University Access: the Role of Background and COVID-19 Throughout the Application Process

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Non-technical summary

Students from low socio-economic status (SES) or ethnic minority backgrounds who apply to university are less likely to enrol into elite institutions than high SES or White students. Some of these gaps are explained by prior educational performance up to age 16, choices of qualifications taken between 16 and 18, and predicted performance at age 18. However, large differences in students' application decisions, universities' offers, and acceptances by ethnicity and SES remain even after accounting for any observed pre-application difference in attainment.

In this paper, we look at university applications from 2016/2017 to 2019/2020 to pinpoint the factors that contribute to these gaps. We also look at what changed for the 2020 cohort, for whom exams were cancelled during the COVID-19 pandemic. Alternative assessment arrangements were brought in, and student number controls temporarily introduced (and later relaxed) to deal with the resulting grade inflation

Low SES students have lower prior educational performance and are less likely to choose an academic post-16 educational track (e.g. studying for A-levels or Highers rather than BTECs) than high SES students. They also receive lower predicted grades and make less ambitious applications (as measured by the difference between the course entry requirements and the student's predicted grades) even after accounting for these earlier disadvantages. Consequently, low SES applicants are less likely than high SES students to access elite universities and competitive courses.

Black students have lower prior educational performance and are less likely to choose an academic educational track than White students. They receive lower predicted grades, but they suffer an additional disadvantage in that they face a lower probability to receive an offer or to be accepted on their firm choice than White applicants who have the same prior educational attainment and predicted grades and apply for the same course in the same year.

South Asian students have similar prior educational performance and are equally likely to choose an academic educational track to White students. They also receive comparable predicted grades but are more ambitious in their application choices than White students in terms of field of study. However, compared with White applicants who have the same prior educational attainment and predicted grades applying for the same course in the same year, South Asian students face a lower probability to receive an offer or to be accepted on their firm choice of course.

We see no indication that 2020 students' application choices were influenced by COVID-19, which only spread outside mainland China after the application deadline in January 2020 had passed. Similarly, we find no evidence that universities' offer decisions were significantly affected by the 2020 disruption in a way that disadvantaged any demographic group. If anything, we see that Black and South Asian students selected more ambitious firm choices in the spring of 2020. The main difference caused by the pandemic is found at the later stages of the application process. Prior to 2020, Black and South Asian students were much more successful at finding a place through Clearing than White students. The most striking impact of COVID-19 was to reduce their scope to do so. Grade inflation meant fewer unfilled places, with restricted access particularly to low-tariff institutions.

University access: the role of background and COVID-19 throughout the application process[1]

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Abstract:

Students from low socio-economic status (SES) or ethnic minority backgrounds are less likely to enrol into elite universities than high SES or White students. We use student-level university application data from the UK centralised university admissions service to show that these gaps cannot be accounted for by prior educational performance or subject preferences. The reasons why these gaps emerge differ according to the demographic group considered. SES gaps are predominantly driven by students' application decisions, while ethnic gaps result from minority groups' lower propensity to achieve the conditions of offers. There is widespread concern about the potential impact of COVID-19 and the resulting alternative assessment arrangements for the 2020 application cohort. We find no evidence of a differential impact on access to elite institutions, but show that Black and South Asian students, who in normal years are successful at finding a place at later stages of the application process were more likely to be squeezed out.

Keywords: Higher Education, Inequality, COVID-19

JEL Codes: I23, I24, I28

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1. Introduction

Increasing participation in Higher Education to develop the skills and knowledge base required for a thriving economy can play a core role in many countries' industrial strategies, not least the UK (Azmat et al., 2018). At the individual level, graduating from university has been shown to increase lifetime earnings, health and other aspects of wellbeing (Heckman et al., 2018, Chevalier and Feinstein, 2007). There is however considerable heterogeneity in these returns by subject (Walker and Zhu, 2011), degree class (Naylor, Smith and Telhaj, 2016; Feng and Graetz, 2017), by selectivity of institution (Broeke, 2012; Drydakis, 2016; Walker and Zhu, 2018, Ge et al., 2022), and how well matched students are to the institution they attend (Dillon and Smith, 2019). This may lead to differing outcomes for students of different backgrounds.

The United Kingdom (UK) has implemented many policies intended to increase participation among young adults from all social, financial and educational backgrounds. Education or training is now compulsory up to age 18. Credit constraints have been mitigated by setting maximum allowable tuition fees and making state-funded loans available to cover both tuition and living costs. The UK also uses a centralised admissions process, intended to reduce the differential information constraints and administrative barriers to entry (McGuigan et al., 2016).

Despite these efforts, we show below that there are large and persistent differences in rates of access to university, and specifically to elite universities in the UK by ethnicity and socio-economic status. Moreover, there are widespread fears that the COVID-19 pandemic has or will set back any progress (Scott, 2020; Atherton, 2020).

In this paper we use UK administrative data on individuals' university applications from the University Centralised Admissions System (UCAS) to map choices and outcomes over the various stages of the university applications process. A rich literature already models differentials in the decision to apply for elite or selective universities (Griffith and Rothstein, 2009; Black et al., 2020); and documents outcomes from the application process by social and ethnic background, including match quality (Campbell et al., 2022; Black et al., 2015); or both (Delaney and Devereux, 2020). Our contribution is to investigate at which junctures of the application process these inequalities emerge, providing improved understanding of the potential mechanisms.

A special focus here is on the impact of the changes made to assessments due to COVID-19 in 2020. Our approach enables us to identify the contributions of ethnic and social differences in a student's endowments, preferences, expectations, and constraints. Here by *endowments* we mean their prior educational performance and educational track at time of application. Students' *preferences* for subjects and universities are reflected in application choices. Their own and their schools' *expectations* are reflected in predicted grades and the ambitiousness of students' applications relative to these. Students face c*onstraints* on their choice set after receiving offers or rejections, and their final grades, which determine whether they are ultimately accepted by a specific university.

We pay particular attention to one aspect by which the UK differs from similar centralised admission systems used in other countries and US states (see e.g. Mountjoy and Hickman, 2021): the role played by teachers' predicted grades. Predicted grades are supplied by applicants' teachers and are used by universities to decide whether to offer a place, and under what conditions, with actual performance revealed and an offer confirmed only several months later. In general, young people at low performing schools or from lower socio-economic backgrounds are more likely to receive predicted grades below their actual performance (they are 'underpredicted'), while Black and South Asian students tend to receive predicted grades above their performance (they are 'overpredicted') (Wyness, 2017; Murphy

and Wyness, 2020). As a result, low SES students are more likely to apply for courses for which they will be over-qualitied, while the opposite holds true for ethnic minority students.

The central role of predicted grades came under intense scrutiny in the summer of 2020, when final exams were cancelled due to COVID-19. The government and qualifications regulator Ofqual sought a way to assign students grades, and eventually settled on eliciting a set of teacher assessed grades (Ofqual, 2020; Kelly, 2021). These 'Centre Assessed Grades' submitted to Ofqual in the summer of 2020 need not necessarily have been the same as the predicted grades submitted to UCAS in the autumn of 2019. While teacher assessments were widely held to be the best solution, they had the potential to generate severe grade inflation and introduce distortions due to the possibility of teacher bias (Alan et al., 2018; Alesina et al., 2018; Carlana, 2019). Our analysis identifies the groups of prospective students who lost out under these arrangements, and the mechanisms by which this occurred.

We begin by summarising the overall outcome - acceptance to an (elite) university - of all students entering the application process, and how this differs by SES and ethnic background. We then proceed to document where differences between groups arise. We briefly look at gaps in predicted grades, conditioning on a student's demographic characteristics. Our analysis then proceeds through the different stages of the university application process. For each stage, we show the SES and ethnic minority gap relevant at that stage, conditional on the outcomes of the preceding stage. By identifying at which stages of the application process these conditional gaps emerge we can advise on changes to policy or strategy for schools, universities and the University and College Admissions Service (UCAS) who implement the centralised admissions procedure.

For low SES prospective students, we find small gaps at each stage of the application process that all contribute to the final deficit in outcomes: Low SES students make less ambitious applications in terms of both entry tariff of course and university, are slightly less likely to receive an offer at any given course, select less ambitious offers as their preferred ('firm') choice, and are less likely to be accepted onto this choice after A-level results are announced.

For ethnic minority students, the picture is more complex, reflecting the fact that their applications and firm choices are more clearly driven by preferences for competitive subjects, particularly medicine and dentistry. However, we show large negative unexplained gaps in both (i) the probability that they receive an offer and (ii) that they are accepted onto their firm choice, than White students with the same educational profile and applying or holding an offer for the same course.

The fact that ethnic minority students have a lower likelihood of receiving an offer suggests that other aspects of the application process, such as references or personal statements, which are seen by admissions tutors but not observed in our data, may play a role. The gap in acceptances onto firm choices instead reflects students' ability to convert predicted into realized grades. Both gaps may therefore reflect differences in the parental and school-provided support and guidance and make it considerably more likely that ethnic minority students enter the Clearing process, where students who fail to get a place after the initial allocation are matched to universities that have spare capacity. We show that until 2019 ethnic minority students were highly successful at gaining a university place through Clearing, albeit predominantly at non elite universities. The 2020 cohort however experienced more difficulties, as most universities filled their places early on, due to general grade inflation.

2. Institutional background

2.1. Higher Education System in the United Kingdom

There are 254 Higher Education Providers in the United Kingdom, including 164 universities that have the right to award degrees, and 90 further colleges that provide degree-level courses but cannot award degrees themselves. There are numerous ways of establishing rankings within this spectrum of education institutions (universities henceforth). We follow UCAS by using the average grade (tariff) score of students accepted at the university, to measure the selectivity of universities. We refer as the top tercile as elite universities.[3]

Bachelor undergraduate courses in the UK are normally three years in duration (often four years in Scotland). At some universities, students without the pre-requisite qualifications for a given course can also take one-year Foundation Level courses to prepare themselves, and/or a year abroad or on a placement in industry. Students usually commit to an intended course, defined as an university-by-subject combination including a major and any minors, from the outset. There is limited flexibility to change course without restarting their degree. On graduation, students are awarded a degree class indicating the level of Honours they receive, with a good degree (First class or Upper Second class honour, equating to an average mark above 60%) typically required by graduate employers.

Applications for undergraduate courses at all 254 universities are made through the same centralised admissions system run by the University and College Admissions Service (UCAS). While the procedure (detailed further below) is multi-staged, its low barriers to entry mean that administrative constraints should not affect students' decisions or ability to apply for any given course (Sa, 2014; Campbell et al., 2022).

The system of student finance in place across the UK also means that financial constraints should not play a major role in determining students' application decisions. The maximum permitted tuition fee remained unchanged in nominal terms over the years we study, at £9250 (or £9000 in Wales). Almost all universities charge this maximum tuition fee, with no differentiation between elite and lower-ranked universities, subjects that are relatively cheap or costly to teach, or those with relatively high or low earnings prospects for graduates. 100% of these tuition fees can be met by a student loan which is not means-tested. Fees are paid directly by the nationalised Student Loans Company to the university. After leaving university, both dropouts and graduates pay back a fixed proportion of the income above an income threshold, until this debt is repaid or written off after 30 years.

Maintenance loans for living costs also have this income-contingent payback structure, but the amount the student can borrow is means-tested according to parental income. The amount students can borrow also differs according to whether the university is in London and whether the student will live at home, which to some extent proxies for the likely costs the student will face.[4]

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[3] This category includes Oxford and Cambridge and many Russell Group universities such as Birmingham, Bristol, Durham and Exeter, but also newer universities such as Sussex and Aston. A list of 'high tariff' universities can be found in Annex E of Office for Students (2018), 'Gap in participation at higher-tariff providers between the most and least represented groups'
https://www.officeforstudents.org.uk/media/876d32cc-db3b-4da7-ad16-e46579f5d644/annex.pdf

[4] There are some differences in these institutional features across the four nations of the UK. In particular, students domiciled in Scotland and attending Scottish universities do not pay tuition fees, but those from elsewhere in the UK who go to Scotland or vice versa do. Similarly, the maximum tuition fee for students domiciled and studying in Northern Ireland is capped at £4630 rather than £9250. Both features contribute to there being less geographical mobility out of these countries. Moreover, a means-tested proportion of the

The absence of administrative or financial constraints in making applications for university should mean that differences in application decisions reflect students' preferences, and own perceived academic ability and potential.

Most universities in the UK have deliberate policies to modify the demographic profile of their intake. Universities accessing Student Loans Company funds are required to publish Access and Participation Plans detailing targets and policies for recruitment of students from disadvantaged backgrounds. The most high-profile such policy is Contextualized Admissions. The principle of this policy is to recognize that low prior academic achievement may reflect a difficult context, and an expectation and empirical regularity that once context is equalized at university, those from more advantaged backgrounds do not outperform students from disadvantaged backgrounds (Vidal Rodeiro and Zanini, 2015). Contextualised Admissions usually entail prospective students from neighbourhoods or schools with low progression to Higher Education, or who are 'first in family' being given conditional offers with lower grade entry requirements than would otherwise be stipulated (Boliver et al., 2017).

2.2. UCAS applications system in normal years

Students typically apply for university during their last year of schooling, at age 17-18. In this section we explain the stages of the application process and will follow this structure in our analysis. These stages are summarised in Figure 1.

Figure 1: Stages of the UCAS applications system

0 Prior to application	**Stage 0** Prior qualifications. 16-18 educational track. Schools supply **predicted grades**
1 Applications	**Stage 1** Students make **applications** to up to 5 courses
2 Offers	**Stage 2** Universities make decisions on each application: **Offer** or reject.
3 Choices	**Stage 3** Students **respond** to their offers, making **firm and insurance choices**
4 Results day	**Stage 4 Results day** – students accepted onto firm, insurance or neither
5 Clearing	**Stage 5 Clearing** – students not yet accepted may find a place elsewhere

Prior to applications

Students submit both achieved and predicted grades when they apply to university. Achieved grades are mainly for qualifications completed at age 16 (GCSEs in England, Wales and Northern Ireland, and

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support for living costs and, until 2018, tuition fees, of Welsh-domiciled students was provided in grants rather than loans, but this does not discriminate by location of study.

Standards in Scotland). At age 16, students select into university-entrance qualifications either via an academic track (A-Levels in England, Wales and Northern Ireland, Highers in Scotland) or a vocational track (predominantly BTECs), or some combination of the two. UCAS maintains a 'tariff' system which weighs a wide range of post-16 qualifications based on number of learning hours required to complete the qualification and grades.

In the Autumn term of the last year of schooling (at age 17-18), schools and colleges supply predicted grades for each qualification a prospective university applicant is taking. These can be based on a combination of objective information and a subjective assessment of how a student may improve. For example, teachers often set students a mock A-level exam, while BTEC students receive coursework marks throughout their studies.

Many university subjects have well-publicised pre-requisites, and most courses – here meaning a specific degree programme, including intended major and any minor subjects at a single university - publish tariff or grade entry requirements. For example, Management and Economics at the University of Essex requires three B grades at A-level, while the equivalent course at Oxford University requires entrants to achieve an A* grade and two A grades at A-Level, of which one has to be in Maths. This implies that apart from educational attainment, studying the required subject is an entry hurdle for some courses and lack of knowledge about these entry requirements can be a significant information barrier. There are a number of A-level subjects (so-called facilitating subjects) that are commonly required or preferred by universities to get on to a range of degree courses, including maths, English, one of the sciences, or history, for example.

Prior educational attainment, choice of educational track or qualification type, choice of subjects, and the predicted grades supplied by the school or college are all therefore potentially important determinants of prospective students' choice set, chances of success conditional on applying to a given course, and therefore probability of applying to a given course.

The university application process then proceeds as follows:

Stage 1: Students *apply* to up to 5 university courses.

Students must apply online, between September and 15th January of the academic year before they plan to enter university. Students can apply to multiple courses at the same university, and/or multiple universities for the same subject. Exceptions are that the Universities of Oxford and Cambridge and Medicine and Dentistry courses have an earlier deadline in October and students cannot apply to both Oxford and Cambridge or to 5 Medicine or 5 Dentistry courses. Students must make all 5 applications simultaneously.

Each application includes information on qualifications already achieved, predicted grades for qualifications students are currently taking, and a personal statement that must stand for all 5 applications. In general, universities must give equal consideration to all applications received by the deadline.

Stage 2: Universities make a *decision* on each application.

A university's decision on a specific application can be a *conditional offer,* which is contingent on the student achieving certain grades in their ongoing qualifications (falling from 64 to 59% of applications between 2017 and 2019); an *unconditional offer* which is not contingent on the student achieving certain grades (rising from 9 to 16% between 2017 and 2019); or a *rejection*.

Conditional offers will usually match entry criteria published in university prospectuses in terms of A-Level grades or UCAS tariff points. Universities with a Contextual Admissions policy may choose to lower entry requirements for prospective students from disadvantaged backgrounds, or to make an unconditional offer instead (see e.g. Boliver et al., 2017).

Stage 3: Students _respond_ to their offers.

Once students have received decisions for all their applications, they must choose a _firm choice_ and an _insurance choice_ by a deadline, usually in May. They must decline all offers not chosen. Once students have received offers from their two most-preferred universities, they can also withdraw any applications for which they have not received a decision and respond early.

Stage 4: Students complete their qualifications and receive their results.

A-Level, Scottish Higher and BTEC final exams and/or coursework submission take place between April and early June. Results from these qualifications are published on results day in August each year. If students were holding an unconditional offer or their results meet the conditions of their firm choice they are automatically accepted onto this course. If they do not meet the conditions of their firm choice but meet the conditions of their insurance choice they are accepted there instead, and the allocation process is complete.

Stage 5: Clearing: Students not yet accepted may find a place elsewhere

After results day, universities publish a list of courses with unfilled capacity. Students not yet accepted on a course may enter a process called Clearing by telephoning these universities and seeking a place based on their achieved grades. Some are _accepted_. [5] Students who do not attempt this, or who are not accepted to any course by these routes remain unplaced. They can re-apply the following year.
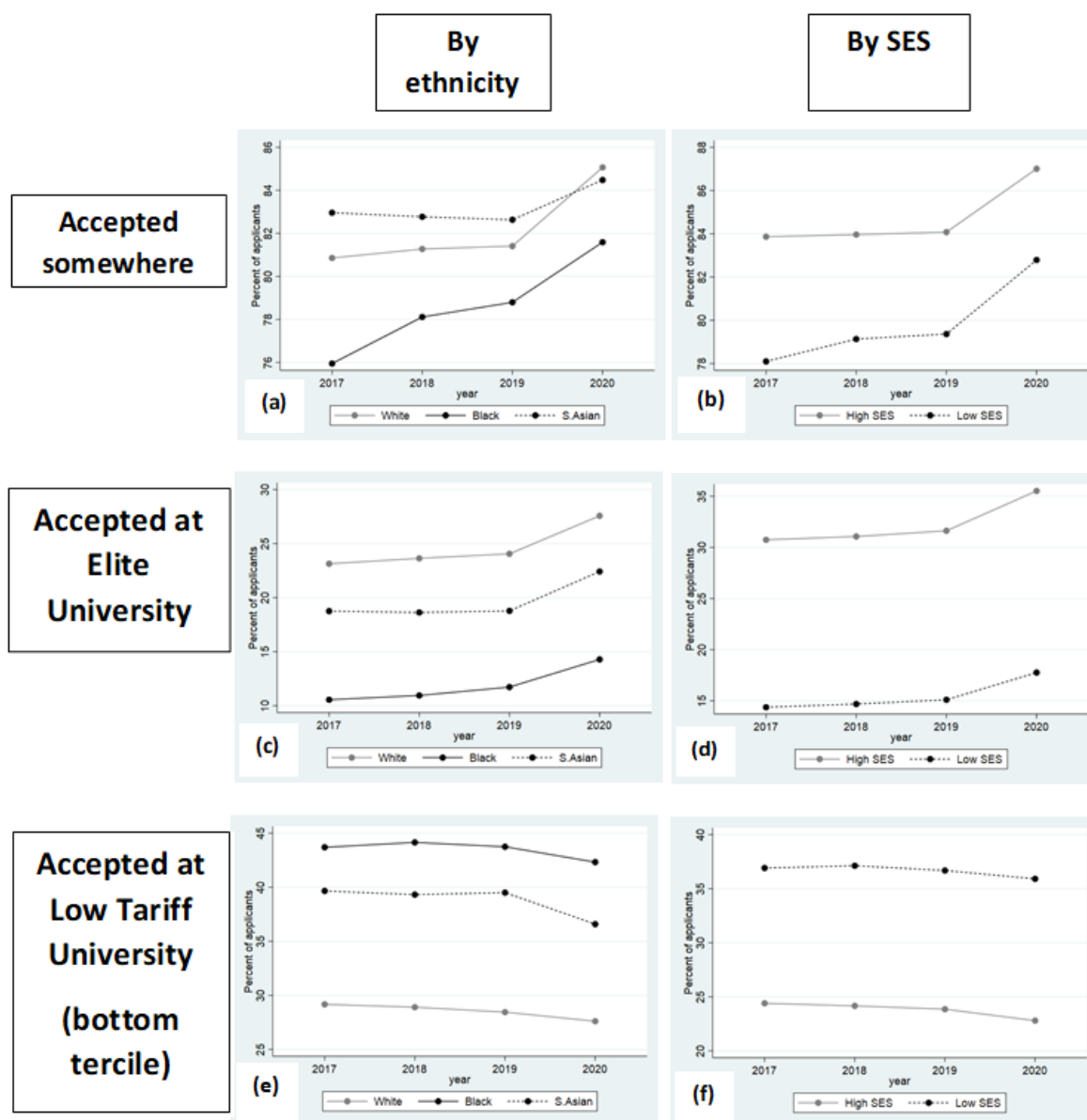
2.3. Application outcomes

To give a flavour of the outcomes of the application process and how this differs by SES and ethnicity, Figure 2 show the proportion of applicants who are accepted onto any undergraduate course at a UK university. We describe the underlying data below. While at least three-quarters of applicants in all ethnic or SES groups are eventually placed at a university, acceptance rates are lower for Black and Low SES students. We will show that these differences largely reflect gaps in prior educational performance.

The differences are much more pronounced for access to elite universities that are known to make a critical difference to students' outcomes in the long run (Broeke, 2012; Drydakis, 2016; Walker and Zhu, 2018). Panels (c) and (d) show White applicants are around twice as likely as Black and high SES more than twice as likely as low SES applicants to end up in an elite university. These gaps in access to elite universities are much larger than the overall gap in access, indicating that ethnic minority and low SES applicants are more likely to be accepted a lower ranked university instead.

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[5] Students who perform better than expected are permitted to enter 'Adjustment', which is similar to Clearing except they are allowed to approach courses with higher required qualifications for entry than their firm choice.

Figure 2: Outcomes from UCAS applications process by ethnicity and SES.

Note: Source: UCAS applications data. All figures show raw percentage of each ethnic or SES group who achieve the outcome, conditional on entering the application process. For example, in panels (c) and (d) the outcome is 1 for students accepted at an elite university, and the outcome is zero for those accepted at a Low or Medium Tariff university and those not accepted at any university.

2.4. Changes due to COVID-19 for the 2020 application cycle

The 2020 application cycle was impacted by the first wave of the COVID-19 coronavirus pandemic. Students' educational profile and applications were determined sufficiently early to be unaffected as the application deadline was 15th January 2020. On 18th March 2020 the government announced that schools in the UK would be closed to in-person teaching and all exams were cancelled. Between 2nd April and 22nd May, details of the system for assigning grades to students not sitting end-of-school exams were gradually published. Teachers would assign Centre Assessed Grades (CAGs), intended to be predictions of how students would have performed if the pandemic had never happened. These CAGs were widely expected to be higher on average than students would have received when taking exams. For this reason, teachers were also required to submit a rank order of students studying for each qualification within a school. An algorithm would then enforce the same distribution of grades as observed in the same school over the past three years.

Results were revealed on 4th August for Scottish Highers and 13th August for A-levels and BTECs. Many students were downgraded by several grades relative to predictions, particularly those from less affluent backgrounds who were likely to be in low-performing schools with low performance averages in previous years. At the same time, some students were effectively upgraded because cohorts of less than 15 students taking the same subject at the same school, were exempted from the ranking system and the application of the algorithm. This happened predominantly in private schools which are smaller on average than state schools. A major public and media outcry followed, and within a week A-Level and Scottish Higher results all reverted to the Centre Assessed Grades if these were higher than the grades assigned by the algorithm, and BTECs within two weeks. Where algorithm-assigned grades were higher than CAGs, these were maintained. Prospective students were also given leeway to switch courses even after having accepted an offer. For example, those placed on their insurance course on the basis of the algorithm grades could revert to their firm choice if they met the conditions of offer on the basis of their CAGs grades.

Over the same period the government also introduced (on 4th May) temporary student number controls that would have penalized universities for increasing recruitment levels above those in previous years. However, the reversion to Centre Assessed Grades resulted in substantial grade inflation. The government therefore removed student number controls again on 18th August to enable universities to honour the conditions of their offers.

The overall impact of these changes was that a greater proportion of students than usual met the conditions of their firm or insurance choices. In turn this meant fewer proceeded to Clearing, but those that did were competing for considerably fewer remaining places. We present all our models separately for 2017, 2018, 2019, and 2020 to identify pre-existing trends in conditional gaps, and make inferences about the differential effects of these pandemic-related changes on outcomes by SES and ethnicity.

3. Data and Methods

We use individual data on the universe of applications to UK universities for the cohorts entering Higher Education in October of each academic year from 2017/18 to 2020/21. We refer to these as the 2017 to 2020 *application cycles.*

For each application cycle, we link three datasets.

- The *applicants* dataset containing demographic information on each prospective student.
- The *qualifications* dataset containing information, recorded at the time of application, on the grades and subjects of qualifications they have already achieved or are predicted to achieve by the ensuing summer.
- The *applications* dataset containing one line per student per course applied to with a university, subject and course identifier. This documents the university's decision, applicant's response, and whether the student was eventually accepted onto the course.

Note that the *applicants* and *qualifications* datasets contain all the quantitative information available to universities when making their offer decisions, but not the applicant's personal statement or references. We do not observe the requirements set for any conditional offers, or students' realized grades. However, we can infer whether the students met these requirements, since we observe whether they are eventually accepted. We proxy the competitiveness of each course as the tariff score of the 25th percentile among the previous year's accepted students.

Table 1 shows descriptive statistics on our pooled estimation sample of applicants from 2017-2020.[6] Our main categorical variables of interest, the conditional gaps on which our subsequent analysis will focus, are in the upper part of the first column. Applicants report parental occupation, and we define high SES as those with a parent in a Managerial or Professional occupation and low SES otherwise. 47% are known to be high SES, 41% are low SES, and 12% could not be classified. Ethnicity is also as reported by the applicant on their application form. 8% are of Black (including African, Caribbean, and mixed Black and White, and Other Black backgrounds) and 12% of South Asian (including Indian, Pakistani, Bangladeshi, and those of mixed South Asian and White backgrounds) ethnicity, and in our analysis we compare these prospective students with the White majority. We retain the small proportion of those with missing and other ethnicities or SES not classified, and control for these with a separate dummy variable.

The remainder of Table 1 documents other control variables in the format included in our regressions. For example, we will control for both the continuous predicted tariff score and for the A-Level grade group defined by the best predicted 3 A-Level (or best 5 Scottish Highers) grades. We also include markers for the number of and best predicted grades in A-Levels or Highers in 'Facilitating' subjects, declared by the Russell Group of elite universities as providing good preparation for a degree.[7] This allows us to be agnostic about which of these is more important from the perspective of an admissions tutor, but to allow the additional information contained in the secondary measure to influence decisions and outcomes.

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[6] We exclude applicants with no UCAS-recognized qualifications. These are predominantly overseas applicants or older applicants applying on the basis of professional rather than academic experience (22% of the sample).
[7] Mathematics or further mathematics, English literature, physics, biology, chemistry, geography, history, and languages.

Table 1: Descriptive statistics - means of explanatory variables for population of main scheme applicants, 2017-2020 application cycles

Demographics		Prior/Predicted Education		Educational Track	
Male	43.3%	Predicted Tariff	134.7	School Type (State school sixth form omitted)	
Low participation neighbourhood	27.0%		(55.1)	FE College	11.7%
SES (High omitted)		Predicted A-Level grade group (A*AA omitted in regressions)		Sixth Form College	17.0%
Low SES	41.4%	A*AA	12.2%	Grammar School	3.1%
SES Not Classified	11.8%	AAA	8.2%	Independent	8.2%
Ethnicity (White omitted)		AAB	8.0%	Other	19.7%
Black	8.4%	ABB	8.0%	N 'Facilitating Subject' A-Levels / Highers	0.936 (1.18)
South Asian	10.5%	BBB	7.2%	Taking International Baccalaureate	0.2%
Chinese	0.8%	BBC	5.5%	Taking BTEC	33.3%
Other	8.2%	BCC	4.1%	Taking Welsh Baccalaureate	3.1%
Age (18 is omitted)		CCC	2.9%		
19	19.0%	CCD	1.6%	Has a Foundation Degree	1.2%
21-21	9.1%	Below CCD	2.1%		
>21	8.9%	<3 A-Levels	40.2%		
		Best predicted A-Level/Higher grade in Facilitating Subject	2.40 (2.38)	Days before deadline that application is submitted	30.4 (47.9)
Region of residence (Greater London is omitted)					
Northern Ireland	4.3%	**Sample size**	**1,590,310**	**Sample size**	**1,590,310**
		Country-specific prior educational performance:			
Scotland	4.9%	Grade in GCSE English Literature	6.59 (1.25)	Scottish National 5: English grade	3.49 (0.70)
Wales	4.5%	Grade in GCSE Maths	6.55 (1.46)	Scottish National 5: Maths grade	3.27 (0.87)
Sample size	**1,590,310**	(Best) GCSE Science	6.98 (1.33)	Scottish National 5: Science grade	3.14 (0.93)
		Sample size for GCSEs	**1,477,453**	**Sample for National 5s**	**101,999**

Notes: Descriptive statistics are for estimation sample with non-missing predicted tariff score. Standard deviations of continuous variables in parentheses. Additional controls are 8 further dummies for Government Office Regions in England; best predicted grade in a Scottish Higher in a Facilitating Subject. GCSE and National 5 results shown only for those in relevant country/countries. In regressions these are set to zero for not taking the qualification. Scottish National 5s are scored from 4 (A grade) to 1 (D grade). GCSE grades are scored from 9 (highest) to 1.

Our aim is to assess ethnic and social gaps in access to university, and the stages at which they occur. To investigate this, we estimate two forms of regression model.

To describe the conditional gaps in outcomes that are the cumulative result of multiple stages of the process, we estimate the following equation using OLS, separately for each of the 4 application cycles 2017-2020:

$$Y_i^s = a.\boldsymbol{Demog_i} + b.\boldsymbol{X_i^s} + \varepsilon_i^s \qquad (1)$$

Here Y_i^s is the outcome for individual i at stage s. $\boldsymbol{Demog_i}$ is a vector of categorical variables including gender, ethnicity, SES, low participation neighbourhood, school/college type and region. All our regressions contain this vector, and the coefficients on the low SES, Black ethnicity and South Asian ethnicity indicators are our coefficients of interest that measure the size of the gap for the outcome in question.

The vector $\boldsymbol{X_i^s}$ is stage-specific and contains a set of individual or application characteristics that are predetermined with respect to that stage. In order of inclusion by stage, this will include: $\boldsymbol{PriorEd_i}$ containing GCSE or equivalent grades in English, Maths, Science; $\boldsymbol{EdTrack_i}$ containing the number of Facilitating subjects being taken, and dummies for non-academic educational tracks (International Baccalaureate, BTEC, Welsh Baccalaureate, Foundation Degree); $\boldsymbol{PredictedGrades_i}$ containing predicted tariff score (continuous), A-Level grade group (11 dummies), and best predicted grade in a Facilitating subject (continuous, zero if not being taken); and $\boldsymbol{ApplicationChars_i}$ containing information on how early before the deadline the application was submitted, whether the student used all 5 applications, and distinct number of subjects or universities applied for, whether the student made at least one application for Oxford or Cambridge, and for Medicine or Dentistry

To describe conditional gaps in (i) the probability of receiving an offer and (ii) the probability of being accepted on a given course, it makes sense to compare students with their direct competitors, i.e. those who have (i) applied for the same course in the same year and (ii) are holding an offer that they have selected as their firm choice, on the same course in the same year. We do this by augmenting equation (1) with course fixed effects:

$$Y_i^s = a.\boldsymbol{Demog_i} + b.\boldsymbol{X_i^s} + \boldsymbol{CFE_c} + \varepsilon_i^s \qquad (2)$$

$\boldsymbol{Demog_i}$ and $\boldsymbol{X_i^s}$ are the same as before.

4. Descriptive statistics

In Table 2 we describe main characteristics, choices and outcomes of students by SES and ethnic background. The first two panels show low SES and Black applicants tend to do less well compared to high SES and White applicants in terms of GCSE grades, probability of taking A-Levels at all or in Facilitating subjects, and in their predicted tariff score. South Asian students have lower prior attainment and predicted grades than White, but are more focused on Facilitating subjects, indicating they are preparing for courses which require a Facilitating subject to be taken. This is consistent with the next panel showing South Asian students are more likely to apply for Medicine and Dentistry courses (as to a lesser extent are Black students) and apply on average for more competitive courses than White students (where the Black-White gap is still negative). The bottom of the table shows the proportion of each group eventually accepted on a Medicine or Dentistry course. Despite this being higher in absolute terms for South Asian students than White, the absolute number of South Asian applicants for this subject failing to be accepted is also substantially higher, and the acceptance rate

lower relative to the proportion of applicants. This distinction in preferences may drive a lot of the conditional gaps we document later in this paper and shows the importance of controlling for course-specific differences in offer and acceptance rates at the relevant stages of the analysis.

Inequalities in rates of application to elite universities are significant but less stark than that shown for acceptances in the bottom panel of the table. The 'Offers' panel shows that students on average receive very similar numbers of offers, with the main distinction for those receiving at least one *unconditional* offer – that is one without any grade requirements attached. This is slightly higher for low SES than high SES students but is lower for both ethnic minority groups than White students. The former result will partially reflect the use of unconditional offers for contextualised admissions, and the latter partially reflect differences by subject, again showing the importance of disentangling preferences from observed and unobserved characteristics.

Gaps in the entry tariff of the most competitive offer that students receive largely reflect those in students' applications. We also see an almost identical rate of acceptance onto firm choice on results day for high and low SES students, of 75%, albeit with the knowledge that low SES students have a small head start in terms of unconditional offers and had applied for courses with lower entry requirements. There is however a major gap in results day acceptances by ethnicity – with a Black-White gap of -12.5%pt and South Asian-White of -17.1%. This difference in ability to convert offers into acceptances is, as we shall show, the major source of inequalities in students' application outcomes.

Table 2: Descriptive statistics - mean applicant or application characteristics by ethnicity and SES, conditional on applying through the main scheme

	High SES	Low SES	White	Black	South Asian
Prior performance and educational track					
GCSE Maths	6.93	6.47	6.75	6.17	6.54
	(1.43)	(1.41)	(1.40)	(1.45)	(1.52)
GCSE English Lang'	6.88	6.50	6.78	6.28	6.41
	(1.24)	(1.21)	(1.21)	(1.25)	(1.29)
(Best) GCSE Science	7.35	6.86	7.14	6.66	7.05
	(1.25)	(1.27)	(1.25)	(1.33)	(1.37)
Sample size	*590,623*	*547,599*	*923,166*	*109,553*	*142,847*
Taking an A-Level or Higher, %	88.2	75.3	83.1	68.5	78.2
Sample size	*743,212*	*658,890*	*1,145,104*	*134,617*	*167,314*
N Facilitating subjects (conditional on taking an A-Level)	1.40	1.18	1.29	1.11	1.38
	(1.12)	(1.10)	(1.12)	(1.04)	(1.13)
Sample size	*655,283*	*496,365*	*951,477*	*91,863*	*130,928*
Predicted tariff score	142.1	127.8	135.9	123.2	132.2
	(52.8)	(56.1)	(55.2)	(54.6)	(52.9)
Sample size	*743,212*	*658,890*	*1,145,104*	*134,167*	*167,334*
Applications					
Entry tariff of courses applied for	122.0	110.2	115.9	109.3	118.0
	(35.6)	(34.9)	(35.4)	(35.1)	(36.4)
Sample size	*3,156,046*	*2,664,106*	*4,641,603*	*575,629*	*737,561*
Medicine and Dentistry, %	3.8	2.7	2.2	3.6	7.9
Elite inst', %	44.2	28.4	37.0	27.3	35.1
Sample size	*3,396,951*	*2,893,169*	*5,029,520*	*625,176*	*788,112*
Offers					
N Offers	3.53	3.16	3.34	3.17	3.37
	(1.49)	(1.62)	(1.59)	(1.61)	(1.51)
At least one, %	95.9	93.4	94.6	92.6	94.9
At least one uncond' %	32.8	35.2	36.2	29.9	25.1
Sample size	*743,212*	*658,890*	*1,145,104*	*134,167*	*167,334*
Highest tariff *If >=1 offer*	134.3	121.6	127.8	120.8	129.5
	(34.7)	(34.5)	(35.5)	(33.5)	(33.3)
Sample size:	*701,420*	*599,818*	*1,059,127*	*121,266*	*156,480*
Stage 5: Results day *If have firm choice*					
Accepted on firm, %	75.0	75.1	78.7	66.2	61.6
Sample size	*668,612*	*563,306*	*1,005,186*	*113,099*	*146,295*
Stage 6: Clearing *If not yet accepted*					
Accepted through Clearing	58.5	55.6	50.1	68.8	68.3
Sample size	*115,226*	*10,695*	*148,645*	*27,937*	*41,549*
Outcomes from entire process:					
Accepted somewhere on results day	75.2	71.1	75.5	65.0	63.9
Accepted somewhere eventually	86.6	83.5	84.7	84.9	85.0
Accepted at elite university	34.1	18.0	27.2	15.6	21.3
Accepted on Medicine and Dentistry	0.56	0.30	0.34	0.32	0.95
Sample size	*743,212*	*658,890*	*1,145,104*	*134,167*	*167,334*

Note: See Table 1.

5. Results

We begin by summarising the overall outcome - acceptance to a university course - of all students entering the application process, and how this differs by SES and ethnic background. We then proceed to document where differences between groups arise. We briefly look at gaps in predicted grades, conditioning on demographic characteristics. Next, we explore gaps at each stage of the university application process. Note that decisions at some stages of the application process can be ambiguous in their effect on the overall outcome. Some decisions that are favourable in principle (such as ambition of applications or firm choices) also increase the risk of not receiving an offer or of not meeting the conditions required. All bar charts in this section show gaps (with 95% confidence intervals) in outcomes between socio-economic or ethnic groups after controlling for characteristics in the stage-specific vector X_i^s. The gaps are the coefficients on dummy variables in the OLS regression models specified in section 3.

5.1. Gaps in university acceptance: Outcome of the entire process

Figures 3-4 show the conditional gaps in probability of acceptance *somewhere* and at an elite university. Here we control for variables predetermined at the time of application (so X_i^s includes $PriorEd_i, EdTrack_i, PredictedGrades_i$ but not the profile of applications made).

Figure 3 shows a very small SES and Black-White gap in the probability of being placed prior to 2020, and a non-trivial negative and growing South Asian-White Gap. The first COVID-19 cohort saw a significant Black-White gap of -1%pt emerge, and an acceleration of the widening of the negative South Asian-White Gap. The SES gap, which seemed to be closing throughout the pre- COVID-19 years, widened again in 2020. Overall, the COVID-19 year saw a widening in the gap of acceptances for low SES and ethnic minority groups, compared to higher SES and White students.

By contrast, Figure 4 shows that while there is a persistent SES and Black-White gap in the probability of accessing an elite university and a growing South Asian-White gap, the 2020 COVID-19 cohort did not see any marked deviation from those trends. Hence, the ethnic gap in access emerging in 2020 in must be due to low SES, Black and South Asian students being squeezed out of less elite universities. In subsequent sections we present evidence ruling out that this is driven by higher rates of application to or acceptance on competitive (high-tariff) courses. Instead, it is explained by Black and South Asian students being less likely than in pre-COVID-19 years to find a university place through Clearing.

The regressions underlying these figures reveal the relative importance of other, usually unobserved, factors in determining the success of university applications (see Appendix Table A1).

With respect to demographics other than SES and ethnic background, estimates show that males are more successful for both the outcomes we consider than females. Coming from a low participation neighbourhood reduces outcomes in addition to - but by a smaller magnitude than - coming from a low SES background. 19-year-olds, who may be applying for a second time, are also more successful than 18 year-olds, while mature students (22 or older) have lower rates of success in general, but are more often accepted at elite universities.

All predicted A-Level grade groups below the top band (A*AA) are associated with less successful outcomes in the expected direction, and the predicted tariff score has its own independent effect in the same direction. Taking BTECs, the main vocational track, has no impact on overall success rates but is negatively associated with access to elite universities.

Those applying *earlier* are slightly more likely to be placed at elite universities, and those using all 5 of their available applications and applying for more distinct universities are also more successful. Those applying for courses in more different *subjects* are less successful. This may go hand-in-hand with their personal statements and references being less specific.

Figure 3: Gaps in probability of being accepted somewhere
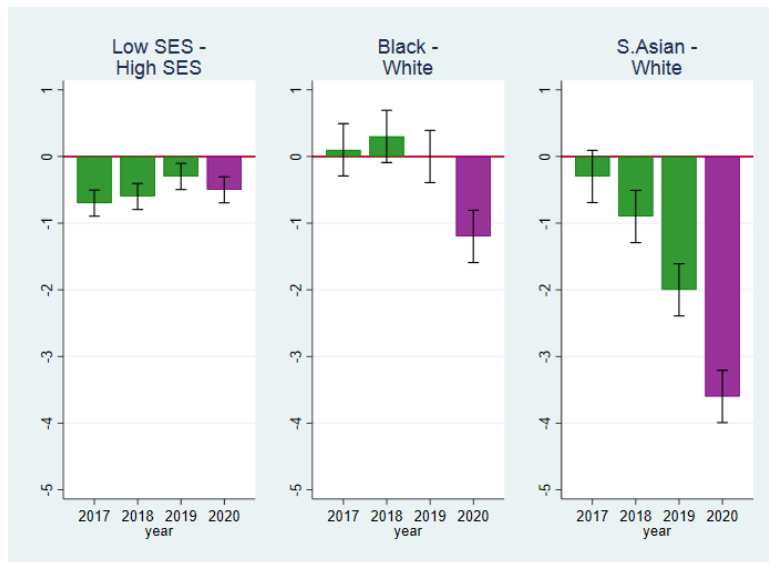
Notes: Source: UCAS applications data. Linear probability model, coefficients rescaled to represent percentage points. Solid bars show point estimates of conditional gaps in outcome. Capped lines show 95% confidence intervals. Additional controls: $Demog_i$, $PriorEd_i$, $EdTrack_i$, $PredictedGrades_i$. Sample size: 2017: 401,181; 2018: 386,596; 2019: 402,173; 2020: 388,294.

Figure 4: Gaps in probability of being accepted at an elite university

Notes: Source: UCAS applications data. Linear probability model, coefficients rescaled to represent percentage points. Solid bars show point estimates of conditional gaps in outcome. Capped lines show 95% confidence intervals. Additional controls: $Demog_i$, $PriorEd_i$, $EdTrack_i$, $PredictedGrades_i$. Sample size: 2017: 401,181; 2018: 386,596; 2019: 402,173; 2020: 388,294.

5.2. Gaps in predicted grades

The previous section has shown that gaps in acceptance to university have widened for Black and South Asian students compared to White students in 2020, and to a lesser extent for low SES students compared to high SES students. While the focus of this paper is on how gaps emerge at the different stages in the university application process, we show here gaps in predicted grades which are determined before applications are sent.

Figure 5 shows the gaps in predicted grades, converted into the tariff score. The lighter bars control only for demographic characteristics ($Demog_i$). The darker bars also account for prior educational performance at age 16 ($PriorEd_i$) and educational track ($EdTrack_i$). Prior educational performance accounts for up to 40% of the Low SES-High SES and Black-White gap (which are both around 8 points, equivalent to 1 grade in one A-Level subject, or 15% of a standard deviation in the predicted tariff score), and by 2019 reverses the already-small South Asian-White gap.

The figure shows that holding constant other demographics and prior educational performance, low SES and Black students can expect to be at a significant disadvantage for receiving offers or for meeting entry criteria for access to elite universities, compared with high SES and White students respectively. South Asian students are at a slight advantage overall, but this may be offset by applying for more (possibly over-) competitive courses. In the year affected by COVID-19, predicted grades were supplied to students during the autumn term which concluded on or around 20th December 2019, 11 days before any reports of a 'pneumonia' outbreak by Chinese authorities. None of the changes over time observed in these figures can therefore reflect expectations about the COVID-19 coronavirus. Rather, the Black-White gap seems to be closing over time, while the South Asian – White gap is widening in favour of the latter

Figure 5: Gaps in predicted tariff score
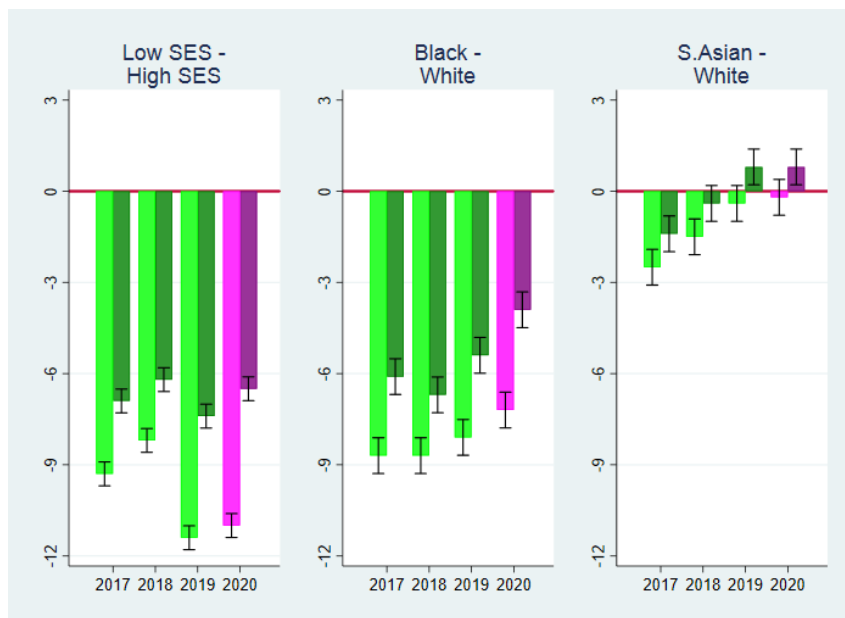
Notes: Source: UCAS applications data. Linear probability model, coefficients rescaled to represent percentage points. Solid bars show point estimates of conditional gaps in outcome. Capped lines show 95% confidence intervals. Additional controls for lighter bars: $Demog_i$ only. Additional controls for darker bars: $Demog_i, PriorEd_i, EdTrack_i$. Sample sizes: 2017: 401,181; 2018: 386,596; 2019: 402,173; 2020: 400,360
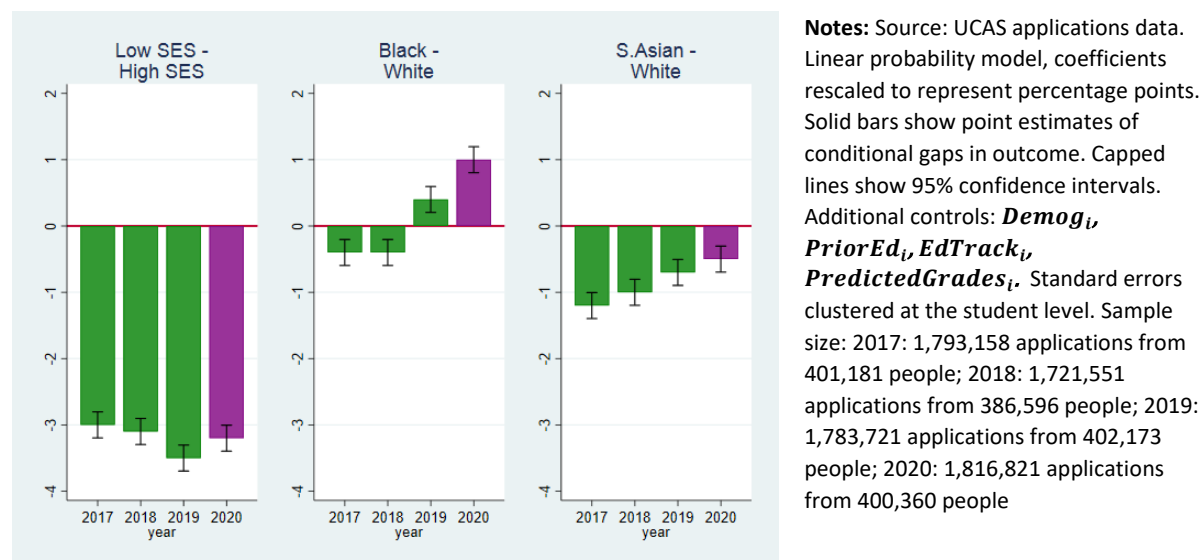
5.3. Gaps in outcomes and decisions by stage of the application process

Stage 1: Applications

In this section we consider the stages of the university application process, starting with all applications. Here we are interested in how ambitious students are when stating their university and course preferences, given their age-16 educational performance, educational track choices and predicted A-level grades. We measure ambition in three different ways: applying at an elite university; applying to a competitive course (as measured by the average entry tariff of the chosen courses); applying to Medicine or Dentistry. In the 2020 COVID-19 year, the vast majority of applications were submitted on or before 15th January 2020, so we do not expect COVID-19 to affect applications in 2020. We estimate these models with one observation per student per application (up to 5 lines per student), and with standard errors clustered at the level of the student. We control for demographics ($Demog_i$), prior educational performance ($PriorEd_i$), educational track ($EdTrack_i$), and the student's predicted grades ($PredictedGrades_i$).

Figure 6 shows social and ethnic gaps in applying to elite universities. Low SES students are less likely to apply to elite universities than their otherwise similar high SES peers. The situation is similar for South Asian students compared to White, though the application gap is smaller for them. Black students in contrast have been applying to elite universities a little more than White students in the last two years. Figures 7 and 8 show that a disproportionate and rising share of applications from Black and South Asian students are for competitive courses, including (always for South Asian, and after 2018 for Black) Medicine and Dentistry.[8] Hence, preferences for competitive courses, especially in Medicine or Dentistry, seem to be driving the application behaviour among South Asian students, rather than the prestige of the university.

Figure 6: Gaps in probability that have applied for a course at an elite university

Notes: Source: UCAS applications data. Linear probability model, coefficients rescaled to represent percentage points. Solid bars show point estimates of conditional gaps in outcome. Capped lines show 95% confidence intervals. Additional controls: $Demog_i$, $PriorEd_i$, $EdTrack_i$, $PredictedGrades_i$. Standard errors clustered at the student level. Sample size: 2017: 1,793,158 applications from 401,181 people; 2018: 1,721,551 applications from 386,596 people; 2019: 1,783,721 applications from 402,173 people; 2020: 1,816,821 applications from 400,360 people

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[8] Because of number controls restricting the supply of places on Medicine and Dentistry courses, we will control for having applied for these specific subjects in subsequent models.

Figure 7: Gaps in competitiveness of courses applied for

Notes: Source: UCAS applications data. Linear regression model. 8 points = 1 grade in one A-Level subject. Solid bars show point estimates of conditional gaps in outcome. Capped lines show 95% confidence intervals. Additional controls: $Demog_i$, $PriorEd_i$, $EdTrack_i$, $PredictedGrades_i$. Standard errors clustered at the student level. Sample size: 2017: 1,652,019 applications from 397,254 people; 2018: 1,576,311 applications from 381,871 people; 2019: 1,645,551 applications from 397,452 people; 2020: 1,705,838 applications from 398,303 people

Figure 8: Gaps in probability that have applied for a course in Medicine or Dentistry

Notes: Source: UCAS applications data. Linear probability model, coefficients rescaled to represent percentage points. Solid bars show point estimates of conditional gaps in outcome. Capped lines show 95% confidence intervals. Additional controls: $Demog_i$, $PriorEd_i$, $EdTrack_i$, $PredictedGrades_i$. Standard errors clustered at the student level. Sample size: 2017: 1,793,158 applications from 401,181 people; 2018: 1,721,551 applications from 386,596 people; 2019: 1,783,721 applications from 402,173 people; 2020: 1,816,821 applications from 400,360 people

Stage 2: Decisions of universities

Next we look at the probability that an applicant receives an offer for a given application, and how this probability differs by background. To do so, we need to take into account that there is significant variation across courses in the ratio of places available to applications received. This determines the average probability that an offer will be received for a given course. This ratio does not necessarily reflect the competitiveness of the course in terms of entry requirements. In particular, courses at Oxford and Cambridge have a demanding second application form followed by interviews, which discourages casual applications. These universities are less oversubscribed than much lower tariff courses.

It is therefore important to compare the probability of receiving an offer for students applying for the same course, at the same university, in the same academic year as well as accounting for differences in prior educational performance and predicted grades. We do this by including a 'Course-by-Cycle fixed-effect' CFE_c in our model, on top of demographics ($Demog_i$), prior educational performance ($PriorEd_i$), educational track ($EdTrack_i$), the student's predicted grades ($PredictedGrades_i$) and application characteristics ($ApplicationChars_i$). As in stage 1, this model includes one observation per student per application (up to 5 lines per student), with standard errors clustered at the level of the student.

Figures 9 and 10 document the gaps in the probability of receiving an offer, or an unconditional offer, *for a specific course at a specific university in a specific year*, after accounting for achieved educational performance, the types of qualifications the student is studying, and their predicted educational performance in these qualifications[9]. In other words, this can be interpreted as the gap in probability of receiving an offer between two students who are identical along those dimensions. Note that these students may *not* be observably identical on two further dimensions: We do not observe the references and personal statement included in the application, and while we control for participation and expected performance in facilitating subjects in general, we do not account for course-specific pre-requisites.

Low SES students are around 1%pt less likely to receive an offer, with an increasing (over time) share of this accounted for by a lower probability of receiving unconditional offers, compared to high SES students. As this regression conditions on post-16 school type and low participation neighbourhood (which universities making contextual offers are able to take into account), this result shows that within groups eligible or not eligible for contextual offers, there is still an advantage to being high SES.

Although the gaps seemed to narrow slightly between 2017 and 2019, and continued to do so in 2020, Black and South Asian students are still less likely to receive an offer for a given course than White students, other things equal, and this is entirely or more than accounted for by being less likely to receive an unconditional offer.

These residual gaps could be due to differences in the quality of references or personal statements, or differences in the ability of applicants to signal skills and potential through extra-curricular experience, or to ethnic minority or low SES students being less likely to be taking course-specific prerequisite qualifications. Differences in offer-making could also reflect an unintended consequence of targeting other aspects of disadvantage in universities' Access and Participation Plans. For example,

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[9] Here we pool all universities. Splitting the analysis by university selectivity yields very similar results for elite and non-elite universities.

high SES or White students in low participation schools or neighbourhoods could be prioritised over low SES or Black applicants in schools or neighbourhoods that just miss out on this designation.

Universities' decisions are made over an extended time-period from mid-January to mid-May. This means that in 2020, some decisions would have been reached under expectations that it would be a normal year, but later decisions under varying states of uncertainty about how students' final grades would be assigned, and (for very late decisions) an expectation of financial penalties for over-recruiting. We might expect this to lead to greater conservativism in making conditional offers, but we find no evidence for Black and South Asian students (who are most likely to be overpredicted and therefore most likely to benefit from the algorithm or Centre-Assessed-Grade approaches) being penalized in this situation.

Figure 9: Gaps in probability of receiving an offer (of any kind)

Notes: Source: UCAS applications data. Linear probability model, coefficients rescaled to represent percentage points. Solid bars show point estimates of conditional gaps in outcome. Capped lines show 95% confidence intervals. Additional controls: $Demog_i$, $PriorEd_i$, $EdTrack_i$, $PredictedGrades_i$, $ApplicationChars_i$, CFE_c. Standard errors clustered at the student level. Sample size: 2017: 1,793,158 applications from 401,181 people; 2018: 1,721,551 applications from 386,596 people; 2019: 1,783,721 applications from 402,173 people; 2020: 1,764,604 applications from 388,294 people

Figure 10: Gaps in probability of receiving an unconditional offer

Notes: Source: UCAS applications data. Linear probability model, coefficients rescaled to represent percentage points. Solid bars show point estimates of conditional gaps in outcome. Capped lines show 95% confidence intervals. Additional controls: $Demog_i$, $PriorEd_{it}$, $EdTrack_i$, $PredictedGrades_i$, $ApplicationChars_i$, CFE_c. Standard errors clustered at the student level. Sample size: 2017: 1,793,158 applications from 401,181 people; 2018: 1,721,551 applications from 386,596 people; 2019: 1,783,721 applications from 402,173 people; 2020: 1,764,604 applications from 388,294 people

Stage 3: Applicants' responses

In stage 3 of the application process, students decide which offer among those received they want to make their firm (i.e. first) choice. These decisions are taken before the final grades are revealed on results day. We estimate ethnic and social gaps in the probability of holding a firm choice, distinguishing as before by the selectivity of the university, the competitiveness of the course and whether the offer held is unconditional. By controlling for demographic characteristics of the student, their prior attainment, educational track, predicted grades and application details we are again comparing students who are very similar to each other in most respects other than SES and ethnicity.

Figure 11 shows that low SES, Black and South Asian students have a lower probability of holding a firm offer at an elite university than their high SES and White counterparts. This in large parts mirrors the lower ambition we saw among these groups in the application stage. An exception are Black students who have been more ambitious than White students in applying to elite universities in recent years, but this ambition is not reflected in the selectivity of the firm offers they choose.

With respect to competitiveness of courses the profile of firm choices is strikingly similar to that for applications. The social and ethnic gaps in entry tariff of the firm choice shown in Figure 12 reflect the (over)ambitiousness of the applications made, all before results day when actual grades are revealed.

Figure 13 shows that Black and South Asian students are between 6 and 18 percentage points less likely to be holding an unconditional offer, with the gaps larger for South Asian than Black students, and both increasing over time. These gaps are similar in magnitude to the raw gap in probability of receiving at least one unconditional offer, as shown in Table 2, and several times larger than the conditional gaps (compared with those applying for the same course) observed in stage 2. This indicates that the gap in holding of unconditional offers at this stage is mainly driven by differences in prevalence of unconditional offers across subjects.

The 2020 COVID-19 cohort will have made their decisions about offers received from universities under varying states of (mis-)information about how grades would eventually be assigned. In the relevant time-period, most were expecting that the CAGs would be modified by an algorithm, the outcome of which was hard to foresee. It is possible that this uncertainty will have influenced some students' choices, depending on their attitude to risk and their expectations regarding how teachers would rate and rank them. In 2020 compared to the three preceding years we observe: (i) a closing of the Black-White gap in the probability of holding a firm choice at an elite university (Figure 11); (ii) a slight widening of the (positive) South Asian-White gap in competitiveness of firm choices courses (Figure 12) and (iii) a widening of the negative Black-White and South Asian-White gaps in the probability of holding an unconditional offer as their firm choice (Figure 13). All of these changes would reflect an expectation among these groups that they have a better chance of achieving a given grade under the algorithm than with exams, though there may be other explanations for these shifts.

The characteristics of students' firm choices in 2020 do determine who was best placed to benefit from the shift to the 2020 Centre Assessed Grades one week after algorithm grades had been revealed. The CAGs tended to be higher than algorithm-determined grades, benefitting students with ambitious firm choices. Black and Asian students held a more competitive first choice of course (c. 2 tariff points for Black, a quarter of an A-level grade, and 4 for Asian, or half an A-Level grade) but not university. Those holding unconditional offers were unable to benefit from the 2020 re-gradings. Over the years, Black and South Asian students have become considerably less likely to hold an unconditional offer than White students (see Figure 13), indicating that the switch to CAGs was more relevant to these groups.

Figure 11: Gaps in probability that hold a firm choice at an elite university

Notes: Source: UCAS applications data. Linear probability model, coefficients rescaled to represent percentage points. Solid bars show point estimates of conditional gaps in outcome. Capped lines show 95% confidence intervals. Additional controls: $Demog_i$, $PriorEd_i$, $EdTrack_i$, $PredictedGrades_i$, $ApplicationChars_i$. Sample size: 2017: 401,181; 2018: 386,596; 2019: 402,173; 2020: 388,294.
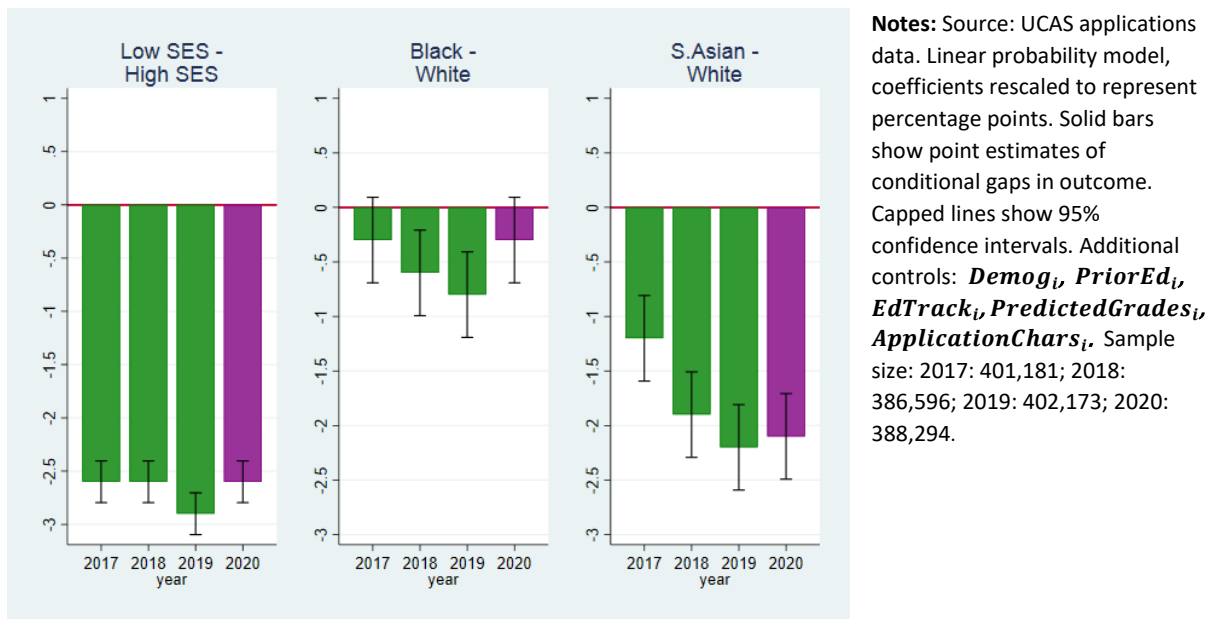
Figure 12: Gaps in competitiveness of firm choice

Notes: Source: UCAS applications data. Linear probability model, coefficients rescaled to represent percentage points. Solid bars show point estimates of conditional gaps in outcome. Capped lines show 95% confidence intervals. Additional controls: $Demog_i$, $PriorEd_i$, $EdTrack_i$, $PredictedGrades_i$, $ApplicationChars_i$. Sample size: 2017: 321,738; 2018: 311,841; 2019: 324,877; 2020: 320,984.

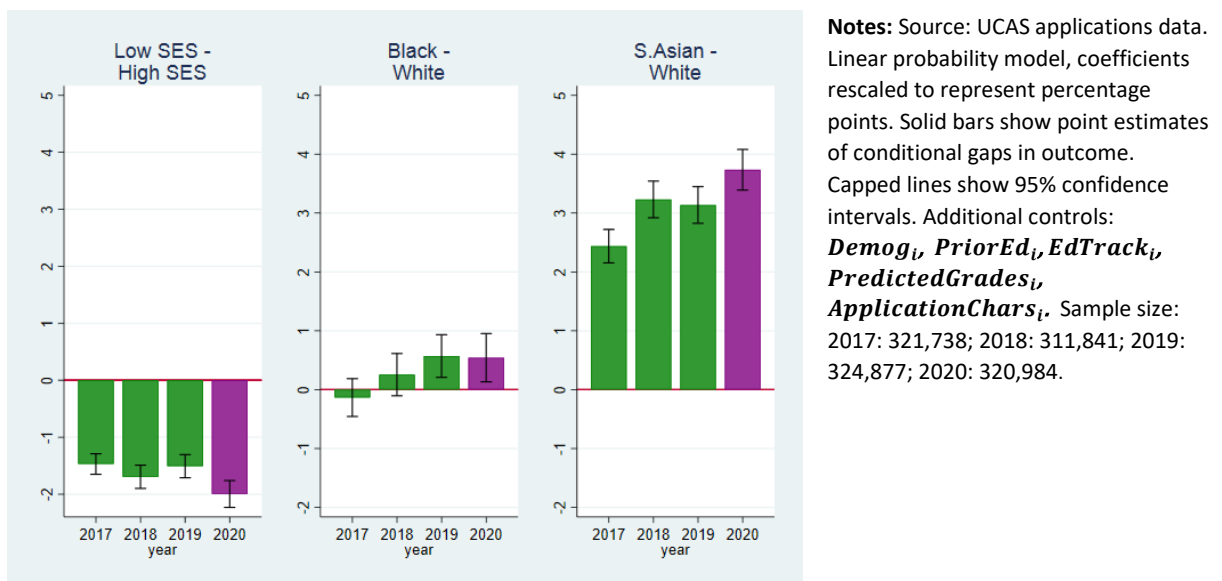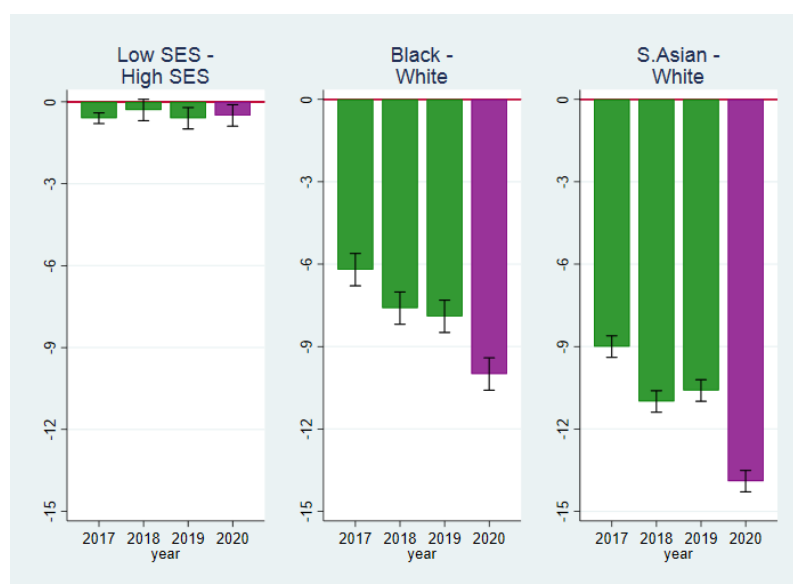*Figure 13: Gaps in probability that firm choice is an unconditional offer*

Notes Source: UCAS applications data. Linear probability model, coefficients rescaled to represent percentage points. Solid bars show point estimates of conditional gaps in outcome. Capped lines show 95% confidence intervals. Additional controls: $Demog_i, PriorEd_i, EdTrack_i, PredictedGrades_i, ApplicationChars_i$. Sample size: 2017: 348,781; 2018: 338,557; 2019: 351,862; 2020: 340,416.

Stages 4 and 5: Results Day and Clearing

Figures 14 and 15 plot the raw percentages of each group achieving different outcomes in these final two stages of the university application process. The first panel ('Accepted on firm') and last ('Accepted somewhere') condition on holding a firm choice on results day; 'Accepted on insurance' conditions on not being accepted on a firm choice but holding an insurance choice; 'Accepted through Clearing' conditions on not being accepted on either firm or insurance. Both graphs show an increase in the proportion accepted on firm choices in the COVID-affected 2020 cohort (this shows outcomes *after* the reimposition of Centre Assessed Grades), and increases in acceptances through Clearing, or overall. The most striking indication from this graph is the much faster increase in acceptances through Clearing for White than ethnic minority students, and that White students overtake those from South Asian ethnicities in their probability of being accepted somewhere.

Figure 14: Results day and clearing outcomes by SES
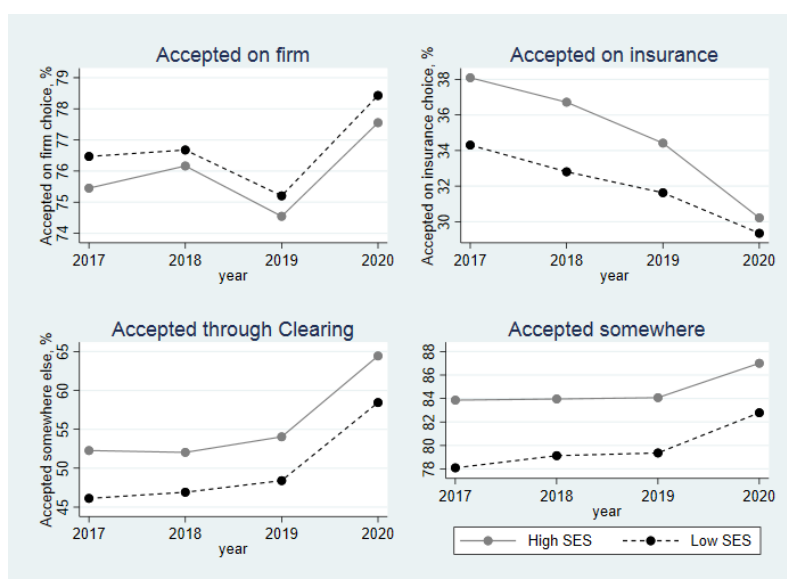
Notes: Source: UCAS applications data. Graphs show raw outcomes without further controls. **Accepted on firm** conditions on holding a firm choice before results day. **Accepted on insurance** conditions on holding a firm and insurance choice before results day, and not being accepted on firm. **Accepted through Clearing** conditions on not being accepted on either firm or insurance choice on results day. **Accepted on firm** conditions on holding a firm choice before results day.

Figure 15: Results day and Clearing outcomes by Ethnicity
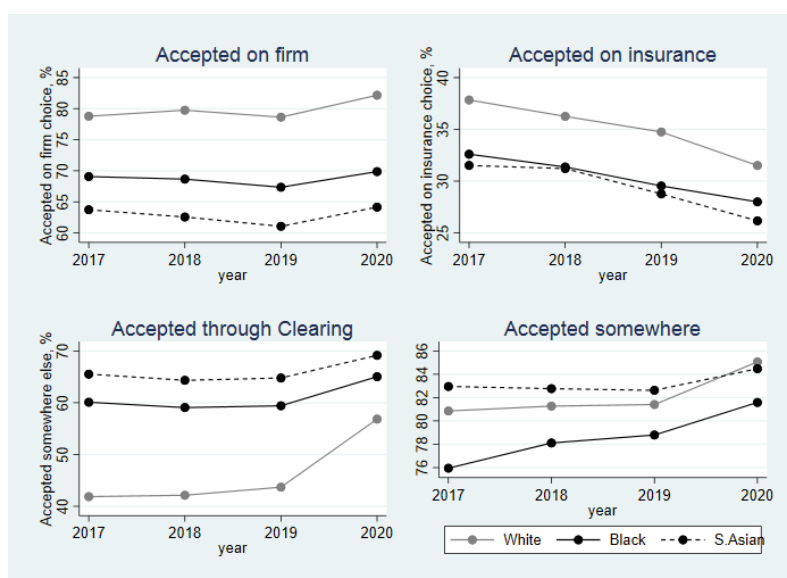
Notes: Source: UCAS applications data. Graphs show raw outcomes without further controls. **Accepted on firm** conditions on holding a firm choice before results day. **Accepted on insurance** conditions on holding a firm and insurance choice before results day, and not being accepted on firm. **Accepted through Clearing** conditions on not being accepted on either firm or insurance choice on results day. **Accepted on firm** conditions on holding a firm choice before results day.

Figure 16 shows the conditional social and ethnic gaps in acceptance at the students' firm choice course. We control for demographics ($Demog_i$), prior educational performance ($PriorEd_i$), educational track ($EdTrack_i$), the student's predicted grades ($PredictedGrades_i$) and application characteristics ($ApplicationChars_i$), and again compare students with their contemporaries holding an offer for the same course as their firm choice, by including course-by-cycle fixed effects CFE_c.

Low SES students are approximately 1ppt less likely to be accepted on their firm choice, a figure dwarfed by the 7-9ppt gap for Black and South Asian students relative to White students. This gap will be caused by a combination of their offer being less likely to be unconditional, these groups being less likely to hit their predicted grades and/or the conditions of their offer, and being less likely to be accepted discretionarily, having not met the conditions of their offer. We do not observe achieved grades, so are not able to differentiate between these mechanisms.

Surprisingly, we do not find a marked change in these gaps for the COVID-19 cohort in 2020, relative to earlier years. This shows that *on average* the Centre Assessed Grades system did not advantage or disadvantage any of these demographic groups, with respect to acceptance on firm choices. However, the overall rate of acceptance onto firm choices rose by 3.5 percentage points (from 73.4% to 76.9%), which is equivalent to an extra 12,300 students being placed on their firm choice.

Where we do observe a marked shift for 2020 is for Clearing. In this specification we drop the course fixed effects. Figure 17 shows that, conditional on missing out on both firm and insurance choices, Black and Asian students were historically more likely than White students to find their place through Clearing (though these gaps decreased over time). The main effect of 2020 is to have squeezed out students' ability to make up for missing the conditions on firm and insurance choices by going through Clearing. This is because, as a result of grade inflation, a higher-than-usual proportion of students met the conditions of their offers. The result of this was reduced access to low tariff universities for Black and South Asian students, relative to White, as we have shown in Figure 4.

Possible explanations for why ethnic minority students success in Clearing fell, relative to White include (i) that the courses they apply for had less scope to expand (possible if related to health or STEM subjects); (ii) that more White students *entered* Clearing than usual, preferring to attend university than take a year out with limited opportunities during the pandemic; or (iii) that universities Clearing decisions in 2020 were, uniquely, based on algorithm or Centre Assessed Grades rather than achieved grades.

Figure 16: Gaps in probability of being accepted on firm choice - with course x cycle fixed effects
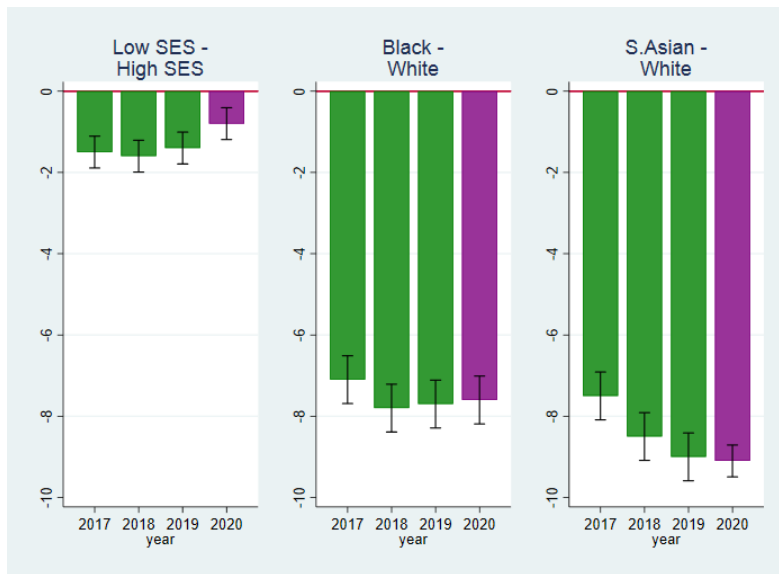
Notes: Source: UCAS applications data. Linear probability model, coefficients rescaled to represent percentage points. Solid bars show point estimates of conditional gaps in outcome. Capped lines show 95% confidence intervals. Additional controls: $Demog_i,$ $PriorEd_i, EdTrack_i,$ $PredictedGrades_i,$ $ApplicationChars_i,$ $CFE_c.$ Sample size: 2017: 348,781; 2018: 338,557; 2019: 351,862; 2020: 340,416.

Figure 17: Probability of being accepted somewhere else, conditional on missing out on both firm and insurance choice
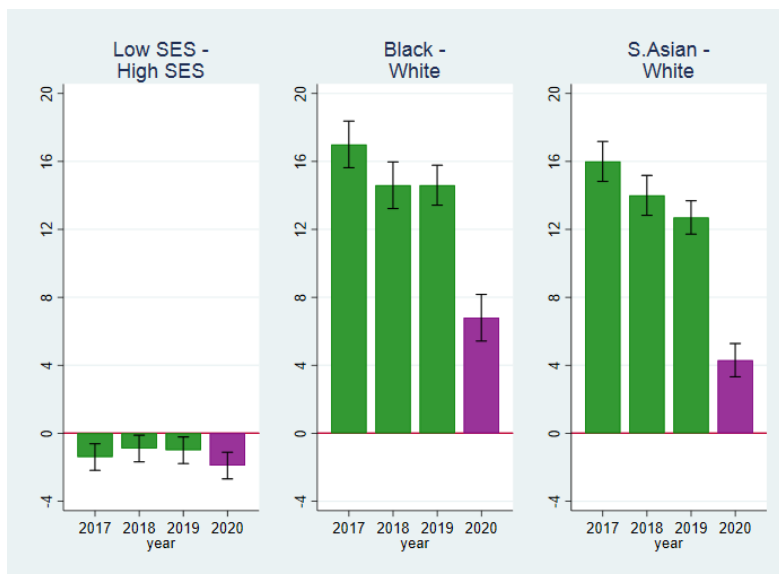
Notes: Source: UCAS applications data. Linear probability model, coefficients rescaled to represent percentage points. Solid bars show point estimates of conditional gaps in outcome. Capped lines show 95% confidence intervals. Additional controls: $Demog_{it},$ $PriorEd_i, EdTrack_i,$ $PredictedGrades_i,$ $ApplicationChars_i,.$ Sample size: 2017: 61,112; 2018: 59.838; 2019: 66,454; 2020: 58,188.

6. Discussion and Conclusion

In this paper we have documented large unconditional and smaller but quantitatively important conditional gaps in access to elite universities in the UK by ethnicity and SES. By studying conditional gaps in students' application portfolios, application decisions, and firm choices; and universities offer and acceptance decisions, we can identify the stages of the application process that contribute to the overall gaps, and possible policy implications.

Initially, there are large negative ethnic and SES gaps in age-16 attainment and 16-18 educational track and subject choices. Gaps in attainment at age 16 and 18 may require improved resourcing and intervention throughout the school system. Gaps in educational track and subject choices for 16-18 study that exist even after controlling for prior performance require improved information, advice and guidance on the pre-requisites or facilitating subjects and qualifications for different university courses.

Low SES students make less ambitious applications than high SES, with respect to both selectivity of university and the competitiveness of the course. For Black students, the sign of these gaps reversed between 2017 and 2019, so by 2020 they were more ambitious on both counts. South Asian students are less ambitious than White with respect to of the prestige of the university, but more so regarding the competitiveness of course, with the latter gap somewhat driven by their higher propensity to apply for Medicine or Dentistry.

After submitting their applications, Black and South Asian students are less likely to receive an offer, even compared to those with the same educational record, and applying to the same subject and university. More data and research are needed on the causes and solutions to this. Schools could consider whether there is a deficit in the quality of references or support in writing personal statements, as that may be a deciding factor between students who are otherwise very similar. Information, advice and guidance about the pre-requisites for different university courses could also prevent applications to courses for which the prospective student will not be qualified. UCAS could reconsider 'masking' of applicant names to admissions tutors or removing or reforming the structure of personal statements. Universities could also consider whether these gaps are an unintended consequence of Access and Participation Plan focusing on other measures of disadvantage.

Having made a firm choice, Black and South Asian students are much less likely than White students to be accepted onto the chosen course on or shortly after results day, indicating that White students are more likely to reach their predicted grades. This suggests improved support is required from schools to convert predicted into realised grades for ethnic minority students. A move to post-qualification applications (which removes any role for predicted grades) would not help address this reason for the gap in access.

Finally, we show that the main group in the first COVID-19 cohort to lose out from the revised assessment arrangements consisted of those who would usually find a place through Clearing. The pandemic has highlighted that this group disproportionately consists of Black and South Asian students. Clearing is stressful *per se* and may lead to weaker attachment to the course or university attended than gaining a place through the regular admissions process. UCAS and universities could work on ways to reduce the importance of Clearing in the application process. Examples to explore include a post-qualification applications system, options for students to apply for and rank a greater number of courses on which they are accepted, or an information campaign or nudge within the application system to encourage a safe bet application and insurance choice. This could emphasise the variability of exam results and how many students miss the conditions of their firm and insurance choice. A more prescriptive approach could be to extend restrictions on the combinations of courses students can apply for (e.g. students can already only apply to either Oxford *or* Cambridge, and this could be extended to include more universities) to increase the likelihood of acceptance on to the insurance option. More work would be needed to determine the feasibility and consequences of these options.

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Table A1: Full table of regression coefficients for key outcomes: Acceptance somewhere, Acceptance at an elite university.

	Accepted somewhere				Accepted at elite university			
	2017	**2018**	**2019**	**2020**	**2017**	**2018**	**2019**	**2020**
Male (v. Female)	0.005***	0.003*	0.003*	0.004**	0.010***	0.013***	0.012***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Low participation neighbourhood	-0.003	0.001	0.000	-0.002	-0.015***	-0.021***	-0.015***	-0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
SES: omitted is High SES								
Low SES	-0.007***	-0.006***	-0.003*	-0.005***	-0.030***	-0.033***	-0.035***	-0.034***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Not classified	-0.013***	-0.015***	-0.012***	-0.013***	-0.029***	-0.026***	-0.028***	-0.026***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Ethnicity: omitted is White								
Black	0.001	0.003	-0.000	-0.012***	-0.028***	-0.036***	-0.038***	-0.034***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
South Asian	-0.003	-0.009***	-0.020***	-0.036***	-0.041***	-0.053***	-0.060***	-0.059***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Chinese	0.017*	0.014	-0.004	-0.004	0.025***	0.021**	0.032***	0.038***
	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)
Age group: omitted is 18 or younger								
19	0.041***	0.040***	0.039***	0.021***	0.037***	0.044***	0.050***	0.045***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
20-21	0.001	0.004	0.006	-0.010***	0.039***	0.043***	0.042***	0.033***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
22 or older	-0.085***	-0.077***	-0.061***	-0.080***	0.054***	0.057***	0.079***	0.063***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Age 16 performance								
English Language GCSE	0.001***	0.001***	0.002***	0.001***	0.002***	0.001***	0.004***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
English Language National 5	-0.009	0.002	-0.021***	-0.012***	0.013	-0.003	-0.029***	-0.024***
	(0.014)	(0.013)	(0.002)	(0.002)	(0.013)	(0.013)	(0.002)	(0.002)
Maths GCSE	0.000	0.000	0.002***	0.001	-0.001***	-0.001***	0.001***	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Maths National 5	0.031	0.014	0.008***	0.008***	-0.000	0.032	0.022***	0.017***
	(0.016)	(0.014)	(0.002)	(0.002)	(0.015)	(0.014)	(0.002)	(0.002)
Best Science GCSE	0.001***	0.001***	0.000	-0.001*	0.002***	0.002***	0.001***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Best Science National 5	0.006	0.012	0.026***	0.019***	0.017	0.006	0.039***	0.036***
	(0.016)	(0.017)	(0.002)	(0.002)	(0.015)	(0.016)	(0.002)	(0.002)
Predicted Tariff Score, 100s.	0.016***	0.017***	0.028***	0.020***	0.047***	0.049***	0.085***	0.089***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Predicted A-Level Grade Group: omitted is AA* or better								
AAA	-0.015***	-0.011***	-0.014***	-0.017***	-0.154***	-0.152***	-0.149***	-0.121***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
AAB	-0.019***	-0.018***	-0.011**	-0.004	-0.291***	-0.284***	-0.262***	-0.213***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
ABB	-0.028***	-0.017***	-0.009*	-0.004	-0.418***	-0.390***	-0.362***	-0.331***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)

BBB	-0.033***	-0.026***	-0.021***	-0.003	-0.507***	-0.482***	-0.443***	-0.430***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
BBC	-0.042***	-0.033***	-0.027***	-0.009*	-0.550***	-0.523***	-0.480***	-0.479***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
BCC	-0.053***	-0.043***	-0.040***	-0.007	-0.559***	-0.537***	-0.484***	-0.493***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
CCC	-0.055***	-0.052***	-0.049***	-0.019***	-0.551***	-0.529***	-0.480***	-0.491***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
CCD	-0.056***	-0.047***	-0.043***	-0.018**	-0.532***	-0.518***	-0.454***	-0.474***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Below CCD	-0.061***	-0.059***	-0.049***	-0.017**	-0.504***	-0.482***	-0.437***	-0.440***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)
<3 A Levels	-0.051***	-0.043***	-0.027***	-0.016***	-0.448***	-0.427***	-0.365***	-0.377***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Other educational tracks								
International Baccalaureate	-0.012	-0.023	-0.007	0.005	0.141***	0.117***	0.152***	0.077***
	(0.013)	(0.013)	(0.016)	(0.012)	(0.012)	(0.013)	(0.016)	(0.014)
Welsh Bacc	0.010	0.017*	0.009	0.004	0.002	0.013	-0.001	-0.005
	(0.005)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
BTEC	0.001	0.001	-0.004	-0.001	-0.047***	-0.048***	-0.053***	-0.051***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Foundation Degree	0.020***	0.003	0.000	-0.022***	0.040***	0.047***	0.051***	0.082***
	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
Number of A-Levels or Highers in Facilitating Subjects	-0.014***	-0.015***	-0.010***	-0.012***	0.002	0.003*	0.008***	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Best predicted A-Level grade in Facilitating Subject	0.005***	0.005***	0.003***	0.003***	0.020***	0.020***	0.016***	0.021***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Best predicted Highers grade in Facilitating subject	0.014	0.007	0.035***	0.023***	0.046***	0.045***	0.039***	0.049***
	(0.006)	(0.007)	(0.002)	(0.002)	(0.006)	(0.007)	(0.002)	(0.002)
School/college type: omitted is state school								
FE College	-0.004	-0.002	0.007*	-0.002	-0.020***	-0.008***	-0.020***	-0.030***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Sixth form College	0.004	0.005*	0.011***	0.003	-0.004	0.001	0.006**	-0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Grammar School	0.027***	0.018***	0.020***	0.020***	-0.036***	-0.039***	-0.042***	-0.060***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Independent School	-0.011***	-0.009**	0.006*	0.007*	0.102***	0.115***	0.139***	0.151***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Application strategy								
Days before deadline (higher = apply later)	0.000***	0.000***	0.000***	0.000***	-0.000***	-0.001***	-0.001***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Use all 5 applications	0.067***	0.062***	0.068***	0.066***	0.028***	0.031***	0.037***	0.040***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Distinct universitiess applied for	0.005***	0.006***	0.005***	0.004***	0.017***	0.019***	0.021***	0.024***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Distinct subjects applied for	0.004***	0.001	0.002***	0.001	-0.008***	-0.011***	-0.008***	-0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Region: (London omitted)								

North East	0.029***	0.036***	0.030***	0.021***	0.061***	0.067***	0.062***	0.072***
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
North West	0.010***	0.008**	0.002	0.008**	0.048***	0.042***	0.032***	0.041***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Yorkshire and The Humber	0.022***	0.023***	0.026***	0.011***	0.043***	0.045***	0.038***	0.041***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
East Midlands	0.028***	0.030***	0.024***	0.011***	0.016***	0.011***	0.007	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
West Midlands	0.015***	0.019***	0.020***	0.003	0.009***	0.015***	0.014***	0.010***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
East of England	0.009**	0.014***	0.017***	0.007*	-0.001	0.005	-0.001	-0.004
	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
South East	0.011***	0.015***	0.015***	0.008**	0.025***	0.032***	0.034***	0.031***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
South West	0.018***	0.017***	0.013***	0.001	0.033***	0.043***	0.049***	0.041***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)
Northern Ireland	-0.134***	-0.107***	-0.100***	-0.061***	-0.088***	-0.080***	-0.096***	-0.112***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)
Scotland	-0.087***	-0.062***	-0.163***	-0.128***	0.090***	0.112***	0.055***	0.051***
	(0.010)	(0.010)	(0.005)	(0.005)	(0.009)	(0.010)	(0.005)	(0.006)
Wales	0.022***	0.017**	0.010	0.009	0.027***	0.039***	0.033***	0.044***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)
Unknown	0.021	0.018	0.028*	-0.007	0.037	0.016	0.007	0.044
	(0.016)	(0.014)	(0.010)	(0.017)	(0.015)	(0.013)	(0.010)	(0.018)
N	401,181	386,596	402,173	388,294	401,181	386,596	402,173	388,294

Notes: Source: UCAS applications data. Standard errors in parentheses.