

INFORMATION, EXPECTATIONS AND TRANSITION TO HIGHER EDUCATION

FINAL REPORT

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Executive Summary

1. Background

There has been a dramatic increase in participation in higher education in the UK. In England, for example, the proportion of 17 to 30 years olds participating in higher education increased from just 5% in 1960 to 49% in 2012, with a strong acceleration in the 1990s (Department for Business Innovation and Skills 2013). A number of studies demonstrate that the expansion of the higher education sector has reinforced rather than attenuated socio-economic inequalities in higher education (Lindley and Machin 2012, Machin and Vignoles 2004).

There are several possible reasons for these socio-economic differences. Poorer students may simply lack the financial resources to go to university, and may be reluctant to take on debt. Alternatively, many studies suggest socio-economic differences can affect both cognitive and non-cognitive skills, and the taste for education, all of which are likely to be important factors in the decision to go to university. Finally, differences in access to information by socio-economic status (SES) could lead to differential beliefs about the availability of financial aid, the requirements to succeed in higher education and the labour market benefits of a university degree.

The SES gap in university entrance could be alleviated in various ways depending on the underlying mechanisms: Reduced tuition fees might help students whose resources are scarce, as might increased financial aid. The effect of poor home learning environments might be mitigated through high-quality pre-school programmes aimed at boosting all pupils' skills. Unequal access to information could be reduced by targeted campaigns, mentoring or coaching programmes. There is currently tremendous effort dedicated to widen participation in higher education with activities and work by universities, the Office for Fair Access and the Higher Education Funding Council for England which funds activity and administers the National Collaborative Outreach Programme (e.g., Connell-Smith and Hubble, 2018).

2. Objectives

We set out to inform UK policy on addressing inequalities in university entrance by investigating how differences in information can explain difference in higher education participation by socio-economic status. We focus on four types of information: information about the availability of financial aid, information about requirements to university admission, information about academic ability, and information about the labour market return to a university degree.

3. The study

3.1 Information about available financial aid and the requirements for university admission

We use survey and administrative data for students in year 9 and 10 (aged 14 and 15) in 2004 and 2005. The survey data asks students to report their educational expectations: the likelihood they will apply to university, and the likelihood they would be admitted to university if they apply.

First, we look at how students' perceived likelihood of applying to university is affected by knowledge of available financial aid: namely the Education Maintenance Allowance (EMA). The EMA was a means-tested weekly allowance introduced in the academic year 2004-2005 and aimed at keeping low-income people between the age of 16 and 19 in post-compulsory academic education until the age for university education.¹ At the time of the collection of wave one of LSYPE, the EMA was in its first year of national implementation. We exploit the fact that, prior to its national implementation, the EMA was piloted in a number of Local Education Areas (LEA). We hypothesise students in former EMA pilot areas are more likely to be informed about the availability of EMA.

Second, we look at the link between the perceived likelihood of being admitted to university if an application is made and academic performance, and, particularly, how it varies by socio-economic status. We use this analysis to assess the role of information about the academic requirements for university admission on the perceived chance of success of a university application.

¹ Note that, for this cohort, the minimum school leaving age was 16. School leaving age was raised to 17 from September 2013 and to 18 from September 2015, Therefore, this cohort was not affected by the increases in the school leaving age, nor by their announcement (school leaving age was raised through with the Education and Skills Act in 2008).

Key findings on information about available financial aid and about requirements for university admission:

- Students from former EMA pilot areas are more likely to expect to apply to university than students from areas where the EMA was not piloted. This is particularly true for students from low socio-economic status (free school meal eligible students) with no older siblings.
- The educational expectations of students from low socio-economic status (free school meal eligible students) are less closely linked to academic attainment than those of their counterparts from more affluent families. This is consistent with the idea that students from less privileged backgrounds are less aware of the academic requirements of universities.

3.2 Information about academic ability

We use administrative and nationally representative survey data on English students for the year 2005. At the end of year 9, students take a set of externally marked exams. Students are not told the marks obtained in these exams, but only the level they achieve. For example, a student who scored just above the minimum mark required to be awarded level five is told her performance is “satisfactory,” while a student who scores just below that minimum mark is told her performance is “not satisfactory.” These two students with similar performance in the exam receive different signals about their academic ability. We use this to show how such information about academic ability might affect students’ plans to stay on in full-time post-compulsory education and students’ effort at school, measured by looking at the number of evenings a week on which they do homework.

Key findings on information about academic ability:

- Compared to receiving negative feedback (that is, being awarded a non-satisfactory level) in mathematics, receiving positive feedback (that is, being awarded a satisfactory level) in mathematics increases the probability of wanting to stay on in post compulsory education for boys. For girls this doesn’t make a difference.
- For boys the effect of receiving positive –as opposed to negative- feedback in mathematics on the probability of wanting to stay on is stronger in the case of boys who have also received positive feedback in English.

- For free school meal (FSM) eligible and ethnic minority girls, the effect of receiving positive – as opposed to negative- feedback in English increases the probability of wanting to stay on in post compulsory education and the number of evenings spent doing homework. There is no such effect for non FSM eligible and White British girls, or for boys.
- There is no effect of receiving positive –as opposed to negative- feedback in science.
- Descriptive evidence suggests that boys (girls) care more about mathematics (English), potentially explaining why different genders respond to feedback in different subjects.
- Girls seem to value hard work more than boys, potentially explaining why only girls adjust their effort level in response to the feedback.

3.3 Information about the labour market returns of a university degree

We use new data on university-related expectations from parents and young people in the Innovation Panel of the UK Household Longitudinal Study to assess the role of perceived labour market benefits of a degree in the intention to apply to university, and whether perceptions vary by socio-economic status. We gathered detailed information on expectations about outcomes such as the chance of having a degree by age 30, or the chance of applying to university, the perceived labour market return from a degree, knowledge about population earnings, and the expected cost of going to university. We also shared statistics about graduate and non-graduate earnings and employment with half of our respondents to test its impact on their perceptions.

Key findings on perceptions about going to university:

- Parents in households where at least one parent has a degree are more likely to expect their children to qualify to go to university, to succeed if they apply and to graduate if they go there.
- Scholarships for university study cannot entirely close the gap in applications expectations between poorer and more affluent students.
- Household income affects expectations about going to, and succeeding at, university, but parental education affects them more.
- Both children and parents who expect higher gains from having a degree are also more likely to expect they or their children will apply.

- Parents from all backgrounds hold similar beliefs about the earnings and employment returns to a degree in the population. So information gaps about this are unlikely to explain inequalities in university applications.
- However, parents tend to underestimate the financial benefits of having a degree. So information on this could increase applications for all groups.
- A very light-touch information intervention, such as showing some statistics about population earnings and employment to families, is powerful enough to change parents' expectations about population earnings so that they become more accurate, with changes still visible six months later.

4. Conclusions

We find that information does have the potential of affecting students' expectations over continuation into post-compulsory education, including university education.

- **Information about awareness of the available financial aid to stay in post-compulsory education (in the form of the Education Maintenance Allowance) affects students' perceived likelihood of applying to university, particularly for low-SES students.**
- **Low-SES may lack information about requirements for university admission.**
- **Students react to information about their academic ability.**
- **There is no SES-gap in information about returns to university education.**
- **Providing information about returns to university education makes parents' expectations about population earnings more accurate, with changes still visible six months later.**

Key changes that could make a difference:

- Providing better information for students and their parents about available financial aid
- Providing better information for students and their parents about requirements for university admission
- Providing better information for students and parents about how to interpret results in standardised tests. This could be done by:
 - Offering feedback which is clear and precise.
 - A more informative, finely-tuned system of grading.

- Providing information on graduate earnings to boost applications across the board.

INFORMATION, EXPECTATIONS AND TRANSITION TO HIGHER EDUCATION

1. Background

There has been a dramatic increase in participation in higher education in the UK. In England, for example, the proportion of 17 to 30 years olds participating in higher education increased from just 5% in 1960 to 49% in 2012, with a strong acceleration in the 1990s (Department for Business Innovation and Skills 2013). A number of studies demonstrate that the expansion of the higher education sector has reinforced rather than attenuated socio-economic inequalities in higher education (Lindlay and Machin 2012, Machin and Vignoles 2004). Previous research for the UK suggests that university enrolment (conditional on application) is not related to income once previous achievements are accounted for (Ermisch and Del Bono 2012), but application decisions are (Anders 2012).

There are several (potentially non-exclusive) reasons for the socio-economic (SES) gradient in university applications. Traditional models have emphasised the role of difficulty in accessing credit to explain the gap in enrolment (e.g., Lochner and Monje-Naranjo 2012). However, it is not clear why those gaps are seen in countries where grants and loans are available to students from disadvantaged backgrounds. Other factors may correlate with family income: Many studies show high-SES families promote cognitive and non-cognitive skills, have better access to information (which could influence beliefs about available financial aid, the requirements for university admission and the returns to education), and have an increased taste for education or a greater ability to pass on academic ability (Carneiro and Heckman 2002, Dearden et al. 2004).

The policy implications of these various reasons are distinct. Financial constraints can be alleviated with reduced tuition fees, increased financial aid or easier access to credit. The effect of poor parenting skills and poor home learning environments can be mitigated through high-quality pre-school programmes aimed at boosting cognitive and non-cognitive skills for all children. Unequal access to information can be reduced by targeted information campaigns, as well as mentoring and coaching programmes tailored to disadvantaged students.

2. Objectives

Our main objective is to investigate the role of information in influencing intentions to continue into full-time post-compulsory education and to go to university, with the aim of informing policies to address the SES gradient in university applications.

In Section 3.1 we use the Longitudinal Study of Young people in England (LSYPE) to study how expectations over the likelihood of applying and being admitted to university are shaped by information about available financial aid and requirements to university admission.

To study the role of information about available financial aid we look at how expectations over the probability of applying to university are affected by knowledge of the availability of the Education Maintenance Allowance (EMA). The EMA was a means-tested weekly allowance introduced in the academic year 2004-2005 and aimed at keeping low-income people between the age of 16 and 19 in post-compulsory academic education until the age for university education. At the time of the collection of wave one of LSYPE, the EMA was in its first year of national implementation. However, before its national introduction, the EMA was piloted in a number of Local Education Authorities (LEAs). We hypothesised households in pilot areas were more likely to be aware of the policy, especially if they included household members who were eligible for receiving the EMA during the pilot (siblings older than the respondents).

To shed light on the role of information about requirements for university admission we look at how the link between expectations over the perceived likelihood of being admitted to university conditional on applying varies by students' SES. If low-SES students are less aware of the requirements for university admission than high-SES students, we expect expectations of the likelihood of university admission among low-SES students to vary less with academic ability (measured through students' grades) than the same expectations among high-SES students.

While Section 3.1 uncovers a correlation between academic performance and educational expectations, it does not make any causal claim about how educational expectations vary with performance in a standardised exam. We make this causal claim in section 3.2. where we analyse how expectations over the likelihood of staying on in full-time post compulsory education and effort at school (measured as number of evenings spent doing homework) vary as a result of feedback in standardised national exams (namely Key Stage Three exams)

Finally, in Section 3.3, we investigate the role of expectations about the labour market returns to a university degree on applications intentions of parents and young people. While a large literature estimates the returns to schooling with earnings data, it is the returns perceived by students and/or their parents that influence actual schooling decisions (Manski, 1993). In fact, recent research shows that imperfect information about different aspects of the benefits or costs of higher education may be an important reason for underinvestment in schooling. Work in developing countries suggests that individuals tend to underestimate returns to schooling, and that providing individuals with statistics on actual returns results in improved school outcomes (Jensen, 2010; Nguyen, 2010). Our analysis relies on new data that we have collected in the UK.

3. The Study

3.1 Information about financial aid and requirements for university admission

We study expectations about university application and admission of English students in years 9 and 10. In particular, we shed light on *(i)* how information about the availability of financial aid affects the perceived likelihood of applying to university, *(ii)* how information about the requirements for university admission affects the perceived likelihood of being admitted to university if an application is made. We expect these expectations to be relevant in the actual decision to apply to university later on. Full details of the method and findings can be found in Fumagalli (2018a).

3.1.a. Information about financial aid and requirements for university admission: objectives

A growing literature suggests availability of financial aid can reduce the SES gap in university enrolment and completion (see, for example: Dynarski, 2008; Dearden et al., 2009; Sjoquist and Winters, 2015; Castleman and Long, 2016; Barr, 2019). Recent studies also show financial aid may not be enough to keep low-SES students in education, as students tend to have little understanding of actual college tuition levels and financial aid opportunities. Therefore, improving access to such information leads to an improvement in educational outcomes, especially for low-SES students (see Dinkelman and Martinez 2011; Bettinger et al., 2012; Oreopoulos and Dunn, 2013; Busso et al, 2017).

We ask the following research question: does information about availability of financial aid (in the form of the Education Maintenance Allowance) affect students' expected likelihood of applying to university measured at year 9 and 10 (age 14 and 15)? The EMA was a means-tested weekly allowance aimed at keeping low-income people between the age of 16 and 19 in post-compulsory academic education. Therefore, the EMA did not directly cover the costs of university. However, as completion of post-compulsory education is required to apply to university and drop-out for post-compulsory education is more prevalent among low-SES students, the EMA had the potential of affecting expectations over university application, particularly among low income students.

Our analysis of the effect of information about availability of financial aid has at least four elements of novelty. First, we rely of a nationally representative sample, while most of the existing work looks at specific populations of students. Second we look at awareness –rather than availability- of financial aid: a topic which is under-researched. Third, while most of the existing literature focuses on financial aid offered at university, we look at financial aid offered to stay on in post-compulsory, non-university education. Fourth, we look at expectations rather than enrolment or attainment. .

The focus on expectations provides an important contribution to the debate on the cost-effectiveness of the EMA. The EMA was abolished in 2010 as it was deemed too expensive.² This decision was criticised claiming it was only based on estimates of the impact of the policy on participation in post-compulsory education, and overlooked potential indirect benefits, such as increased effort at school (see Chowdry and Emerson, 2010). In this respect Chowdry et al. (2008) conclude that the EMA significantly increased students' performance at A-levels, particularly among pupils from deprived backgrounds. Our analysis of expectations complements -and potentially provides an explanation for- this boost in attainment.

The literature (e.g., Hoxby and Avery, 2012 and Hoxby and Turner, 2014, Goodman 2016) suggests low-SES high-achievers underestimate their suitability for selective colleges and generally apply to less prestigious institutions than richer peers with similar attainment. This may be due to various reasons. For example, this may be due to more prestigious universities levying

² The EMA is still available in Wales, Scotland and Northern Ireland, see: <https://www.gov.uk/education-maintenance-allowance-ema>.

higher fees and being located in more expensive cities than less prestigious ones.³ Alternatively, this may be due to low-SES people not being aware of the requirements for university admission (see also Hastings et al., 2007). We provide evidence that the latter explanation is relevant.

We focus on the perceived likelihood of being admitted to university if an application is made. Once the application has been made, the perceived likelihood of being admitted should not depend on the costs of university. We look at how the perceived likelihood of being admitted varies by academic performance and if the relationship between the perceived likelihood of being admitted to university and academic performance varies by SES. If low-SES students are not aware of the requirements for university admission, we expect low-SES students with low (high) academic performance to expect higher (lower) probability of being admitted than equally able high-SES students. In other words, we expect the link between academic performance and expectations on university admission to be weaker for low-SES students.

3.1.b. Information about financial aid and requirements for university admission: method

We use data from the Longitudinal Study of Young People in England (LSYPE): a cohort study on about 15,000 students of English schools interviewed for the first time in 2004 while in year 9, and interviewed annually since then. The sample is derived by first selecting schools, and then selecting students within schools. Children educated at home are excluded from the sample and so are boarders, children in maintained schools with fewer than 10 pupils, children in independent schools with less than six pupils, or children who are in England only for educational purposes. LSYPE can be linked to the National Pupil Database (NPD): a longitudinal administrative data set on students of English state schools with detailed information on students' academic performance. The LSYPE can also be linked to geographical identifiers, and in particular the Local Authority District (LADs) students were living in at the time of the collection of wave one. Using lookup tables available through the Office for National Statistics (ONS) website, we were able to identify the Local Education Authorities (LEAs) where students were living at the time of data collection, and thus isolate the students living in LEAs where the EMA was piloted prior to its national roll-out.

³ For the USA, this does not seem to be the case, as prestigious universities often offer more generous financial aid than less prestigious institutions (Hoxby and Avery, 2012).

To shed light on the role of information about the availability of financial aid we use the LSYPE question on the perceived likelihood of applying to university. This question reads as follows: ‘How likely do you think it is that you will ever apply to go to university to do a degree?’. Four possible answers are provided: ‘not at all likely’, ‘not very likely’, ‘fairly likely’, ‘very likely.’ We conduct multivariate analysis (using ordered logit) where the outcome is the perceived likelihood of being admitted to university. The explanatory variables are a dichotomous variable indicating residence in a EMA pilot LEA (plus its interaction with FSM eligibility and presence of older siblings), a measure of neighbourhood deprivation (the income deprivation affecting children or IDACI index) to account for the fact that EMA pilot areas might have been more economically deprived than other areas, a measure of family SES (FSM eligibility status), a measure of academic performance (plus its interaction with FSM eligibility), students’ demographics (gender, age and ethnicity), information on family composition, and Government Office Regions (GOR) fixed effects, to take into account for differences in macro areas (e.g., the North-South divide).

To study the role of information about requirements for university admission we use the questions on the perceived likelihood of being admitted if an application is made. It reads as follows: How likely do you think it is that if you do apply to go to university you will get in?’, with the available answers being: ‘not at all likely’, ‘not very likely’, ‘fairly likely’, ‘very likely.’ We conduct multivariate analysis where the main explanatory variables include a measure of family SES (FSM eligibility status), a measure of academic performance, and, crucially, an interaction between the measure of SES and academic performance. We also control for students’ demographics (gender, age and ethnicity), measures of family composition, a measure of neighbourhood deprivation, and Government Office Regions (GOR) fixed effects.⁴

Crucially, in LSYPE the question on the perceived likelihood of being admitted to university is not asked of those students answering they are not at all likely to apply to university. The fact that that not everybody is asked how likely they think they are to be admitted creates sample selection which is potentially non-random, as students who are not likely to apply to university are generally those with lower expectations of being admitted. The existing literature using the LSYPE has addressed this problem by focusing on the perceived likelihood of applying to

⁴ For both the analysis of the perceived likelihood of applying and the analysis on the perceived likelihood of being admitted if an application is made, we carried out the same exercise using as a measure of SES a composite index, taking into account, alongside FSM eligibility, a set of family characteristics such as mother employment status and education, grandparents’ education, and family wealth. The results are qualitatively the same as those derived using FSM eligibility only.

university (Anders and Micklewright, 2013), or by combining in a single variable information on the two elicited perceived likelihood (see Chowdry et al., 2009, 2010, who use a dichotomous indicator that the respondent is likely to apply to university and likely to get in). This is not ideal, as policies aimed at widening school participation can only be successful if the determinants of the perceived chances of success are understood separately from other factors (including financial constraints) affecting the choice of university application.

We address this issue by estimating a selection model. This is achieved by using variation in factors affecting the perceived likelihood of applying to university but not the perceived likelihood of being admitted once an application is made. The first source of variation we use is the geographical variation in the awareness of the availability of the Educational Maintenance Allowance (EMA) discussed above. Awareness of the availability of EMA should affect the subjective likelihood of applying to university, but not the subjective likelihood of being admitted conditional of applying. The second source of variation is variation in the local unemployment rates. Higher risk of unemployment reduces the opportunity costs of being a student and has been found to encourage participation in education (Reynolds and Pemberton, 2001; Rampino and Taylor, 2013; Tumino, 2013).

3.1.c. Information about financial aid and requirements for university admission: findings

We find that living in a former EMA pilot area increases the perceived likelihood of applying to university measured at age 14 (the first year of implementation of the EMA). Figure 1 shows that living in a former EMA pilot area decreases the probability of perceiving to be not at all likely and not very likely to go to university by around one percentage point, and increases the probability of perceiving to be very likely to apply to university by over two percentage points. Note that around 10 (17) percent of the sample said they were not at all likely (not very likely) to apply to university, and around 35 percent of the sample declare to perceive to be very likely to apply to university. Therefore, these effects are not negligible.

Figure 1: Effects of living in an EMA pilot area on the perceived likelihood of applying to university (wave one, age 14)

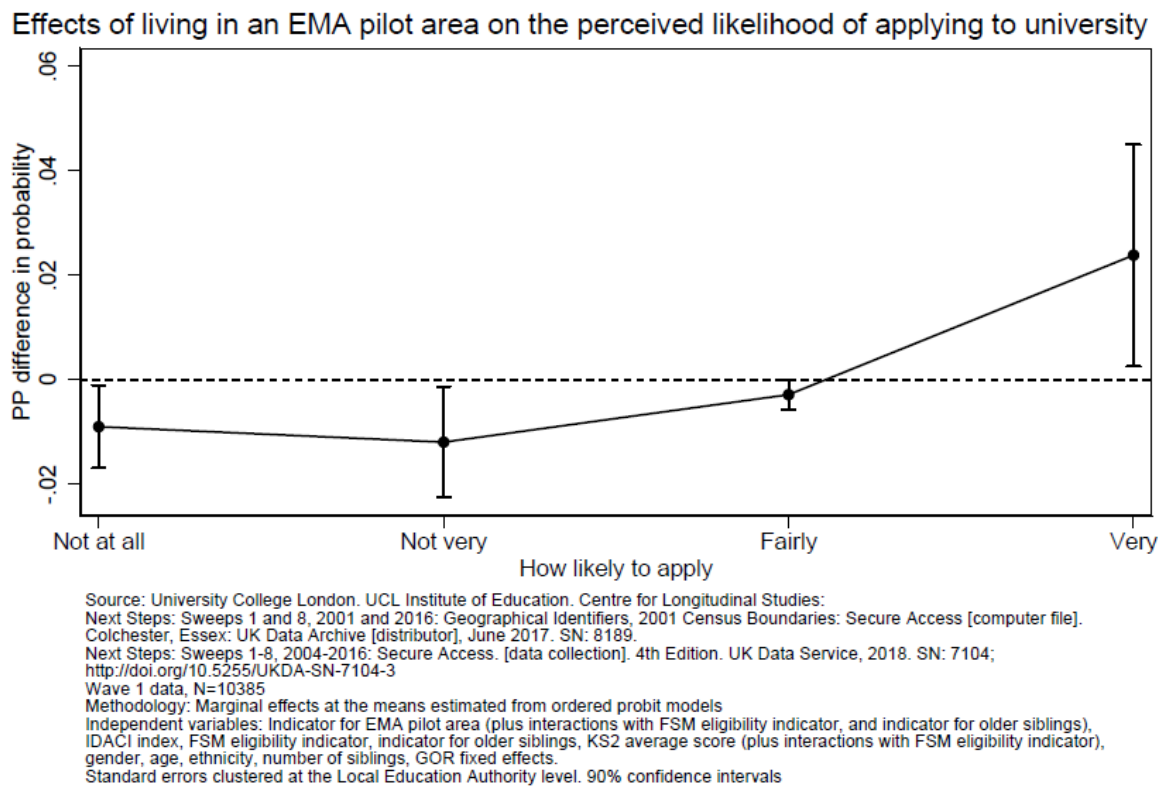
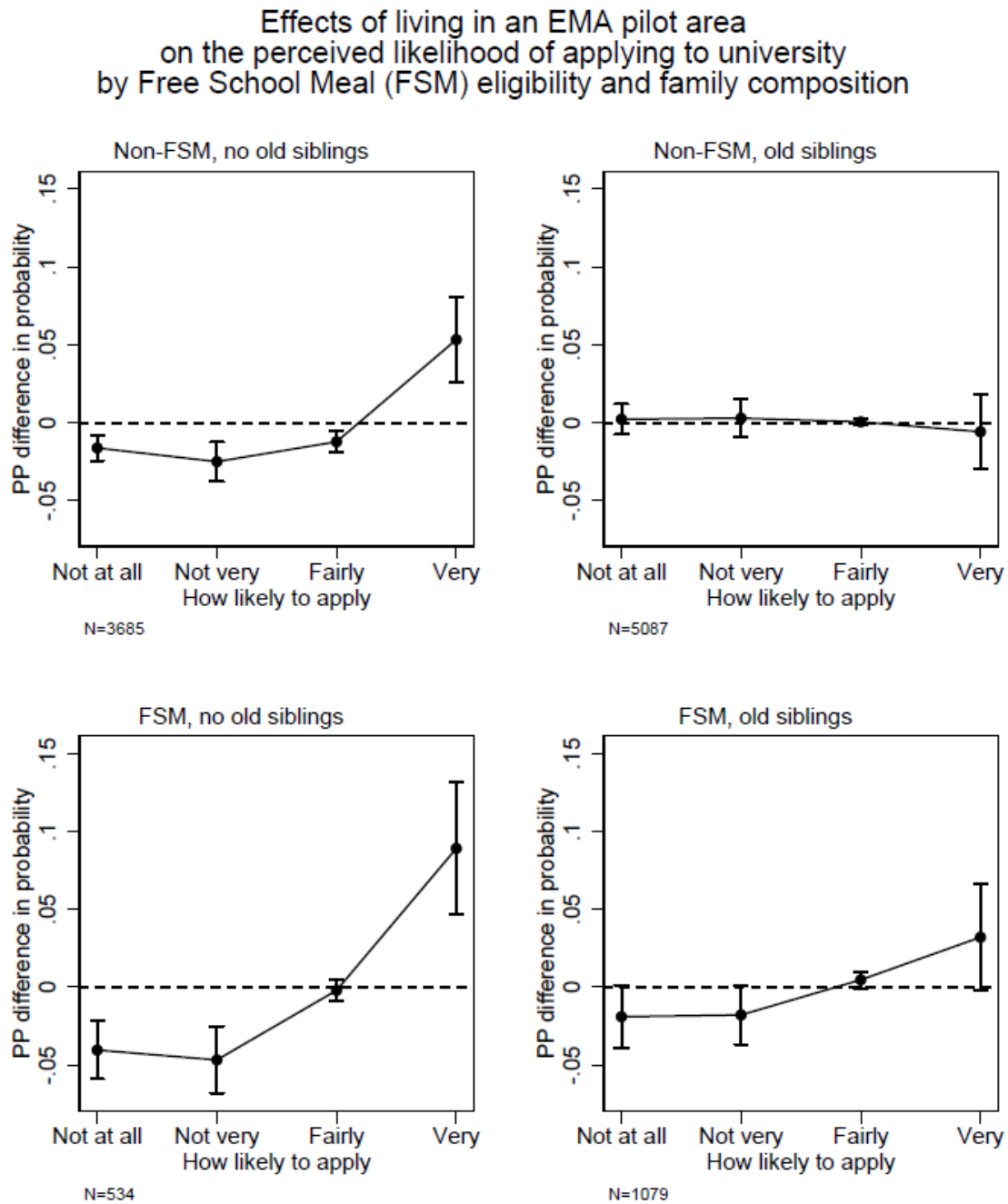


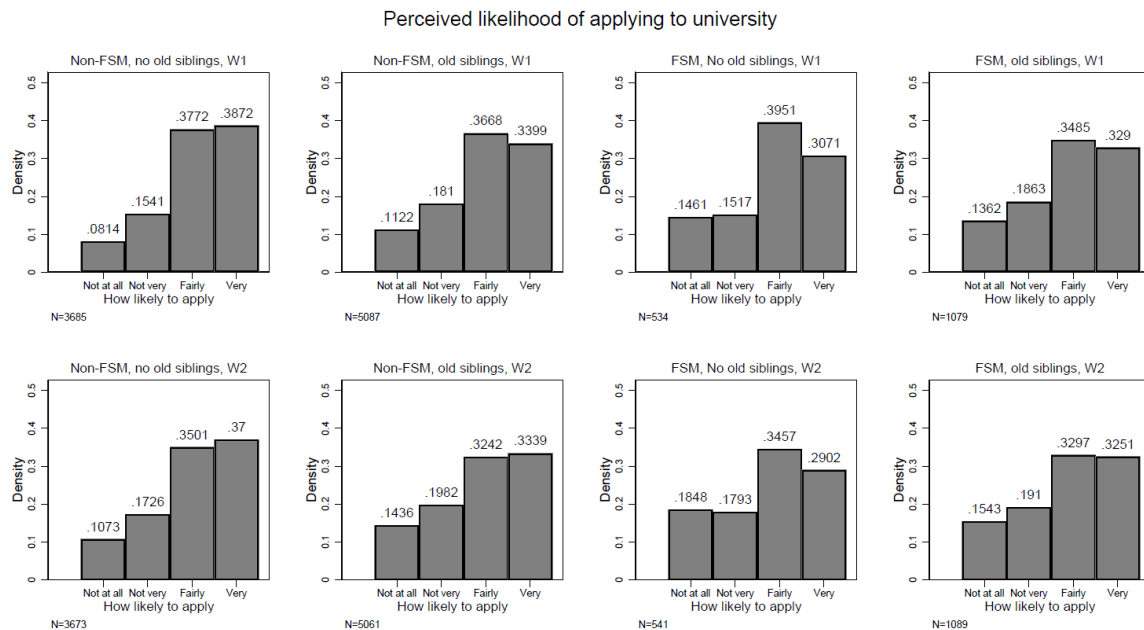
Figure 2 shows this effect is driven by FSM eligible students. Moreover, the figure shows the positive effect of the EMA on the perceived likelihood of applying to university is weaker in the case of students with older siblings. The left column of figure 2 shows living in a former EMA pilot area increases the likelihood of perceiving to be very likely to apply to university by around five percentage points for non-FSM eligible students with no older sibling, and by almost 10 percentage points for FSM with no older siblings. The right column of figure 2 shows living in a EMA pilot area has no effect of the perceived likelihood of applying to university for non FSM eligible students with older siblings, and a have limited positive effect on FSM eligible students with older siblings. The baseline percentages are shown in figure 3.

Figure 2: Effects of living in an EMA pilot area on the perceived likelihood of applying to university, by FSM eligibility and family composition (wave one, age 14)



Source: University College London. UCL Institute of Education. Centre for Longitudinal Studies:
 Next Steps: Sweeps 1 and 8, 2001 and 2016: Geographical Identifiers, 2001 Census Boundaries: Secure Access [computer file].
 Colchester, Essex: UK Data Archive [distributor], June 2017. SN: 8189.
 Next Steps: Sweeps 1-8, 2004-2016: Secure Access. [data collection]. 4th Edition. UK Data Service, 2018. SN: 7104;
<http://doi.org/10.5255/UKDA-SN-7104-3>
 Wave 1 data
 Methodology: Marginal effects at the means estimated from ordered probit models
 Independent variables: Indicator for EMA pilot area (plus interactions with FSM eligibility indicator, and indicator for older siblings), IDAC1 index
 FSM eligibility indicator, indicator for older siblings, KS2 average score (plus interactions with FSM eligibility indicator), gender, age, ethnicity,
 number of siblings, GOR fixed effects.
 Standard errors clustered at the Local Education Authority level. 90% confidence intervals

Figure 3: Perceived likelihood of applying to university



Source: University College London, UCL Institute of Education, Centre for Longitudinal Studies; Next Steps: Sweeps 1 and 8, 2001 and 2016; Geographical Identifiers, 2001 Census Boundaries; Secure Access [computer file]. Colchester, Essex: UK Data Archive [distributor], June 2017. SN: 8189. Next Steps: Sweeps 1-8, 2004-2016; Secure Access [data collection]. 4th Edition. UK Data Service, 2018. SN: 7104; <http://doi.org/10.5255/UKDA-SN-7104-3> Wave 1 and 2 data.

The early availability of EMA in the pilot areas is likely to have increased awareness of the existence of financial aid, thus boosting the perceived likelihood to apply to university. Availability of financial aid is particularly salient for FSM eligible students who are those more likely to be eligible for the EMA and more in need of financial aid. Early availability of EMA in the pilot areas is also likely to have induced older siblings to attend university themselves. This may have led to a shift of family resources towards the older siblings (and away from the younger siblings), thus reducing the positive impact of the awareness of the EMA on the perceived likelihood of applying to university for younger siblings.

Figure 4: Effects of living in an EMA pilot area on the perceived likelihood of applying to university (wave two, age 15)

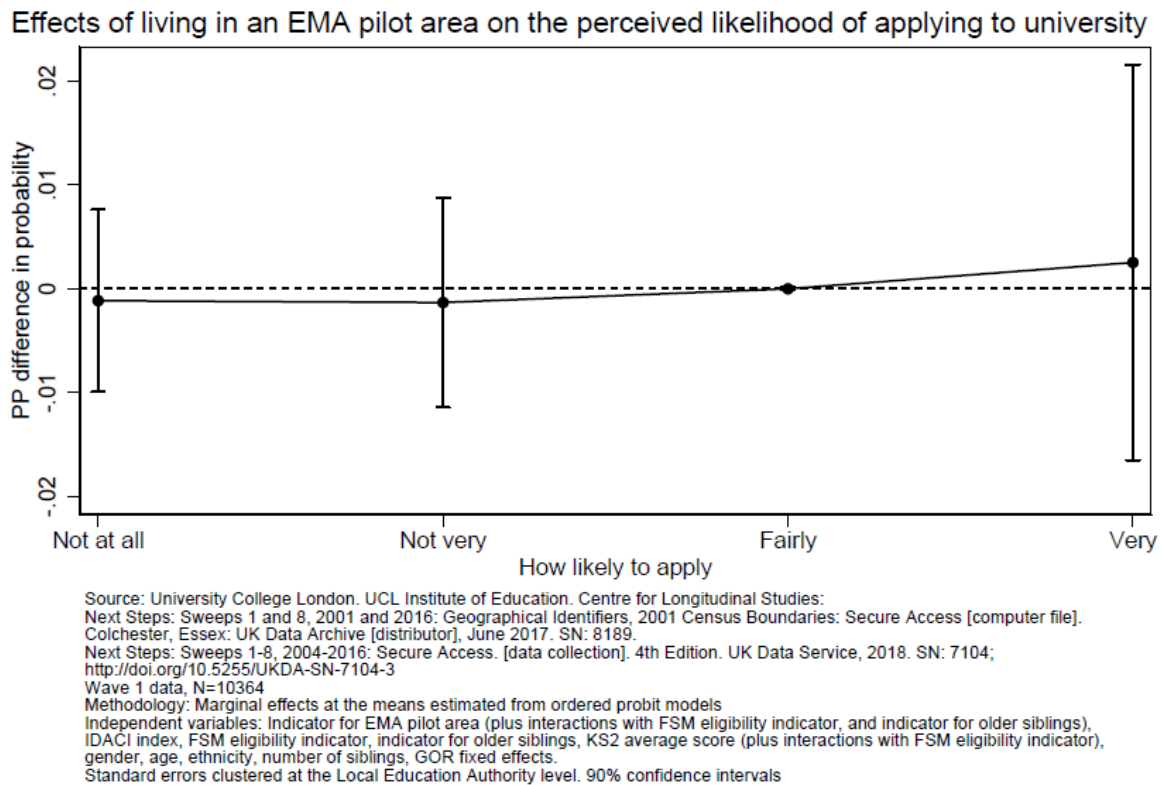
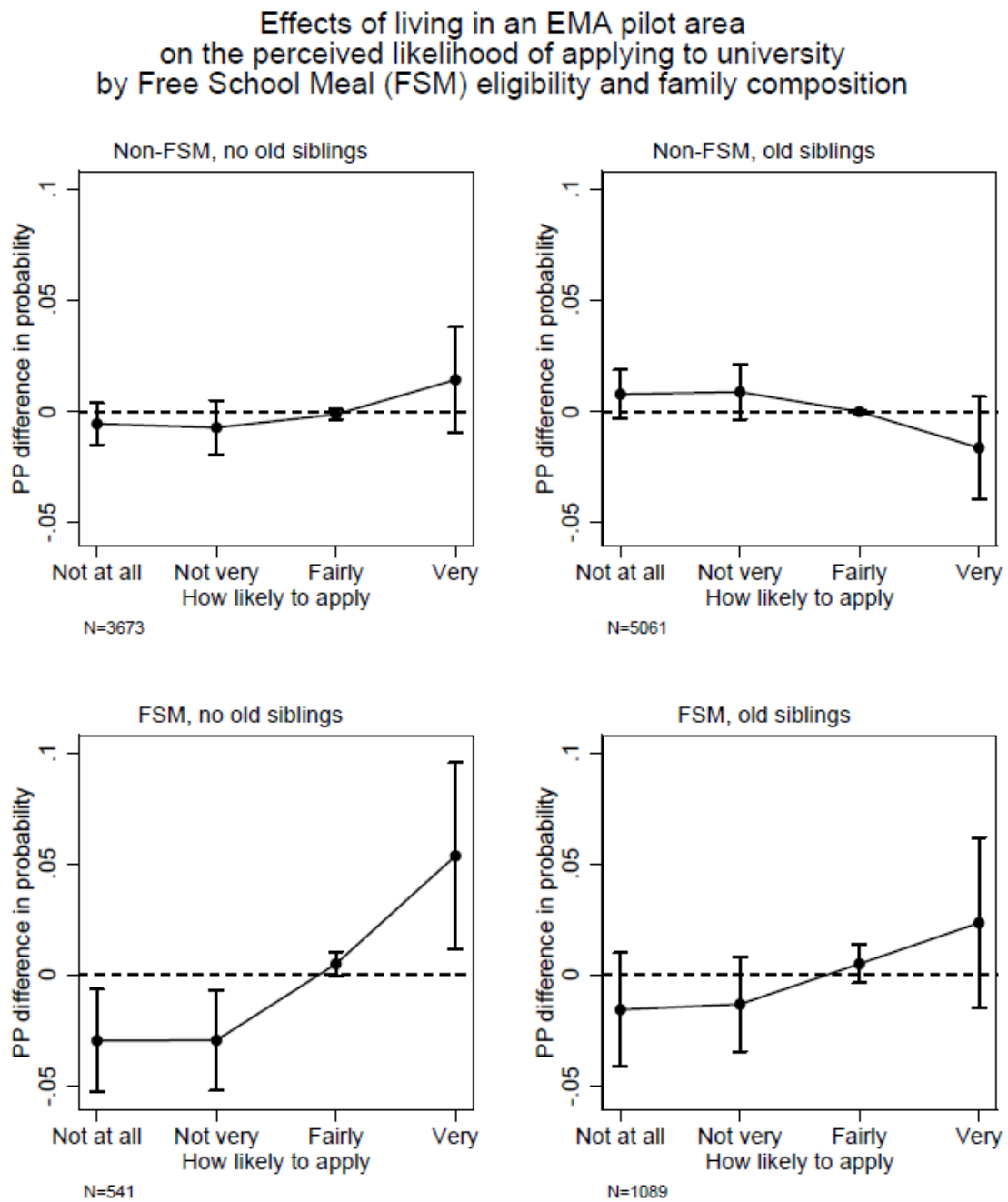


Figure 4 shows that, when we look at expectations at age 15, when the EMA was fully in place in the whole country, there is no positive impact of living in an EMA pilot areas. However, for one particular subgroup, that is FSM eligible students without older siblings, we still find that living in a EMA pilot increases the perceived likelihood of applying to university. Figure 5 (bottom left quarter) shows the effect is around half of the size of the same effect estimated at wave one (and shown in Figure 2): living in a EMA pilot area decreases by two/three percentage points the probability of perceiving to be not at all likely and not very likely of applying to university and increases by around five percentage points the probability of perceiving to be very likely to apply to university.

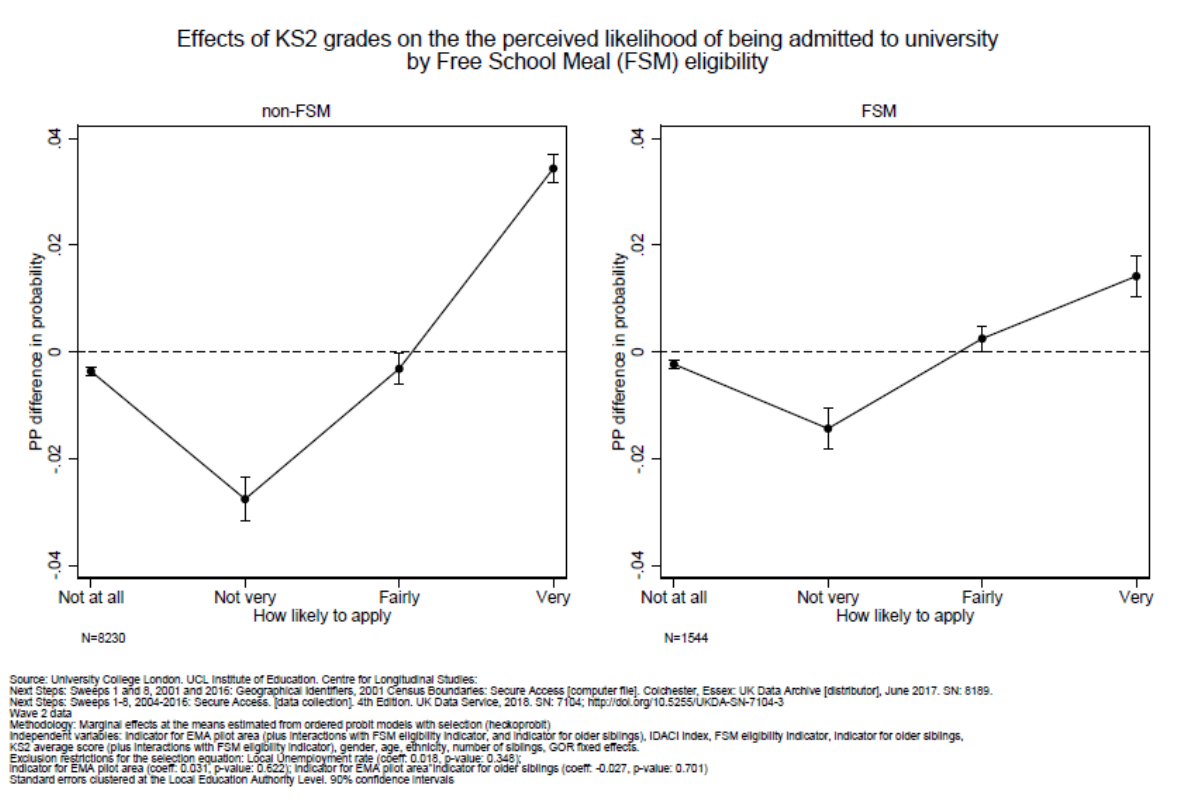
Figure 5: Effects of living in an EMA pilot area on the perceived likelihood of applying to university, by FSM eligibility and family composition (wave two, age 15)



Source: University College London. UCL Institute of Education. Centre for Longitudinal Studies: Next Steps: Sweeps 1 and 8, 2001 and 2016; Geographical Identifiers, 2001 Census Boundaries: Secure Access [computer file]. Colchester, Essex: UK Data Archive [distributor], June 2017. SN: 8189.
 Next Steps: Sweeps 1-8, 2004-2016: Secure Access. [data collection]. 4th Edition. UK Data Service, 2018. SN: 7104; <http://doi.org/10.5255/UKDA-SN-7104-3>
 Wave 2 data
 Methodology: Marginal effects at the means estimated from ordered probit models
 Independent variables: Indicator for EMA pilot area (plus interactions with FSM eligibility indicator, and indicator for older siblings), IDACI index, FSM eligibility indicator, indicator for older siblings, KS2 average score (plus interactions with FSM eligibility indicator), gender, age, ethnicity, number of siblings, GOR fixed effects.
 Standard errors clustered at the Local Education Authority level. 90% confidence intervals

We also find that the link between the perceived likelihood of being admitted to university and students' academic performance is weaker for low-SES students, that is, low-SES students with low (high) academic performance expect higher (lower) probability of being admitted to university than high-SES students. For example, Figure 6, which uses wave two data, shows that a six percentage point increase in the KS2 grades increases the probability of perceiving to be very likely to be admitted to university conditional on applying by almost four percentage points for non-FSM eligible students (left column) and by less than two percentage points for FSM eligible students (right column).⁵

Figure 6: Effects of KS2 grades on the perceived likelihood of being admitted to university conditional on applying, by FSM eligibility (wave 2, age 15).

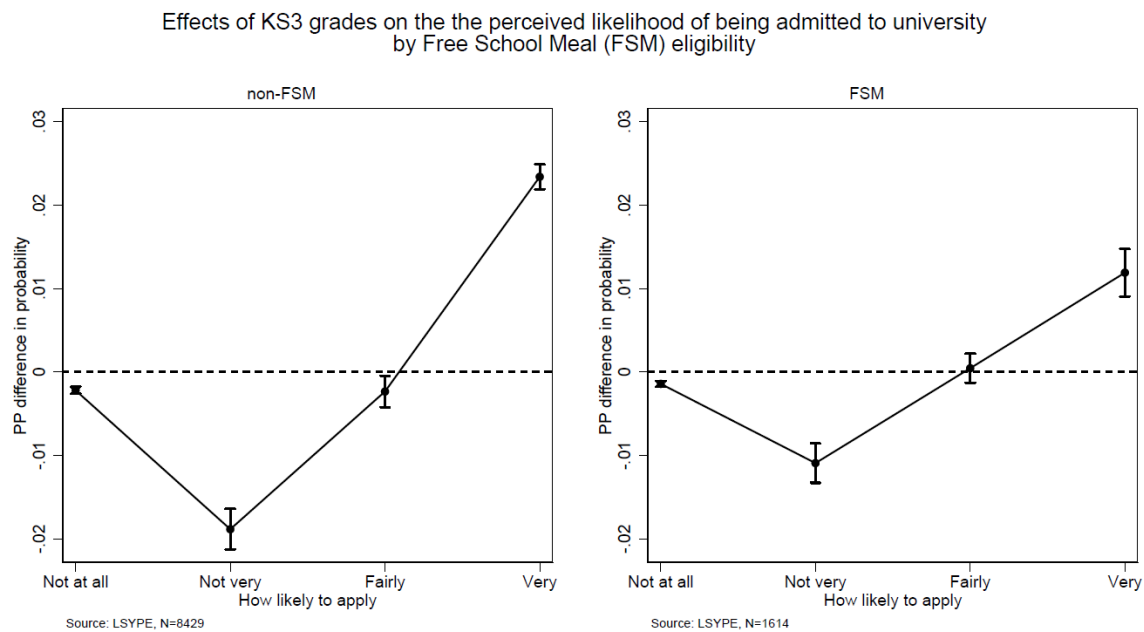


When we use KS3 (the most recent measure of academic performance at wave two), the results are qualitatively the same (the effects of grades are around double the size in the case of non-

⁵ We use this metric as six times the fine grading level is the measure currently used in policy (i.e. to calculate the value added score). To have an idea of the magnitude of these results, notice that in the (selected) sample of those who are asked the question at wave 2 about the perceived likelihood of being admitted to university if an application is made, around 2 percent of the students answer they perceive to be not at all likely to be admitted, 15 percent answer they perceive to be not very likely to be admitted, 59 percent answer they perceive to be fairly likely to be admitted, and 24 percent answer they perceive to be very likely to be admitted.

FSM eligible students). Figure 7 shows that a six percentage point increase in the KS3 grades increases the probability of perceiving to be very likely to be admitted to university conditional on applying by just over two percentage points for non-FSM eligible students (left column) and by just over one percentage point for FSM eligible students (right column). This is evidence supporting the hypothesis that there is less of an association between perceived likelihood of admission and attainment for FSM eligible students.

Figure 7: Effects of KS3 grades on the perceived likelihood of being admitted to university conditional on applying, by FSM eligibility (wave 2, age 15).



Source: University College London, UCL Institute of Education, Centre for Longitudinal Studies.
 Next Steps: Sweeps 1 and 8, 2001 and 2016; Geographical Identifiers, 2001 Census Boundaries; Secure Access [computer file], Colchester, Essex: UK Data Archive [distributor], June 2017. SN: 8189.
 Next Steps: Sweeps 1-8, 2004-2016; Secure Access. [data collection], 4th Edition. UK Data Service, 2018. SN: 7104; <http://doi.org/10.5255/UKDA-SN-7104-3>
 Wave 2 data
 Methodology: Marginal effects at the means estimated from ordered probit models with selection (heckprobit)
 Independent variables: Indicator for EMA pilot area (plus interactions with FSM eligibility indicator, and indicator for older siblings), IDAC1 index, FSM eligibility indicator, indicator for older siblings, KS3 average score (plus interactions with FSM eligibility indicator), gender, age, ethnicity, number of siblings, GOR fixed effects.
 Exclusion restrictions for the selection equation: Local Unemployment rate (coeff: 0.036, p-value: 0.043);
 indicator for EMA pilot area (coeff: 0.029, p-value: 0.661); indicator for EMA pilot area indicator for older siblings (coeff: -0.036, p-value: 0.600)
 Standard errors clustered at the Local Education Authority Level. 90% confidence intervals

3.1.d. Information about financial aid and requirements for university admission: conclusions

Using variation in the length of the exposure to the EMA, a weekly allowance aimed at keeping low-SES students in post-compulsory education until they reach university, we provide suggesting evidence that information about the available financial aid increases the perceived likelihood of applying to university, especially for low-SES students.

We also provide evidence that the link between the perceived likelihood of being admitted to university and academic performance is weaker for low-SES students: we interpret this as evidence that low-SES students may not be aware of the requirements for university admission.

Our results suggest improving information on available financial aid for low income pupils between the age of 16 and 19 in post-compulsory academic education may boost students' perceived likelihood of applying to university. This would be particularly beneficial for low-SES students. Moreover, our results suggest low-SES students do not base their expectations of success in a university application on their academic performance. Therefore, closing the SES gap in educational attainment may not reduce the gap in university application. Better information about the requirements for university admission may also be required.

3.2 Information about academic ability

Using the same nationally representative survey and administrative data as in Section 3.1 (the LSYPE, and NPD), we test whether information on students' ability affects (i) students' plans to stay on in full-time post-compulsory education, and (ii) effort at school, measured as number of evenings a week spent doing homework.⁶ Full details of method and findings can be found in Fumagalli (2018b).

3.2a Information about academic ability: objectives

Students decide whether and where they want to continue into full-time post compulsory education based on beliefs about their academic ability. Performance in standardised tests gives information about students' academic ability. This is particularly true in the case of Key Stage Three (KS3) tests that are low-stake exams with no consequence for the students other than signalling their ability.

We ask the following research questions: Does information about students' academic ability, delivered through performance in KS3 exams, affect students' plans to stay on in full-time post-compulsory education and effort at school, measured as number of evenings a week spent doing homework? Do these effects vary by KS3 exam and students' characteristics? What are the drivers of these differential effects?

⁶ At the time of the data used, post compulsory education was secondary education.

3.2b Information about academic ability: method

We use data from the LSYPE and the NPD. Details of these data can be found in section 3.1b. To identify the effect of information on students' ability we use small and mostly random variation in results in standardised tests. At the end of year 9 (around age 14/15) English students take KS3 standardised tests in English, mathematics, and science. At the time of our data, each test was awarded a total mark by external examiners. These total marks were then summarised into levels indicating the degree of knowledge reached by each child in each subject. The students were told the level achieved in each test, but not the underlying total marks. We argue that when there is uncertainty about academic ability, the levels awarded in the test (and, in particular, whether the test is judged 'satisfactory') provide new information on students' academic ability.

We seek to establish the causal effect of being awarded a satisfactory level on students' investment in education, as measured by their plans to stay on in full-time post compulsory education and their effort in doing homework. Simply comparing their plans to stay on in full-time post compulsory education and the effort of those who passed the exam and those who failed does not provide causal evidence. This is due to omitted factors (e.g., more motivated students are more likely to both pass the KS3 exams and want to stay on in post-compulsory education, and this does not mean that they want to continue into post-compulsory education *because* they passed the KS3 exams) and reverse causality (e.g., planning to attend post-compulsory education can lead to more effort in preparing for KS3 exams, which can result in better KS3 performance).

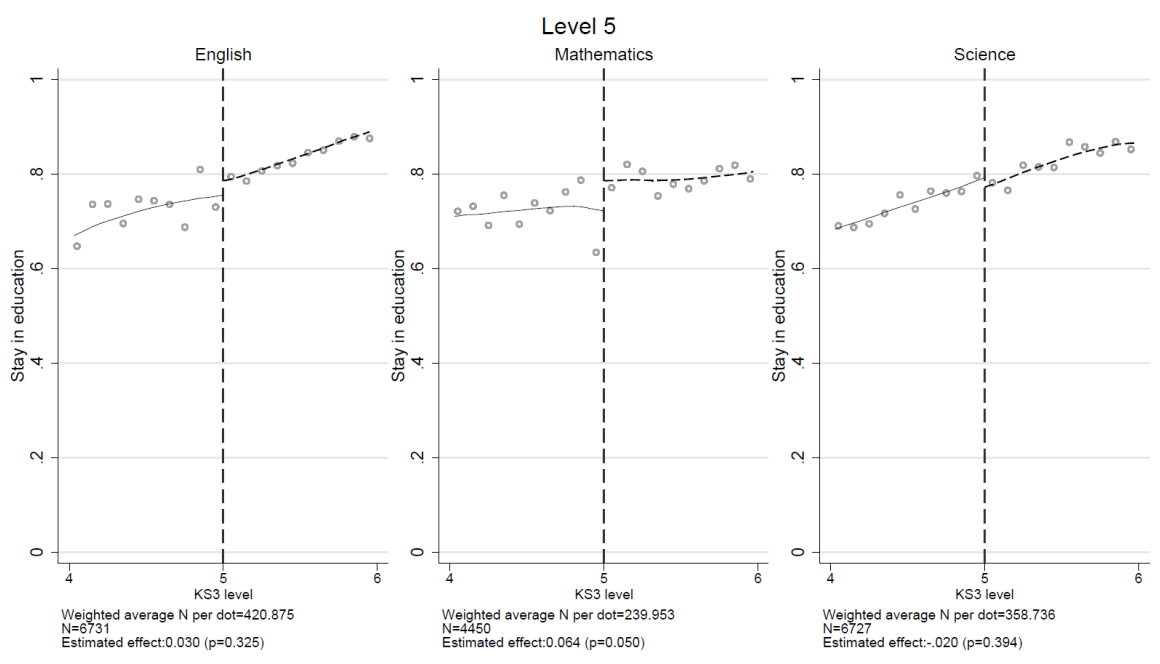
To get causal evidence, we compare students with a total score just slightly below the pass/fail threshold, and students with a total score just slightly above it. These students are likely to be comparable in all respects before the KS3 exam, and small differences in KS3 performance are likely to be randomly determined by exogenous factors such as specific conditions on the day of the test, luck, or random variation in the external marking. Note that students at both sides of the threshold receive some form of treatment: the students on the left of the threshold are told they did not pass the exam, those on the right are told they did. Thus, we can only estimate the effect of barely passing the KS3 exam compared to barely failing it in the sub-population of students next to the threshold. The technique can be easily extended to accommodate our setting where students take three different exams (see the paper and Papay et al., 2011; 2014; Reardon

and Robinson, 2012; Smith et al., 2017, Porter et al, 2017 for more details). Having three exams means that students can now be classified into different groups according to the exams they passed/failed.

3.2c: Information about academic ability: findings

Figure 8 shows the effects of passing the English (left panel), mathematics (middle panel) and science (right panel) KS3 exams on intentions to stay on in full-time post-compulsory education. For each panel, the effect is represented by the vertical distance at the pass/fail threshold between the solid line at the left of the threshold and the dashed line at its right. This shows graphically what is mentioned in the previous section, i.e., that the effect we estimate is the combination of two treatments (passing and failing the exam) and only regards students in proximity of the pass/fail threshold.

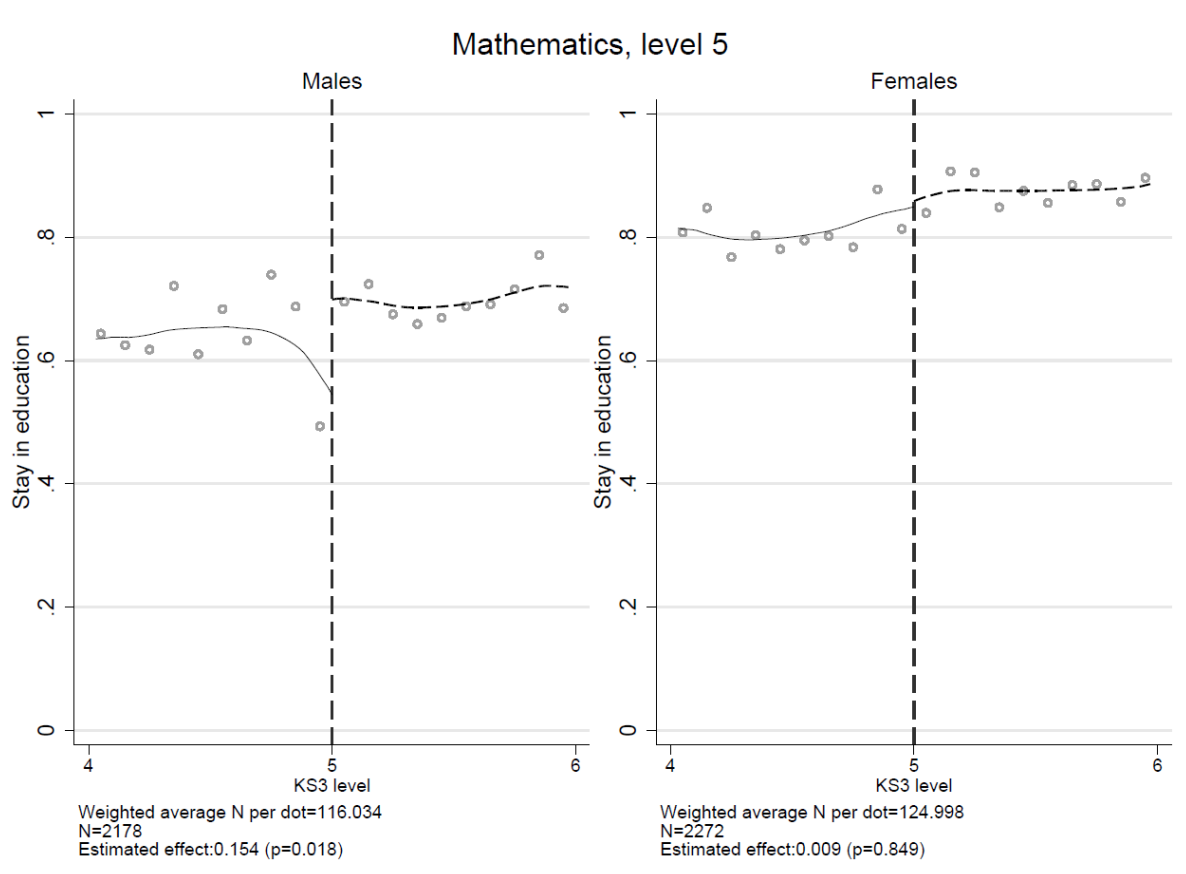
Figure 8: Effect of reaching level 5 in English, mathematics and science on plans to stay on in post-compulsory education



Note: Triangular kernel. Imbens and Kalyanaraman optimal bandwidths. The dots represent the average of the variable indicating students' intention of continuing into full-time post-compulsory education (P C_i) computed over bins of width 0.1 of the underlying KS3 ne grading level.

The middle panel suggests students who are just awarded a satisfactory level in mathematics are more than six percentage points more likely to want to stay on in full-time post-compulsory education than students who just miss it, that is, the solid line at the left of the threshold lays six percentage points below the dashed line at the right of the threshold. Figure 9 suggests this result is entirely driven by boys (15 percentage point increase, as shown in the left panel of Figure 9). Being awarded a satisfactory level in mathematics does not have any impact on girls (see right panel of Figure 9). Being awarded a satisfactory level in English has no impact on the probability of wanting to stay on in full education when we look at the whole sample and when we split the sample by boys and girls. However, when we split the sample further, we find that being awarded a satisfactory level in English increases the probability of wanting to stay on in full-time post-compulsory education for girls from categories with below-average achievement (e.g. Free School Meal eligible and ethnic minorities).

Figure 9: Effect of reaching level 5 in English, mathematics and science on plans to stay on in post-compulsory education



Our results are in line with the existing literature which finds greater effects in the case of mathematics compared to humanities, and very little or null effect for science, and in the case of under-achieving groups (Ou, 2010; Papay et al., 2010, 2016; Foote et al., 2015; Polson, 2018).

Moreover, our results are consistent with performance in mathematics being more salient for boys' self-image than for girls' (see: Akerlof and Kranton, 2002).⁷ Language is often considered a 'female' subject and mathematics a 'male' one (Steele and Ambady, 2006, Chatard et al., 2007, Shapiro and Williams 2012), and girls often prefer art and humanities to STEM subjects (Zafar, 2013). Gender stereotypes on school subjects have two implications in our setting. First, females (males) might care more about doing well in English (mathematics). Second, females (males) may see themselves in future careers where skills in language (mathematics) are greatly rewarded (see Zafar, 2013). Therefore, passing an exam in English (mathematics) might be more relevant for females (males). Finally, our results are consistent with boys and girls from underachieving groups being more uncertain about their ability or about continuing into full-time post-compulsory education.

The results suggest signals of complementary abilities are particularly salient for students. Being awarded a satisfactory level in mathematics has a stronger effect on students who are also awarded a satisfactory level in English, compared to those who are not. In contrast, the effect of being awarded a satisfactory level in mathematics does not significantly differ between students who are also awarded a satisfactory level in science and students who are not.

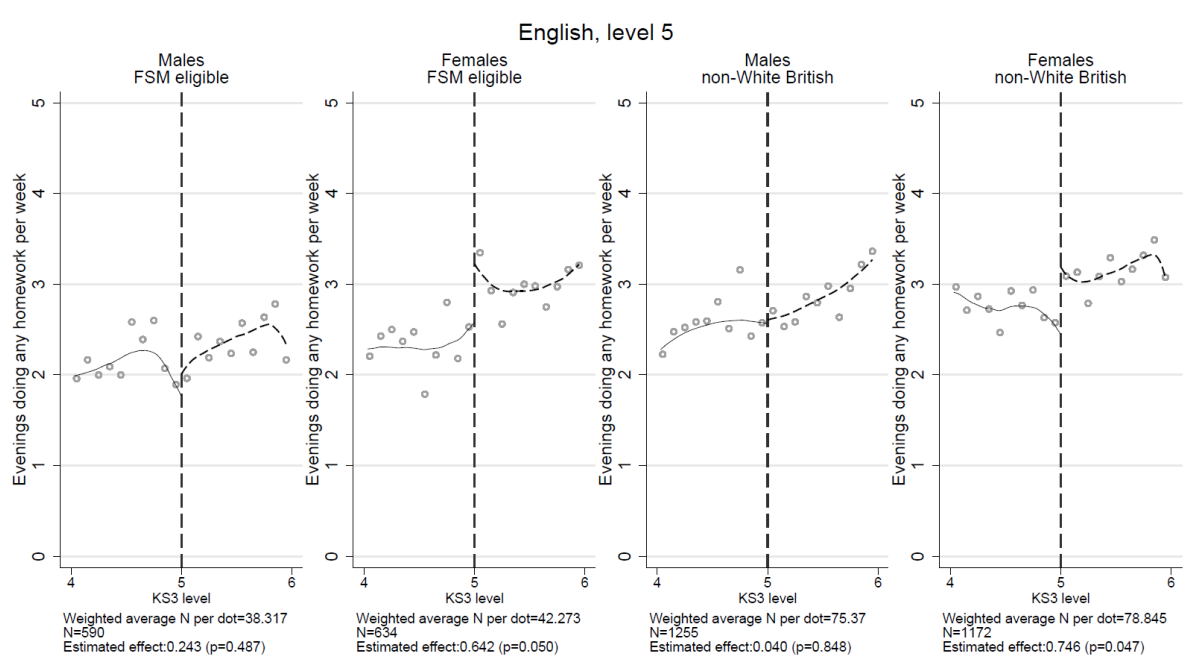
Performance in mathematics and English is likely to signal two different types of abilities (quantitative and verbal), both needed for succeeding in full-time post-compulsory education. Therefore, being awarded a satisfactory level in mathematics may not be enough to convince students with unsatisfactory verbal skills to enter full-time post-compulsory education. In contrast, both performance in mathematics and performance in science may be perceived as signalling ability in the quantitative/scientific domain. However, the former is a more powerful signal than the latter. Therefore, people may only consider the signal coming from the results in mathematics and overlook the signal coming from the results in science.

We also find that boys and girls differ in how they adjust their effort in response to new information about their academic ability. Being awarded the minimum satisfactory level in English makes girls - and particularly those from under achieving groups - increase the number of evenings spent doing homework. Figure 10 suggests this increase in effort is equal to 0.64 evenings for FSM eligible girls and by 0.75 evenings for non-White British girls. This increase is

⁷ Gender is one of the characteristics that mostly define people's identity, especially in the case of adolescents, who tend to have closer ties with other people from the same gender (Akerlof and Kranton, 2002).

not negligible, as it roughly corresponds to a 25% increase in the evenings spent doing homework. No results are found on boys, i.e., boys do not adjust their effort in response to new information on academic ability.

Figure 10: Effect of reaching level 5 in English on evenings spent doing homework (selected subsamples)



Our results on effort are consistent with the literature suggesting females respond to failure by decreasing effort, while males do not (Gill and Prowse, 2013). Moreover, it is consistent with research suggesting that females (males) are more likely to attribute success to effort (talent) and failure to lack of talent (effort) (e.g., Bornholt and Möller, 2003; Dickhäuser and Meyer, 2006; Espinoza et al., 2012; 2014; Leslie et al., 2015; Bian et al., 2017).

Additional questions from the LSYPE can shed light on the perceived role of effort in determining success and how it varies by gender. We use a question asking respondents how much they agree with the statement “I work as hard as I can at school”, with the available answers being: “strongly agree”, “agree”, “disagree”, “and strongly disagree”. The cumulative distribution function of answers is plotted by gender in Figure 11. The first step from the left indicates the share of respondents who strongly agree with the sentence. The second step from the left indicates the share of respondents who either strongly agree or agree with the sentence, the third step from the left indicates share of people who disagree, agree or strongly agree with

the sentence. The function for females (dashed line) always lies above the one for males (solid line), indicating girls value hard work at school more than boys. Where respondents are asked to state how much they agree with the sentence “I get good marks with my work” (Figure 12) we draw similar conclusions: Girls seem more likely to link good grades and effort.

Figure 11: I work as hard as I can at school, by gender (LSYPE data)

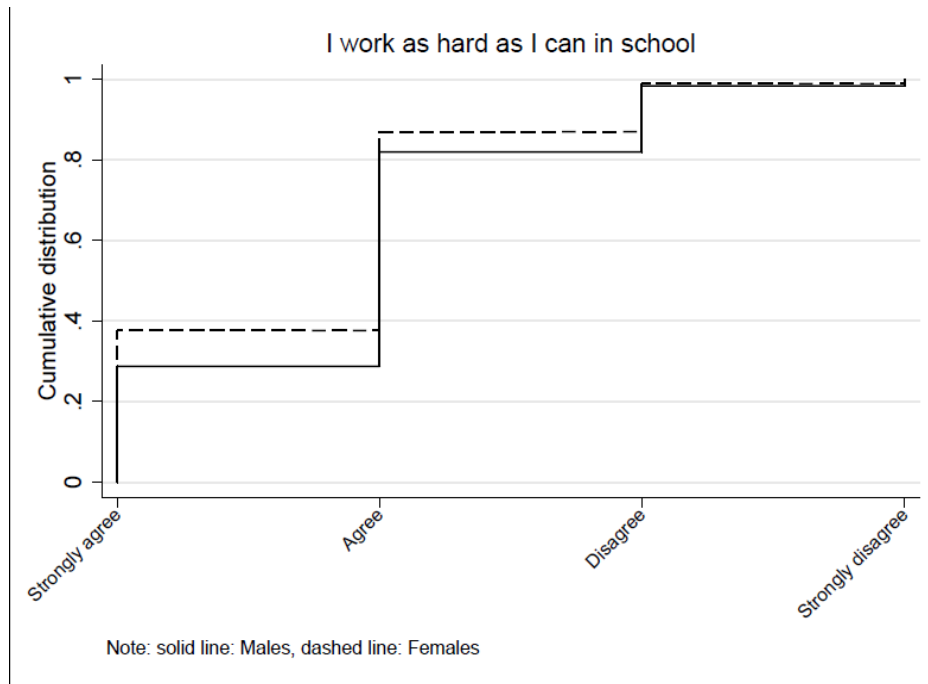
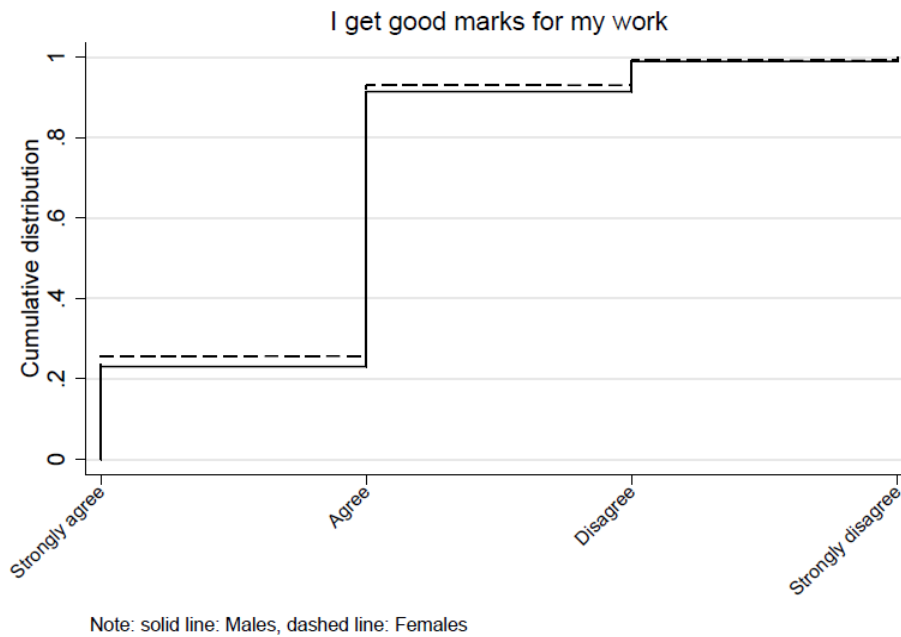


Figure 12: I get good marks for my work, by gender (LSYPE data)



Figures 11 and 12 may only signal higher engagement of girls in school, rather than a simple attitude towards effort. We investigate this potential issue by using data on interest in lessons: an indicator of engagement in education not directly related to effort (and possibly more related to the perceived role of ability). Figure 13 plots the answer to a question asking respondents to state how much they agree with the sentence: “The work I do in lesson is interesting to me.” We do not find any higher involvement of girls in school for this non effort-related indicator of involvement in school. If anything, Figure 12 shows boys are slightly more interested than girls in the content of lessons.

Figure 13: The work I do in lessons is interesting to me, by gender (LSYPE data)



Finally, the result that boys mainly react to academic performance in mathematics and girls mainly react to academic performance in English are in line with Akerlof and Kranton (2002), suggesting students only care about academic performance in subjects that conform to their identity. Figures 14 and 15 use LSYPE data to address this issue: They show boys are more likely than girls to like and think they are good at mathematics.

Figure 14: Whether students think they are good at/like Mathematics, by gender (LSYPE data)

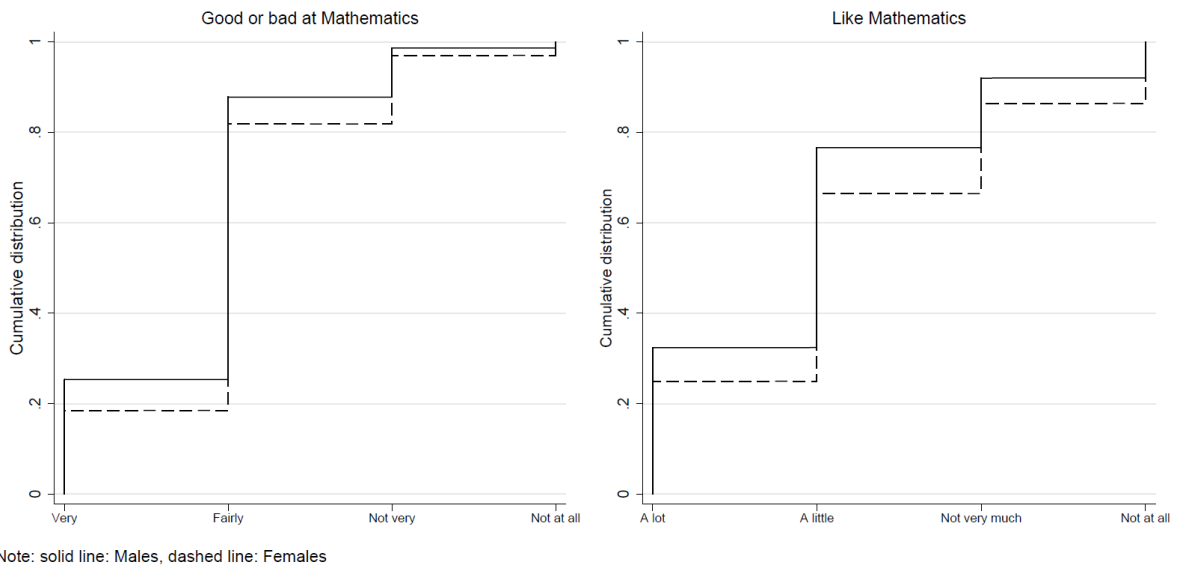
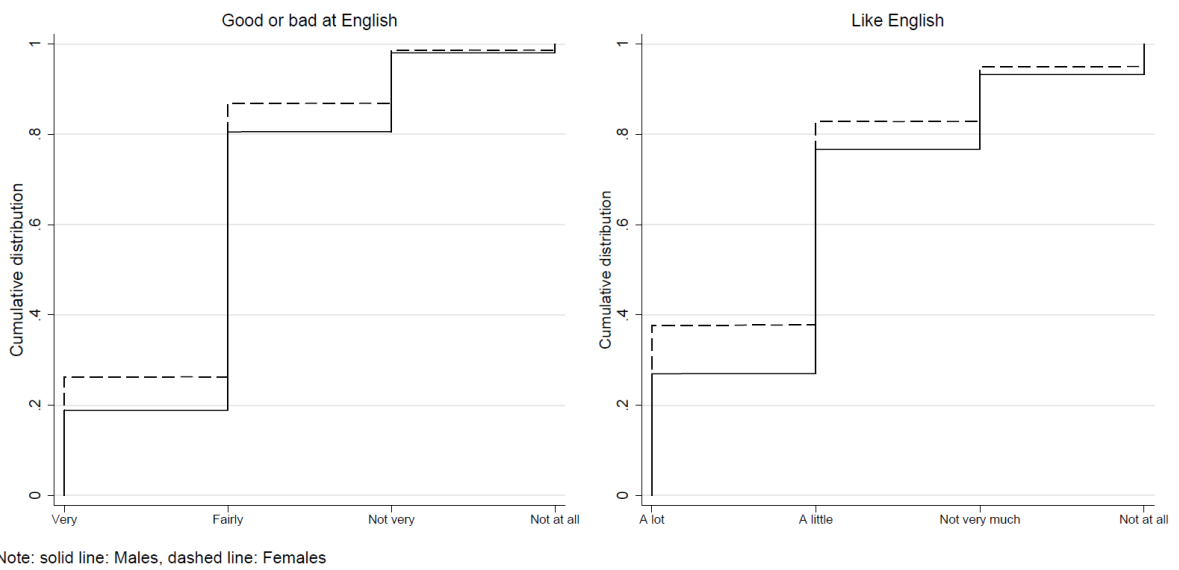


Figure 15: Whether students think they are good at/like English, by gender (LSYPE data)



3.2d Information about academic ability: conclusion

Understanding how students react to information about their academic ability may help uncover a potential driver of education inequality, still under-researched in economics. Our findings suggest that feedback about academic ability is important: feedback shapes plans to stay on full-time post-compulsory education for boys and girls from underprivileged background, and effort at school for girls. Repeated feedback may help fill the information gap between low and high-SES students about what determines success at school.

Our research suggests that feedback, to be useful, should be precise. Indeed, coarse performance indicators (such as large levels) may be inappropriate as they provide an imprecise signal of academic ability, such that small - arguably random - differences in students' performance the day of the exam can lead to substantive perceived differences in ability. If students', parents' and teachers' behaviour responds to perceived rather than real students' ability, students with comparable academic ability may be given substantially different opportunities for human capital investment. Moreover, easy-to-interpret labelling of academic performance may exacerbate the psychological effect of failure. If low-SES students are less able than high-SES students to bounce back after failure, early labelling of students' ability can exacerbate inequality in education (see Reardon et al., 2010).

This work also sheds light on how different students (e.g., boys and girls) react to the same signal, and how this reaction may be driven by identity concerns. There is very limited evidence on how identity interacts with feedback in practice. Understanding this could help design feedback schemes to incentivise the participation in education of under-represented categories, such as girls and women in STEM subjects and low-SES students in higher education as a whole.

Three cautionary notes need to be sounded. First, our findings rely on the assumptions that students at different sides of the pass/fail cut off are comparable. A marking system based on external markers who do not know the identity of the students suggests this is likely to be the case. Moreover, we checked for discontinuity of students' observed characteristics at the relevant cut-off and we find none. This is encouraging and suggests claims of causality can be made. Second, our findings can only shed light on the effect of being awarded a satisfactory level (versus not being awarded a satisfactory level) for the students at the pass/fail cut-off. Students

scoring around the minimum mark considered satisfactory are a policy-relevant group. However, we should be careful about generalising our results to other, different, populations of students - for example to students with very poor or very good academic performance. Third, our results could be driven by the negative, discouraging effect of receiving negative feedback, by the positive, motivational effect of receiving positive feedback, or by a combination of the two effects. Future research is needed to disentangle the effects of negative from positive feedback.

3.3 Information about the labour market returns to a degree

Most economic decisions involve uncertainty and are therefore shaped not only by individual preferences but also by expectations of future outcomes. Understanding the expectations that individuals have is thus critical for understanding their behaviour and for modelling the effects of policies. For example, several explanations could rationalise why many young individuals from less privileged background do not go to university. One possibility is that they expect low returns to a university degree. Another is that they face high attendance costs or credit constraints. Without data on expectations we cannot separate these two explanations (Manski, 2004), yet doing so is important for designing policies that widen participation in higher education. We use new data on expectations to investigate whether different perceptions of the labour market returns to a degree by SES may explain gaps in university application intentions. Full details of the method and findings can be found in Delavande et al. (2018).

3.3a Information about the labour market returns to a degree: objectives

We use new data on university-related expectations to provide evidence on the perceived labour market returns to a degree in the UK and investigate whether (i) students and parents take into consideration expected labour market returns to a degree in the decision to apply to university; (ii) different perceptions of the labour market returns to a degree by SES may explain gaps in university application intentions; (iii) providing information about the labour market returns to a degree change parents and children's expectations about the labour market return to a degree and decision to apply to university.

3.3b Information about the labour market returns to a degree: method

We collected new data on university-related expectations in the Innovation Panel (IP) of the UK Household Longitudinal Study (UKHLS). The sample includes 169 young people aged 16 to 21 and not currently at university, and 332 parents of children ages 10 to 21. In our sample of analysis, we have 90 children (44 with one parent and 46 with two parents) matched to 124 parents (112 matched to one child and 12 matched to two). At wave 8 (Spring 2015) and wave 9 (Spring 2016), the same respondents were asked a series of university-related expectations as follows:

(1) Expectations of university-related outcomes: the percentage chance of having a degree by age 30, the percentage chance of gaining the qualifications to go to university; the percentage chance of applying to university, and the percentage chance of applying to university if all costs were forgone via a scholarship; and the percentage chance of finishing university if one goes to university;

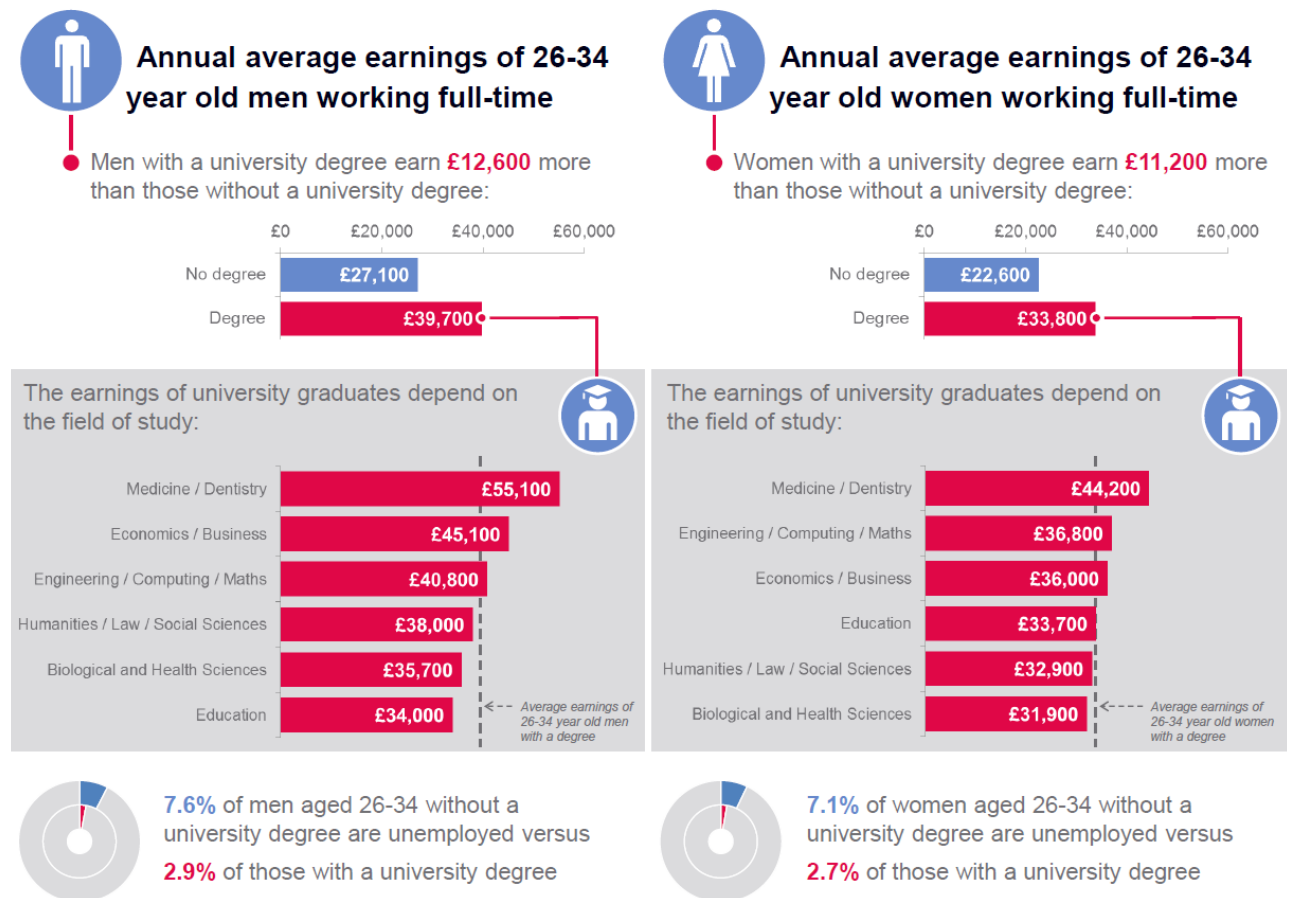
(2) Expected labour market returns to a university degree: expected earnings at age 30 and 45 conditional on working full-time and conditional on (i) going to university in first choice field of study and (ii) not going to university; and the percent chance of being employed at age 30 conditional on (i) going to university in first choice field of study and (ii) not going to university;

(3) Knowledge about labour market returns to a university degree: population earnings of 30-year old of the respondent's (child) gender with and without a degree.

(4) The expected monetary cost of going to university: Expected tuition and expected loan.

Half of the IP wave 8 households eligible for this module was randomly provided with information about the average annual earnings of men and women aged 26-34 and working full time for university degree holders and for those without a university degree, and their respective employment rate. Households received a mailing with the information sheet presented in Figure 16 just after their wave 8 interview, and by post again about 6 months prior to the wave 9 interview. The randomisation of the intervention enables us to assess the causal impact of information on expectations. We do not have empirical evidence on whether participants have looked at the information we provided.

Figure 16: Information Treatment provided to households in-between IP waves 8 and 9



Source: Labour Force Survey, 2004-2011

3.3c Information about the labour market returns to a degree: findings

An overview of parents' expectations is presented in Table 3. Parents report on average a 68 per cent chance that their child will have a university degree by age 30. The differences in expected university outcomes by parental education are clear in the very first question: while 78 per cent of parents belonging to university degree households believe their child will have a degree by age 30, only 54 per cent of their counterparts believe so (difference statistically significant at the one per cent level). This difference in expected outcome stems from differences in all the steps of the way to acquiring a degree: parents from university degree households have higher expectations of the chance of qualifying to go to university (83 vs 65 per cent), the chance of applying if they qualify (83 vs 68 per cent) and the chance of finishing university conditional on going (91 vs 87 per cent). All those differences are statistically significant, and remain so in multivariate regressions where we control for parental age, gender, marital status, income and ethnicity, as well as children's gender.

Table 3: Parental university-related expectations for their children (wave 8)

Variables	Mean (£1k's or %)	Female Child	Male Child	Low Income	High Income	No HH Degree	HH Degree
Chance of a Degree by 30	68.02	70.2	66.1	64.4	70.7	54.4***	77.8
Chance Qualify for University	75.63	79.4**	72.2	73.0	77.6	65.1***	83.2
Chance of Applying to University	76.93	78.3	75.7	73.0*	79.9	68.3***	83.2
Chance of Applying With Scholarship	82.45	83.9	81.2	80.8	83.7	75.2***	87.5
Chance Finish University	89.59	91.5	87.8	89.2	89.8	86.9*	91.1
Expected Earnings at 30 With Degree	33.49 ⁺⁺	31.3*** ⁺⁺	35.4 ⁺⁺	32.1***	34.5 ⁺⁺	30.7*** ⁺⁺	35.2 ⁺⁺
Expected Earnings at 30 No Degree	24.31	22.8***	25.6	23.0**	25.3	21.9***	25.9
Expected Returns to a Degree 30	9.80	9.9	9.7	10.1	9.6	10.2	9.6
Expected Earnings at 45 With Degree	43.79 ⁺⁺	40.4*** ⁺⁺	46.8 ⁺⁺	39.4*** ⁺⁺	47.0 ⁺⁺	38.7*** ⁺⁺	47.0 ⁺⁺
Expected Earnings at 45 No Degree	30.00	28.0***	31.8	26.0***	33.2	26.1***	32.6
Expected Returns to a Degree 45	15.10	14.8	15.1	15.7	14.4	15.1	14.9
Chance Employed With Degree	91.40 ⁺⁺	92.1 ⁺	90.8 ⁺⁺	91.0	91.8 ⁺⁺	90.0	92.3 ⁺⁺
Chance Employed With No Degree	86.83	88.8	85.1	87.5	86.3	86.4	87.2
Expected tuition	7.05	7.19	6.92	6.78	7.23	5.99**	7.56
Expected Tuition (England only)	7.48	7.33	7.61	7.44	7.50	6.56**	7.91
Expected Loans	7.55	7.94	7.23	7.51	7.58	6.60	8.05
Maximum Observations	323	151	172	146	177	136	187

Note: Stars indicate statistical significances at the 10%(*), 5% (***) and 1% (***) levels for t-test of equality of means between groups (male/female, low/high income, HH degree/no HH degree). Plus's indicate statistical significance for t-test of equality of means between the 'with, and without, a degree' labour market outcomes at the 5% (+) and 1% (++) levels.

Differences in application expectations persist by household degree status even when financial costs are forgone. In the hypothetical situation that students would receive a scholarship, parents from a household with a degree report a 13 percentage point higher probability of applying to

university than parents from a household without a degree. Without a scholarship, parents from a household with a degree report a 15 percentage point higher probability of applying to university than their counterparts. This suggests that there are differences other than financial constraints that explain the gap in expected university outcomes by household degree.

While there are also differences in expectations by household income, they are substantially smaller than by household degree. In fact, with the exception of the expectations to apply to university, parents from high and low income households do not have statistically different expectations for their children. In multivariate regressions where we control for household characteristics, there are no statistical differences in expectations by household income. Regarding gender differences, parents of girls tend to have slightly more positive expectations about university-related outcomes than parents of boys, although the differences are statistically significant only for the chance of qualifying for university. This difference is still statistically significant in the multivariate regressions.

Young people's university-related expectations tend to mirror those of their parents, although children from households with a university degree have slightly lower expectations than their parents, resulting in a smaller gap in expectations by household education.

Respondents perceive overall a positive payoff for their children/themselves to a university degree versus no university degree. Parents expect their children to earn £33,500 per annum on average if they have a university degree, compared to £24,300 per annum without a degree. They also perceive a benefit in terms of employment probability at age 30 (91 per cent with a degree versus 87 per cent without) (Table 3). The mean expectations with a degree are statistically different than the mean expectations without a degree. Parents from a high-income household or from a university degree household expect their children to earn significantly more with a degree *and* without a degree than their counterparts. They also expect their children to have a more favourable growth in earnings. These differences in earnings expectations are quite large and significant (e.g., £4,500 per annum with a degree and £4,000 per annum without a degree at age 30). Note that as a result, parents from more privileged backgrounds do not expect higher earning *returns* (differences in earnings with a degree and without a degree) than parents from less privileged background.

These differences in earnings expectations by background could be due to different beliefs about children’s ability, or different access to job networks. Interestingly, they do not seem to be driven primarily by differential *knowledge* of population earnings. To directly test respondents’ knowledge, we asked them about the average earnings of current 30 year-olds who have a degree and those of 30 years old who do not have a degree of the same gender as their child. Those population earnings are shown in Table 4. For the population earnings with a degree, parents from all backgrounds tend to have similar, and underestimated, perceptions. On average they believed that current 30 year old males (resp. females) earn £33,200 (resp. £30,700) with a degree; and £23,300 (resp. £20,700) without one. In reality, graduate earnings at 30 were £39,700 for males and £33,800 for females, and non-graduate earnings were £27,100 for males and £22,600 for females (Figure 16). Parents from more privileged backgrounds expect slightly larger population earnings without a degree than their counterparts, and are as a result slightly more accurate, as everyone tends to under-estimate those earnings as well. But the difference by parental background in population earnings expectations is small, and more than half the one found for their children’s future earnings.

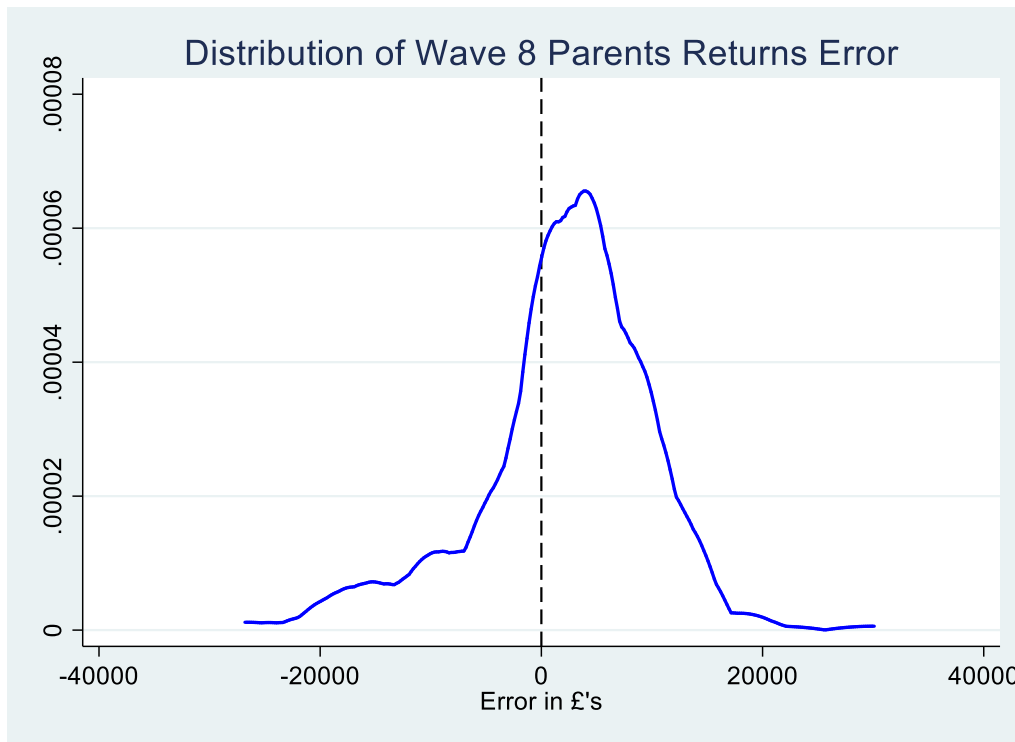
Table 4: Perceived average population earnings (wave 8)

	Mean in £1k’s	Female Child	Male Child	Low Income	High Income	No HH Degree	HH Degree
Population Earnings at 30 With Degree	32.04 ⁺⁺	30.7 ^{****+}	33.2 ⁺⁺	31.2 ⁺⁺	32.7 ⁺⁺	31.7 ⁺⁺	32.3 ⁺⁺
Population Earnings at 30 No Degree	22.10	20.7 ^{***}	23.3	21.1 ^{**}	22.9	21.2 [*]	22.8
Returns to a Degree at 30	9.91	9.9	9.9	10.3	9.6	10.6	9.4
Maximum Observations	323	151	172	146	177	136	187

Note: Stars indicate statistical significances at the 10%(*), 5% (**), and 1% (***) levels for t-test of equality of means between groups (male/female, low/high income, HH degree/no HH degree). Plus’s indicate statistical significance for t-test of equality of means between the ‘with, and without, a degree’ labour market outcomes at the 5% (+) and 1% (++) levels.

Note that, on average, parents under-estimate the population earnings with a degree more than they under-estimate the population earnings without a degree. As a result they under-estimate the population earnings returns to a degree by about £2,000. Of course, there is heterogeneity in this misperception, and about a third of the parents actually over-estimate the returns (see Figure 17).

Figure 17: Parents' Population Earnings Return Error (actual population earnings return – perceived population earnings return)



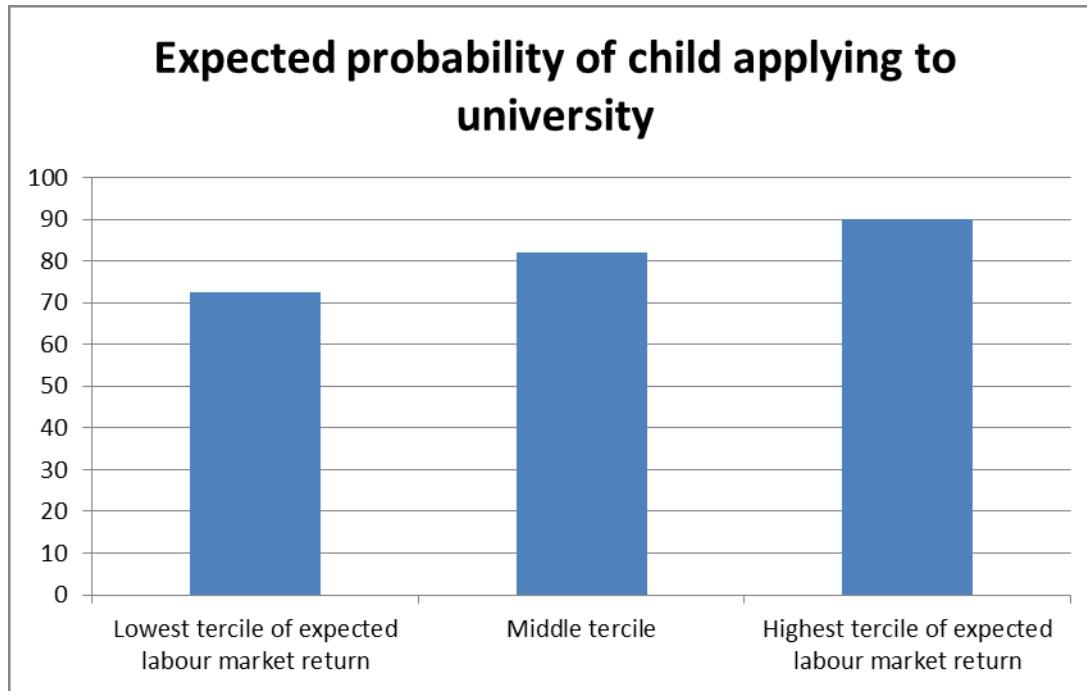
Returning to the parental earnings expectations for their children presented in Table 3, parents of male children expect higher earnings than those of female children, consistent with the gender pay gap. These differences by child's gender are still statistically significant in a multivariate regression. Note that these differences hold for earnings both with and without a degree, resulting in no differences in the returns to a degree by gender.

When it comes to costs, parents and young people expect on average to pay between £7,000 to £8,000 for tuition per year, and to take loans of a similar amount. Parents from university degree households expect to pay more in tuition than their counterparts, reflecting either differences in knowledge about university tuition or different expectations about what university their children might attend. In England, tuition fees are capped at £9,250 a year for UK and EU students, with around 76% of all institutions charging the full amount in 2015-16.

Our focus on the perceived labour market returns to a degree stem from the fact that they ought to be an important driver of the decision to go to university. Indeed, in our data, parents who expect higher labour market returns for their children also expect a higher probability that their child will apply to university. We define a composite measure of labour market returns that

encompasses both future earnings and employment, i.e. the difference in log expected earnings weighted by the perceived probability of being employed (See Delavande et al. 2018 for details on how we construct this measure). Figure 18 shows that those whose perceived returns are in the bottom tercile have an average application expectation of 72.6 per cent, compared to 90.0 per cent for those in the top tercile.

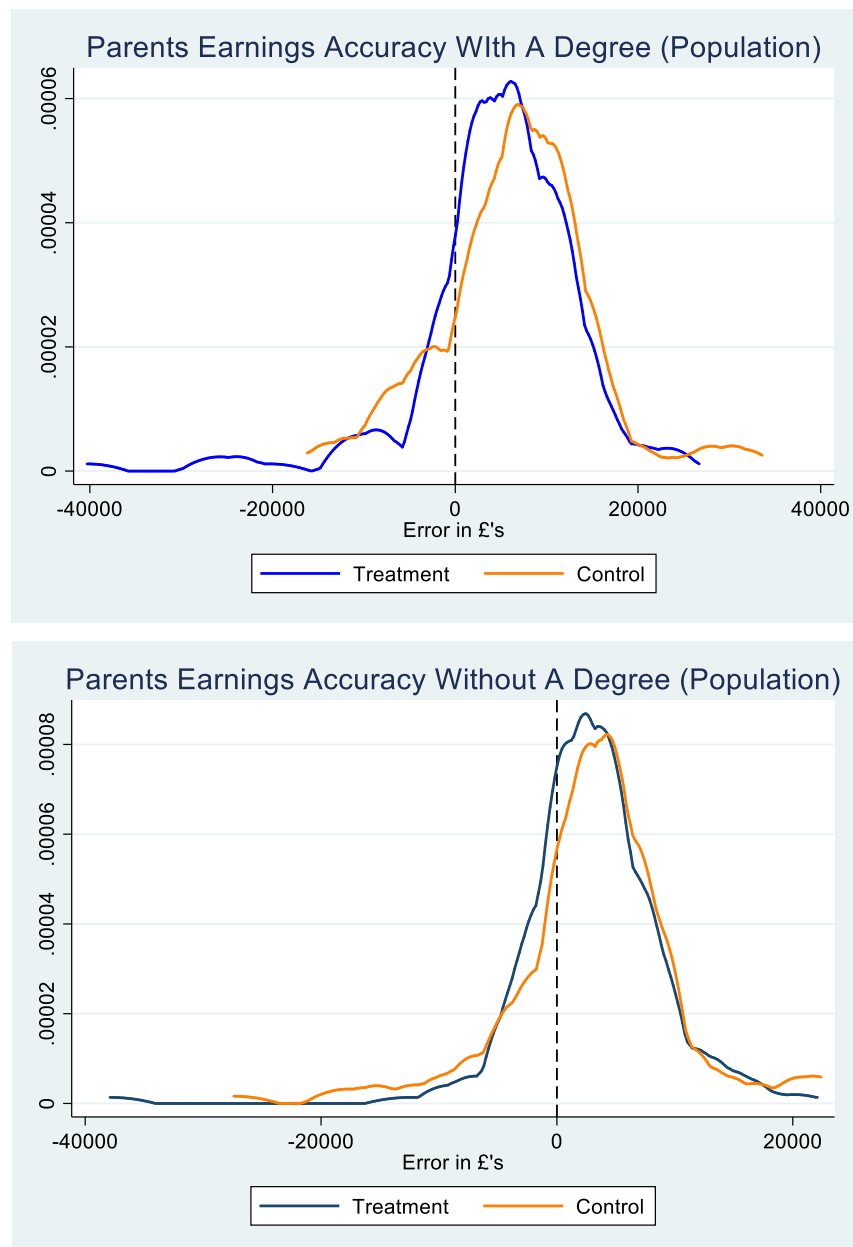
Figure 18: Expected probability of applying to university and expected labour market returns



Can information change expectations?

We further assess whether respondents change their expectations if provided with some information. Half of the families were provided with information on earnings and employment of 30 year old graduates and non-graduates (Figure 16). Figure 19 displays the distributions of population earnings error (actual population earnings minus perceived population earnings) for parents who received the information (treated group) and those who did not (control group). It shows that those who received the information are more accurate about the population earnings of graduates than those who did not receive information, suggesting information had a positive impact on accuracy of expectations.

Figure 19: Parents earning accuracy by treatment status



This increase in accuracy translates into higher beliefs about the population returns to a degree: parents who receive the information expect the population return to a degree to be £2350 larger than parents who did not receive the information (controlling for household characteristics). This translates into small differences in the expectations that their children will apply to university (2 percentage point when controlling for households characteristics) but the difference is not statistically significant (possibly due to small sample size).

3.3d Information about going to university: conclusion

We speculated that different expectations about the labour market return to a university degree by SES might explain in part why low-SES students are less likely to apply to university. Our research shows that expectations about the return to a degree matter in the sense that those who expect higher labour market returns are also more likely to expect to apply to university. However, we have established two important facts:

- (i) parents and young people from various SES backgrounds hold similar beliefs about the earnings return and employment returns to a degree;
- (ii) parents under-estimate on average the population earnings return to a degree. It is therefore unlikely that the information gaps about the labour market advantage of a degree explains the SES gap in participation. But providing information on earnings may boost participations into higher education for many, irrespective of SES backgrounds.

We have also found that a very light-touch information intervention, such as showing some statistics about population earnings and employment to families, is powerful enough to change parents' expectations about population earnings so that they become more accurate, with changes still visible 6 months later. This information also increased participants perceptions about the returns to a degree in the population. Providing such information can help families from all backgrounds to make better-informed decision.

We also provide indirect evidence that financial constraints at the time of university application are not a major factor in the decision to apply as differences in application expectations persist by family background even in the hypothetical situation of being provided a scholarship that would cover all costs. This does not mean that financial constraints are irrelevant; rather that they may matter earlier on - by affecting primary and secondary school quality, for example, or access to tutoring.

4. Recommendations for future research

- Our results on the relative effects of being given feedback could be driven by the negative, discouraging effect of receiving negative feedback, or the positive, motivational effect of receiving positive feedback (or a combination of the two). Future research is needed disentangle these two effects.
- This work sheds light on how different students (e.g., boys and girls) react to the same signal, and how this reaction may be driven by identity concerns. There is very limited evidence on how identity interacts with feedback in practice. Understanding this could help design feedback schemes to incentivise the participation in education of under-represented categories, such as girls and women in STEM subjects and low-SES students in higher education as a whole
- More research is needed to better understand the underlying mechanism explaining the gap in higher education application by socio-economic status. Psychological costs are found to be important for educational choices (Delavande and Zafar, 2018; Eisenhauer, Heckman, and Mosso, 2015) and those may be different for individuals who come from different backgrounds. Information gaps might still be relevant in other domains than labour market returns to a degree, such as the non-pecuniary returns to a degree (Boneva and Rauh, 2017).

5. Summary of conclusions

- Awareness of the available financial aid, namely the Education Maintenance Allowance provided to low-income pupils between the age of 16 and 19 in post-compulsory academic education, does seem to affect students' perceived likelihood of applying to university, particularly for low-SES students. Therefore, improving information on available financial aid may reduce the SES gap in university application and participation.
- Low-SES students may not base their expectations of success in university applications on their academic performance. So closing the SES gap in attainment may not reduce the gap in university applications.
- Understanding how students react to information about their academic ability may help uncover a potential driver of education inequality, still under-researched in economics. Our findings suggest that feedback about academic ability has the potential to change students' plans.

- Feedback about academic ability should be precise. If students, parents and teachers respond to perceived rather than real students' ability, students with comparable academic ability may be given substantially different opportunities for human capital investment. Coarse labels of academic performance are easy to interpret, but they may be imprecise: this may exacerbate the psychological effect of failure. If low-SES students are less able than high-SES students to bounce back after failure, early labelling of students' ability can exacerbate inequality in education.
- Expectations about the return to a degree matter in the sense that those who expect higher labour market returns are also more likely to expect to apply to university. But:
 - (i) parents and young people from various SES backgrounds hold similar beliefs about the earnings and employment returns to a degree;
 - (ii) parents tend to under-estimate the earnings return to a degree. It is therefore unlikely that information gaps about the labour market advantages of degrees explain the SES gap in participation. But providing information on earnings may increase participation into higher education for many, irrespective of SES backgrounds.
- A very light-touch information intervention, such as showing some statistics about population earnings and employment to families, is powerful enough to change parents' expectations about population earnings so that they become more accurate, with changes still visible six months later.
- Financial constraints at the time of university application are not a major factor in the decision to apply: poorer families remain more sceptical about university application even when they are asked to consider the difference a scholarship might make

6. Summary of policy recommendations

- Feedback about students' ability shapes plans to stay on full-time post-compulsory education for boys and girls from underprivileged backgrounds, and effort at school for girls. Repeated feedback may help fill the information gap between low and high-SES students about what determines success at school, especially for girls.
- Feedback, to be useful, should be precise. Indeed, coarse performance indicators (such as large levels) may be inappropriate as they provide an imprecise signal of academic ability, such that small -arguably random- differences in students' performance the day of the exam can lead to substantive perceived differences in ability.

- Other interventions such as providing feedback on academic ability, or information about the application requirements, may be needed.
- Providing simple information about the labour market returns to a degree can help families from all backgrounds to make better-informed decision.

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