University of Kent

School of Economics Discussion Papers

A Longitudinal Perspective on Higher Education Participation in the UK

Javier Valbuena

November 2012

KDPE 1215

A Longitudinal Perspective on Higher Education participation in the UK*

Javier Valbuena†

November 2012

ABSTRACT

This paper is based on the first seven waves of the Longitudinal Study of Young People in England (LSYPE) that allow us to follow a recent cohort of pupils from age 14 through to Higher Education (HE) participation at age 19/20. Therefore, our approach involves using rich individual data that have been linked to school level information and geographic markers to examine some of the factors determining HE participation for individuals who were in Year 11 in 2005/06 and who could therefore first enter HE in 2008/2009. Our results indicate that differences in HE participation (including studying a science degree and attending prestigious universities) between students coming from advantaged and disadvantaged backgrounds are large and that much of the socio-economic gap in HE participation rates is driven by particularly low participation rates for students at the bottom of the income distribution. However, when we introduce controls for prior educational attainment, student's expectations towards university, academic results during secondary schooling and type of school attended these gaps in participation are substantially reduced. Our analysis suggests that one of the main challenges to widening participation for pupils from poorer socio-economic backgrounds is early policy interventions at, say, age 11 as they are likely to have an important effect in HE participation. Also, relatively later intervention (at ages 14 to 16) aiming at improving educational aspirations of teenagers and targeting better GCSEs results will further close the gap.

JEL Subject Codes: I21, I28, J11

Keywords: Education inequality, family background, higher education

* **Acknowledgements:** I would like to specially thank Yu Zhu and William Collier for their thorough remarks and helpful guidance. Financial support from the School of Economics at University of Kent is gratefully acknowledged. All remaining errors are mine.

† **Corresponding author:** School of Economics, University of Kent, CT2 7NP; email: jv51@kent.ac.uk

1. Introduction

There has been almost continuously rising Higher Education (HE) participation in the UK since the late 1960s (Finegold, 2006) and further expansion is very likely, given that widening access and improving participation in HE is a government target (HEFCE, 2009). The widening participation agenda is predicated on the notion that disadvantaged students coming from lower socio-economic backgrounds are unfairly under-represented on initial entry into tertiary education. This concern partly arises from empirical evidence which suggests that the gap in HE participation rate between richer and poorer students widened throughout the 1980s, 1990s and mid 2000s (Blanden and Machin, 2004; Machin and Vignoles, 2004; Chowdry et. al, 2008 and 2010a). This means that although poorer students are certainly more likely to continue into HE now than they were in the past, the likelihood of them doing so relative to their richer peers has decreased during recent decades. Recent evidence from HEFCE indicates that the 20% most disadvantaged students were around 6 times less likely to participate in HE compared to the 20% most advantaged pupils (HEFCE, 2005).

The acceleration of HE participation since the 1980's has raised concerns regarding a sustainable financial scheme. The situation was addressed by the introduction of tuition fees in 1998 alongside the reduction of grants, which were finally phased out in 1999. The grants system was replaced by a loans system with loans repaid by from earnings after graduation, thereby ensuring that graduates and not students bear the cost of HE participation. More fundamental reforms were introduced by government in 2003 with the purpose of allowing universities to increase their funding by collecting higher tuition fees from students. These reforms also provided the basis for variable fees with a cap set by the government. Indeed, students who start university or college on or after 1 September 2012 (academic year 2012/2013) will be under a new finance scheme as universities or colleges can charge tuition fees of up to £9,000.

Despite these recent reforms to student finance, a major concern regarding the expansion of HE remains *who* is accessing HE. Although the fees were means tested, there were fears that the prospect of fees would create another barrier to HE participation by poorer students (Callender, 2003). Whilst there is evidence that poorer students leave university with more debt and may be more debt averse in the first place (Pennell and West, 2005), there is no strong empirical evidence that the introduction of fees reduced the relative HE participation rate of poorer students (UUK, 2007 and Wyness, 2009).

The motivation for this paper is the observation that socio-economic differences in HE participation have worsened and that it remains a major policy challenge. Indeed the expansion appears to have been more beneficial for richer students, thereby increasing education inequalities further (Machin and Vignoles, 2004; Marcerano-Gutierrez, Galindo-Rueda and Vignoles, 2004). Using a rich set of data drawn from the Longitudinal Study of Young People in England (LSYPE), we follow a recent cohort of pupils from age 14 through to HE participation at age 19/20 and analyse the participation decisions of young people who had the opportunity to enter HE from 2008/09 onwards. These data provide a new and detailed picture of the factors affecting pupils

during secondary education and, in particular, those which contribute to their HE choices. Furthermore, the data enable us to consider the attainment paths of young people from disadvantaged and vulnerable groups, deprived backgrounds, and those from less well-educated families. The contribution of this paper is to add to the existing literature by testing the economic hypothesis regarding the relationship(s) of socio-economic status in HE participation using recent data.

Our approach involves first looking at the association between relevant factors highlighted in the economics of education literature and the likelihood of participating in HE at age 19 or 20. We focus specifically on socio-economic differences, and then examine the extent to which the resultant gaps can be explained away by differences in other observable characteristics. To do this, we add in characteristics of interest successively to our model. This enables us to analyse whether disparities in HE participation rates between different groups of students are simply attributable to differences in choices made at age 18, or whether earlier characteristics, expectations and educational achievement plays a more significant role in explaining the gap in HE participation. We find that differences in HE participation between students coming from advantaged and disadvantaged backgrounds are large and that much of the gap is driven by particularly low participation rates for pupils at the bottom of the income distribution. However, our analysis suggests that early policy interventions, at say age 11, are likely to have an important effect on HE participation.

For much of the paper we focus simply on access to HE. However, widening participation is not simply about access to HE, but also about the type of degree acquired by students and the status of the institution attended. This is important because the economic value of a student's investment in HE will vary substantially according to the type of degree and higher institution attended. Therefore, we also provide empirical evidence of how participation by students from different socio-economic backgrounds varies by type of degree (science, technology, engineering and mathematics, or STEM) and institution (high status universities). We find large socio-economic differences in the probability of studying a STEM degree. Our results suggest the important role of schools in encouraging students from disadvantaged backgrounds to take up science fields during compulsory schooling and to apply to do science degrees as a way to increase enrolment. Finally, we find evidence of a significant socio-economic gradient in HE participation at a high status institution. Large differences between advantaged and disadvantaged pupils suggest that much of the gap is driven by particularly high participation rates for richer students. Our results highlight both the importance of educational attainment in secondary school and the role of schools in raising HE expectations and encouraging disadvantaged pupils to apply to high status universities.

The remainder of the paper proceeds as follows. Section 2 presents a brief overview of related research. Section 3 explains and discusses the data used. Section 4 outlines the empirical approach, presents the main estimates and discusses results. Finally, section 5 concludes.

2. Related research

There exists a well-established field of literature within the economics of education concerned with the factors influencing educational achievement of different types of students. Much of this literature has looked at the role of parental characteristics - including income, ethnicity, education and socio-economic status - in determining young people's likelihood of attending HE (Haveman and Wolfe, 1995; Gayle et al. 2002; Carneiro and Heckman, 2002 and 2003; Blanden and Gregg, 2004; Meghir and Palme, 2005). Such studies have generally found that an individual's probability of participating in HE is significantly determined by their parents' characteristics, particularly their parents' education level and/or socio-economic status.

There remain other potential barriers to participation at the point of entry into HE. These include financial barriers/credit constraints, lack of careers advice, and the attitude and motivation of potential students. Quantifying the relative importance of these factors has proved difficult. However, the qualitative and quantitative evidence on the role of these factors was reviewed in Dearing (1997) and has since been comprehensively surveyed by Gorard et al. (2006).

There is another literature which has focused on the difficulties in identifying the distinct effects of family and school environmental factors and the pupil's genetic ability. There is growing recognition that gene-environment interactions are such that attempting to isolate the separate effects of genetic and environmental factors is fruitless (Rutter et al. 2006). In a recent paper, Cunha and Heckman (2007) analyse the complex interaction mechanisms of nature and nurture and define as obsolete the separability of both concepts, e.g. "…the sharp distinction between acquired skills and ability featured in the early human capital literature is not tenable". Piketty (2000) also points out the "poor" relevance of distinguishing clearly between both concepts. On the other hand, this literature suggests the importance of identifying the critical age in child cognitive development to understand further the best channels to increase educational outcomes and target public policies towards them.

It is important to know that parental education and socio-economic status significantly affect the likelihood of a young person attending university. It is equally important to understand why this relationship exists and how policy-makers can address the problem of inequality in HE participation in a cost-effective manner. For this, we need to understand when and why the gaps in education achievement that lead to later HE inequalities emerge.

In this regard, an important and intimately related literature has focused on the timing of when gaps in the cognitive development and educational achievement of different groups of children emerge (Feinstein, 2003 and CMPO, 2006). This literature suggests that gaps in educational achievement emerge early in pre-school and primary school such that potential barriers at the point of entry into HE (e.g. low parental income) do not play a large role in determining HE participation. The evidence for the UK regarding the extent to which this drives observed inequalities in HE participation is mixed. Gayle et al. (2002) find differences in HE participation across different socio-economic groups using data from the Youth Cohort Study of

England and Wales (YCS) and logistic regression models. These differences remain significant, even after allowing for educational achievement in secondary school, suggesting that choices at 18, including credit constraints, also drive the inequalities we observe. Dearden et al. (2004) also find limited evidence of credit constraints for members of the 1958 and 1970 British cohort studies. By contrast, Bekhradnia (2003) suggests that for a given level of educational attainment at age 18 (as measured by A level point score), there are no significant differences by socio-economic background in the participation rates of young people in HE. This would indicate that socio-economic differences in HE participation are actually related to the well-documented education inequality in primary and secondary schools in the UK (Sammons, 1995; Strand, 1999; Gorard, 2000).

In addition to the above studies that have looked at the determinants of attending HE, there is a related empirical literature that has focused on changes in patterns of HE participation over time (Blanden and Machin, 2004; Galindo-Rueda, Marcenaro-Gutierrez and Vignoles 2004, Machin and Vignoles 2004). This research has suggested that inequality of access to HE, at least for socio-economically disadvantaged students, actually worsened in the UK during the 1980s and early 1990s.[1]

Finally, there is now evidence that the return to a degree varies substantially according to subject choice and the type (quality) of HEI attended. The existing UK literature on the effect of "college major" is very thin (Walker and Zhu, 2011; Sloane and O'Leary, 2005, and references therein) but the studies that do exist report large differentials by major of study. Regarding the impact of institution quality, Chevalier and Conlon (2003) suggest that the wage premium associated with having a degree tend to be greater from high status universities. Iftikhar, McNally and Telhaj (2008) present recent evidence which suggests that a degree from a Russell Group university leads to a higher wage return. Chevalier (2009) also suggests the importance of institutional quality for future wages. Previous research has suggested that non-traditional students in the UK are concentrated in modern post-1992 universities and that degrees from these institutions attract lower labour market returns (Connor et. al, 1999). Thus, socio-economic differences accessing different types of degree subject and/or HE institutions are likely to have a long term impact on students' opportunities in the labour market, and therefore should be of policy concern.

A common pattern of the related literature presented here is the important role that socio-economic status plays in determining access into HE and the presence of social inequality in education achievement despite policy interventions designed to widen participation of disadvantaged pupils. This paper aims to contribute to the existing literature by testing the economic hypothesis regarding the relationship(s) of socio-economic status in HE participation using recent data.

[1] Work by sociologists on the relationship between social class and HE participation finds similar results. For example, Glennerster (2001) found a strengthening of the relationship between social class and HE participation in the 1990s, although the social class gap in HE participation appears to have narrowed somewhat since then (Raffe et al. 2006).

3. Data and descriptive statistics

Our empirical analysis is based on the first seven waves of the Longitudinal Study of Young People in England (LSYPE). The LSYPE, also known as Next Steps, is a large and unique dataset providing valuable insight into the factors that can influence the paths taken by young people and their associated outcomes. The data collected in the survey are also merged with administrative records from the National Pupil Database (NPD) and the Pupil Level Annual School Census (PLASC) which contain a rich set of data relating to pupil and school experience, covering socio-economic background such as eligibility for free school meals (FSM), geo-demographic markers such as the Index of Multiple Deprivation (IMD) and the Income Deprivation Affecting Children Index (IDACI), and measures of prior attainment coming from ability tests such as Key Stage 2 (KS2) test results.

LSYPE was commissioned by the former Department for Education and Skills (DfES) in 2004. The study has been subsequently managed by the DfES and successor departments i.e. the Department for Children, Schools and Families (DCSF) (2007 to 2010) and the Department for Education (DfE) (2010 to 2011).

Respondents were first interviewed in the spring of 2004 (at age 13/14) and then subsequently interviewed annually until 2010 (at age 19/20), resulting in a total of seven waves. For the first four waves of LSYPE, the parents or guardians of the respondents were also interviewed. In the first wave, around 15,500 young people were interviewed as part of the survey. Respondents were selected to be representative of young people in England. They were selected from a target population of those in Year 9 (or equivalent) in February 2004 who were born between 01/09/89 and 31/8/90. In addition, at Wave 4 sample boosts have taken place for some sub-groups (i.e. some ethnic minority groups) to ensure large enough numbers in key groups. From Wave 5, when the young person was aged 17/18, only the young person was interviewed. The study has achieved impressive response rates of 74%, 86%, 92%, 92%, 89%, 87% and 90% through waves 1 to 7 respectively.[2] The final sample size at Wave 7 was around 8,700.

To carry out the analysis we use individual-level data for a cohort of students who sat GCSE public examinations at age 16 in 2005-06 academic year. In our analysis we restrict the sample to individuals who were born in the UK and provided full interviews, together with their mothers, across the first seven waves of the LSYPE data. This results in a final sample 5,682 individuals aged 19/20, of which 2697 (47.5%) are boys and 2,985 are girls (52.5%).[3,4]

[2] Average response rate from waves 1 to 7 is 87%.

[3] Note that there is no need to worry about the cohort effect as this data is representative of a cohort of young people (those born in 1989/90 and undertook schooling in England). Still, one needs to worry about time effects or any cohort-specific issues such as tuition fees regime and impact of the Great Recession.

[4] Our main sample is constructed on the basis of UK born young people who provide full interviews, together with their mothers as 82% of them report to be the main parent. This means that mothers tend to be the main provider of care within the household. Therefore, the main parent is always the mother.

In particular, our main outcome of interest is participation in HE. It is defined as enrolling in a UK higher education institution at age 19 or 20. At the time of the wave 7 interview, 4,061 (71.5%) of our sample are reported as HE students.[5] There is a significant gender gap in HE participation in favour of girls. The share of girls enrolled in HE, 73%, is 4 percentage points higher than that of boys and equality of means across genders is rejected at the 1% significant level. Secondly, we are interested in the degree subject studied, in particular on the enrolment in science, technology, engineering and mathematics (STEM) fields of study at the university level. Conditional on HE participation it appears that 28% of the selected sample is studying a STEM subject. There is a significant gender gap in STEM enrolment in favour of boys. Girls are almost 6 percentage points less likely to undertake science studies than boys and equality of means across genders is rejected at the 1% significant level. Finally, our data also includes information on the type of university attended by each HE participant allowing us to explore the characteristics of students attending a high status university.[6] More than 15% of young people in our sample who have chosen to participate in HE are reported to be enrolled in a high status university (Russell Group or Oxbridge). There are no significant differences across gender in the probability of attending a high status institution.

Table A1 in the appendix presents summary statistics by gender for the main variables used in our empirical analysis. Around one third of the young people in our sample are non-white. There are significant gender differences regarding the results of the General Health Questionnaire - GHQ test (at age 16-17) as 31% of the girls report results consistent with psychological distress as opposed to 17% of the boys.[7] There are no notable differences in family background characteristics. Around 14% of mothers (as main parents) report having a university degree qualification and almost one fifth report A-levels as their highest qualification. As regards housing tenure, almost two thirds of young people report that the family home is mortgaged, 19% report that the family home is owned outright, and 18% rent the property.

LSYPE also collects information on attitudes and behaviours of the young person during their teenage years. Around one quarter of the sample admits to having played truant during compulsory education and almost 70% report frequent consumption of alcohol. As expected, girls are less likely to be engaged in risky behaviours (e.g. truancy, smoking and consuming alcohol). Academically, only 25% of the sample report studying three separate science GCSEs (i.e. Biology, Chemistry and Physics). Notably, there is a marked difference by gender in this regard with boys 9 percentage points more likely than girls to study three science subjects. More

[5] This proportion is certainly high compared to the official Higher Education Initial Participation Rate (HEIPR) calculated for ages 17-30. This is partly due to non-random attrition. As a robustness check we have run our regressions using W7 sampling weights. This more recent weight is required to compensate for the changing demographic structure of the cohort over time. Results from these estimations are qualitatively similar to those presented in the paper and are available upon request.

[6] For the purposes of this paper, attending a high status institution is defined as to be enrolled in a Russell Group, including Oxbridge universities.

[7] The General Health Questionnaire (GHQ) is a measure of current mental health and since its development by Goldberg in the 1970s it has been extensively used in different settings and cultures (Goldberg and Hillier, 1979).

than half of the sample opts to study double science GCSEs which result in two science GCSEs.

Regarding educational aspirations and HE expectations as measured at age 16, 78% of young people in our sample report planning to go into Sixth Form College and above 80% believe they are likely to apply and get into university. Girls show higher aspirations and expectations than boys. It is interesting to note that HE expectations among young people are high across the board as more young people think that they are likely to go to university than will eventually end up going. Only 16% of individuals in our sample would like to study a science degree and boys are about 4 percentage points more likely to do so than girls.

At age 16, when pupils take GCSEs, we additionally include an indicator of whether the individual achieved 5 GCSEs at grades A*- C. Our data shows that 88% of young people achieved this qualification. Girls are more likely to achieve Level 2 threshold. Furthermore, the data contains information about the number of A-levels studied; around 13% of the estimated sample has achieved 5 or more A-levels. We also include controls for secondary school attended by the students. Approximately 60% of pupils attended a state-funded Community School. Boys are more likely than girls to attend private schools. However, the overall proportion is small, around 5%.

We do attempt to control for potential credit constraints arising from low parental income and/or lack of access to funds. Around 70% of individuals consider that financial issues and salary expectations are very important reasons to be taken into account at the time of applying to university. Girls show a significant higher probability as they tend to be more risk averse than boys. Also, up to 16% of students decided to live at home during term time to save many, 34% received any type of grant, bursary or scholarship, and 41% of students have a loan to pay for university costs (including tuition fees and/or maintenance costs).

4. Methodology and results

We use a Linear Probability Model (LPM) to quantify the determinants of the key HE indicators emphasized in the literature: first, HE participation generally; second, enrolment in science, technology, engineering and mathematics fields of study (STEM) at a university level; and finally, participation in a high status institution (RG). Despite the fact that our three outcome variables are binary (taking a value of 1 if the person participates and 0 otherwise) we choose to use a LPM for theoretical and practical reasons.[8,9]

Thus, our model is estimated using Ordinary Least Squares (OLS) as follows:

[8] A non-linear model may fit the conditional expectation function for Limited Dependent Variable models more closely than a Linear Probability Model but this matters little when evaluating marginal effects (Angrist & Pischke, 2009).

[9] Subject to data availability we would like to take account of school effects (within and across schools) on our outcome variables. Furthermore, a linear model offers clear advantages for extensions of the regression framework to consider causal relationships.

$$Y_i = \alpha + \beta_1 IF_i + \beta_2 AB_i + \beta_3 ES_i + \beta_4 FC_i + \beta_5 UC_i + \mu_i$$

where Y is our dependent variable (HE, STEM, RG), IF is a vector of individual and family background characteristics, AB measures other individual characteristics such us attitudes and behaviours, ES relates to the individual's educational attainment at the end of the compulsory stage, number of A-levels studied and school type attended at age 16, FC is a vector of financial considerations at the time of applying to university, UC is a further set of controls regarding university costs; and μ is an error term.

We proceed by estimating our models sequentially. Our baseline model (Spec1) controls for a comprehensive set of individual and family background characteristics. We include controls for gender, ethnicity, month of birth, whether the student has any disability, and the presence of any psychological distress as measured by the General Health Questionnaire (GHQ). We also control for maternal highest educational qualification, labour market status and housing tenure.

A second model (Spec2) augments the baseline specification to include attitudes and behaviours of the young person in the compulsory education stage. We include controls for risky behaviours (such as truancy, smoking and alcohol consumption), whether the young person is studying GCSEs in science and maths, and attitudes towards post-compulsory education and HE participation. In model 3 (Spec3), we add records which capture educational attainment at the end of compulsory schooling (Level 2 threshold) and number of A-levels studied. In an attempt to control for school quality and unobserved individual heterogeneity we take account of the secondary school attended at age 16.

Our fourth model (Spec4) adds controls for the main factors accounted for by the young person at the time of applying to university. These include financial considerations and the importance of obtaining a degree regarding specific job market opportunities and related salary considerations. Our final model (Spec5) includes a further set of controls which relate specifically to university costs. These include whether the young person needs to live at home whist at University, whether they are in receipt of any type of grant, scholarship, bursary, or loan, whether they are in employment (full- or part-time), and whether they have considered the cost vs. long term benefit of attending university. Note that this final model specification is not included in the HE equations as the university costs variables post-date HE entry such that we do not observe this information for non-participants.

We would obviously like to uncover causal effects on the likelihood of HE participation. However, to the extent that there are factors which influence participation in tertiary education but that are unobserved in our data, our analysis describes the statistical association between the main determinants highlighted in the literature and the probability of attending university at age 19/20.[10] Therefore, the reader should bear in mind that the presence of unobserved individual

[10] Quantifying the relative importance of all the factors that could potentially act as barriers to HE participation has proved difficult (Gorard et al., 2006).

(and school) heterogeneity may provoke some bias in our results. However, the strength of our analysis is that we have unique longitudinal data including rich individual and school level information. We thus need to ensure that we control for as many other factors that influence HE participation as possible.[11] By controlling for these rich measures, we are better able to allow for unobservable factors that influence educational attainment, assuming that such unobserved factors are likely to influence earlier achievement as well as the HE participation decision. Hence, we believe that the reported evidence will be informative about conditional differences in the likelihood of participating in HE.

We acknowledge the potential non-random assignment of students into schools as a source of selection bias. Unfortunately, our data does not include school identifiers ruling out the possibility of looking at school fixed/random effects. However, we are able to include indicators for the type of school attended at age 16 in an attempt to minimise any bias in our results.

Another potential source of endogeneity concerns sampling bias which may affect post-compulsory educational results. After 16, most students who stay on in school following the academic route and take A-levels probably intend to go to university. Students not planning to go to university may not take A-levels, or even if they do, they may not put in much effort and hence are more likely to dropout. By contrast, students in England are required by law to remain in school up to the age of 16 and sit GCSEs at the end of compulsory education. Therefore, in our estimations we include educational attainment at the end of compulsory schooling.

4.1. Higher Education participation

In this section, we document the association between relevant factors highlighted in the economics of education literature such as family background, school environment, ability or financial constraints and the likelihood of participating in HE at age 19 or 20. This allows us to better understand the channels through which socio-economic variables, academic performance and school attributes affect the likelihood of HE participation. We consider as HE participants those students who enrol in courses leading to qualifications which are above the standard of A-Levels or National Vocational Qualification (NVQ) Level 3. We include degree courses, postgraduate courses and Higher National Diplomas.

Table 1 reports the gradients in HE participation for models Spec1 through Spec4. The first column shows that there are large and significant differences in HE participation related to individual and family background characteristics. For example, being non-white increases the likelihood of going into HE by 16.1 percentage points. Similarly, individuals whose mother holds a degree qualification (A-levels) as her highest educational qualification are 16.2% (6.1%) more likely to participate in HE. Housing tenure, as a proxy for family wealth, also has an important influence on the participation decision. Students living in a rented property are almost

[11] See Haveman and Wolfe (1995) for a survey of literature that attempts to identify the causal effect of socio-economic status on HE participation.

11 percentage points less likely to enrol in HE studies. However, these individual and family background characteristics can only explain around 5% of the variation in HE participation.

Spec2 reveals that attitudes and behaviours of young people captured in our study play an important role. Once we add these variables, the explanatory power of our model increases to 24.1%. Participation in risky behaviours such as truancy and frequent alcohol consumption reduces the likelihood of going into HE by 3.9 and 3.3 percentage points respectively. On the other hand, taking separate science GCSEs (double science GCSEs) increases the probability by 6.8% (5.9%). However, it is expectations for HE formed by age 14 that make the greatest contribution to HE participation. For example, students who believe they are likely to do a university degree are 29.5 percentage points more likely participate in HE. Individual and family background variables remain statistically significant although the magnitude of the effects has been reduced substantially indicating a strong relation between family background and the attitudes and behaviours of young people.

Spec3 reports the importance of prior educational attainment. Achieving Level 2 threshold and studying 5 or more A-levels increases the chance of getting into HE by 15 and 12 percentage points respectively. We also observe a significant positive impact of Education Maintenance Allowance (EMA).[12] Previous research has shown that EMA has a significant impact on increasing participation in post-compulsory education, particularly amongst students from the poorest socio-economic backgrounds (Dearden et al., 2005). This implies that most of the effect of EMA impacts on the outcome through their effect on educational attainment, increasing the stay-on rates past the age of 16 by alleviating potential liquidity constraints. Regarding school type, students attending independent schools are 67% percentage points more likely to participate in HE. This result is consistent with recent literature showing those educated at private schools are significantly more likely to go on to postgraduate education (BIS, 2010; Machin and Murphy, 2010). However, the interaction of the main effect with educational attainment at the end of secondary schooling results in a strong and significant negative estimate which indicates differences in ability in favour of state-school educated pupils. Intuitively, to the extent that private school inputs are more productive than those at state schools, students from state schools who obtain the same GCSEs or A-level scores as those from private schools will be, on average, of higher ability (Naylor and Smith, 2004).

Finally, we include controls for the impact of financial issues and job specific considerations when applying to university. Lack of funding can have both indirect and direct impacts as both are barriers to HE participation and successful completion. In Spec4 we observe a positive effect of financial considerations as a determinant factor at the time of applying to university. It turns out that salary expectations has the stronger effect on HE participation, individuals who consider attending university aiming for a well-paid job are 22 percentage points more likely to participate in HE. This last model specification accounts for almost 34% of the

[12] EMA is a means-tested government scheme payable to students aged between sixteen and nineteen whose parents have a certain level of taxable income, with an aim to improve stay-on rate of pupils from disadvantaged family backgrounds. It is no longer paid in England as it has been replaced by 16 to 19 bursaries.

variation in the proportion of HE participation.

The progressive inclusion of controls reveals a substantial reduction in the magnitude of family background controls although they remain highly statistically significant. This implies that most of the effect of family background variables impact on the outcome through their effect on prior educational attainment, young person expectations and school choice. Furthermore, across all four specifications, the attitudes and behaviours of young people in the sample remain highly statistically significant. This suggests a positive effect on the likelihood of participating in HE, probably through their impact on educational attainment at the end of compulsory schooling.[13]

4.2. Enrolment in STEM fields

In the Government's Plan for Growth, education is described as "the foundation of economic success". The Government further stated that "our economy needs to become much more dynamic ... and retooled for a high-tech future, if we are going to create the jobs and prosperity we need for the next generation".[14] The Council for Industry and Higher Education (CIHE) warned that "the workforce of the future will increasingly require higher-level skills as structural adjustments in the economy force businesses to move up the value chain. These jobs of the future will increasingly require people with the capabilities that a STEM qualification provides".[15]

Given the enormous policy relevance of the topic, in this section we move on to analyse the likelihood of enrolling into a science, technology, engineering and mathematics (STEM) degree at age 19 or 20, conditional on HE participation (N=4,061).

Table 2 reports the gradients in probability of studying a STEM degree conditional on HE participation for models Spec1 through Spec5. The results clearly indicate gender, ethnic and family background differences on the likelihood of studying a science degree even though model Spec1 only explains around 2% of the variation. The progressive inclusion of behavioural and educational variables adds 11 percentage points to the explanatory power of the model and reveals additional evidence. The results from Spec2 show the adverse effect for young people engaged in risky behaviours, the positive impact of taking separate science GCSEs compared to any other option available and, in particular, the strong effect of expectations regarding university and willingness to do a STEM degree in the future. Young people reporting at the age of 14 that they would like to study a science degree are around 26 percentage points more likely

[13] Given the distinct differences in HE participation across gender described in the data section, we have also estimated regressions for boys and girls separately to allow for gender-specific effects, while maintaining a common model specification. The behaviour of the main covariates is fairly similar compared to the baseline estimation. It is noticeable that girls are less likely to be affected by engagement in risky behaviours such us truancy and alcohol consumption, and more sensible to university costs. On the other hand, boys seem to be more responsive to HE expectations and school choice. Results from these estimations are available upon request.

[14] HM Treasury & BIS, The Plan for Growth, March 2011.

[15] CIHE, The Demand for STEM Graduates and Postgraduates, January 2009.

to realise this intention. Spec 3 reveals the importance of educational attainment at the end of compulsory schooling in the likelihood of studying a STEM degree, and replicates the results for young people attending independent schools compared to the analysis of overall participation.

The importance of financial considerations together with the perception of the necessity of studying a degree to guarantee access to specific jobs as determinant reasons to apply to university, the negative effect of young people living at home during term time, and the increase in the likelihood for young people who receive help with university costs are highlighted in Spec4 and Spec5.

It is important to notice that the addition of the whole set of controls in model Spec5 does not reduce individual differences. For example, boys and non-whites are 5.2 and 3.1 percentage points more likely to study a STEM degree. On the other hand, the effect of family background variables is reduced markedly with only housing tenure remaining statistically significant. Students who reside in a rented family home are 4.9 percentage points less likely to enrol in STEM studies. Risky behaviours reduce the likelihood by about 3% and for students doing separate science GCSEs the likelihood increases by 5.5 percentage points.

Overall, it appears that expectations towards doing a university degree and particularly willingness to uptake science studies play a very important role in STEM enrolment. Even after controlling for educational attainment, school choice and financial considerations, those students who report preferences for a science degree at the age of 14 are 25.3 percentage points more likely to enter HE and follow a STEM pathway. These results indicate the importance of encouraging teenagers towards the fields of science during compulsory schooling as a way to increase numbers in STEM enrolment in HE.[16]

4.3. Attending a high status university

Not all HE participation has equal economic value as the return to a degree varies markedly according to the type of HE institution attended (Chevalier and Conlon, 2003; Iftikhar, McNally and Telhaj, 2008). In this respect, socio-economic differences should be of policy concern as they are likely to have a long term impact on students' future prospects and social mobility. In this section, we move on to consider the main determinants affecting young people in our sample on the likelihood of attending a high status university at age 19 or 20. Unfortunately, our data does not permit us to distinguish between Old and New universities.

[16] Given the significant differences in STEM enrolment across gender described in the data section, we have also estimated regressions for boys and girls separately to allow for gender-specific effects, while maintaining a common model specification. Compared to our main findings in the pool model, both boys and girls are equally affected by adverse family wealth conditions. Girls are more responsive to science GCSEs, with a 6.2 percentage points and highly statistically significant effect as opposed to a statistically insignificant 4.7 percentage points effect for boys. We also observe marked differences in the effects of expectations at the age of 14 indicating that girls are more sensitive. There is almost a 10 percentage point difference in the positive effect of preferences towards a science degree in favour of girls. Educational attainment at the end of compulsory schooling and school choice matters more for boys, and girls are definitely more job-oriented when considering to study a science degree. Results from these estimations are available upon request.

However, it does include information on whether each HE participant attends any of the Russell Group universities including Oxbridge.[17] Thus, for the purposes of this paper, we define students attending high status institutions as those enrolled in a university belonging to the Russell Group, including Cambridge and Oxford.

Table 3 reports gradients in the probability of attending a Russell Group university conditional on HE participation (N=4,061). The first column shows that gender and ethnic differences are not significant in the probability of attending a high status university. Surprisingly, reporting results consistent with psychological distress (as measured by the GHQ test at age 16/17) increases the probability by 3 percentage points for young people in our sample. We also observe an important role for family background especially that related to maternal education. Young people whose mother holds a degree are almost 20 percentage points more likely to study in high status universities. Poor family wealth reduces the probability by 6.6%. Overall, individual and family background characteristics explain only 4.4% of the variation.

After adding attitudes and behaviours of teenagers in Spec2 the explanatory power of our model increases by more than 7 percentage points. As expected risky behaviours reduces the outcome probability, but it is again differences in expectations towards HE that contribute the most to explain the likelihood of attending a high status university. For those pupils at age 14 who believe they are likely to do a university degree, the probability increases by almost 15 percentage points. Column three reports results regarding academic performance and school type. The outcome probability is significantly related to academic excellence at the end of secondary schooling: Pupils studying 5 or more A-levels increase their likelihood by 17 percentage points. On the other hand, the magnitude of the effect of attending a private school is much weaker compared to HE participation and is not statistically significant. Both results suggest again differences in ability in favour of state-school educated pupils. Finally, it is noticeable the negative and significant effect of students receiving EMA indicating socio-economic differences in the probability of attending a high status institution.

Results in model Spec4 suggest that determinant factors at the time of applying to university for young people aiming to study at a high status university are driven by salary considerations. These increase the probability by 7.2 percentage points. By contrast, specific job-related characteristics penalize the likelihood by 7.5 percentage points. Finally, Spec5 extends our analyses to control for potential sources of short-run credit constraints. Adding university costs increases the explanatory power of our model by up to 19%. Furthermore, our results indicate further socio-economic differences with pupils on grants, bursaries of

[17] At the time of wave 7 interview, the Russell Group represented twenty universities with the best research reputation in the country and who receive a large proportion of the government's research funding. The Russell Group is made up of: Birmingham, Bristol, Cambridge, Cardiff, Edinburgh, Glasgow, Imperial College, London, King's College London, University College, London, Leeds, Liverpool, LSE, Manchester, Newcastle, Nottingham, Queen's University, Belfast, Oxford, Sheffield, Southampton and Warwick. However, since August 2012 universities of Durham, Exeter, Queen Mary, University of London, and York became members of the Russell group. Oxbridge is a portmanteau of the University of Oxford and the University of Cambridge.

scholarships 2.5 percentage points less likely to enroll at a high status university. On the other hand, for those students who receive loans (including tuition fees and/or maintenance costs) the likelihood increases by 11%.

Overall, even after progressive inclusion of all set of controls available in the data maternal education represents the main contribution in terms of family background variables. The offspring of mothers who hold a university degree benefit by almost 10 percentage points in the likelihood of attending a higher status institution. The positive contribution of psychological distress as measured by the GHQ remains statistically significant, and the magnitude of the effect remains broadly unchanged. We interpret this effect as potential stress suffered by young people aiming for excellence in academic results at the end of secondary school.[18] However, this finding contrasts with those of Cornaglia, Crivellaro and McNally (2012) who point to an adverse effect of positive results in the GHQ test on educational attainment at the end of compulsory schooling (GCSEs). Further analysis of this result is beyond the scope of this paper, but given the short literature existing on the topic, especially using longitudinal studies, more research investigation is needed. The crucial role of attitudes and behaviours during teenage years is highlighted by the magnitude and statistical significance of many of the variables included in the study. Our results show lower educational expectations associated with risky behaviours and positive increments in the likelihood of attending a high status university related to ability beliefs. Young people from richer and more educated families are less likely to engage in a range of risky behaviours, such us playing truant, smoking or frequent alcohol consumption, and tend to have higher educational expectations, such as thinking it likely that they will apply and get into university (Chowdry, Crawford, Dearden, Joyce et al., 2010b). Therefore, our results point to yet another source that might increase socio-economic differences.

4.4. Are students coming from disadvantaged backgrounds penalised?

4.4.1. Socio-economic background and HE participation

HE participation has been almost continuously rising in England since the 1960s (Finegold, 2006). However, while participation in tertiary education has expanded, inequality for socio-economically disadvantaged students remains a major policy challenge (Department for Education and Skills, 2003, 2006). Furthermore, much of the widening participation policy agenda has been focused on the under-representation of disadvantaged pupils attending universities.

In this section we examine the association between socio-economic background and HE participation. The LSYPE study has been linked to administrative records such as the National Pupil Database (NPD) and other data sources such as geo-demographic markers from the 2001

[18] Our results suggest that the GHQ effect is non-linear. For example, at lower levels anxiety can be productive (Sadock and Sadock, 2000). This interpretation is also consistent with results reported by Graetz (1991) who found that, for young people, anxiety is associated with more schooling.

Census. Ideally, we would wish for rich individual-level data on students' socio-economic background but administrative data are weak in this respect. Therefore, as a first attempt to describe socio-economic background, we make use of school level data on eligibility for free school meals (FSM).[19] We divide the sample into five evenly sized groups (quintiles) according to FSM eligibility, and run models Spec1 through Spec4 including the four highest quintiles, such that the base case is individuals in the highest socio-economic quintile.

Table 4 reports the differences in the likelihood of participating in HE at age 19 or 20 by socio-economic quintile, and how this relationship changes as we progressively include different sets of controls. The first column reveals that there are large and significant socio-economic differences in HE participation rates. Being in the top FSM quintile (compared to the bottom FSM quintile) reduces the likelihood of participating in HE by 15.3 percentage points even controlling for individual and family background characteristics. Similarly, pupils in the middle FSM quintile remain around 13 percentage points less likely to participate. Once we take into account a variety of attitudes and behaviours of teenagers, educational attainment and school type (Spec2 and Spec3), these gaps fall by around 50%, suggesting that differences in expectations, academic success and type of school attended by young people from different socio-economic backgrounds provide a significant explanation of why young people from poorer families are less likely to go to university than those from richer families. These results also suggest that socio-economic disadvantage has already had an impact on academic outcomes at the age of 16 and that this disadvantage explains some of the proportion of the gap in HE participation.

Finally, the inclusion of controls for determinant factors at the time of applying to university in Spec4 reduces the effect of socio-economic background on HE participation rates further. For example, pupils who belong to the top FSM quintile are 7.2 percentage points less likely to go to university. It is also interesting to notice that the socio-economic gradient in HE participation including all available controls, suggests a relatively large difference in participation between the middle and bottom FSM quintiles (of 3.8 percentage points), and a lower gap between the middle and top FSM quintiles (of 3.4 percentage points). This suggests that much of the socio-economic gap in HE participation rates is driven by particularly high participation rates for students above the median income.

Our results indicate that the differences in university participation rates between students coming from advantaged and disadvantaged backgrounds are large. However, when we take into account attitudes and expectations (at the age of 14) towards HE participation, these gaps in participation are reduced by around 30%. The addition of academic results in secondary schooling further reduces the gap by around 20%. This suggests that one of the main challenges

[19] The variable reports the percentage of students known to be eligible for free school meals (FSM) at age 14. Students are entitled to FSM if their parents receive income support, income-based jobseeker's allowance, or child tax credit with a gross household income of less than £15,575. They are eligible for FSM if they are both entitled and registered as such with their local authority. Hence, eligibility for FSM can be thought of a proxy for very low family income.

to widening participation for pupils from poorer socio-economics backgrounds is to improve educational expectations of teenagers and increase the proportion of pupils getting good GCSE and A-level results.

Eligibility for FSM is a widespread measure of deprivation, albeit admittedly crude. As socio-economic background can be measured in different ways we check the robustness of our results by re-estimating all specifications using other well established socio-economic indexes included as administrative geo-demographic data in the LSYPE. We are aware of the possibility that our proposed measures of socio-economic background may be endogenous. This will arise if there are unobserved characteristics correlated both with the measures and HE participation. If this were the case, then our estimates of socio-economic differences in the likelihood of HE participation would be upward biased if the unobserved characteristics were both positively or negatively correlated with the measures of socio-economic status and the outcome, and downward biased otherwise. Therefore, to minimise endogeneity issues we attempt to ensure that we have controlled for as many factors that influence the likelihood of participating in HE as possible.

Firstly, we use the Index of Multiple Deprivation (IMD) as a measure of socio-economic status.[20] We divide the sample into five evenly sized groups (quintiles) according to their rank in the IMD and run models Spec1 through Spec4. In our estimations we include the four lowest quintiles such that the base case is individuals in the highest socio-economic quintile.

Table 5 reports the differences in the likelihood of participating in HE at age 19 or 20 by IMD quintile, and how this relationship changes when we introduce to the analysis all controls available in our data.

In the first column we observe that there are large and significant socio-economic differences in HE education participation rates when we use IMD as a measure of socio-economic background. For example, young people in the bottom IMD quintile (the most deprived) are 10.8 percentage points less likely to participate in HE than students in the top IMD quintile (the least deprived). Similarly, being in the middle IMD quintile reduces the likelihood of going into HE at age 19/20 by 7.1 percentage points. Again, when we include controls for attitudes, behaviours and expectations of teenagers at age 14, the effect of socio-economic status on HE participation rates decreases by around 25%.

As might be expected, the inclusion of all controls (Spec4) reduces the effect of socio-economic status on the likelihood of participating in HE. Students belonging to the bottom IMD quintile are 7.3 percentage points less likely to participate compared to students in the top IMD quintile. We observe evidence that much of the socio-economic gap in HE participation rates might be driven by particularly low participation rates for students at the bottom of the

[20] The Index of Multiple Deprivation (IMD) is a measure of deprivation used in England covering seven aspects: Income, Employment, Health deprivation and disability, Education skills and training, Barriers to housing and services, Living environment and Crime. IMD is measured at the geographical unit of Lower layer Super Output Area (LSOA). There are 32,482 LSOAs in England. The most deprived LSOA for each Index is given a rank of 1 and the least deprived LSOA is given a rank of 32,482. They are easily interpretable, the higher the rank the less deprived the area.

income distribution. The difference between the middle and the top IMD quintiles is 4.3 percentage points whereas the gap between the middle and the bottom IMD quintiles, mostly due to the difference between the second and bottom quintiles, is 3 percentage points.

Next, we use the Income Deprivation Affecting Children Index (IDACI) as an alternative measure of socio-economic status to test further the robustness of our results.[21] Again, we divide the sample into five evenly sized groups (quintiles) according to their IDACI score and re-estimate models Spec1 through Spec4.

Table 6 reports the differences in the likelihood of participating in HE at age 19/20 by IDACI quintile, and how this relationship changes when we introduce to the analysis all controls available in our data.

Results using IDACI scores as a measure of socio-economic status replicate the patterns discussed above. Spec1 shows large differences in the likelihood of participating in HE. Pupils in the top IDACI quintile (the most deprived) are 10 percentage points less likely to go into university compared to students in the bottom IDACI quintile (the least deprived). Similarly, being in the middle IDACI quintile reduces the probability of HE participation by 6.9 percentage points. The impact of socio-economic background on the likelihood of participating in HE becomes much smaller once we include controls for attitudes and behaviours of teenagers, educational attainment and school choice, and financial considerations. Still, Spec4 shows a 5.3 percentage point gap between individuals who belong to the bottom IDACI quintile compared to their most advantaged counterparts. Our results also suggest that much of the socio-economic gap in HE participation rates is being driven by particularly low participation rates for students at the bottom of the income distribution.[22]

Finally, our data also include measures of prior educational attainment at a school level coming from Key Stage 2 tests (cognitive ability) taken at age 11.[23] Accordingly, we now consider the association between the school quality, measured as the percentage of pupils achieving level 4 or above in KS2 test for English, and the likelihood of HE participation.[24] The sample is again split into five quintiles on the basis of the KS2-English test results and we include the four highest quintiles in our models, such that the base case is individuals in the lowest KS2 quintile.

---

[21] The Income Deprivation Affecting Children Index (IDACI) shows the percentage of children in each Super Output area that live in families that are income deprived (i.e., in receipt of income support, income based jobseeker's allowance, working families' tax credit or disabled person's tax credit below a given threshold). It is used for calculation of the contextual value added, measuring children's educational progress. They are easily interpretable. An IDACI score of 0.24 means that 24% of children aged less than 16 are living in families that they are income deprived. The higher the score the more deprived the area.

[22] Full details of all coefficients for models Spec1 and Spec4 regarding FSM, IMD and IDACI estimations can be found in Table A2 in the appendix. Notice that the results do not qualitatively differ from those in our baseline models presented in Table 1. The estimates broadly show the same magnitudes and remain highly statistically significant.

[23] Note that this measure is only available for state school students (N=5,387).

[24] We also re-estimated all model specifications using school level KS2 results in mathematics and science. Even though the magnitude of the coefficient estimates was slightly smaller, the results are qualitatively similar to those presented here. Results from these estimations are available upon request.

Table 7 reports the differences in the likelihood of participating in HE at age 19/20 by KS2-English test results quintiles, and how this relationship changes once we progressively include different sets of controls.[25]

Spec1 through Spec4 show how university participation rates vary between students from different schools in terms of KS2-English results, but otherwise have similar observable characteristics. As expected, we observe large differences in HE participation related to the school quality. For pupils in the top KS2 quintile the likelihood of getting into HE increases by 14.2 percentage points compared to their counterparts in the bottom KS2 quintile. Similarly, students who belong to the middle quintile are still 7.5 percentage points more likely to participate.

Progressive inclusion of all the controls available in the data reduces the participation gap by about 50% as shown in the last column. Nonetheless, students who attend the top schools in terms of KS2-English test results are almost 6.5 percentage points more likely to access HE. Notably, the difference in HE participation between the second and bottom KS2 quintiles (of 3.4 percentage points) is roughly equivalent to the gap between the second and top KS2 quintiles (of 3.1 percentage points). This result suggests that much of the gap in HE participation is driven by particularly low participation rates for students attending lower quality schools in terms KS2 results.

Our results indicate that gaps in university participation rates between students coming from schools with different KS2 performance are large. However, the inclusion of additional controls in the data such as expectations towards HE (at the age of 14) reduce observed differences by about 40%. These results suggest that early interventions at, say, age 11 are likely to have an important effect in widening participation. Relatively later intervention (at ages 14 to 16) designed to improve the educational expectations of teenagers and to target improvements in GCSE attainment will further close the HE participation gap.

4.4.2 Socio-economic background and enrolment in science degrees

In this section, we document the association between socio-economic status and the probability of studying a STEM degree. As discussed above we rely on FSM eligibility as a measure of socio-economic background. To test the robustness of our results we repeat this exercise using other widespread measures of socio-economic background such as IMD and IDACI indexes.

Spec1 through Spec5 in Table 8 presents the estimates of the impact of socio-economic status on the likelihood studying a STEM degree at age 19/20, conditional on participation, and show how this relationship changes when we add controls for attitudes and behaviours of teenagers, educational attainment and school choice, financial considerations and university

[25] Full details of all coefficients for models Spec1 through Spec4 can be found in Table A3 in the appendix. Notice that the results do not qualitatively differ from those in our baseline model presented in Table 1. The estimates broadly show the same magnitudes and remain highly statistically significant.

costs. Column 1 reveals that there are large socio-economic differences in the probability of doing a science degree. Students in the top FSM quintile are almost 13 percentage points less likely to study a STEM degree than those in the bottom quintile. Similarly, the gradient of studying a science degree is almost 8 percentage points lower for students in the middle FSM quintile. Interestingly, the inclusion of expectations towards HE (including information about the type of science GCSEs taken) contributes the most to reducing the gap between students who belong to the top FSM quintile and those in the bottom. The attendance gap between participants is reduced by around 15%. Thereafter, the progressive inclusion of each of our control measures makes a relatively smaller difference to the coefficients on socio-economic status. In our final model specification, the gap in the likelihood between the top and bottom quintiles reveals a difference of 9.2 percentage points.

In contrast with our overall HE participation results, the difference between the proportion of students who study a science degree from the middle and bottom FSM quintile, 3.5 percentage points, is much smaller than the difference between those in the middle and top FSM quintile, 5.7 percentage points. This result clearly suggests that the socio-economic gap in the likelihood of studying a science degree is not driven solely by particularly high attendance of individuals at the top of the income distribution.

In summary, we find large socio-economic differences in the likelihood of studying a science degree conditional on participation, although they are significantly smaller than those we observe for our overall participation results in the previous section.[26] However, once we add control variables these differences are substantially reduced, particularly with the inclusion of expectations towards HE. This result suggests that schools may have an important role to play in encouraging students from disadvantaged backgrounds to apply to science degrees.

We test the robustness of our results and consider other well-established alternative measures of socio-economic status. Tables 9 and 10, report socio-economic differences in the probability of studying a STEM degree when we re-estimate models, Spec1 through Spec5, using IMD and IDACI indexes respectively.[27] The results reveal large and highly significant socio-economic gaps regardless of the index considered, and replicate the patterns discussed above. For example, once we include all control variables, pupils from the bottom IMD quintile (top IDACI quintile) are 9 percentage points (10.3 percentage points) less likely to study a science degree than their counterparts in the top (bottom) quintile.

Finally, we once again consider the association between school quality, as measured by the percentage of pupils achieving level 4 or above in KS2 test for English, and the likelihood of studying a science degree.[28] We split the sample into five quintiles on the basis of the

[26] This is mainly due to different scales. The expected probabilities are 0.715 for HE participation and 0.282 for STEM enrolment.

[27] Full details of all coefficients for models Spec1 and Spec5 regarding FSM, IMD and IDACI estimations can be found in Table A4 in the appendix. Notice that the results do not qualitatively differ from those in our baseline models presented in Table 2. The estimates broadly show the same magnitudes and remain highly statistically significant.

[28] Note that this measure is only available for state school students (N=3,766).

KS2-English test results and we include the four highest quintiles in our models, such that the base case is individuals in the lowest KS2 quintile.

Table 11 shows the differences in the likelihood of studying a science degree at age 19/20 by KS2-English test results quintiles, and how this relationship changes once we progressively include different sets of controls.[29]

Spec1 through Spec5 reveal how the proportion of students studying a STEM degree varies between students from different schools in terms of KS2-English results, but otherwise have similar observable characteristics. As expected, we observe large differences in STEM degree enrolment related to school quality. For pupils in the top KS2 quintile the likelihood of studying a science degree increases by 10.6 percentage points compared to their counterparts in the bottom KS2 quintile. Similarly, students who belong to the middle quintile are still 6.8 percentage points less likely to study a science degree.

Our results indicate the presence of large gaps in science degree enrolment between students coming from schools with different KS2 performance. However, additional controls in the data such as expectations towards HE (at the age of 14) reduce differences by about 30%. Notice that, once we include all control variables available in the data, differences in the probability of studying a science degree between the second and bottom KS2 quintiles (of 3.9 percentage points) is much higher than the gap between the second and top KS2 quintiles (of 2.7 percentage points). This result indicates that much of the gap in the probability of doing a science degree is driven by particularly low participation rates of students attending lower quality schools in terms KS2 results.

Overall, this results suggest that early interventions at, say, age 11 are likely to have an important effect in increasing enrolment in STEM degrees. Also, relatively later intervention (ages 14 to 16) designed to improve the educational expectations of teenagers and to target improvements in GCSE attainment will further close the gap.

4.4.3 Socio-economic background and high status universities

In this section, we examine the relationship between socio-economic background and the probability of attending a high status institution. Using FSM eligibility as a measure of socio-economic background we divide the sample into five evenly sized groups (quintiles) and run models Spec1 through Spec5 including the four highest quintiles, such that the base case is individuals in the highest socio-economic quintile. Furthermore, we check the robustness of our results re-estimating all specifications using other widespread measures of deprivation, namely IMD and IDACI indexes.

Table 12 reports the differences in the likelihood of attending a high status university at age 19/20 by socio-economic quintile, and how this relationship changes once we progressively

[29] Full details of all coefficients for models Spec1 through Spec5 can be found in Table A5 in the appendix. Notice that the results do not qualitatively differ from those in our baseline model presented in Table 2. The estimates broadly show the same magnitudes and remain highly statistically significant.

include additional sets of controls. The first column reveals that there is a large and significant socio-economic gradient in HE participation at a high status institution. Being in the top FSM quintile (compared to the bottom FSM quintile) reduces the likelihood by 19.6 percentage points even controlling for individual and family background characteristics. Similarly, pupils in the middle FSM quintile are still 11.2 percentage points less likely to attend a high status university. Once we take into account a variety of attitudes and behaviours of teenagers, and particularly HE expectations (Spec2), these gaps fall by around 20% for individuals in the top FSM quintile and 25% for those who belong to the middle FSM quintile. Controlling for type of school attended at the age of 16 and academic performance in secondary school we observe a further reduction in the likelihood of attending a high status university of 45% and 68% respectively (compared with a reduction of around 20-30% for HE participation). These results indicate that socio-economic disadvantage has already had an impact on HE expectations at the age of 14 and academic outcomes at the age of 16, and that this disadvantage explains a significant proportion of the gap in the likelihood of attending a high status institution. These finding also highlight that schools may have an important role to play encouraging disadvantaged students to apply to high status universities.

Finally, the inclusion of controls for determinant factors at the time of applying to university in Spec4 and university costs in Spec5 further reduces the effect of socio-economic background on HE participation in high status universities. For example, for pupils who belong to the top FSM quintile, the likelihood is more than 6 percentage points smaller. It is interesting to notice the large differences in participation between the second and bottom FSM quintiles (of 3 percentage points), and the similar proportion of individuals who attend high status institutions from the second and top FSM quintiles (of 3.2 percentage points). This suggests that much of the socio-economic gap regarding attendance to high status universities is being driven by particularly high participation rates for students at the top of the income distribution. Interestingly, we also observe a much smaller and insignificant effect of private schooling in the likelihood of study in a high status university, suggesting that the high participation rates amongst the rich are not entirely driven by the ability of private schools to get their students into high status institutions.

Tables 13 and 14 present robustness checks. They report gradients in probability of attending a Russell Group university when we re-estimate models, Spec1 through Spec5, using IMD and IDACI indexes respectively.[30] Results again reveal large and significant socio-economic gaps regardless of the index considered, and replicate the patterns discussed above. For example, once we include all control variables, pupils from the bottom IMD quintile (top IDACI quintile) are almost 4 percentage points (5.4 percentage points) less likely to attend high status institutions than their counterparts in the top (bottom) quintile.

[30] Full details of all coefficients for models Spec1 and Spec5 regarding FSM, IMD and IDACI estimations can be found in Table A6 in the appendix. Notice that the results do not qualitatively differ from those in our baseline models presented in Table 3. The estimates broadly show the same magnitudes and remain highly statistically significant.

Finally, we consider the association between school quality, as measured by the percentage of pupils achieving level 4 or above in KS2 test for English, and the likelihood of attending a high status university.[31] We split the sample into five quintiles on the basis of the KS2-English test results and we include the four highest quintiles in our models, such that the base case is individuals in the lowest KS2 quintile.

Table 15 shows the differences in the likelihood of studying in a high status institution at age 19/20 by KS2-English test results quintiles, and how this relationship changes once we progressively include different sets of controls.[32]

Spec1 through Spec5 show how the proportion of students studying in a high status institution varies between students from different schools in terms of KS2-English results, but otherwise have similar observable characteristics. As expected, we observe large differences in the likelihood of attending a high status university related to school quality. For pupils in the top KS2 quintile the probability of studying in a high status institution increases by 12 percentage points compared to their counterparts in the bottom KS2 quintile. Similarly, students who belong to the middle quintile are almost 6 percentage points less likely to attend a high status university.

Interestingly, the inclusion of expectations towards HE in Spec2 (together with attitudes and behaviours of teenagers) contributes the most to reduce the gap between students who belong to the top KS2 quintile and those in the bottom KS2 quintile. The attendance gap between participants in high status universities is reduced by 20%. Adding information on academic performance in secondary school and school type contributes to a further reduction in the likelihood of attending a high status university of about 15%. Thereafter, the progressive inclusion of each of the control measures available in the data makes a relatively smaller difference to the coefficients on school quality. In our final model specification the gap in the likelihood between the top and bottom quintiles shows a difference of 8.5 percentage points.

As we saw with our overall participation results, there is also a similar difference between the proportions of individuals who attend high status universities from the bottom and second KS2 quintiles, 4.2 percentage points as shown in Spec5, and the second and top KS2 quintiles, 4.3 percentage points. Again, our results suggest that much of the gap in the likelihood of studying at a high status institution is driven by particularly low participation rates for students attending poor quality schools.

Overall, we find that gaps in university participation rates at high status institutions between students coming from schools with different KS2 performance are large. Nonetheless, the results suggest that early interventions at, say, age 11 are likely to have an important effect on widening participation. Also, relatively later interventions (ages 14 to 16) designed to improve the educational expectations of teenagers and to target improvements in GCSE attainment will contribute to further close the gap.

[31] Note that this measure is only available for state school students (N=3,766).

[32] Full details of all coefficients for models Spec1 through Spec5 can be found in Table A7 in the appendix. Notice that the results do not qualitatively differ from those in our baseline model presented in Table 3. The estimates broadly show the same magnitudes and remain highly statistically significant.

5. Conclusions

This paper focuses on the determinants of HE participation, including the likelihood of studying a science degree and the type of HE institution attended by the student. We draw on the LSYPE data that allows us to follow a recent cohort of pupils from age 14 right through to HE participation at age 19/20. Therefore, our approach involves using rich individual data that have been linked to school level information and geographic markers to examine some of the factors determining HE participation for individuals who were in Year 11 in 2005/06 and who could therefore first enter HE in 2008/2009.

Our results indicate that differences in HE participation between students coming from advantaged and disadvantage backgrounds are large and that much of the socio-economic gap in HE participation rates is driven by particularly low participation rates for students at the bottom of the income distribution. However, when we introduce controls for prior educational attainment, student's expectations towards university, academic results during secondary schooling and type of school attended these gaps in participation are substantially reduced. This implies that most of the effect of family background variables impact on HE participation through their effect on prior educational attainment, young people's expectations and school choice.

In other words, socio-economic disadvantage has already had an impact on academic outcomes at the age of 16 and this disadvantage explains a substantial proportion of the gap in HE participation. Therefore, differences in expectations, academic success and type of school attended by young people from different socio-economic backgrounds provide a significant explanation of why young people from poorer families are less likely to go to university than young people from richer families. These findings confirm the general conclusion in the literature that socio-economic gaps emerge relatively early in individual's live rather than at the point of entry into HE. These results also potentially explain why the introduction of tuition fees did not have a major impact on widening participation, although we cannot rule out the possibility that the recent large increase in tuition fees may widen the socio-economic gap.

Our analysis suggests that one of the main challenges to widening participation for pupils from poorer socio-economic backgrounds is early policy interventions at, say, age 11 as they are likely to have an important effect in HE participation. Also, relatively later intervention (at ages 14 to 16) aiming at improving educational aspirations of teenagers and targeting better GCSEs results will further close the gap.

We are aware of the importance of non-cognitive skills and their influence in the lifetime outcomes of individuals (Carneiro and Heckman, 2003) but unfortunately our data does not include measures for students' non-cognitive skills. It is plausible that there is a positive relationship between cognitive (prior educational attainment) and non-cognitive skills and separate analysis of such measures would reveal whether the latter is the key determinant in the likelihood of HE participation.

We also explore the likelihood of enrolling in a science, technology, engineering and

mathematics (STEM) degree, conditional on HE participation. We find large socio-economic differences in the probability of studying a STEM degree, although they are significantly smaller than those we saw in our overall participation results. Besides, and in contrast to our findings in HE participation, this socio-economic gap is not driven solely by particular high attendance of individuals at the top of the income distribution. These results suggest that schools may have an important role in encouraging teenagers from disadvantaged backgrounds to take up science fields during compulsory schooling and to apply to do science degrees as a way to increase numbers in STEM enrolment.

Another aspect of the widening participation agenda that we analyse is the relationship between socio-economic background and the probability of attending a high status institution. Again, we find a significant socio-economic gradient in HE participation at a high status institution. Large differences between advantaged and disadvantaged pupils suggest that much of the socio-economic gap is driven by particularly high participation rates for richer students. However, the likelihood of advantaged pupils attending a high status university becomes much smaller once we take account of school type. Interestingly, we also observe a much smaller and insignificant effect of private schooling in the likelihood of studying at a high status university, suggesting that the high participation rates amongst the rich are not entirely driven by the ability of independent schools to get their students into high status institutions. Overall, these results highlight both the importance of educational attainment in secondary school and the important role of schools in raising HE expectations and encouraging disadvantaged pupils to apply to high status universities.

Throughout the paper, we rely on FSM eligibility as a proxy for socio-economic background alongside other widespread measures of deprivation such as IMD and IDACI. It is not possible to compare the relative size of the effects across different measures of deprivation, as they will depend on the joint distribution. Therefore, all we can do is to make qualitative statements regarding the robustness of our results. Hence, it is important to notice that our results reveal large and highly significant socio-economic gaps regardless of the index considered. Besides, we are aware of the distinct transmission mechanisms associated with the different measures of deprivation used. We recognise that the mechanism through which FSM eligibility (and also KS2 results) may impact on pupil attainment is via peer effects whereas for the IMD and IDACI indexes the transmission mechanism would be related to neighbourhood effects. Further research based on the possibility of identifying students within and across schools would allow us to assess separately the contribution of these effects and better understand the channels through which socio-economic variables affect the likelihood of HE participation.

6. References

Angrist, J. and A. Krueger (1991), 'Does Compulsory School Attendance affect Schooling and Earnings?', Quarterly Journal of Economics, 106, 4, 979-1014.

Bekhradnia, B. (2003), 'Widening Participation and Fair Access: An Overview of the Evidence', Report from the Higher Education Policy Institute.

BIS (2010), 'One Step Beyond: Making the Most out of Postgraduate Education', Department for Business, Innovation and Skills Postgraduate Review.

Blanden, J. and Machin, S. (2004), 'Educational inequality and the expansion of UK higher education', Scottish Journal of Political Economy, Special Issue on the Economics of Education, vol. 51, pp. 230–49.

Blanden, J. and Gregg, P. (2004), 'Family income and educational attainment: a review of approaches and evidence for Britain', Oxford Review of Economic Policy, vol. 20, pp. 245–63.

Callender, C. (2003), 'Student financial support in higher education: access and exclusion', in M. Tight (ed.), Access and Exclusion: International Perspectives on Higher Education Research, London: Elsevier Science.

Carneiro, P. and Heckman, J. (2002), 'The evidence on credit constraints in post-secondary schooling', Economic Journal, vol. 112, pp. 705–34.

Carneiro, P. and Heckman, J. (2003), 'Human capital policy', in J. Heckman, A. Krueger and B. Friedman (eds), Inequality in America: What Role for Human Capital Policies?, Cambridge, MA: MIT Press.

Chevalier, A. (2009), 'Does higher education quality matter in the UK?', Royal Holloway, University of London, mimeo.

Chevalier, A. and Conlon, G. (2003), 'Does it pay to attend a prestigious university?', Centre for the Economics of Education (CEE), Discussion Paper no. 33.

Chowdry, H., Crawford, C., Dearden, L., Goodman, A. and Vignoles, A. (2008), 'Understanding the determinants of participation in higher education and the quality of institute attended: analysis using administrative data', Institute for Fiscal Studies, mimeo.

Chowdry, H., Crawford, C., Dearden, L., Goodman, A. and Vignoles, A. (2010a), 'Widening Participation in Higher Education: Analysis using Linked Administrative Data', IFS Working Paper W10/04.

Chowdry, H., Crawford, C., Dearden, L., Joyce et al. (2010b), 'Poorer children's educational attainment: how important are attitudes and behaviour?', Eds Goodman A, Gregg P. Joseph Rowntree Foundation. York.

CMPO (2006), Family Background and Child Development up to Age 7 in the Avon Longitudinal Survey of Parents and Children (ALSPAC), DfES Research Report no. RR808A.

Connor, H., Burton, R., Pearson, R., Pollard, E. and Regan, J. (1999), Making the Right Choice: How Students Choose University and Colleges, London: Institute for Employment Studies (IES).

Cornaglia, F., Crivellaro, E. and McNally, S. (2012), 'Mental health and education decisions', Centre for the Economics of Education (CEE), Discussion Paper no. 136.

Cunha, F. and Heckman, J. (2007), 'The technology of skill formation', American Economic Review, vol. 92, pp. 31–47.

Dearden, L., McGranahan, L. and Sianesi, S. (2004), 'The role of credit constraints in educational choices: evidence from the NCDS and BCS70', CEE Discussion Paper No. 48, London.

Dearden, L., Emmerson, C., Frayne, C. and Meghir, C. (2005) 'Education Subsidies and School Drop-out Rates', IFS Working Paper W05/11.

Dearing, R. (1997), 'Higher Education in the Learning Society', Report of the National Committee of Inquiry into Higher Education, Norwich: HMSO.

Department for Education and Skills (2003), 'Widening Participation in Higher Education', London: DfES.

Department for Education and Skills (2006), 'Widening Participation in Higher Education', London: DfES.

Feinstein, L. (2003), 'Inequality in the early cognitive development of British children in the 1970 cohort', Economica, vol. 70, pp. 73–98.

Finegold, D. (2006), 'The roles of higher education in a knowledge economy', Rutgers University, mimeo.

Galindo-Rueda, F., Marcenaro-Gutierrez, O. and Vignoles, A. (2004), 'The widening socio-economic gap in UK higher education', National Institute Economic Review, no. 190, pp. 70–82.

Gayle, V., Berridge, D. and Davies, R. (2002), 'Young people's entry into higher education: quantifying influential factors', Oxford Review of Education, vol. 28, pp. 5–20.

Glennerster, H. (2001), 'United Kingdom education 1997–2001', Centre for the Analysis of Social Exclusion (CASE), Working Paper no. 50.

Gorard, S. (2000), Education and Social Justice: The Changing Composition of Schools and Its Implications, Cardiff: University of Wales Press.

Gorard, S., Smith, E., May, H., Thomas, L., Adnett, N. and Slack, K. (2006), 'Review of Widening Participation Research: Addressing the Barriers to Widening Participation in Higher Education', Report to HEFCE by the University of York, Higher Education Academy and Institute for Access Studies, Bristol: HEFCE.

Graetz, B. (1991), 'Multidimensional properties of the General Health Questionnaire', Social Psychiatry and Psychiatric Epidemiology, 26, 132–138.

Haveman, R. and Wolfe, B. (1995), 'The determinants of children's attainments: a review of methods and findings', Journal of Economic Literature, vol. 33, pp. 1829–78.

Higher Education Funding Council for England – HEFCE (2009), 'Aimhigher Associates scheme: guidance and planning for the national phase, 2009-2011', Bristol, HEFCE.

Higher Education Funding Council for England – HEFCE (2005), 'Young Participation in Higher Education', Bristol, HEFCE.

Herrmann, K. (2009), 'The Demand for STEM Graduates and Postgraduates' London: Council for Industry and Higher Education, STEM Policy Group, CIHE.

HM Treasury & BIS (2011), 'The Plan for Growth', Department for Business, Innovation and Skills.

Iftikhar, H., McNally, S. and Telhaj, S. (2008), 'University quality and graduate wages in the UK', Centre for Economics of Education, mimeo; output from ESRC-TLRP project 'Widening Participation in Higher Education: A Quantitative Analysis'.

Machin, S. and R. Murphy (2010), 'The Social Composition and Future Earnings of Postgraduates', Sutton Trust report.

Machin, S. and Vignoles, A. (2004), 'Educational inequality: the widening socio-economic gap', Fiscal Studies, vol. 25, pp. 107–28.

Meghir, C. and Palme, M. (2005), 'Educational reform, ability, and family background', American Economic Review, vol. 95, pp. 414–24.

Naylor, R. A. and Smith, J. (2004), 'Determinants of educational success in higher education', chapter 11 in Johnes, G. and Johnes, J. (eds.), International Handbook of the Economics of Education, Edward Elgar.

Pennell, H. and West, A. (2005), 'The impact of increased fees on participation in higher education in England', Higher Education Quarterly, vol. 59, pp. 127–37.

Piketty, T., (2000), "Theories of Persistent Inequality and Intergenerational Mobility", Atkinson, A.B. and Bourguignon, F. (eds.). Handbook of Income Distribution, vol. 1, Elsevier Science, North Holland, 429-476.

Raffe, D., Croxford, L., Iannelli, C., Shapira, M. and Howieson, C. (2006), Social-Class Inequalities in Education in England and Scotland, Special CES Briefing no. 40, Edinburgh: Centre for Educational Sociology.

Rutter, M., Moffitt, E. and Caspi, A. (2006), 'Gene–environment interplay and psychopathology: multiple varieties but real effects', Journal of Child Psychology and Psychiatry, vol. 47, pp. 226–61.

Sammons, P. (1995), 'Gender, ethnic and socio-economic differences in attainment and progress: a longitudinal analysis of student achievement over 9 years', British Educational Research Journal, vol. 21, pp. 465–85.

Sadock, B. J. and V. A. Sadock (2000): 'Kaplan and Sadock's compre-hensive textbook of psychiatry'. Philadelphia, PA, US: Lippincott Williams & Wilkins Publishers.

Sloane, P. J. and O'Leary, N. C. (2005), 'The return to a university education in Great Britain', National Institute Economic Review, 193, 75–89.

Strand, S. (1999), 'Ethnic group, sex and economic disadvantage: associations with pupil's educational progress from Baseline to the end of Key Stage 1', British Educational Research Journal, vol. 25, pp. 179–202.

Seiffge-Krenke, I. and Stemmler, M. (2003), 'Coping with everyday stress and links to medical and psychosocial adaptation in diabetic adolescents', Journal of Adolescent Health, 33(3), 180 – 18

Universities UK (2007), 'Variable Tuition Fees in England: Assessing their Impact on Students and Higher Education Institutions', London: UUK.

Walker, I. and Zhu, Y. (2011), 'Differences by degree: Evidence of the net financial rates of return to undergraduate study for England and Wales', Economics of Education Review, 30, 1177-1186.

Wyness, G. (2009), 'The impact of higher education finance in the UK', PhD thesis, Institute of Education, University of London.

Tables

Table 1 Gradients in HE participation

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*
Young Person (YP) Characteristics:				
Boy	-0.039***	-0.010	-0.012	-0.004
Non-white	0.161***	0.063***	0.079***	0.046***
Family Background Characteristics W4:				
Mother holding degree	0.162***	0.076***	0.061***	0.063***
Mother holding A-level	0.061***	0.044***	0.037***	0.025*
Tenure - own outright	0.033**	0.027**	0.020	0.025*
Tenure - rented	-0.109***	-0.060***	-0.062***	-0.058***
YP Attitudes and Behaviours W1-W3:				
Playing truant		-0.039***	-0.030**	-0.027**
Alcohol consumption		-0.033**	-0.038***	-0.039***
Taking separate science GCSEs		0.068***	0.059***	0.052***
Taking double science GCSEs		0.059***	0.055***	0.047***
Planning to go into Sixth Form College		0.066***	0.045***	0.037***
Likely to apply to University		0.182***	0.172***	0.112***
Likely to get into University		0.085***	0.070***	0.060***
Likely to do a University degree		0.295***	0.266***	0.175***
Educational attainment/school type W4:				
Achieved 5 or more A*-C GCSEs			0.154***	0.134***
Achieved 5 or more A-levels			0.119***	0.099***
Receiving EMA			0.042***	0.030***
Attending independent school			0.671***	0.549***
Interaction independent school and level 2 threshold			-0.582***	-0.464***
Determinant factors when apply to university W5:				
Financial considerations				0.087***
Necessary for specific jobs				0.060***
Salary considerations				0.221***
University costs W6-W7:				
Living home during term time				
Receiving grants, bursaries or scholarships				
Receiving loan				
Working and studying				
Weighted cost vs. long term benefit				
N	5682	5682	5682	5682
adj. R^2	0.049	0.241	0.259	0.337

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table 2 Gradients in probability of studying a STEM degree conditional on HE participation

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*	*Spec[5]*
Young Person (YP) Characteristics:					
Boy	0.055***	0.051***	0.048***	0.052***	0.052***
Non-white	0.097***	0.030**	0.043***	0.028*	0.031**
Family Background Characteristics W4:					
Mother holding degree	0.079***	0.031*	0.018	0.021	0.026
Mother holding A-level	0.029*	0.023	0.017	0.012	0.007
Tenure - own outright	0.020	0.018	0.016	0.018	0.022
Tenure - rented	-0.085***	-0.058***	-0.054***	-0.052***	-0.049***
YP Attitudes and Behaviours W1-W3:					
Playing truant		-0.036**	-0.029**	-0.028*	-0.026*
Alcohol consumption		-0.027*	-0.032**	-0.031**	-0.031**
Taking separate science GCSEs		0.072***	0.065***	0.061***	0.055***
Taking double science GCSEs		0.025	0.021	0.018	0.012
Likely to apply to University		0.037**	0.030	0.005	0.004
Likely to get into University		0.055***	0.043***	0.040***	0.039**
Likely to do a University degree		0.132***	0.111***	0.072***	0.048***
Would like to study a Science degree		0.266***	0.257***	0.250***	0.253***
Educational attainment/school type W4:					
Achieved 5 or more A*-C GCSEs			0.120***	0.112***	0.087***
Achieved 5 or more A-levels			0.060**	0.052**	0.039
Receiving EMA			0.009	0.004	-0.013
Attending independent school			0.794***	0.749***	0.755***
Interaction independent school and level 2 threshold			-0.773***	-0.727***	-0.726***
Determinant factors when apply to university W5:					
Financial considerations				0.036***	0.035***
Necessary for specific jobs				0.070***	0.060***
Salary considerations				0.054***	0.020
University costs W6-W7:					
Living home during term time					-0.041**
Receiving grants, bursaries or scholarships					0.112***
Receiving loan					0.039**
Working and studying					0.005
Weighted cost vs. long term benefit					0.012
N	4061	4061	4061	4061	4061
adj. R^2	0.020	0.119	0.129	0.144	0.161

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table 3 Gradients in probability of attending a Russell Group university conditional on HE participation

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*	*Spec[5]*
Young Person (YP) Characteristics:					
Boy	-0.004	-0.001	-0.008	-0.007	-0.011
Non-white	-0.003	-0.005	-0.004	-0.004	0.004
General health questionnaire test	0.030***	0.031***	0.030***	0.028***	0.029***
Family Background Characteristics W4:					
Mother holding degree	0.195***	0.146***	0.110***	0.106***	0.099***
Mother holding A-level	0.041***	0.030**	0.016	0.014	0.008
Tenure - own outright	0.020	0.021*	0.017	0.017	0.022*
Tenure - rented	-0.066***	-0.041***	-0.020	-0.018	-0.014
YP Attitudes and Behaviours W1-W3:					
Playing truant		-0.032***	-0.020*	-0.020*	-0.018
Alcohol consumption		0.027**	0.031**	0.030**	0.030**
Taking separate science GCSEs		0.064***	0.045***	0.047***	0.042**
Taking double science GCSEs		0.015	0.016	0.016	0.013
Planning to go into Sixth Form College		0.052***	0.026**	0.023**	0.019*
Likely to apply to University		0.023	0.017	0.012	0.009
Likely to get into University		0.051***	0.039***	0.037***	0.033***
Likely to do a University degree		0.144***	0.116***	0.110***	0.089***
Would like to study a Science degree		0.039***	0.030**	0.034***	0.038***
Educational attainment/school type W4:					
Achieved 5 or more A*-C GCSEs			0.015	0.014	0.011
Achieved 5 or more A-levels			0.171***	0.170***	0.154***
Receiving EMA			-0.030***	-0.030***	-0.025**
Attending independent school			0.122	0.100	0.095
Interaction independent school and level 2 threshold			-0.002	-0.019	-0.031
Determinant factors when apply to university W5:					
Financial considerations				0.024**	0.019*
Necessary for specific jobs				-0.075***	-0.071***
Salary considerations				0.072***	0.048***
University costs W6-W7:					
Living home during term time					-0.098***
Receiving grants, bursaries or scholarships					-0.025*
Receiving loan					0.110***
Working and studying					0.006
Weighted cost vs. long term benefit					0.020
N	4061	4061	4061	4061	4061
adj. R^2	0.044	0.116	0.163	0.168	0.189

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table 4 Gradients in HE participation – School controls: Eligibility for Free School Meals (FSM), quintiles

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*
2nd FSM quintile	-0.084***	-0.029*	-0.011	-0.011
Middle FSM quintile	-0.126***	-0.061***	-0.041**	-0.038**
4th FSM quintile	-0.168***	-0.085***	-0.064***	-0.056***
Top FSM quintile	-0.153***	-0.097***	-0.080***	-0.072***
N	5682	5682	5682	5682
adj. R^2	0.064	0.245	0.262	0.339

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table 5 Gradients in HE participation – Geographic controls: Index of Multiple Deprivation (IMD) by rank, quintiles

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*
4th IMD quintile	-0.031*	-0.019	-0.016	-0.013
Middle IMD quintile	-0.071***	-0.048**	-0.043***	-0.043***
2th FSM quintile	-0.083***	-0.049***	-0.049***	-0.046***
Bottom IMD quintile	-0.108***	-0.080***	-0.078***	-0.073***
N	5682	5682	5682	5682
adj. R^2	0.054	0.243	0.262	0.339

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table 6 Gradients in HE participation – Geographic controls: Income Deprivation Affecting Children (IDACI) score, quintiles

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*
2nd IDACI quintile	-0.036*	-0.016	-0.009	-0.006
Middle IDACI quintile	-0.069***	-0.028*	-0.027	-0.026
4th IDACI quintile	-0.083***	-0.041**	-0.038**	-0.030*
Top IDACI quintile	-0.100***	-0.056***	-0.055***	-0.053***
N	5682	5682	5682	5682
adj. R^2	0.053	0.242	0.260	0.338

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table 7 Gradients in HE participation – School controls: KS2 English test results, quintiles

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*
2nd KS2 quintile	0.046**	0.037**	0.036**	0.034**
Middle KS2 quintile	0.075***	0.055***	0.054***	0.045***
4th KS2 quintile	0.119***	0.075***	0.074***	0.067***
Top KS2 quintile	0.142***	0.080***	0.077***	0.065***
N	5387	5387	5387	5387
adj. R^2	0.064	0.245	0.262	0.339

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table 8 Gradients in probability of studying a STEM degree conditional on HE participation – School controls: Eligibility for Free School Meals (FSM), quintiles

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*	*Spec[5]*
2nd FSM quintile	-0.055***	-0.022	-0.016	-0.017	-0.019
Middle FSM quintile	-0.079***	-0.044**	-0.037*	-0.037*	-0.035*
4th FSM quintile	-0.117***	-0.069***	-0.059***	-0.057***	-0.057***
Top FSM quintile	-0.128***	-0.107***	-0.101***	-0.098***	-0.092***
N	4061	4061	4061	4061	4061
adj. R^2	0.064	0.245	0.262	0.339	0.412

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table 9 Gradients in probability of studying a STEM degree conditional on HE participation – Geographic controls: Index of Multiple Deprivation (IMD) by rank, quintiles

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*	*Spec[5]*
4th IMD quintile	-0.036*	-0.024	-0.024	-0.023	-0.026
Middle IMD quintile	-0.046**	-0.034*	-0.031*	-0.032*	-0.032*
2th FSM quintile	-0.082***	-0.067***	-0.063***	-0.062***	-0.063***
Bottom IMD quintile	-0.108***	-0.094***	-0.094***	-0.093***	-0.090***
N	4061	4061	4061	4061	4061
adj. R^2	0.025	0.123	0.132	0.147	0.164

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table 10 Gradients in probability of studying a STEM degree conditional on HE participation – Geographic controls: Income Deprivation Affecting Children (IDACI) score, quintiles

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*	*Spec[5]*
2nd IDACI quintile	-0.029	-0.020	-0.017	-0.019	-0.023
Middle IDACI quintile	-0.063***	-0.044**	-0.041**	-0.042**	-0.044**
4th IDACI quintile	-0.091***	-0.078***	-0.074***	-0.071***	-0.071***
Top IDACI quintile	-0.118***	-0.105***	-0.105***	-0.105***	-0.103***
N	4061	4061	4061	4061	4061
adj. R^2	0.026	0.124	0.133	0.148	0.165

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table 11 Gradients in probability of studying a STEM degree conditional on HE participation – School controls: KS2 English test results, quintiles

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*	*Spec[5]*
2nd KS2 quintile	0.050***	0.043**	0.042**	0.042**	0.039**
Middle KS2 quintile	0.068***	0.048***	0.047**	0.043**	0.045**
4th KS2 quintile	0.098***	0.071***	0.069***	0.065***	0.063***
Top KS2 quintile	0.106***	0.076***	0.071***	0.065***	0.066***
N	3766	3766	3766	3766	3766
adj. R^2	0.028	0.121	0.131	0.145	0.163

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table 12 Gradients in probability of attending a Russell Group university conditional on HE participation – School controls: Eligibility for Free School Meals (FSM), quintiles

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*	*Spec[5]*
2nd FSM quintile	-0.102***	-0.075***	-0.034*	-0.031	-0.030
Middle FSM quintile	-0.112***	-0.084***	-0.035*	-0.032	-0.031
4th FSM quintile	-0.180***	-0.139***	-0.076***	-0.073***	-0.058***
Top FSM quintile	-0.196***	-0.158***	-0.088***	-0.087***	-0.062***
N	4061	4061	4061	4061	4061
adj. R^2	0.070	0.129	0.166	0.171	0.191

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table 13 Gradients in probability of attending a Russell Group university conditional on HE participation – Geographic controls: Index of Multiple Deprivation (IMD) by rank, quintiles

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*	*Spec[5]*
4th IMD quintile	-0.022	-0.011	-0.009	-0.007	-0.006
Middle IMD quintile	-0.034*	-0.023	-0.017	-0.016	-0.011
2th IMD quintile	-0.083***	-0.065***	-0.051**	-0.051**	-0.037*
Bottom IMD quintile	-0.111***	-0.086***	-0.057**	-0.056**	-0.039*
N	4061	4061	4061	4061	4061
adj. R^2	0.051	0.100	0.140	0.146	0.159

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table 14 Gradients in probability of attending a Russell Group university conditional on HE participation – Geographic controls: Income Deprivation Affecting Children (IDACI) score, quintiles

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*	*Spec[5]*
2nd IDACI quintile	-0.025	-0.017	-0.011	-0.010	-0.008
Middle IDACI quintile	-0.055***	-0.037*	-0.028	-0.027	-0.024
4th IDACI quintile	-0.113***	-0.089***	-0.071***	-0.071***	-0.061***
Top IDACI quintile	-0.125***	-0.102***	-0.070***	-0.068***	-0.054**
N	4061	4061	4061	4061	4061
adj. R^2	0.053	0.101	0.140	0.146	0.160

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table 15 Gradients in probability of attending a Russell Group university conditional on HE participation – School controls: KS2 English test results, quintiles

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*	*Spec[5]*
2nd KS2 quintile	0.052**	0.045*	0.040*	0.040*	0.042*
Middle KS2 quintile	0.057**	0.048*	0.040*	0.041*	0.044*
4th KS2 quintile	0.074**	0.059*	0.047*	0.048*	0.050*
Top KS2 quintile	0.120***	0.100***	0.086**	0.087***	0.085***
N	3766	3766	3766	3766	3766
adj. R^2	0.053	0.101	0.140	0.146	0.160

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Appendix

Table A1: Descriptive Statistics, by gender

Variable Name	Girls	Boys	Gender gap
Outcome Variables			
Attending Higher Education (HE)	0.734	0.693	0.041***
Doing a Science degree (STEM) | HE=1	0.255	0.313	-0.058***
Attending a high status institution (RG) | HE=1	0.157	0.153	0.004
Young Person (YP) Characteristics			
Non-white	0.354	0.330	0.024*
General health questionnaire test (W4)	0.315	0.169	0.146***
Family Background Characteristics W4:			
Mother holding degree	0.129	0.142	-0.013
Mother holding A-level	0.181	0.184	-0.003
Tenure – mortgage (ref. category)	0.623	0.635	-0.012
Tenure - own outright	0.187	0.192	-0.005
Tenure – rented	0.190	0.173	0.017*
YP Attitudes and Behaviours W1-W3			
Playing truant	0.228	0.260	-0.032***
Alcohol consumption	0.694	0.700	-0.006
Taking separate science GCSEs	0.211	0.301	-0.090***
Taking double science GCSEs	0.590	0.548	0.042***
Planning to go into Sixth Form College	0.790	0.770	0.020*
Likely to apply to University	0.883	0.843	0.040***
Likely to get into University	0.820	0.824	-0.004
Likely to do a University degree	0.647	0.565	0.082***
Would like to study a Science degree	0.143	0.179	-0.036***
Educational attainment/school type W4			
Achieved 5 or more A*-C GCSEs	0.892	0.877	0.015*
Achieved 5 or more A-levels	0.120	0.135	-0.015*
Receiving EMA	0.353	0.316	0.037***
Community School	0.631	0.569	0.062***
City Technology College (ref. category)	0.009	0.011	-0.002
Foundation School	0.160	0.175	-0.015
Independent School	0.046	0.059	-0.013**
Voluntary Aided School	0.122	0.128	-0.006
Voluntary Controlled School	0.020	0.044	-0.024***
Factors considered when apply to university W5			
Financial considerations	0.735	0.649	0.086***
Necessary for specific jobs	0.668	0.620	0.048***
Salary considerations	0.729	0.688	0.041***
University costs W6-W7			
Living home during term time	0.176	0.144	0.032***
Receiving grants, bursaries or scholarships	0.364	0.321	0.043***
Receiving loan	0.419	0.412	0.007
Working and studying	0.322	0.274	0.048***
Weighted cost vs. long term benefit	0.355	0.334	0.021*
Number of observations	2985	2697	

Source: Longitudinal Study of Young People in England (LSYPE), Wave 1-7.
Significant levels: * p<0.1; ** p<0.05; *** p<0.01 based on Welch's t-test.

Table A2: Gradients in HE participation - Eligibility for Free School Meals (FSM), Index of Multiple Deprivation (IMD) by rank and Income Deprivation Affecting Children (IDACI) score

	FSM		IMD		IDACI	
	Spec[1]	*Spec[4]*	*Spec[1]*	*Spec[4]*	*Spec[1]*	*Spec[4]*
Young Person (YP) Characteristics:						
Boy	-0.044***	-0.005	-0.040***	-0.004	-0.040***	-0.004
Non-white	0.194***	0.060***	0.186***	0.059***	0.185***	0.057***
Family Background Characteristics W4:						
Mother holding degree	0.134***	0.058***	0.149***	0.058***	0.150***	0.060***
Mother holding A-level	0.047***	0.020	0.052***	0.020	0.054***	0.022
Tenure - own outright	0.031**	0.025*	0.037**	0.027**	0.033**	0.025*
Tenure - rented	-0.090***	-0.051***	-0.088***	-0.046***	-0.088***	-0.047***
YP Attitudes and Behaviours W1-W3:						
Playing truant		-0.025*		-0.024*		-0.025**
Alcohol consumption		-0.046***		-0.046***		-0.043***
Taking separate science GCSEs		0.046**		0.048**		0.049***
Taking double science GCSEs		0.045***		0.043***		0.044***
Likely to apply to University		0.031**		0.033**		0.035***
Likely to get into University		0.115***		0.115***		0.114***
Likely to do a University degree		0.060***		0.060***		0.061***
Would like to study a Science degree		0.175***		0.174***		0.174***
Educational attainment/school type W4:						
Achieved 5 or more A*-C GCSEs		0.135***		0.135***		0.134***
Achieved 5 or more A-levels		0.094***		0.095***		0.096***
Receiving EMA		0.037***		0.042***		0.038***
Attending independent school		0.516***		0.531***		0.540***
Interaction independent school and level 2 threshold		-0.461***		-0.452***		-0.459***
Determinant factors when apply to university W5:						
Financial considerations		0.086***		0.087***		0.087***
Necessary for specific jobs		0.060***		0.060***		0.060***
Salary considerations		0.220***		0.220***		0.220***
N	5682	5682	5682	5682	5682	5682
adj. R^2	0.064	0.339	0.054	0.339	0.053	0.338

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table A3: Gradients in HE participation – School controls: KS2 results English test

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*
Young Person (YP) Characteristics:				
Boy	-0.040***	-0.011	-0.012	-0.004
Non-white	0.180***	0.072***	0.087***	0.053***
Family Background Characteristics W4:				
Mother holding degree	0.138***	0.068***	0.057***	0.060***
Mother holding A-level	0.049***	0.039***	0.033**	0.021
Tenure - own outright	0.033**	0.028**	0.020	0.025*
Tenure - rented	-0.098***	-0.055***	-0.058***	-0.054***
YP Attitudes and Behaviours W1-W3:				
Playing truant		-0.035***	-0.027**	-0.025*
Alcohol consumption		-0.039***	-0.042***	-0.043***
Taking separate science GCSEs		0.061***	0.056***	0.049***
Taking double science GCSEs		0.054***	0.051***	0.044***
Planning to go into Sixth Form College		0.061***	0.041***	0.034***
Likely to apply to University		0.181***	0.171***	0.112***
Likely to get into University		0.082***	0.069***	0.059***
Likely to do a University degree		0.292***	0.264***	0.174***
Educational attainment/school type W4:				
Achieved 5 or more A*-C GCSEs			0.151***	0.133***
Achieved 5 or more A-levels			0.115***	0.096***
Receiving EMA			0.049***	0.036***
Attending independent school			-	-
Interaction independent school and level 2 threshold			-	-
Determinant factors when apply to university W5:				
Financial considerations				0.086***
Necessary for specific jobs				0.059***
Salary considerations				0.220***
N	5387	5387	5387	5387
adj. R^2	0.064	0.245	0.262	0.339

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table A4: Gradients in probability of studying a STEM degree conditional on HE participation - Eligibility for Free School Meals (FSM), Index of Multiple Deprivation (IMD) by rank and Income Deprivation Affecting Children (IDACI) score

	FSM		IMD		IDACI	
	Spec[1]	*Spec[5]*	*Spec[1]*	*Spec[5]*	*Spec[1]*	*Spec[5]*
Young Person (YP) Characteristics:						
Boy	0.051***	0.051***	0.054***	0.052***	0.054***	0.052***
Non-white	0.128***	0.047***	0.122***	0.045***	0.127***	0.050***
Family Background Characteristics W4:						
Mother holding degree	0.057***	0.020	0.067***	0.020	0.065***	0.019
Mother holding A-level	0.018	0.002	0.021	0.002	0.020	0.001
Tenure - own outright	0.019	0.023	0.024	0.025*	0.021	0.022
Tenure - rented	-0.067***	-0.039**	-0.062***	-0.035**	-0.057***	-0.030*
YP Attitudes and Behaviours W1-W3:						
Playing truant		-0.024*		-0.023		-0.023
Alcohol consumption		-0.039**		-0.037**		-0.038**
Taking separate science GCSEs		0.048**		0.050**		0.050**
Taking double science GCSEs		0.009		0.008		0.007
Likely to apply to University		0.008		0.006		0.006
Likely to get into University		0.039***		0.039**		0.040***
Likely to do a University degree		0.047***		0.047***		0.045***
Would like to study a Science degree		0.254***		0.253***		0.254***
Educational attainment/school type W4:						
Achieved 5 or more A*-C GCSEs		0.087***		0.086***		0.086***
Achieved 5 or more A-levels		0.033		0.034		0.034
Receiving EMA		-0.005		-0.001		0.000
Attending independent school		0.717***		0.732***		0.732***
Interaction independent school and level 2 threshold		-0.722***		-0.708***		-0.712***
Determinant factors when apply to university W5:						
Financial considerations		0.034***		0.035***		0.035***
Necessary for specific jobs		0.060***		0.060***		0.061***
Salary considerations		0.020		0.020		0.019
University costs W6-W7:						
Living home during term time		-0.035**		-0.036		-0.036**
Receiving grants, bursaries or scholarships		0.112***		0.115***		0.115***
Receiving loan		0.039**		0.035**		0.036**
Working and studying		0.005		0.004		0.003
Weighted cost vs. long term benefit		0.012		0.011		0.010
N	4061	4061	4061	4061	4061	4061
adj. R^2	0.020	0.161	0.025	0.164	0.026	0.165

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table A5: Gradients in probability of studying a STEM degree conditional on HE participation – School controls: KS2 English test results

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*	*Spec[5]*
Young Person (YP) Characteristics:					
Boy	0.054***	0.050***	0.048***	0.052***	0.052***
Non-white	0.112***	0.038**	0.049***	0.034**	0.037**
Family Background Characteristics W4:					
Mother holding degree	0.060***	0.023	0.014	0.018	0.022
Mother holding A-level	0.020	0.018	0.013	0.008	0.004
Tenure - own outright	0.020	0.018	0.016	0.018	0.023
Tenure - rented	-0.076***	-0.053***	-0.051***	-0.050***	-0.046***
YP Attitudes and Behaviours W1-W3:					
Playing truant		-0.033**	-0.026*	-0.025*	-0.024*
Alcohol consumption		-0.032**	-0.035**	-0.034**	-0.035**
Taking separate science GCSEs		0.065***	0.061***	0.057***	0.051**
Taking double science GCSEs		0.020	0.017	0.014	0.009
Likely to apply to University		0.036*	0.030	0.005	0.003
Likely to get into University		0.052***	0.041***	0.038**	0.037**
Likely to do a University degree		0.129***	0.109***	0.071***	0.047***
Would like to study a Science degree		0.264***	0.256***	0.249***	0.252***
Educational attainment/school type W4:					
Achieved 5 or more A*-C GCSEs			0.118***	0.110***	0.085***
Achieved 5 or more A-levels			0.057**	0.049**	0.036
Receiving EMA			0.016	0.010	-0.007
Attending independent school			-	-	-
Interaction independent school and level 2 threshold			-	-	-
Determinant factors when apply to university W5:					
Financial considerations				0.035***	0.035***
Necessary for specific jobs				0.071***	0.061***
Salary considerations				0.053***	0.019
University costs W6-W7:					
Living home during term time					-0.041
Receiving grants, bursaries or scholarships					0.115***
Receiving loan					0.037**
Working and studying					0.004
Weighted cost vs. long term benefit					0.011
N	3766	3766	3766	3766	3766
adj. R^2	0.028	0.121	0.131	0.145	0.163

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table A6: Gradients in probability of attending a Russell Group university conditional on HE participation - Eligibility for Free School Meals (FSM), Index of Multiple Deprivation (IMD) by rank and Income Deprivation Affecting Children (IDACI) score

	FSM		IMD		IDACI	
	Spec[1]	*Spec[5]*	*Spec[1]*	*Spec[5]*	*Spec[1]*	*Spec[5]*
Young Person (YP) Characteristics:						
Boy	-0.004	-0.017	0.002	-0.016	0.002	-0.016
Non-white	0.005	0.013	-0.010	0.012	-0.005	0.015
General health questionnaire test	0.033**	0.037***	0.036**	0.038***	0.037**	0.038***
Family Background Characteristics W4:						
Mother holding degree	0.165***	0.099***	0.182***	0.101***	0.181***	0.100***
Mother holding A-level	0.020	0.006	0.027	0.007	0.027	0.006
Tenure - own outright	0.018	0.024	0.023	0.025	0.019	0.023
Tenure - rented	-0.041**	-0.009	-0.041**	-0.007	-0.039**	-0.006
YP Attitudes and Behaviours W1-W3:						
Playing truant		-0.025		-0.024		-0.024
Alcohol consumption		-0.007		-0.007		-0.013
Taking separate science GCSEs		0.046*		0.051**		0.049**
Taking double science GCSEs		0.017		0.017		0.016
Likely to apply to University		0.033		0.030		0.030
Likely to get into University		0.051***		0.051***		0.052***
Likely to do a University degree		0.094***		0.094***		0.094***
Would like to study a Science degree		0.049***		0.049***		0.050***
Educational attainment/school type W4:						
Achieved 5 or more A*-C GCSEs		0.034		0.032		0.032
Achieved 5 or more A-levels		0.143***		0.145***		0.145***
Receiving EMA		-0.031**		-0.029*		-0.028*
Attending independent school		0.052		0.075		0.070
Interaction independent school and level 2 threshold		0.033		0.040		0.041
Determinant factors when apply to university W5:						
Financial considerations		0.017		0.018		0.018
Necessary for specific jobs		-0.083***		-0.083***		-0.084***
Salary considerations		0.027		0.028		0.028
University costs W6-W7:						
Living home during term time		-0.099***		-0.100***		-0.100***
Receiving grants, bursaries or scholarships		-0.026		-0.026		-0.026
Receiving loan		0.085***		0.085***		0.085***
Working and studying		-0.002		-0.002		-0.003
Weighted cost vs. long term benefit		0.009		0.007		0.008
N	4061	4061	4061	4061	4061	4061
adj. R^2	0.070	0.191	0.051	0.159	0.053	0.160

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Table A7: Gradients in probability of attending a Russell Group university conditional on HE participation – School controls: KS2 English test results

	Spec[1]	*Spec[2]*	*Spec[3]*	*Spec[4]*	*Spec[5]*
Young Person (YP) Characteristics:					
Boy	0.001	-0.004	-0.011	-0.010	-0.015
Non-white	-0.025*	-0.033**	-0.007	-0.002	0.006
General health questionnaire test	0.036**	0.041***	0.040***	0.037**	0.038***
Family Background Characteristics W4:					
Mother holding degree	0.173***	0.140***	0.113***	0.107***	0.100***
Mother holding A-level	0.031*	0.027	0.016	0.015	0.009
Tenure - own outright	0.015	0.020	0.019	0.018	0.023
Tenure - rented	-0.066***	-0.047***	-0.022	-0.020	-0.016
YP Attitudes and Behaviours W1-W3:					
Playing truant		-0.034**	-0.024	-0.024	-0.023
Alcohol consumption		-0.027	-0.020	-0.019	-0.014
Taking separate science GCSEs		0.063**	0.051**	0.054**	0.049**
Taking double science GCSEs		0.013	0.019	0.018	0.016
Likely to apply to University		0.040	0.033	0.035	0.029
Likely to get into University		0.067***	0.055***	0.053***	0.049***
Likely to do a University degree		0.133***	0.107***	0.112***	0.096***
Would like to study a Science degree		0.047***	0.039**	0.047***	0.049***
Educational attainment/school type W4:					
Achieved 5 or more A*-C GCSEs			0.026	0.025	0.031
Achieved 5 or more A-levels			0.156***	0.156***	0.146***
Receiving EMA			-0.039***	-0.038***	-0.032**
Attending independent school			0.074	0.057	0.061
Interaction independent school and level 2 threshold			0.034	0.040	0.036
Determinant factors when apply to university W5:					
Financial considerations				0.024	0.017
Necessary for specific jobs				-0.092***	-0.085***
Salary considerations				0.045**	0.030
University costs W6-W7:					
Living home during term time					-0.102***
Receiving grants, bursaries or scholarships					-0.026
Receiving loan					0.084***
Working and studying					-0.002
Weighted cost vs. long term benefit					0.008
N	3766	3766	3766	3766	3766
adj. R^2	0.058	0.103	0.139	0.146	0.160

Notes: * p<0.1; ** p<0.05; *** p<0.01.