes by school characteristics (e.g. Crawford, 2014; HEFCE, 2014; Smith and Naylor, 2001a). The raw differences suggest that students from the best-performing schools tend to outperform those from the worst-performing schools; however, these relationships are reversed once we compare individuals with the same human capital on entry to university, with those from the worst performing schools now, on average, less likely to drop-out, more likely to complete their degree and more likely to graduate with a first or a 2:1 than those from the best performing schools.

These results provide important new insights for universities interested in the choice between using school or individual (or neighbourhood) measures of deprivation to inform their admissions policies. While, on average, students from the worst-performing schools go on to outperform students with the same human capital from the best-performing schools, the same is not true if we compare individuals from lower and higher socio-economic backgrounds. Thus, while the evidence suggests that if universities were to account for school performance in making admissions offers they would, on average, get it right most of the time, the same is not necessarily true of using (individual or neighbourhood measures of) socio-economic background. That is not to say that no individuals from lower socio-economic backgrounds will go on to outperform their more advantaged counterparts; simply that it is not true on average, thus presenting a greater challenge for universities to identify those from lower socio-economic backgrounds with strong potential to succeed.

This paper now proceeds as follows: Section 2 offers a brief overview of the relevant literature and Section 3 a little institutional background on the education system in England; Section 4 describes the individual-level administrative data that we use for our analysis; Section 5 outlines our methodology; Section 6 discusses our main results; and Section 7 concludes.

2 Previous literature

There are large socio-economic differences in HE participation in the UK. For example, using data on English-domiciled students, Chowdry et al. (2013) show that males (females) from the bottom fifth of an index of socio-economic status are 40.1 (44.2) percentage points less likely to go to university than males (females) from the top fifth of the index. But returns to education tend to accrue via qualifications rather than years of schooling in the UK (e.g. Dickson and Smith, 2011), suggesting that differences in participation may not be the whole story: one must also consider whether – amongst the select group of individuals who go to university – there are socio-economic differences in the likelihood of going to a top university, completing a degree and graduating with a first or a 2:1.

We know that, amongst older cohorts in the UK, there were large socio-economic differences in drop-out, degree completion and degree class. For example, using data on students leaving "traditional" universities in 1993, Johnes and McNabb (2004) find that those whose parents work in

higher social class occupations are significantly less likely to drop-out (and significantly more likely to complete their degree) than those from lower social class backgrounds, even after conditioning on a range of other individual, family background and institutional characteristics, although Smith and Naylor (2001b), using the same data, do not identify such a strong relationship.

Blanden and Macmillan (2014) show that, amongst a sample of individuals graduating from university in the late 1970s, 20% of those from the fifth of families with the highest incomes have completed a degree by age 23, compared with just 6% of those from the fifth of families with the lowest incomes, a gap of 14 percentage points.

Finally, using similar data to Johnes and McNabb (2004) and Smith and Naylor (2001b) – focusing on those graduating from "old" universities in 1993 – Smith and Naylor (2001a) and McNabb et al. (2002) find strong evidence that students whose parents are from a higher occupational class are more likely to be awarded a higher degree class. This relationship holds for both males and females

We also have some evidence on how these relationships have changed amongst more recent cohorts of university entrants in the UK. In terms of drop-out, Vignoles and Powdthavee (2009) look at 18-year-old entrants to university in 2004-05 and show that a student from a professional background is 1.3 percentage points less likely to drop out after their first year than a student from a managerial background, even after accounting for a variety of other individual and area-level characteristics. In terms of degree completion, Blanden and Macmillan (2014) show how the gap in degree acquisition rates between the most and least deprived families have changed over time, rising to around 37 percentage points amongst a cohort graduating from university in the late 1990s – although it appears to have fallen back slightly in the early 2000s, to around 34 percentage points. A similar pattern is observed in terms of HE participation during the 2000s (e.g. Crawford, 2012).

There has been less work on socio-economic differences in degree acquisition in recent years, although Crawford (2014) and HEFCE (2014) explore the relationship between the characteristics of the school attended prior to university and degree class. Both studies show that those from better-performing schools are more likely to achieve higher degree classes than those from worse-performing schools, but that this relationship is reversed once account is taken of an individual's attainment on entry to university. This suggests that, conditional on attainment, those from the worst-performing schools are likely to outperform those from the best-performing schools once at university.

Many of these studies have highlighted the strong correlation between attainment on entry to university and subsequent outcomes (e.g. Johnes, 1990; Johnes and McNabb, 2004; Johnes and Taylor, 1989; McNabb et al., 2002; Smith and Naylor, 2001a,b), but very few have explicitly assessed the role of prior achievement in explaining socio-economic differences in degree outcomes. Vignoles and Powdthavee (2009) are one obvious exception: they can explain around half of the drop-out rate that they observe amongst 18-year-old university entrants by accounting for a rich set of measures of prior attainment on entry to university. One of the key contributions of our study is to assess the role of prior attainment in explaining socio-economic differences in drop-out, degree completion and degree class. We build on Vignoles and Powdthavee (2009) by considering more outcomes, a richer set of measures of prior attainment, and more recent cohorts of students.

In addition to attainment on entry to university, previous research has also focused on the role played by the institutional environment in explaining differences in degree outcomes (e.g. Bound and Turner, 2011, emphasise the role of supply side factors). For example, previous studies in the UK have highlighted differences in drop-out or degree completion by institution and subject (e.g. Johnes, 1990; Johnes and Taylor, 1989; Smith and Naylor, 2001b). Johnes and McNabb (2004) also investigate the impact of different measures of institutional quality on degree completion rates, showing that, for example, research quality, teaching quality and staff-student ratios are all positively associated with the likelihood of completing a degree; McNabb et al (2002) find similar positive links between these measures of institutional quality and degree performance.

Emphasis has also been placed on the potentially crucial role played by the appropriateness of the match between student and university in determining drop-out and completion rates. For example, the conceptual framework put forward by Tinto (1987) emphasises the way in which students adjust and fit in to university life – alongside their attitudes (e.g. their aspirations and commitment to the course), and the role of external factors (e.g. financial pressures or commitments to family) – as potential determinants of an individual's decision to stay in university and complete their degree. Bean and Metzner (1985) also suggest that traditional students are more susceptible to "match" factors in making their decision to stay or leave, while non-traditional students – including those studying part-time – were more susceptible to external factors in making their decisions.

Smith and Naylor (2001b) and Johnes and McNabb (2004) investigate the role of various measures of integration in explaining the likelihood of dropping out of university. Both studies consider whether the student lives at home or on campus, finding that those who live on campus are significantly less likely to drop out. Both also consider the gender composition of the students' course, and Smith and Naylor (2001b) additionally consider the proportion of students from independent schools, lower social class backgrounds, and so on. Neither study finds strong evidence that these compositional factors play an important role in explaining different propensities to drop-out of university. Johnes and McNabb (2004) additionally consider the relative ranking of students in terms of their A-level scores, finding – perhaps surprisingly – that those with lower relative rankings are less likely to drop-out of university.

Of course, drop-out could be regarded as a rational choice for some students (e.g. Manski, 1989). However, the substantial increase in university participation in recent years – especially amongst students from non-traditional backgrounds – has lead to an increasing focus on ensuring that students make the right decisions when applying to university and have the support necessary to continue with their studies once they are there in policy discussions in the UK.[5]

We build on these previous studies by focusing explicitly on socio-economic differences in degree outcomes and exploring the extent to which these differences can be explained by: a) a very rich set of measures of the human capital with which students enter university, and; b) institution and subject choice. To do so, we use individual-level administrative data on recent cohorts of English-domiciled students attending university in the UK.

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[5] See, for example,
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/299689/bis-14-516-national-strategy-for-access-and-student-success.pdf and
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/80188/Higher-Education.pdf

3   Institutional background

Because our data focuses on English-domiciled students attending university in the UK (who comprise approximately 80% of all students attending university in the UK), we provide institutional background on the education system in England.

Compulsory education in England begins at age four for most children, with seven years of primary schooling culminating in national achievement tests taken at age 11 in English, maths and science. Following a further five years of secondary schooling, most students take public exams known as General Certificates in Secondary Education (GCSEs), which to a large extent determine whether they can continue into post-compulsory education.[6] Students typically take at least eight GCSEs (or equivalent qualifications), including in English, maths and at least one science subject. Around two thirds of students reached the government's benchmark of 5 A*-C grades in GCSEs or equivalent qualifications by age 16 in 2013, with a further 20% achieving this benchmark by age 19.[7]

A substantial majority of the population stay in education beyond age 16, including virtually all students who go on to university at age 18 or 19. Following two years of study, most of those who stay on will take three or four Advanced Levels (A-levels) or other equivalent, largely vocational, qualifications, with approximately 60% getting the equivalent of 2 or more A-level passes by age 19 in 2013 (up significantly from around 40% in 2004).[8]

Approximately 35% of the population entered higher education at age 18 or 19 over the period that we study. Higher education in the UK is primarily (but not exclusively) delivered in around 160 universities. There is a centralised admissions process, with students able to apply to up to five courses (to study a particular subject at a particular institution). Most first degree courses last for 3 or 4 years, which – together with the fact that the proportion of the population entering higher education later in life is relatively low in the UK compared to some other countries – contributes to the UK having the lowest average age at graduation in OECD (2013).[9]

There have been a number of changes to the way in which higher education is financed over our period of study, with tuition fees increasing from £1,200 in 2005-06 (payable upfront) to up to £3,375 in 2011-12 (covered by government-backed loans to students which are repayable after graduation).[10] However, there is little evidence that these changes have reduced access to university for disadvantaged students (e.g. Crawford and Dearden, 2010; Crawford, 2012).

Universities design, deliver and award their own degrees. Each institution has control over the course content, method of examination and awarding of degrees (subject to scrutiny by external bodies). There is thus some concern that the quality of degrees awarded varies by institution and

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[6] Compulsory education ended at age 16 for the cohorts that we analyse, but students must now stay in some form of education of training (which they can combine with work under certain circumstances) until age 18.

[7] Source: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/295696/SFR_10-2014.pdf.

[8] Source: see footnote 7.

[9] Source: Chart A3.1 in OECD (2013).

[10] The cap on tuition fees was further increased to £9,000 per year in 2012-13, but this is outside the period covered by our data.

subject.[11] The system of degree classification in the UK is broad, with students generally awarded one of five degree classifications: first (the highest degree classification), 2:1, 2:2, 3rd or unclassified. Amongst those graduating in 2011-12, approximately 15% of students were awarded a first class honours degree and just under half were awarded a 2:1[12], which is a critical cut-off: having a 2:1 is often used as a benchmark by employers when recruiting graduates and by universities in deciding whether to admit students for postgraduate study.

Figure 1 provides some sense of the variation across courses in the proportion of students who drop-out, the proportion who complete their degree and the proportion who are awarded a first or a 2:1. The unit of analysis is the course (subject-institution), with figures averaged across the years for which we observe these outcomes in our data (see Section 4 below for further details). As outlined in the introduction, the UK has lower average drop-out rates than some other countries, although there appear to be some courses with very high drop-out rates (and low completion rates). There is greater variation in the proportion of students on a particular course who graduate with a first or a 2:1, with more than 50% of students awarded these classes across more than half of all courses across the period of study. (Medics can take longer than 5 years to complete their course and do not receive a degree class, hence the clustering at zero.)

Figure 1   Distribution of the likelihood of dropping out within 2 years, completing a degree within 5 years and graduating with a first or 2:1, by university course

kernel = epanechnikov, bandwidth = 0.0156
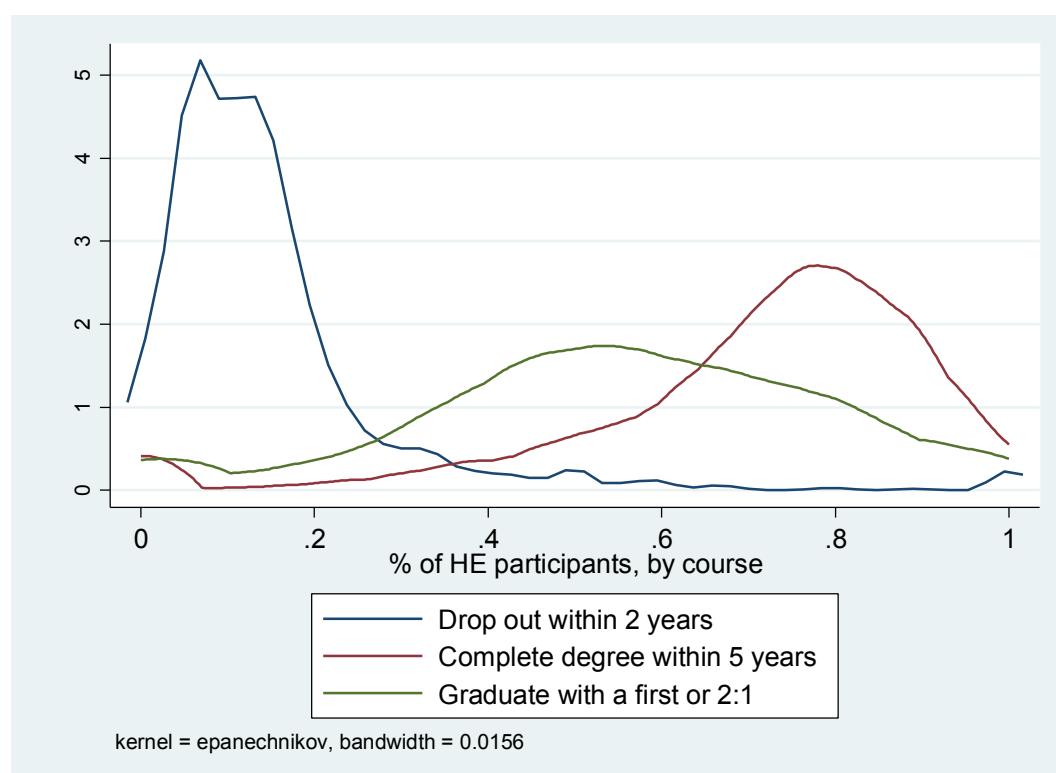
Source: authors' calculations using data on English-domiciled students entering UK universities between 2004-05 and 2009-10. All outcomes are as defined in Section 4 below and collapsed at the course (institution-subject) level..

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[11] See, for example, http://www.publications.parliament.uk/pa/cm200809/cmselect/cmdius/170/170i.pdf.

[12] Source: Table 6 of
http://www.hesa.ac.uk/index.php?option=com_content&task=view&id=2355&Itemid=161.

4 Data

To carry out our analysis, we use linked individual-level administrative data from schools, colleges and universities. The information from schools – the National Pupil Database (NPD) – comprises an annual census of pupils attending state schools in England, together with the results of national achievement tests for all pupils in England who sat them (covering both state and private school students). The information from sixth forms and further education colleges – which together cater for most students undertaking A-levels – comes from two sources, which together provide an annual census of those attending further education colleges and those studying for qualifications outside the compulsory education system in England, including details of the qualifications achieved.[13] The data on universities comes from the Higher Education Statistics Agency (HESA) and provides an annual census of all students attending higher education institutions throughout the UK.

We focus on English-domiciled students who attended any UK university for the first time at age 18 or 19 between 2004-05 and 2009-10, with each cohort including between 180,000 and 235,000 HE participants. Table 1 shows the progression of our cohorts through the English education system.

Table 1   Progress of our cohorts through the education system in England

Outcome	Cohort 1	Cohort 2	Cohort 3	Cohort 4	Cohort 5
Born	1985–86	1986–87	1987–88	1988–89	1989–90
Sat Key Stage 2 (age 11)	1996–97	1997–98	1998–99	1999–2000	2000–01
Sat GCSEs /Key Stage 4 (age 16)	2001–02	2002–03	2003–04	2004–05	2005–06
Sat A levels /Key Stage 5 (age 18)	2003–04	2004–05	2005–06	2006–07	2007–08
HE participation (age 18 or 19)	2004–05 or 2005-06	2005–06 or 2006-07	2006–07 or 2007-08	2007–08 or 2008-09	2008–09 or 2009-10
Drop-out within two years	2004-05 to 2007-08	2005-06 to 2008-09	2006-07 to 2009-10	2007-08 to 2010-11	2008-09 to 2011-12
Complete degree within 5 years	2004-05 to 2009-10	2005-06 to 2010-11	2006-07 to 2011-12		

The combined data set includes public examination results (GCSEs, A levels and equivalent vocational qualifications) at ages 16 and 18 for all pupils who sat them, as well as an identifier for the school in which they did so. For pupils in state schools, it also includes a variety of background characteristics, plus national achievement test scores taken at the end of primary school (at age 11). For those educated outside the state system (including those at private school), we have only limited background information (gender and date of birth).

Together, these datasets (known collectively as the NPD-HESA data) enable us to follow English-domiciled entrants to UK higher education institutions through the university system to see whether they complete their degree and if so how well they do. The detailed information available from before they start university also enables us to explore the factors that may affect their decision to drop-out or complete their degree, and what degree class they go on to obtain.

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[13] These are the Individual Learner Records (ILR) and National Information System for Vocational Qualifications (NISVQ) databases.

Outcomes

Course completion: this variable is equal to 1 if the individual in question went to university full-time to study for a non-medical first degree and was recorded as completing their course within five academic years of entry, and it is 0 if they went to university full-time to study for a non-medical first degree but were not recorded as completing their course within this period.[14]

We regard individuals as having completed their course if: (a) at least one of their HESA records over the relevant period includes a code indicating that the reason they left the institution in question is that they successfully completed their course; (b) even if this code is missing, degree class is non-missing in at least one record over this period. In both cases, we require students to have been at university for at least as long as their course was supposed to last in order to class them as a successful completer.

Using this definition, 78.2% of those who go to university at age 18 or 19 successfully complete their course within five years. This figure is similar to those produced (using a different method) by HESA, who predict that, amongst the cohort of students starting a first degree full-time in 2010–11, 80.5% will have completed their degree within 15 years.[15]

Dropout: this variable is equal to 1 if the individual in question went to university but dropped out of HE completely within two years of initial entry, and it is 0 if they went to university but did not drop out within this period. In line with our other work on degree outcomes (Crawford, 2014), we make use of the panel element of the HESA data in order to define dropout (rather than relying on codes reported within a particular year's HESA data). This enables us to focus on dropout from HE entirely, rather than from a particular institution. With this in mind, individuals are classified as having dropped out if they appear in one year of the HESA data and not in the next (without having completed their course using our definition).

To minimise potential measurement error (arising because successful completion of a course is not always perfectly observed), we restrict attention to dropout within the first three years of appearing in the HESA data (i.e. between years 1 and 2 or 2 and 3 of an individual's time at university). Using this definition, 11.5% of those who go to university at age 18 or 19 have dropped out by the time of the HESA census in their third year. This figure falls slightly (to 9.7%) if we focus on those who were studying full-time for first degrees. HESA only produces estimates of dropout between years 1 and 2 for full-time first-degree entrants: amongst those who started their degree in 2010–11, it estimates that 6.3% of young entrants left HE entirely between years 1 and 2;[16] the equivalent figure for our sample of English-domiciled students is 4.2%, suggesting that, if anything, our figures may underestimate the proportion of all students at UK universities who drop out in these early years.

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[14] We consider course completion up to five years after entry to allow sufficient time for individuals studying full-time on longer courses to graduate. We exclude medical students, as they do not typically receive a degree class; hence we do not want to include them in our degree class sample. It is worth noting, however, that lifting this restriction would not materially change our results.

[15] Source: Table T5_1112 at
http://www.hesa.ac.uk/index.php?option=com_content&task=view&id=2064&Itemid=141.

[16] Source: Table T3a_1112 at
http://www.hesa.ac.uk/index.php?option=com_content&task=view&id=2064&Itemid=141.

The proportion who go to university at age 18 or 19 but drop out within two years is lower than the proportion who do not complete their degree within five years. The difference between the two includes individuals who drop out after Year 3 and individuals who fail their course. We choose to investigate both in this study, as the determinants of early vs. late non-completion may differ.

First or 2:1: this variable is equal to 1 if the individual in question went to university full-time to study for a non-medical first degree, successfully completed their degree within five years of entry and graduated with a first or a 2:1 as their degree class, and it is 0 if they went to university full-time to study for a non-medical degree and successfully completed it within five years of entry but did not graduate with a first or a 2:1 as their degree class. We take degree classifications from the first HESA record in which such information appears (after the individual has completed their degree). On our definition, 64.6% of those studying full-time for a first degree in a non-medical subject who complete their course within five years graduate with a first or a 2:1. This is very similar to the estimates produced by HESA, which show that amongst those who graduated with a classified degree in 2010–11 having studied full-time, 64% acquired a first or a 2:1.[17]

Socio-economic background

Ideally, we would want rich individual-level data on pupils' socio-economic background, but the administrative data are weak in this respect: the only individual-level indicator we observe is the pupil's eligibility for free school meals (FSM) at age 16 (an indicator of being in receipt of state benefits), and that only for pupils who attend state schools.

Whilst we could use the FSM indicator alone as our measure of socio-economic status, this would only capture differences in participation for those who are eligible (approximately 16% of the school population) and those who are not, i.e. the lowest part of the distribution vs. the rest. Instead, we choose to make use of the fact that we observe the home postcode of state school pupils at the same age, to link in detailed information about the area in which they live.

Whilst we recognise that it is not ideal, we opt to combine individual and neighbourhood level data to create an index of socio-economic background, to provide a broader, more continuous measure of family circumstances. This index combines, using principal components analysis, the pupil's eligibility for free school meals (measured at age 16) with the following neighbourhood-based measures of socio-economic circumstances (linked in on the basis of home postcode at age 16):

- their Index of Multiple Deprivation score (designed to capture lack of access to jobs or services, and available for neighbourhoods containing approximately 700 households);

- their ACORN type (constructed using information on socio-economic characteristics, financial holdings and property details; available for neighbourhoods of approximately 15 households);

- three measures from the 2001 Census: the proportion of individuals in each area: a) who work in higher or lower managerial/professional occupations; b) whose highest educational qualification is equivalent to 2 or more A-level passes or above; c) who own (either outright or through a mortgage) their home (available for neighbourhoods containing approximately 150 households).

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[17] Source: http://www.hesa.ac.uk/index.php?option=com_content&task=view&id=2355&Itemid=161.

Chowdry et al. (2013) demonstrate the validity of this index as a measure of socio-economic position by comparing it with individual measures of socio-economic position from the Longitudinal Study of Young People in England.

We split the state school population into five quintile groups on the basis of this index, and include the four highest quintile groups in our models. While we focus on the differences in degree outcomes amongst state school students, it is also of interest to understand how much difference including private school students would make to our analysis. We do not observe FSM eligibility and home postcode for private school students, however, thus we must make some assumptions about their socio-economic position relative to state school students in order to include them in our analysis. Given the high average fees paid to attend private schools, it does not seem unreasonable to assume that private school pupils come from families of higher socio-economic position than most state school pupils (see also Figure 4 of Anders, 2014). We therefore add them to the top quintile group (and do not re-estimate the quintile groups, such that the top quintile group is larger than the remaining quintile groups).

Other background characteristics

We observe gender, month of birth and government office region for all pupils. We observe ethnicity and language status for the vast majority of HE participants in our sample who previously attended state schools (over 99%) and a small number of those who previously attended private schools (around 9%) who have attended a state school at some point over the period covered by our data. We also observe eligibility for free school meals and statemented (more severe) and non-statemented (less severe) special educational needs status for pupils in state schools at age 16.[18]

We have access to scores from national achievement tests taken by state school pupils at age 11 (Key Stage 2), plus rich measures of attainment for all pupils who sat the relevant qualifications at Key Stages 4 and 5 (GCSEs and A levels and equivalents). We use marks from tests in English, maths and science at Key Stage 2 (age 11) to calculate continuous Key Stage test levels in each subject and split pupils into five equally-sized groups on the basis of their achievement in each subject. Because Key Stage 2 tests do not have to be taken in private schools, we observe this information only for the sizeable proportion (around 65%) of private secondary school pupils who attended a state primary school.[19] We use a rich set of measures to account for differences in subjects, qualifications and grades at Key Stage 4 (age 16)[20] and Key Stage 5 (age 18).[21] We observe this information for pupils attending both state and private schools.

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[18] While we could in principle include information about a pupil's FSM or SEN status for private school students who have attended a state school at some point, we do not do so on the basis that this information could change over time.

[19] It is worth noting that we observe Key Stage 2 test scores for a substantially higher proportion of private school pupils than we observe background characteristics because we can only observe background characteristics from 2001–02 onwards, while we can potentially observe Key Stage 2 test scores for all pupils who have sat them since the tests were introduced in 1994-95.

[20] Specifically, we include controls for: highest grades in English and Maths; number of GCSEs at grades A*, A, B, C and D-G in "high status" subjects (science, humanities and languages); the number of GCSEs at grades A*, A, B, C and D-G in other subjects; the number of GNVQs (a vocational qualification) at grades A, B, C and D-G; whether the pupil achieved a Level 2 qualification by age 18 (equivalent to 5 or more GCSEs at grades A*-C);

We also include some information on the secondary school that each young person attended at age 16. Specifically, we include information on school type (whether it is run by the state or private sector, and the degree of control state schools have over their budgets and admissions policies), whether the school selects students on the basis of ability, whether the school has an attached sixth form college (in which students can study for post-compulsory education qualifications) and the quintile group of school performance, defined on the basis of the proportion of students that achieve at least the government's benchmark of 5 GCSEs at grades A*-C at age 16.

Pupils for whom some or all of this information is missing are still included in our analysis through the use of dummy (binary) variables that indicate missing values. We will explore in future work the impact of using multiple imputation techniques instead.

University and course characteristics

Finally, we want to account for the type of institution that the young person attends, the subject that they study and the "match" or degree of integration between the student and the course.[22]

To capture the influence of subject choice, we use a set of dummy variables indicating whether the young person was studying each of 20 subjects: medicine and dentistry; subjects allied to medicine; biological sciences; veterinary sciences and agriculture; physical sciences; mathematical sciences; computer sciences; engineering; technologies; architecture, building and planning; social studies; law; business and administrative studies; mass communications and documentation; linguistics and classics; European languages and literature; non-European languages and literature; historical and philosophical studies; creative arts and design; education.

To capture the influence of type of institution, we use another set of dummy variables indicating which of five self-defined institutional groupings they attend: Russell Group, 1994 Group, University Alliance, Million+, Guild HE, or any other institution (see the online appendix for details). We additionally create a set of course indicators – the interaction between institution and subject – and effectively include a series of dummy variable indicators for each course in our final specification. (See Section 5 for further discussion of our analytical approach.)

We also include a binary indicator for whether the student attends an institution in the same region in which they live. There is some evidence (e.g. Artess et al., 2014) that disadvantaged students are more likely to live at home when they go to university. There is also evidence that those who live at home are more likely to drop-out of university (e.g. Johnes and McNabb, 2004; Smith and Naylor,

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whether they achieved Level 2 via a non-academic (further education or vocational) route; quintile groups created on the basis of total points from Level 2 academic qualifications.

[21] Specifically, we include controls for: number of A-levels at grades A, B, C, D and E in "high status" subjects (English, maths, science, humanities and languages); number of A-levels at grades A, B, C, D and E in other subjects; quintile groups created on the basis of total points achieved at Key Stage 5; whether the pupil achieved a Level 3 qualification by age 18 (equivalent to 2 or more A-levels at grades A-E); whether they achieved Level 3 via a non-academic (further education or vocational) route; quintile groups created on the basis of total points from Level 3 academic qualifications.

[22] When looking at dropout, we also account for whether they were studying for a first degree and whether they were studying part-time. These characteristics do not vary when we look at degree completion or degree class as we restrict attention to those studying full-time for first degrees only.

2002b). Unfortunately we do not observe whether students lived at home in our data, but we do observe whether the student attended a university in the same region as they lived, which can be thought of as a crude proxy for living at home.

We additionally run our analysis on a group of "high status" institutions to see whether socio-economic differences in degree outcomes are lower in more selective institutions. To do so we follow our previous work on this topic (e.g. Chowdry et al., 2013) in defining "high-status" institutions as all members of the Russell Group plus all UK universities with an average institution-level score from the 2001 Research Assessment Exercise (RAE) – a measure of research quality – exceeding the lowest found among the Russell Group. This gives a total of 41 'high-status' universities (listed in the online appendix).

5 Methodology

We are interested in modelling the relationship between socio-economic background and degree outcomes, and exploring the extent to which accounting for the other ways in which individuals from different socio-economic backgrounds differ can help to explain the relationships that we observe.

We would obviously like to uncover the *causal* effects of socio-economic status on degree outcomes, but in the absence of any experimental or quasi-experimental variation in socio-economic background, it is possible that socio-economic status (SES) may be endogenous. To maximise our chances of estimating the causal impact of socio-economic status on degree outcomes, we rely on richly specified regression models, modelling degree outcomes as a function of an individual's background characteristics, a rich set of measures of their human capital at the point of entry into higher education, and some information about their university experience. The strength of our analysis is that we have extremely rich longitudinal data on the educational performance and achievement of children from age 11 onwards, which may allow us to account for some unobservable factors that may affect degree progression and performance, assuming that such unobserved factors are likely to influence earlier achievement as well as university outcomes.

Specifically, we estimate models of the following form:

$$y_i = \beta_1 SES_i + \beta_2 X_i + \beta_3 HC_i + \beta_4 sc_s + \beta_7 uni_u + \varepsilon_i$$

where *y* is the degree outcome of individual *i*; SES is a series of dummy variables indicating the socio-economic quintile to which they belong; *X* is a vector of individual and family background characteristics; *HC* is a vector of human capital on entry to higher education, as captured by measures of attainment at Key Stages 2 (age 11), 4 (age 16) and 5 (age 18); *sc* is a vector of secondary school characteristics (*s*); and *uni* is a vector of university and subject characteristics (*u*).

To investigate the potential drivers of the relationship between socio-economic background and degree outcomes, we adopt a sequential modelling approach, successively adding different groups of characteristics to our baseline model. The extent to which the relationship between socio-economic background and the outcome of interest changes when we include these additional characteristics in our model provides an indication of their likely importance in explaining the baseline relationship that we observe.

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We start by running a specification that includes only the socio-economic background of the student (and a set of cohort dummies). This provides a baseline estimate of the relationship between socio-economic background and the outcome of interest (Specification 1).

Specification 2 adds factors that differ between young people from different socio-economic backgrounds prior to entering university, including demographic characteristics, characteristics of the secondary school that the young person attended and a rich set of measures designed to capture the young person's human capital on entry to university, based on test scores from Key Stages 2, 4 and 5. (Full details of these variables are given above.) This enables us to understand how much of the difference in degree outcomes between young people from different socio-economic backgrounds can be explained by the fact that they enter HE with different levels of human capital, which are likely to influence their progression and performance at university as well.

We then move on to consider the role of university-level factors in explaining differential progression and performance outcomes. To account for differences in degree outcomes by subject and institution, we include, in Specification 3, indicators for the institutional grouping that the student attends, and in Specification 4, dummy variables for each of the 20 subjects that the student studies. This should capture the extent to which the differences in degree outcomes by socio-economic background arise because of the differential selection of students into different types of institutions or different subjects with different progression and performance outcomes. In Specification 5, we include a binary indicator for whether the student attended a university in the same region in which they lived, which can be thought of as a crude proxy for living at home.

Finally, in Specification 6, we include course-level fixed effects (i.e. the combination of institution and subject choice). We do so in order to fully control for any differences in drop-out, degree completion or degree class that arise because different departments in different universities have different continuation policies or academic support mechanisms, or because they are more or less likely to award higher degree classes, on average, to their students. We also include the indicator for attending a university in the same region as you live, to assess the extent to which these factors can collectively help to explain the socio-economic differences in university progression and performance that we observe.

Although the outcomes we consider are binary (taking value 0 or 1), we use linear probability models to undertake our analysis, as it is challenging and extremely time-consuming to include fixed effects in a non-linear model. As a robustness check, we compare the results from linear probability and probit regression models for specifications excluding fixed effects, with very similar results.[23]

We conduct our analysis at the individual level, but account for the fact that the outcomes of students at particular institutions will be correlated (because they have been taught by the same lecturers, had the same peer groups, and so on) and hence cluster our standard errors at the course level.

6 Results

Figure 2 provides an overview of the differences in the likelihood of dropping out of university within two years of entering, the likelihood of completing a degree within five years and the likelihood of

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[23] See Appendix Tables 13 and 14.

graduating with a first or a 2:1 by socio-economic background. Each bar plots the average rate amongst individuals in a given percentile of our distribution of socio-economic background, in which the first percentile represents the 1% least deprived state school students and the 100th percentile represents the 1% most deprived state school students.

Figure 2 shows that the relationship between socio-economic background and degree outcomes is approximately monotonic, with less than 10% of the least deprived state school students dropping out of university within two years, over 80% completing their degree within five years and nearly 70% graduating with a first or a 2:1. This compares to figures of more than 20% drop-out, less than 60% degree completion and less than 40% graduating with a first or a 2:1 amongst the most deprived state school students.

The remainder of this section splits students into quintile groups on the basis of socio-economic background, and examines what helps to explain these differences in degree outcomes by SES.

Figure 2   % of HE participants dropping out within 2 years, completing a degree within 5 years and graduating with a first or 2:1, by socio-economic background

Percentile of SES distribution (1=least deprived; 100=most deprived)

■ Drop-out within 2 years   ■ Complete degree within 5 years   ■ Graduate with a first or 2:1
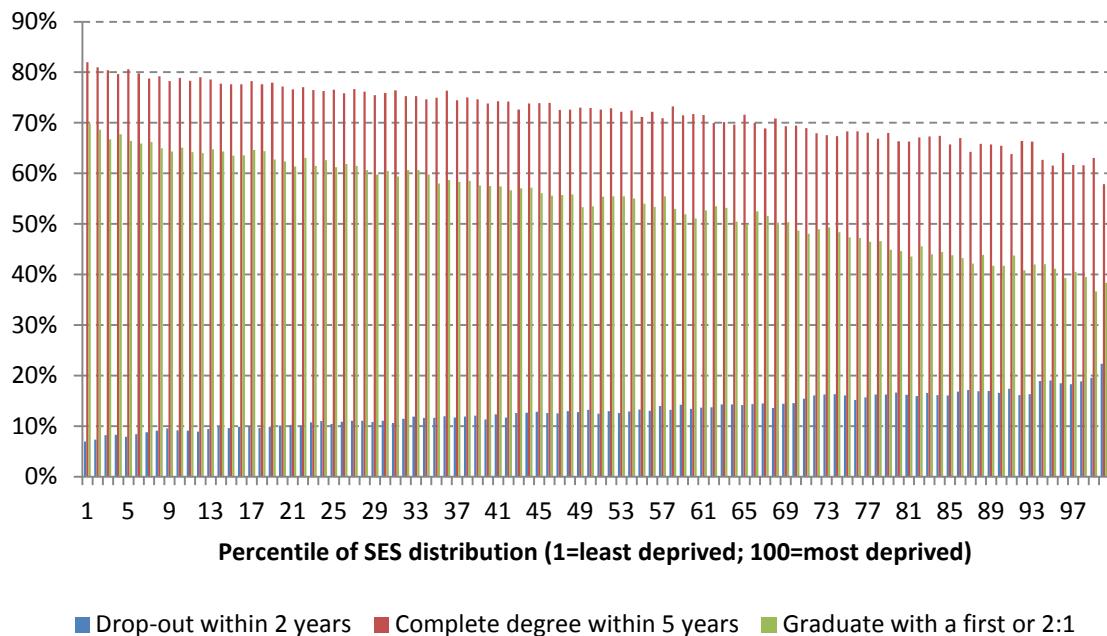
Table 2 explores the drivers of the socio-economic differences in the likelihood of dropping out of university within two years of starting a course at a UK HEI at age 18 or 19, showing how the addition of various characteristics affects the relationship between socio-economic background and the likelihood of dropping out. Appendix Table 1 presents all other coefficient estimates.

Column 1 shows the raw differences in drop-out by socio-economic quintile group relative to the lowest quintile group. As was suggested by Figure 1, there are sizeable differences in the likelihood of dropping out by socio-economic background, with those from the highest socio-economic quintile group just over 8 percentage points more likely to drop-out of university within two years of starting than students from the lowest socio-economic quintile group (compared to an average drop-out rate of 11.5%). These raw differences are very similar if we include individuals from private schools in the

top socio-economic quintile group (see Appendix Table A2), and are slightly larger for men than for women (see Appendix Table A3).

Table 2   Socio-economic differences in drop-out within 2 years of starting university at age 18/19

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2nd SES quintile group	-0.023***	-0.009***	-0.009***	-0.009***	-0.009***	-0.008***	-0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Middle SES quintile group	-0.044***	-0.019***	-0.019***	-0.019***	-0.019***	-0.018***	-0.019***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
4th SES quintile group	-0.062***	-0.027***	-0.026***	-0.027***	-0.027***	-0.025***	-0.026***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Top SES quintile group	-0.084***	-0.037***	-0.037***	-0.037***	-0.037***	-0.035***	-0.034***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
	Controls						
Cohort	√	√	√	√	√	√	√
Social and human capital		√	√	√	√	√	√
Institution grouping			√				
Subject dummies				√			
Qualification/study mode					√		√
Live/study in same region						√	√
Course fixed effects							√

Notes: *** indicates significance at the 1% level; ** at the 5% level; * at the 10% level. Standard errors are clustered at the university level and reported in brackets underneath the coefficient estimates. All other coefficient estimates are available in an online appendix.

Column 2 shows what happens to the relationship between socio-economic status and the likelihood of dropping out of HE when we account for a limited set of demographic characteristics and a rich set of measures of human capital on entry to university. It shows that we can explain just over half of the raw difference in drop-out between the top and bottom SES quintile groups by accounting for performance in national achievement tests at ages 11, 16 and 18, and a small number of demographic characteristics, including gender, ethnicity and month of birth. But there remains a significant negative relationship between socio-economic background and the likelihood of dropping out of university.

Columns 3 to 7 use the information at our disposal regarding the course that the student is studying to explore whether the choice of institution, subject, type of qualification or mode of study, or location of institution can help to explain the remaining socio-economic differences in drop-out. The short answer is no. While Appendix Table 1 shows that some of these factors are significantly associated with the likelihood of dropping out of university, perhaps surprisingly, the addition of these characteristics either individually or jointly makes very little difference to the estimated socio-economic gradient in the likelihood of dropping out of university. Indeed Column 7 shows that, even when comparing individuals on the same course, following the same mode of study and with similar living arrangements, the remaining unexplained difference between the top and bottom socio-economic quintile group is still 3.5 percentage points, only marginally lower than it was when just controlling for demographic characteristics and human capital on entry to university. This difference is of approximately similar magnitude if we include private school students (see Appendix Table A2) and for men and women (see Appendix Table A3).

Focusing just on "high status" institutions (see Appendix Table A4), the raw socio-economic gradient is shallower: amongst those studying at these 41 research-intensive institutions, individuals from the top socio-economic quintile group are 5.3 percentage points less likely to drop out of university within two years of entering than those from the bottom socio-economic quintile group, compared with a raw gap of 8.4 percentage points across all institutions. The relative importance of differences in human capital on entry to university, and course choice, in explaining these differences is similar, however: approximately half of the raw gap can be explained by a small number of demographic characteristics and a very rich set of measures of prior attainment at ages 11, 16 and 18; and comparing individuals within course does not reduce the socio-economic gap much further. Overall, the socio-economic gap in the likelihood of dropping out is about 1 percentage point smaller amongst high status institutions than it is amongst all institutions, but, at 2.3 percentage points, remains significantly different from zero.

Table 3 shows the socio-economic differences in the likelihood of completing a degree within five years of entering university. Appendix Table 5 presents all other coefficient estimates from the model. We focus on those studying full-time for a first degree, and exclude those studying medicine, both because their courses are relatively longer, and because they are not awarded a degree class. Table 3 follows a similar format to Table 2, but does not consider type of qualification or mode of study as explanatory factors in later columns, as we have restricted our sample such that there is now no variation in these factors.

Table 3 Socio-economic differences in degree completion within 5 years of starting university at age 18/19

	(1)	(2)	(3)	(4)	(5)	(6)
2nd SES quintile group	0.041***	0.014***	0.014***	0.015***	0.013***	0.016***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Middle SES quintile group	0.074***	0.029***	0.028***	0.029***	0.027***	0.030***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
4th SES quintile group	0.102***	0.040***	0.039***	0.041***	0.038***	0.039***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Top SES quintile group	0.133***	0.055***	0.054***	0.056***	0.052***	0.053***
	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
	Controls					
Cohort	√	√	√	√	√	√
Social and human capital		√	√	√	√	√
Institution grouping			√			
Subject dummies				√		
Live/study in same region					√	√
Course fixed effects						√

Notes: *** indicates significance at the 1% level; ** at the 5% level; * at the 10% level. Standard errors are clustered at the university level and reported in brackets underneath the coefficient estimates. All other coefficient estimates are available in an online appendix.

Column 1 shows that those in the highest socio-economic quintile group are 13.3 percentage points more likely to complete their degree than those in the lowest socio-economic quintile group (compared to an average completion rate of 78%). This figure is identical if we include private school students in the top socio-economic quintile group (see Appendix Table A6), and – as was the case for drop-out within two years – slightly larger for men than women (see Appendix Table A7).

Column 2 shows that a substantial proportion of this difference can be explained by the human capital with which students arrive at university: those who are admitted with higher grades in more attractive qualifications and subjects are more likely to complete their degree, on average, than those with lower grades in less attractive qualifications and subjects. However, even amongst those who enter university with similar levels of human capital, those from the highest socio-economic quintile group are still 5.5 percentage points more likely to complete their degree than those from the lowest socio-economic quintile group.

Moreover – as was the case for the likelihood of dropping out of university within the first two years – we are not able to explain much more of this difference by comparing individuals on the same course: those from the richest backgrounds are still 5.3 percentage points more likely to complete their degree than those from the poorest backgrounds. This figure is very similar if we include private school students (Appendix Table A6) and for both men and women (Appendix Table A7).

Appendix Table A8 shows how these relationships vary if we focus just on our group of 41 "high status" institutions. The picture is broadly similar to that described above for drop-out within the first two years: the raw gaps are somewhat smaller than they are when looking across all institutions (10.7 percentage points instead of 13.3 percentage points), and around 1 percentage point smaller once we control for all individual and institutional factors at our disposal (4.3 percentage points vs. 5.3 percentage points).

Finally, Table 4 presents estimated socio-economic differences in the likelihood of graduating from university with a first or a 2:1, conditional on having studied full-time for a first degree in a non-medical subject and having completed the degree within five years of entering. Appendix Table 9 presents the remaining coefficient estimates from the model.

Table 4 Socio-economic differences in the likelihood of obtaining a first or a 2:1 conditional on completing degree within 5 years of starting university at age 18/19

	(1)	(2)	(3)	(4)	(5)	(6)
2nd SES quintile group	0.074***	0.014***	0.015***	0.013***	0.014***	0.011**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Middle SES quintile group	0.129***	0.022***	0.022***	0.020***	0.021***	0.018***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
4th SES quintile group	0.181***	0.034***	0.035***	0.032***	0.033***	0.030***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Top SES quintile group	0.229***	0.043***	0.044***	0.040***	0.041***	0.037***
	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
	Controls					
Cohort	√	√	√	√	√	√
Social and human capital		√	√	√	√	√
Institution grouping			√			
Subject dummies				√		
Live/study in same region					√	√
Course fixed effects						√

Notes: *** indicates significance at the 1% level; ** at the 5% level; * at the 10% level. Standard errors are clustered at the university level and reported in brackets underneath the coefficient estimates. All other coefficient estimates are available in an online appendix.

The first column shows that there are very large differences in the likelihood of getting a first or a 2:1 by socio-economic background, far larger than the differences in drop-out or degree completion. It suggests that those from the highest socio-economic quintile group are just under 23 percentage points more likely to get a first or a 2:1 than those from the lowest socio-economic quintile group (compared to an average of 65% of students getting these two highest degree classifications).

Column 2 shows that these gaps are largely driven by differences in the human capital with which students from different socio-economic backgrounds start university: once we account for how well they did in national achievement tests at ages 11, 16 and 18, as well as a small number of other demographic characteristics, the remaining unexplained differences fall substantially. Indeed, the remaining unexplained difference in the likelihood of graduating with a first or a 2:1 is lower than the difference in the likelihood of completing your degree within five years and amounts to just 4.3 percentage points between the top and bottom SES quintile groups.

Columns 3 to 6 go on to explore the extent to which differences in choice of university, subject and location can help to explain why those from richer backgrounds are more likely to graduate with a first or a 2:1 than those from poorer backgrounds, even amongst those with the same human capital on entry to university. These factors make a little more difference here than they did for either drop-out or degree completion: once we compare students on the same courses, the gap between the highest and lowest socio-economic quintile groups falls from 4.3 percentage points to 3.7 percentages; but remains significantly different from zero.

This suggests that the differential selection of students from different socio-economic backgrounds into courses with different propensities to award firsts or 2:1s can help to explain a small proportion of the socio-economic gap that remains conditional on performance on entry to university. But there remain significant differences in the likelihood of getting a first or 2:1 by socio-economic background, even conditional on the rich measures of human capital and comparing students on the same courses.

Discussion

Two key findings emerge from the results described above: first, differences in the human capital with which students from different backgrounds enter university plays a key role in explaining the socio-economic differences in drop-out, degree completion and degree class that we see. The addition of these characteristics reduces the raw gap between the top and bottom SES quintile groups by between 55-60% (for drop-out and degree completion) and over 80% (for degree class). This suggests that a key part of any strategy to reduce socio-economic inequalities in degree acquisition and performance should be to increase the attainment of those from the poorest families earlier in the school system.

Second, the relatively crude measures of university experience at our disposal do not help to reduce the remaining difference in degree outcomes by socio-economic background very much further. Even the addition of course fixed effects – effectively comparing students on the same courses – plus an indicator for whether the student lived and studied in the same region (and, in the case of drop-out, indicators for type of qualification and mode of study), does not reduce the difference in degree outcomes between young people from different socio-economic backgrounds by very much:

only 0.3 and 0.2 percentage points respectively in the case of drop-out and degree completion, and 0.6 percentage points in terms of degree class.

The upshot is that there remain relatively small but significant differences in the likelihood of graduating from university (with a first or a 2:1) by socio-economic background, even amongst the relatively selected group of individuals who make it to university. Young people from the top socio-economic quintile group remain 3.4 percentage points less likely to drop-out within two years, 5.3 percentage points more likely to complete their degree within five years and 3.7 percentage points more likely to graduate with a first or a 2:1 than young people from the bottom socio-economic quintile group.

What could explain these remaining socio-economic differences in degree outcomes amongst those studying on the same courses? One possibility is that young people from different socio-economic backgrounds have different skills which we are not able to measure properly in our data which may influence their ability to access and succeed in the university environment. For example, it may be that young people from richer backgrounds have better non-cognitive skills – e.g. greater resilience, motivation or independent study skills – than those from poorer backgrounds, and that it is these skills which lead to them having more positive degree outcomes. Future research could usefully explore the extent to which these factors may help to explain the remaining socio-economic differences in degree outcomes.

Alternatively, young people from higher socio-economic backgrounds may experience fewer external pressures or unexpected challenges whilst studying than young people from lower socio-economic backgrounds; they may also have access to greater support. For example, young people from poorer backgrounds may be more likely to need to offer financial or other support to their family whilst they are studying, commitments which may make it more difficult to study effectively. They may also be more likely to face unexpected challenges: for example, those from richer families may be more likely to have access to a financial safety net than those from poorer families, such that they may be less susceptible to dropping out of university for financial reasons. They may also have better knowledge about the ways to access support either within or outside university: for example, if their parents were more likely to have gone to university themselves, they may be better equipped to offer advice about the best ways to overcome any challenges faced.

Future research could usefully explore the extent to which the quantity and type of university resources devoted to pastoral care and other student support services – or indeed support more generally – can help to explain the remaining socio-economic differences in degree outcomes.

As part of the access agreements introduced in 2012-13, UK universities are expected to set out strategies for the recruitment, retention and progression of students from disadvantaged backgrounds. It will therefore be interesting to see whether these remaining unexplained differences in degree outcomes by socio-economic background – which were relevant to cohorts studying at university between 2004-05 and 2011-12 – fall or indeed rise over time. (Attracting a wider pool of students to university may make it more challenging for universities to retain those students.)

It is also interesting to note the difference between these results and those comparing degree outcomes by school characteristics, as highlighted by other researchers, e.g. Crawford (2014). Appendix Tables 1, 5 and 9 show the relationship between school type, school performance and

whether the school has a sixth form, and drop-out, degree completion and degree class respectively. Tables 5 and 6 reproduce a selection of coefficient estimates from these models and additionally show the raw differences between school characteristics and degree outcomes, enabling us to see how the gaps change once we include other controls in the same way as we did for socio-economic status.

Table 5   Differences in drop-out by school characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Attends a selective community school	-0.012***	0.010***	0.010***	0.010***	0.009***	0.009***	0.011***
	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)
Attends a selective other maintained school	-0.015***	0.014***	0.015***	0.015***	0.014***	0.014***	0.015***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Attends a school in the 2nd quintile of performance	-0.016***	0.009***	0.009***	0.009***	0.008***	0.009***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Attends a school in the 3rd quintile of performance	-0.031***	0.013***	0.013***	0.013***	0.012***	0.013***	0.012***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Attends a school in the 4th quintile of performance	-0.046***	0.015***	0.016***	0.015***	0.015***	0.016***	0.015***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Attends a school in the top quintile of performance	-0.057***	0.020***	0.020***	0.019***	0.019***	0.021***	0.020***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Controls							
Cohort	√	√	√	√	√	√	√
Social and human capital		√	√	√	√	√	√
Institution grouping			√				
Subject dummies				√			
Qualification/study mode					√		√
Live/study in same region						√	√
Course fixed effects							√

Notes: *** indicates significance at the 1% level; ** at the 5% level; * at the 10% level. Standard errors are clustered at the university level and reported in brackets underneath the coefficient estimates. All other coefficient estimates are available in an online appendix.

It is clear that both the type of school you attend at age 16, and the overall performance of that school, are strongly correlated with how well you go on to do at university. Table 5 shows that those who attended selective community or other maintained schools (relative to non-selective community schools) are significantly less likely to drop-out of university within the first two years; Table 6 shows that a similar pattern holds for degree class: those from selective state schools are significantly more likely to graduate from university with a first or a 2:1 relative to those from non-selective community schools. The relationships with school performance are even stronger: those who attended one of the 20% best performing schools at age 16 are 5.7 percentage points less likely to drop-out, 9.5 percentage points more likely to complete their degree and 15.3 percentage points more likely to graduate with a first or a 2:1 than those who attended one of the 20% worst performing schools at age 16.

Once we account for the human capital with which these students start university, however, these relationships are reversed: when comparing pupils from similar backgrounds with the same prior attainment, those from the best-performing state schools are now 2 percentage points *more* likely to drop-out, 2 percentage points *less* likely to complete their degree and 5.2 percentage points *less* likely to graduate with a first or 2:1. This is in contrast to the results by socio-economic background,

where the relationship between socio-economic background and degree outcomes was reduced but remained significant and, more importantly, of the same sign.

Table 6 Differences in degree completion and degree class by school characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
	Degree completion					
Attends a selective community school	0.007	-0.020***	-0.020***	-0.021***	-0.020***	-0.023***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Attends a selective other maintained school	-0.004	-0.022***	-0.022***	-0.025***	-0.022***	-0.029***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Attends a school in the 2nd quintile of performance	0.035***	-0.006*	-0.007*	-0.007*	-0.007*	-0.005*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Attends a school in the 3rd quintile of performance	0.062***	-0.009**	-0.009**	-0.009***	-0.010***	-0.008**
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Attends a school in the 4th quintile of performance	0.075***	-0.019***	-0.019***	-0.019***	-0.020***	-0.017***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Attends a school in the top quintile of performance	0.095***	-0.020***	-0.020***	-0.021***	-0.022***	-0.020***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
	Degree class					
Attends a selective community school	0.046***	-0.025***	-0.026***	-0.028***	-0.025***	-0.027***
	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Attends a selective other maintained school	0.042***	-0.047***	-0.046***	-0.048***	-0.047***	-0.045***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)
Attends a school in the 2nd quintile of performance	0.058***	-0.011**	-0.011**	-0.011**	-0.011**	-0.012***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Attends a school in the 3rd quintile of performance	0.098***	-0.025***	-0.024***	-0.025***	-0.025***	-0.028***
	(0.005)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)
Attends a school in the 4th quintile of performance	0.132***	-0.038***	-0.037***	-0.039***	-0.038***	-0.042***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Attends a school in the top quintile of performance	0.153***	-0.052***	-0.051***	-0.054***	-0.053***	-0.058***
	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
	Controls					
Cohort	√	√	√	√	√	√
Social and human capital		√	√	√	√	√
Institution grouping			√			
Subject dummies				√		
Live/study in same region					√	√
Course fixed effects						√

Notes: *** indicates significance at the 1% level; ** at the 5% level; * at the 10% level. Standard errors are clustered at the university level and reported in brackets underneath the coefficient estimates. All other coefficient estimates are available in an online appendix.

This is important for universities interested in using contextual data to inform their admissions policies. Our results could be interpreted as suggesting that, amongst students with a given set of characteristics and measures of prior attainment, those from poorly-performing state schools have, on average, higher 'potential' than those from highly-performing state schools. This may, in turn, suggest that university entry requirements could be lowered for pupils from poorly-performing state schools in order to equalise the potential of all students being admitted to university, on average.

The same does not appear to hold, on average, for individuals from different socio-economic backgrounds, however: those from lower socio-economic backgrounds remain, on average, more likely to drop-out, less likely to complete their degree and less likely to graduate with a first or 2:1

than those from higher socio-economic backgrounds, even once we compare individuals with the same human capital on entry to university. That is not to say that universities should not be using information on individuals' own socio-economic background to inform their admissions processes; simply that it is more challenging to identify those from lower socio-economic backgrounds with strong potential to succeed. Of course, it should be remembered that even when using school performance as a basis for contextualising admissions, there will be some pupils from low performing schools who do not go on to outperform pupils from high performing schools; but they will on average. The same is not true for pupils from low socio-economic backgrounds though.

8 Conclusions

This paper has provided new evidence on the magnitude and determinants of socio-economic differences in degree outcomes amongst recent cohorts of English-domiciled students attending university in the UK. We have shown that there are large differences in the likelihood of dropping out of university within two years of entering at age 18/19, completing a degree within five years of starting and being awarded a first or a 2:1 conditional on graduating, a large part of which can be explained by the fact that individuals from different socio-economic backgrounds arrive at university with very different levels of human capital. Once we account for differences in these characteristics, the differences in degree outcomes by socio-economic background become smaller, but remain significantly different from zero. This suggests that a key part of any strategy to reduce socio-economic inequalities in degree acquisition and performance should be to increase the attainment of those from the poorest families earlier in the school system.

Although we have access to only relatively crude measures of university experience, we find that these make relatively little difference to the remaining socio-economic gaps in degree outcomes: even once we compare individuals on the same course, we still find that those from the highest socio-economic quintile group are, on average, 3.4 percentage points less likely to drop-out, 5.3 percentage points more likely to complete their degree and 3.7 percentage points more likely to graduate with a first or 2:1 than those from the lowest socio-economic quintile group.

This is in stark contrast to differences in degree outcomes by school characteristics: while the raw differences suggest that those from the highest performing schools are less likely to drop-out, more likely to complete their degree and more likely to graduate with a first or a 2:1 than those from the worst performing schools, these relationships are reversed once we hold constant the qualifications, subjects and grades that individuals from different schools have on entry to university.

This highlights a number of policy implications and areas for future research: future research could usefully explore the reasons why, even amongst those on the same courses, individuals from lower socio-economic backgrounds are more likely to drop-out and less likely to graduate with a first or 2:1 than individuals from higher socio-economic backgrounds. If differences in non-cognitive skills mean that students from different backgrounds are more or less prepared for the university experience, then what could be done to improve the skills of individuals from lower socio-economic backgrounds? If those from poorer families are more likely to experience unexpected challenges that make them more susceptible to dropping out, then is increasing the support available – or increasing the awareness of or willingness to take up existing support – the right approach?

These results also provide important new insights for universities interested in using contextual data to inform their admissions policies. While it is clear that, on average, amongst students with the same human capital on entry to university, those from the worst-performing schools go on to outperform those from the best-performing schools, the same is not true if we compare individuals from lower and higher socio-economic backgrounds. Thus, while the evidence suggests that if universities were to account for school performance in making admissions offers they would, on average, get it right most of the time, the same is not necessarily true of using socio-economic background. That is not to say that no individuals from lower socio-economic backgrounds will go on to outperform their more advantaged counterparts; simply that it is not true on average, thus presenting a greater challenge for universities to identify those from lower socio-economic backgrounds with strong potential to succeed.

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