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Gender Differences in College Applications: Aspiration and Risk Management*

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Abstract

We study gender differences in decision-making strategy when applying for college using applications data for all college applicants in Ireland over the 2015-17 period. Detailed information on high school subjects and grades enable us to examine how the college choices of equally achieving students differ by gender. We find that female students better balance the opportunity to aim for highly selective programmes with their top choices while also listing programmes with lower entry requirements so as to reduce their risk of not being admitted to any programme. We also find that females favour field of study over institution with their top 3 choices being more likely to cluster on field of study and less likely to be for a particular college. When we investigate how effects differ across the achievement distribution, we find that gender differences in risk management are concentrated amongst high achieving students.

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1. Introduction

Much previous research has shown systematic differences in decision-making between men and women in a variety of experimental and real-world contexts. In this paper, we explore this variation in a particularly important setting, the choice of undergraduate programmes made by college applicants. As in many other countries, in Ireland, women are more likely than men to attend college and more likely to enrol in prestigious institutions and selective programmes.[1] While this may relate to their superior performance in high school it could also result from gender differences in college application behaviour at any given level of school achievement. Women may aim higher in terms of their top choices and they may manage risk better so as to be less likely to receive no offers of college places. These college application decisions are highly consequential as the decision of what college to attend and the selectivity of the programme studied may have long-lasting impacts on labour market and other important outcomes over the life cycle (Altonji et al., 2016; Belfield et al. 2017).

In Ireland, there is a centralized college applications system in which students provide a ranking of college programmes in order of preference. We use data on these choice rankings for all high school students who apply for college and detailed information on school subjects and grades to examine how the choices of equally achieving students differ by gender.

We focus on three aspects of student decision-making. First, are there gender differences in the tendency to list highly selective colleges and programmes? Second, are there gender differences in how students balance the opportunity to aim for highly selective programmes with their top choices while also listing programmes with lower entry requirements so as to reduce their risk of not being admitted to any programme? Third, are there gender differences in how students list their top 3 choices – for example, are girls more

[1] For example, 57% of students attending the prestigious Trinity College Dublin are female. In addition, females represent 53% of students studying in the top 10% most selective programmes.

likely to cluster their top three choices by field of study while boys are more likely to cluster them by institution?

Our data include all individuals who did their Leaving Certificate (the terminal high school exam in Ireland) and applied to an Irish college in the years 2015 to 2017. The admissions system to third level is centralized and students provide a choice ranking of college programmes.[2] Each student can list (in order of preference) up to 10 honours degree programmes (level 8s) and also can choose to provide a separate listing of up to 10 non-honours degree programmes and certificates (level 6/7). The programme offered to the prospective student depends both on performance in the Leaving Certificate (measured in "points") and on the preference ranking over programmes provided by the candidate.[3] We have information on both the student's preference ranking of programmes and, if relevant, on the programme accepted, and we use both sources of information in the analysis.

Why might college application behaviour differ between male and female students? A large literature documents that females may be less confident, less competitive, and more risk-averse than males (van Veldhuizen 2017; Buser et al. 2014; Croson and Gneezy 2009; Niederle and Vesterlund 2007). Boring and Brown (2016) use data from Sciences Po in France to show that, when giving preference rankings for universities in which to spend a year abroad, male students tend to list higher ranked institutions in their top three choices. The authors suggest that their results may be due to gender differences in confidence, competitiveness, and risk-aversion. In our context of college applications, these differences may lead females to be less likely to aim for highly selective programmes and to be more likely to list programmes that require low points for admittance. Another factor relevant to gender differences in college applications is that students are relatively young when applying for college and may make

[2] Programmes are both subject- and institution-specific. For example, a person's first choice could be science in University College Dublin and second choice could be engineering in Trinity College Dublin.
[3] Each programme has a minimum points level that is required to enter. The required points vary from year to year depending on the choice rankings of students and the number of available places in the programme.

mistakes. At any given age, we might expect that girls are more mature than boys (Lim et al., 2015) and more capable of making sensible decisions.

While there is a lot of literature on field choice, there is not much prior research on gender differences in decision-making strategy when applying for college.[4] This partly reflects the paucity of detailed individual information on college applications that is necessary to distinguish application behaviour from the admissions decisions of colleges. Additionally, researchers typically do not have access to information on all the factors that determine admission as application processes often involve unobserved components such as essays, reference letters, and extra-curricular activities.[5] Ireland provides an interesting laboratory for this analysis as applicants use a single centralized application to provide a preference-ordering of college programmes. College admission depends almost completely on grades in the terminal high school examinations and these grades are observable to us. Also, given we observe choice rankings for all secondary school students who apply for college, we can analyse desired programmes of study for all persons who consider college, not just for the sample who actually attend.

Probably the most closely related paper to ours is work by Saygin (2016). She shows that, in Turkey, there is no gender difference in the selectivity of the first-choice programme chosen by college applicants, but females appear to be more risk-averse, listing more programmes with low entry requirements than males. Her analysis relies on survey data linked to administrative college applications data and about 80% of her sample are persons who repeat

[4] Many papers have demonstrated that boys are much more likely than girls to choose STEM fields in college (Delaney and Devereux; 2019; Speer, 2017; Card and Payne, 2017). There is a large literature examining reasons for the gender gap in STEM including the gender of professors (Bettinger et al. 2005; Carrell et al. 2010), peer characteristics (Griffith and Main, 2019; Ost, 2010; Zolitz and Feld, 2017), the effect of grades in STEM classes (Rask, 2010; Kugler et al. 2017), and the effect of expected earnings (Montmarquette et al. 2002).

[5] Studying enrolments rather than applications, Campbell et al. (2019) find negligible gender gaps in academic match in the UK. The UK system is more decentralised than in Ireland and admission decisions may depend on difficult to observe factors such as a personal statement, a school reference, grades already attained, and predicted A-level grades.

the college selection test. We add to her analysis by using administrative data for all college applicants, restricting the sample to persons who are applying to college for the first time, and by studying college application behaviour in a different country with a different (and less complex) application system. We also utilise more detailed information on academic achievement in school (grades for each of the 7 or 8 subjects taken by students in the Leaving Certificate examinations) so as to compare males and females with similar academic backgrounds.[6] In addition, we contribute to the literature by studying a much broader array of outcomes, including several different measures of risk management and measures of how students cluster their top choices. Finally, in contrast to other work, we examine how application behaviour differs across the achievement distribution.

We find that, on average, females are more likely to apply to selective college programmes and to universities than males. We also find that, on average, females are more likely to list programmes with varying entry requirements so as to manage the risk of not receiving any offer. Females are more likely to diversify their choices by listing both honours and non-honours degree programmes. They also tend to list more "safe" choices, defined as programmes to which their achieved points are at least 20 points greater than the programme required points. In addition, the required points of the programme listed with the lowest entry requirement is lower for females than for males.

When we investigate how effects differ across the achievement distribution, we find that gender differences in risk management are concentrated amongst high achieving students. Given that high achieving students are unlikely to prefer not to go to college, our findings suggest that females are more concerned about the risk of not receiving any offers. We also find that females are more likely to favour field of study over a particular institution, -- their

[6] These high-stakes exams are centrally set and graded and so are comparable across all students. They provide a detailed description of academic readiness at the end of secondary schooling and allow us to compare behaviour across students who show similar academic interests and have similar academic achievement in school.

top 3 choices are more likely to cluster on field of study and less likely to all be for a particular college. Finally, we look at how these gender differences in college decision-making manifest in differences in enrolment. We find that they do not result in large differences in enrolment by gender due to the centralized applications system which ultimately leads to high achieving students being much more likely to be offered one of their top programmes.

The structure of the paper is as follows: In the next section, we describe the institutional background and data, and, in Section 3, we discuss our testable hypotheses. In Section 4 we describe the empirical methodology and in Section 5 we present our main results. Section 6 shows the effect on enrolment outcomes and Section 7 concludes.

2. Data and Institutional Details[7]

Our data include all individuals who sat the Leaving Certificate (the terminal high school exam) in the years 2015 to 2017 and applied to a college in Ireland in the year that they sat the Leaving Certificate.[8] We use data obtained from the Central Admissions Office (CAO) in our analysis. The CAO is an independent company that processes applications for undergraduate programmes in colleges in Ireland, issues offers to applicants, and records all acceptances. The CAO centralized system means that applicants do not have to apply separately to each college and that data are processed and collected in one place. When applying, applicants can list up to 10 level 8 programmes (honours bachelor's degrees) and 10 level 6/7 programmes (ordinary bachelor's degrees and higher certificates). At the end of the last year of high school, students sit the Leaving Certificate, typically in 7 or 8 subjects, and

[7] This section draws heavily from Delaney and Devereux (2019, 2020a).
[8] We exclude people who sat the Leaving Certificate in years prior to college application as they may have done further education that provides an alternative (non-Leaving Certificate based) route to some college programmes. Therefore, we cannot be certain that we are capturing the academic history of those applicants.

grades in the student's 6 best subjects are combined to form their total Leaving Certificate points. For the majority of programmes, whether or not an applicant is accepted depends solely on their performance in the Leaving Certificate.[9] Applications are made by February of the year of entry and students can change the programmes they list until July. When students apply to college, they do not know how many points they will have, and they do not know how many points each programme will require. However, the required points in the previous year provide a strong indication of what required points will be and performance in practice "mock" exams gives a prediction of how well they are likely to perform in the Leaving Certificate.[10] After Leaving Certificate results are released in August, offers are made using a "serial dictatorship" allocation mechanism – the algorithm allocates the applicant with the highest points his/her first preference, then the second-ranked applicant gets an offer for his/her top ranked programme amongst those still available, and so on.

Students typically take 7 or 8 subjects in the Leaving Certificate and can choose to take each subject at either a higher level or at a lower level. Irish, English, and mathematics are compulsory and other subjects are chosen from a menu that includes art, music, modern languages, sciences, business, economics, and other subjects. Appendix Table A1 shows how points/grades are awarded.[11] As seen in Appendix Table A1, the grading scheme changed somewhat in 2017. To take account of this, when controlling for student achievement, we interact the points obtained with an indicator variable for 2017. If the student has points equal to or above the minimum for their first-ranked programme, they are offered that programme.

[9] There are a small number of programmes that base admissions on information other than Leaving Certificate points. For example, music programmes typically require an audition, and arts/architecture programmes may require a portfolio.

[10] The "mock" exams are taken about 4 months prior to the Leaving Certificate and are a complete rehearsal for the Leaving Certificate. Students sit the full set of exams under the same conditions that they later face in the Leaving Certificate.

[11] In 2017, the maximum number of points obtained from a subject at the lower level is 56 while at the higher level it is 100. Since 2012, to induce more students to study higher level mathematics, an additional 25 points bonus is given in mathematics to those who pass the subject at higher level.

If not, they are offered the highest ranked programme for which they have enough points. A student can be offered both a level 6/7 and a level 8 programme.[12]

We have programme preferences for all students who filled out a CAO form -- the group of people who at least considered going to college. This group constitutes 83% of all students who sit the Leaving Certificate. We believe that this group is an appropriate one to study as it excludes students who have no intention of going to college but does not suffer from the selection bias that may arise from considering only students who successfully obtain and accept a college place.[13]

The CAO data we use cover the period 2015 to 2017 and include information on the applicant's age, gender, high school, Leaving Certificate subjects and grades, county of origin, year they sat the Leaving Certificate, and whether they have a foreign qualification. We restrict the sample to applicants between the ages of 16 and 20. In addition, we only consider applicants who have taken at least six subjects in the Leaving Certificate and who list at least one level 8 (honours degree) programme on their CAO application (more than 94% of students list at least one level 8). We also delete cases with missing information on school attended and a small number of cases where the student did not take English or mathematics for the Leaving Certificate.

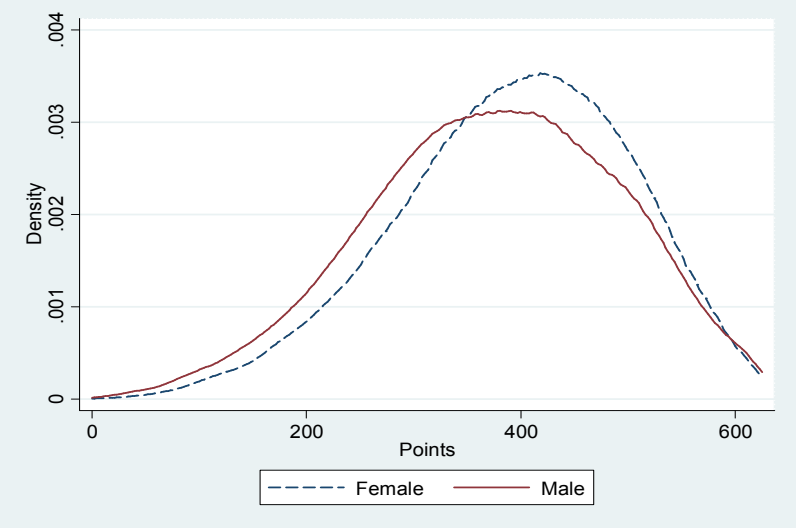
Descriptive statistics for the full sample and by gender are shown in Table A2 in the appendix. Overall, 52% of our sample are female, representing the slightly higher tendency for females to apply to college. Females score an average of 20 points more than males in the

[12] A student is offered one programme from each list -- the highest ranked programme for which they have sufficient points. If the student does not accept either offer, then they cannot attend any college.

[13] A relatively small number of Irish students go abroad to study. They are probably still in our dataset as all students are advised by guidance counsellors to apply to Irish colleges in case they do not get accepted abroad or change their mind. Thus, we think that our application estimates are very unlikely to be affected by missing students who plan to study abroad. Also, students who plan to take a gap year are encouraged to apply anyway in case they change their mind and, so, non-applicants are generally the least academically inclined students.

Leaving Certificate exams.[14] Figure 1 shows the distribution of points by gender. Females achieve more points on average but there is little difference at the very top part of the distribution. We also see in Table A2 that males do better than females in mathematics in the Leaving Certificate while females do better than males in English. While not reported in the table, there are also large differences in the subjects chosen by males and females for Leaving Certificate with, for example, males more likely to study physics and females more likely to study biology (Delaney and Devereux, 2019). These differences make clear that, in order to compare decision-making by gender, we need to control for a set of variables that capture the subject choices and subject grades achieved by students in the Leaving Certificate.

Figure 1: Leaving Certificate Points by Gender



3. Testable Hypotheses

In this section, we describe the hypotheses that we later test in the empirical analysis.

Selectivity of Highest-Ranked Programme

[14] Similar gender gaps in achievement exist in many countries. Machin and McNally (2005) show that the gender gap in academic performance in the UK has been increasing over time.

Because students can rank many programmes, there is little reason not to rank their most preferred programme as first choice. Therefore, we treat their first choice (and to a lesser extent their second and third choices) as a measure of their ideal programme. Based on findings from previous literature, we hypothesise that, on average, women have lower aspirations or are less confident in their abilities or are less willing to compete (Boring and Brown 2016; Buser et al. 2014; Buser et al. 2017; van Veldhuizen 2017) and therefore, for any given level of achievement, may tend to avoid more selective colleges and programmes. We measure selectivity based on the median points of students who enrol in the first-choice programme (measured over the full 3-year period). So, our first testable hypothesis is that, conditional on prior achievement, top choices of women are less likely to be in selective colleges or programmes that enrol students with higher points.

Number of "Safe" Choices and Range of Programmes Listed

Students are offered the highest ranked program for which they have sufficient points. We assume that, since applicants do not know the exact points requirements for college programmes when they apply to college, they infer a probability of being offered a particular programme based on required points in previous years and their expectation about what Leaving Certificate points they will acquire. Applying to college involves balancing the desire to apply to most preferred programmes while also managing the risk of not qualifying for any of the programmes applied to. Previous research has typically found that women are more risk-averse than men (Reuben et al., 2015) and also that, as teenagers, women are more likely to be able to make mature decisions (Lim et al., 2015). For both these reasons, we hypothesise that, conditional on achievement, women pay more attention to the risk of not being offered any programme and are better at managing this risk while also aiming high with their top choices. Thus, our second testable hypothesis is that, conditional on achievement, women are more

likely than men to list some programmes that are "safe" choices and that the required points of the lowest required points programme listed by women will be lower than the required points of the lowest required points programme listed by men. We also hypothesise that the gap between the median entry points for the top ranked programme and the required points of the listed programme with the lowest required points will be greater for women, given we expect them to be better at managing risk.

Clustering of Choices

Students rank college-specific programmes and they may vary in how they approach these decisions. Some students may have a strong preference for a certain institution and approach the issue as a two-stage process where first they choose a college and then list only programmes in that college among their top choices. Other students may instead decide on a particular field, listing only programmes from that field but across a range of institutions. Yet others may first choose the level of programme selectivity and then choose a set of programmes of similar selectivity, perhaps across a range of fields and institutions. We have no strong prior about how gender would relate to these different approaches. However, we test whether it does by seeing how gender relates to the probability that the top 3 choices listed are all from the same institution, all in the same field, and all about the same level of selectivity (measured using median points of enrolees), respectively.

4. Empirical Strategy

We regress each of our dependent variables on an indicator variable for whether the applicant is female or not. The basic specification has the form

$$y = \beta_0 + \beta_1 FEMALE + \delta' X + u \qquad (1)$$

where y denotes the outcome being studied, *FEMALE* denotes an indicator for being female or not and *X* is a vector of controls including indicators for student age, year, a set of high school characteristics, a quadratic function of Leaving Certificate points (interacted with an indicator variable for 2017), the rank of the student in their high school cohort points distribution, indicator variables for the subjects taken in high school, along with the grade achieved in each subject, and indicator variables for whether the student satisfies several common programme requirements.[15]

The subject choice and subject grade variables we include are for the following subjects: mathematics, Irish, English, history, geography, physics, chemistry, biology, physics with chemistry, agricultural science, applied mathematics, French, Spanish, German, economics, accounting, business, art, music, home economics, design and communication graphics, engineering, building construction, Leaving Certificate Vocational Programme (LCVP) module, technology, religious education and classical studies.[16] By controlling for these variables in addition to the quadratic function of points, we are comparing boys and girls whose previous academic career is observationally equivalent. So, we can see whether there are gender differences in application behaviour for students who are otherwise very similar.

We believe that this rich set of achievement controls contains most of what is important for predicting performance in college. The Leaving Certificate examines material that students learn over the previous two years (in 5th and 6th year of high school). To do well in these exams typically requires both high cognitive skills and also the capacity to pay attention in class, the

[15] Many programmes have subject and grade requirements that must be satisfied to enter the programme. Even if the applicant has Leaving Certificate points above the cut-off for the programme, they will not be admitted if they do not also satisfy the programme requirements. We control for the following common subject- and grade-specific requirements for programmes and colleges: passing 5 subjects; passing 1 science subject; getting at least 40% (an H6) in a higher level science subject; passing 6 subjects including English, mathematics and a foreign language; passing 6 subjects including at least 2 higher level subjects.

[16] We do not include controls for the following subjects that are each taken by less than 1% of the sample: Latin, Hebrew, classical Greek, Modern Greek, Italian, Polish, Russian, Danish, Dutch, Swedish, Portuguese, Finish, other EU language, other foreign language, agricultural economics, musicianship, and technical drawing.

conscientiousness to study after school, and time management skills that enable efficient study. Previous research has found Leaving Certificate performance to be a powerful predictor of college performance (Delaney and Devereux, 2020b). So, while our controls do not include direct measures of non-cognitive skills, we believe that they encompass both cognitive and non-cognitive skills to a considerable extent.[17]

We also control for several characteristics of the high school attended as these can capture important differences in schooling experience such as the student/teacher ratio. There are several different types of high schools in Ireland including secondary schools (both non-fee-paying and fee-paying), vocational schools, community or comprehensive schools, and "grind" schools and we include indicators for which type of school the student attended.[18] We also control for additional school characteristics --- whether the school has been designated as a disadvantaged "DEIS" school, whether it is an Irish-medium school, whether the school is a same-sex or co-ed school, and a quartic polynomial in school size.[19] Because distance may influence institution choice, we also include indicators for quartiles of distance from the school

[17] Saltiel (2020) shows that, in the US, non-cognitive skills are strong predictors of the colleges to which students apply and also of completion rates in college.

[18] Most students attend secondary schools. These are privately owned and managed but largely funded by the state. Most do not charge fees, but there is a set of fee-paying high schools that are partially funded by student fees (typically around €6,000 per year) and tend to attract students from disproportionately affluent backgrounds. Vocational schools are owned by the local Education and Training Board. They do not charge fees and tend to focus more on technical education than secondary schools. Community or comprehensive schools were often established through the amalgamation of secondary and vocational schools. These are all free, are fully funded by the state, and offer a wide range of academic and technical subjects. "Grind" schools are private fee-paying schools that place strong emphasis on maximising the achievement of their students in the Leaving Certificate. They differ from fee-paying secondary schools in that they receive no government support, place little emphasis on extra-curriculars, and tend to enrol only those in the final 2 years of high school (5th and 6th year students) as well as one-year repeat Leaving Certificate students. See Doris et al. (2019) for further information about Irish high schools.

[19] We use the number of students in the school who sat the Leaving Certificate as our measure of school size.

to the nearest university and nearest non-university.[20] We report standard errors that are clustered at the school level.[21]

We are particularly interested in examining whether gender differences are heterogeneous across the achievement distribution and therefore in addition to reporting pooled regressions we also report estimates by quintile of achievement as measured by points obtained.[22]

5. Results

In this section, we show the results for gender differences in aspiration, risk management, and clustering of top 3 choices. Throughout, we show both the overall mean effects for each outcome and also show the gender effects across achievement quintiles.

5.1. Selectivity of Top Choice Programme

While students can list up to 10 level 6/7 and 10 level 8 programmes, in practice, the most important decisions are what programmes to place at or near the top of the lists. Therefore, we particularly focus on the first listed programme. Throughout the analysis, we use the characteristics of the level 8 (honours degree) programmes as everyone in our sample has listed at least one level 8 programme.

We use two different metrics to characterize selectivity. First, we use whether the first ranked programme is in a university – in Ireland, the universities are generally considered more prestigious than other colleges, most of which are institutes of technology.[23] While going to

[20] Cullinan and Duggan (2016) and Flannery and Cullinan (2014) show that distance affects student college choices in Ireland.

[21] Ideally, we would like to add school fixed effects to our regressions but, since 40% of schools in Ireland are single-sex schools, this is not feasible. Reassuringly, we find that, if we restrict our sample to co-ed schools, there is little difference between the estimates that do or do not control for school fixed effects.

[22] Table A3 shows variable means by achievement quintile and Table A4 shows the points cut-offs for each achievement quintile.

[23] There were seven universities during this period: University College Dublin (UCD), Trinity College Dublin (TCD), Dublin City University (DCU), Maynooth University (MU), National University of Ireland, Galway

university or not speaks to the type of programme accepted, a more precise measure of the selectivity of the programme is the median points of all persons starting the programme.[24] Therefore, second, we use the median points of entrants to the first ranked programme as a measure of selectivity.[25] To measure this, we calculate the median points of all students who enter the programme, measured over the three years. So, the measure of programme selectivity is the typical points of people who enter the programme.

There is large variation in programme selectivity in Ireland. While the number of colleges that students could apply to varied between 39 and 44 during the 3 years we study, in each year there were over 1,300 unique college programmes that students could choose from. The points required to access programmes varies greatly – some programmes have no minimum points requirement (zero selectivity), others require very low points (over 10% of programmes have required points less than 200), while others require very high points (over 5% of programmes have required points greater than 500). Figure 2 below shows the wide distribution of median points across level 8 programmes: Over 5% of programmes have median points greater than 550 while over 20% of programmes have median points less than 350.[26]

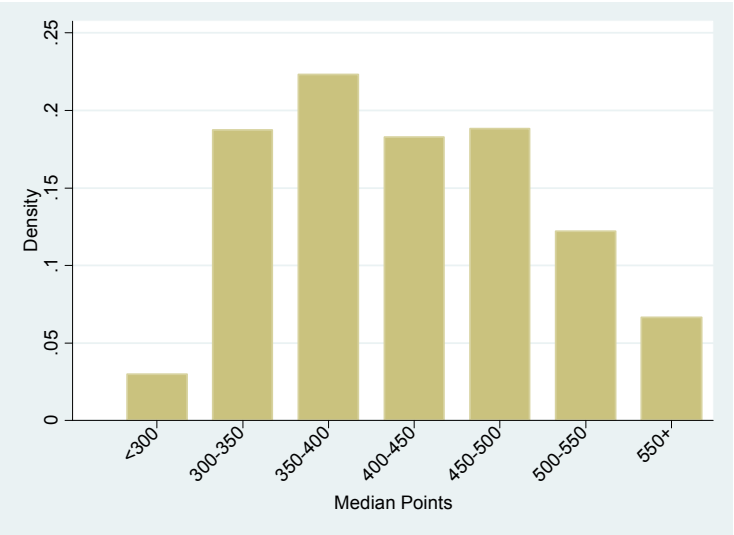
(NUIG), University College Cork (UCC), and University of Limerick (UL). We also include the Royal College of Surgeons (RCSI) and two teacher training colleges as universities as they offer degrees that are equivalent to those offered by the universities.

[24] The sample size is reduced by a tiny amount when we use this variable because there are some programmes which are listed as preferences but are not ultimately offered as a programme due to lack of numbers or other funding reasons. We cannot calculate the median Leaving Certificate points of the entrants to these programmes.

[25] An alternative would be to use the required points for the programme. In practice, these two measures have a correlation of 0.92 and give very similar results.

[26] There is also large variation in required and median points across programmes within institutions. For example, in Trinity College Dublin, required points in 2015 vary from 310 points required to enter *Catholic Theological Studies* to 585 points required for *Nanoscience, Physics and Chemistry of Advanced Materials*.

Figure 2: Distribution of Level 8 Programme Median Points 2015-2017



We first examine the selectivity of the first-choice programme. Table A2 shows that, in terms of raw differences, females list first choice programmes that have median points 11 points higher than first choice programmes listed by males. However, this partly reflects their higher points and Table 1 shows that, once we include controls, the gender gap decreases to only 4 points. We also find that, conditional on the controls, females are 2.3 percentage points more likely to list a university as first choice (the unconditional gap is 9 percentage points). Given that the average probability of listing a university as first choice is 70 percent, 2.3 percentage points represents a 3.5 percent difference between genders in the probability of listing a university as first choice. Overall, and contrary to expectations based on prior literature, the evidence suggests that, conditional on achievement, females aim higher than males in terms of the selectivity of the first choice institution and programme.

We further exploit our ranking data in Table 1 by examining the characteristics of the second and third ranked programmes (93% report at least 3 preferences).[27] When we compare characteristics of the second and third ranked programmes to those for the first ranked

[27] Female students are more likely to list a second or third choice programme. We also find that girls tend to list more programmes than boys with the differences increasing with achievement from 0.40 in the lowest quintile to 1 in the highest quintile.

programme, we find similar but generally slightly bigger gaps by gender. Clearly, our results are not being driven by one particular gender making an extremely unrealistic first choice.

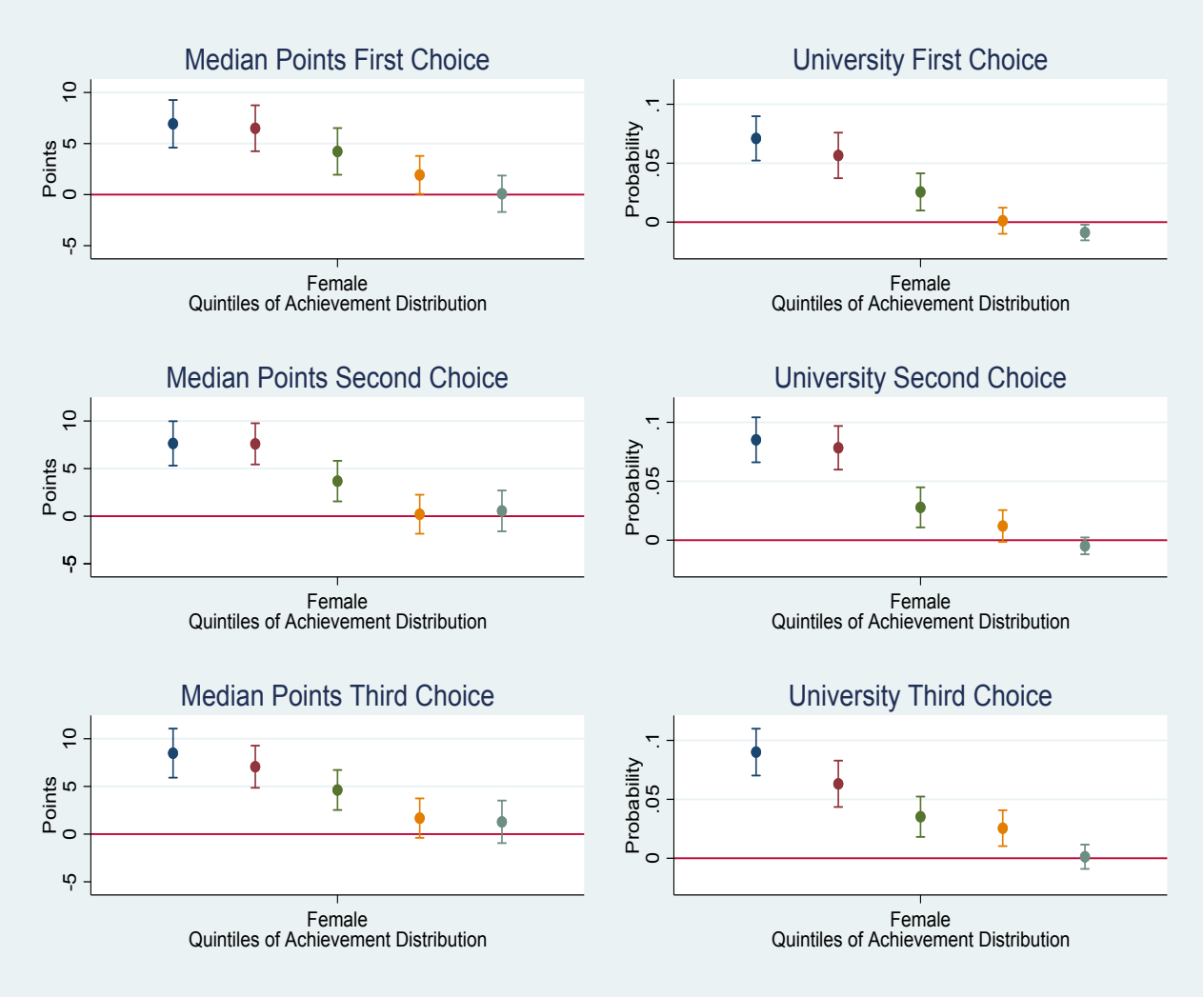
Table 1: Gender and Programme Selectivity

VARIABLES	(1) Median Points 1st Choice	(2) Median Points 2nd Choice	(3) Median Points 3rd Choice	(4) University 1st Choice	(5) University 2nd Choice	(6) University 3rd Choice
Female	3.542***	3.560***	4.288***	0.023***	0.032***	0.037***
	(0.614)	(0.625)	(0.617)	(0.004)	(0.005)	(0.005)
Observations	123,232	117,700	111,099	123,656	118,353	111,840
R-squared	0.505	0.462	0.420	0.295	0.278	0.242

Note: Robust standard errors clustered by school in parentheses. *** p<0.01. Age, year, quadratic in Leaving Certificate points (interacted with 2017), subject requirements, subject fixed effects, grade fixed effects (interacted with subject), school-cohort rank, school characteristics and indicators for quartiles of distance to nearest university and nearest non-university included in all regressions.

In Figure 3, we show how the effects differ across the points distribution. We split the sample by quintile of the applicant points distribution and run separate regressions for each quintile. Figure 3 shows the coefficients and 95% confidence intervals for each quintile. Interestingly, the effect of gender on programme selectivity decreases monotonically with Leaving Certificate points and becomes zero for high achievers.

Figure 3: Gender and Programme Selectivity



Note: Quintiles based on the applicant points distribution. Separate regressions are run for each quintile. Figures display female coefficients and 95% confidence interval for each quintile. Regressions include controls for age, year, quadratic in Leaving Certificate points (interacted with 2017), subject requirements, subject fixed effects, grade fixed effects (interacted with subject), school-cohort rank, school characteristics and indicators for quartiles of distance to nearest university and nearest non-university.

5.2. Managing the Risk of Getting No Offer

Since students can rank several programmes, they have the opportunity to aim for more selective programmes as their top choices while also including less selective programmes lower down the ranking list in order to reduce the risk of not receiving any offers. There is uncertainty when students are applying to college as they have not yet received their Leaving Certificate exam results. Given this uncertainty and uncertainty about what the required points will be for

each programme, it may be sensible to diversify by ranking programmes with varying points requirements.

Students can manage the risk of not being offered any programme by including programmes towards the end of the preference list that are less preferred than some omitted programmes but for which there is a very high probability of admittance for the student. To examine gender differences in how students manage the risk of not receiving an offer, we study (1) whether the student listed both level 6/7 and level 8 programmes, (2) the number of "safe" programmes listed where a programme is considered "safe" if its required points were no more than 20 less than their Leaving Certificate points, and (3) the points of the lowest-points programme listed.

As noted earlier, applicants can list both level 7 and level 8 programmes and can be offered both but only one programme can be accepted.[28] Level 8 programmes are honours degrees and therefore considered more prestigious than level 7 ordinary degrees and certificates. However, level 7 programmes typically require lower points for admission and so many students list level 7 programmes to reduce the risk of not receiving any offers.

Table A2 shows that the raw gender difference in the probability of listing programmes from both levels is very small with 69% of boys listing programmes from both levels compared to 68% of girls. However, Table 2 shows that, once we add controls, girls are 5 percentage points more likely to list programmes from both levels than observationally equivalent boys. Figure 4 shows that this result is driven mainly by the highest achieving girls with girls in the top achievement quintile being 10 percentage points more likely to list programmes from both levels. Because of their high points, girls in the top achievement quintile are almost certain to be offered a level 8 programme. Therefore, this greater likelihood of listing both level 7 and level 8 programmes suggests that girls are more risk averse than boys and/or that high achieving

[28] For ease of notation, we refer to the list of level 6/7 programmes as level 7 programmes.

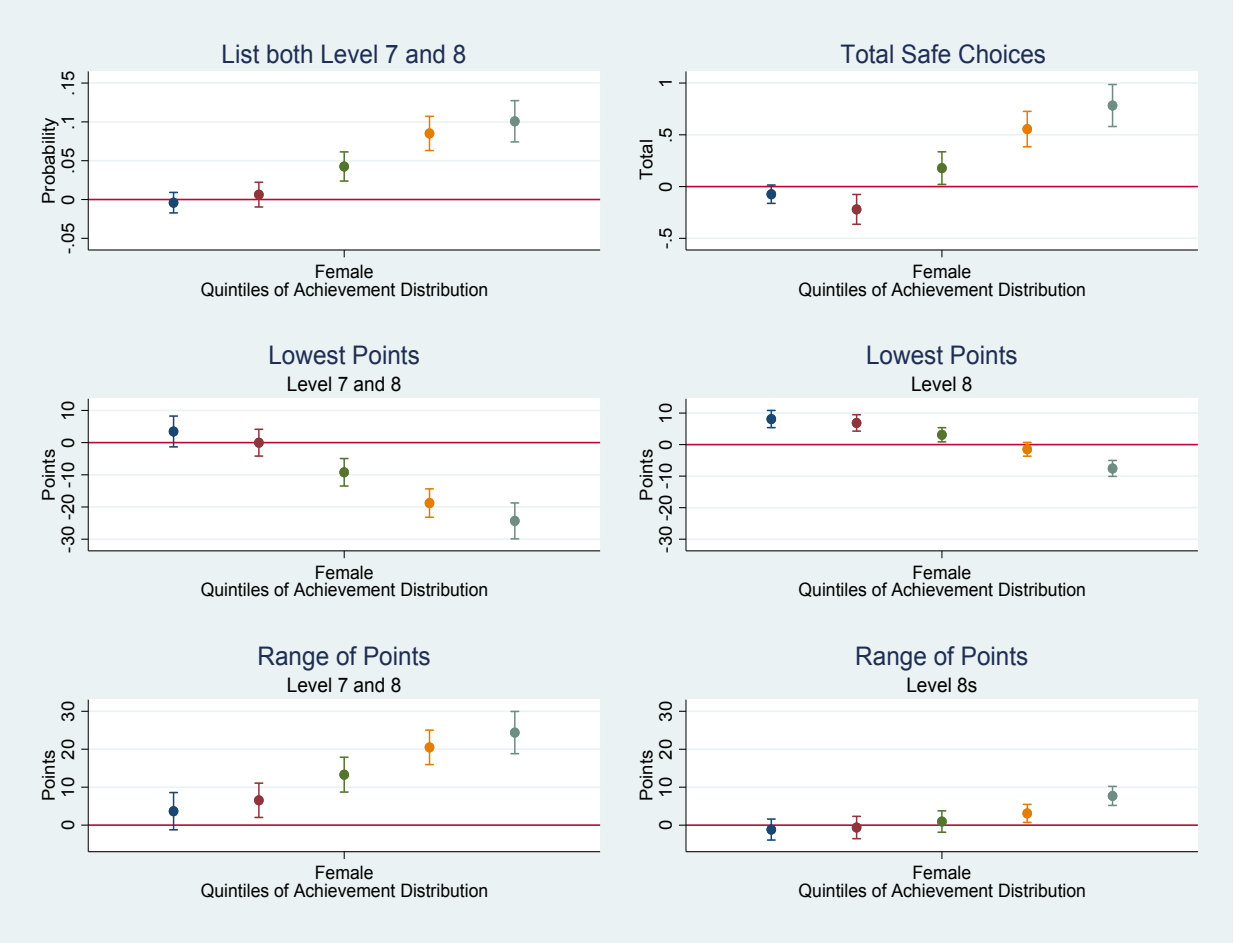
boys are more confident of being offered a level 8 programme. This is consistent with findings in the literature that boys are less risk averse and more confident that girls (Charness and Gneezy, 2012; Bengtsson et al. 2005). It is plausible in our setting as students apply for college before they receive their Leaving Certificate results, so there is uncertainty about how many points they will receive and what programme they will be able to enter.

Table 2: Gender and Risk Management

VARIABLES	(1) List Both Level 7 and Level 8	(2) Total Safe Choices	(3) Lowest Points	(4) Lowest Points (Level 8s)	(5) Range of Points	(6) Range of Points (Level 8s)
Female	0.050***	0.255***	-10.022***	1.804**	13.526***	1.593**
	(0.007)	(0.056)	(1.662)	(0.725)	(1.681)	(0.772)
Observations	123,656	122,602	122,602	121,622	122,187	121,245
R-squared	0.135	0.272	0.185	0.270	0.030	0.109

Note: Robust standard errors clustered by school in parentheses. *** p<0.01; ** p<0.05. Age, year, quadratic in Leaving Certificate points (interacted with 2017), subject requirements, subject fixed effects, grade fixed effects (interacted with subject), school-cohort rank, school characteristics and indicators for quartiles of distance to nearest university and nearest non-university included in all regressions.

Figure 4: Gender and Risk Management



Note: Quintiles based on the applicant points distribution. Separate regressions are run for each quintile. Figures display female coefficients and 95% confidence interval for each quintile. Regressions include controls for age, year, quadratic in Leaving Certificate points (interacted with 2017), subject requirements, subject fixed effects, grade fixed effects (interacted with subject), school-cohort rank, school characteristics and indicators for quartiles of distance to nearest university and nearest non-university.

The greater tendency for girls to ensure that they receive at least one offer extends to listing more choices that they are likely to be offered. On average, girls list 0.26 more "safe choices" than boys but, once again, this is entirely seen in the top three quintiles (in the top quintile, girls list an extra 0.75 safe choices). The coefficients on female are negative for the bottom two quintiles and are a statistically significant -0.25 for the second quintile.[29] The average number of safe choices listed by the full sample is 5 and the number listed for the top quintile is 7 (see Tables A2 and A3). Therefore, we find that these effects translate into girls

[29] We have also checked alternative definitions of "safe" choices by defining a choice to be safe if Leaving Certificate points were at least 10, 30 or 50 points greater than the required points of the programme and find very similar results for each definition.

being 5% more likely than boys to list safe choices on average while in the top quintile girls are 11% more likely to list safe choices.[30]

While listing level 7 programmes and/or listing "safe" programmes speaks to how students approach risk management, the key factor determining whether a student receives an offer is how the points achieved by the student relate to the points required by the programme listed with the lowest required points. Table 2 shows that, on average, the points required for the listed programme with the lowest required points is 10 points lower for girls than for boys. However, crucially, this average finding is driven by the top three achievement quintiles, with the gap for the top quintile being almost 25 points (Figure 4). For the bottom two quintiles, the lowest points are higher for girls, although the differences are small and not statistically significant. Appendix Tables A2 and A3 show that, on average, the programme with the lowest required points listed requires 240 points while for the top quintile, it requires 305 points. Therefore, on average, the programme with the lowest required points listed by girls requires 4% fewer points than the average lowest points programme listed. For the highest achieving quintile, girls are listing lowest points programmes that require points 8% lower than the average lowest points programme listed by high achievers.

When calculating the lowest points, we have included both level 7 and level 8 programmes as this gives the best overall view of how determined students are to avoid receiving zero offers. In column (4) of Table 2, we instead focus on the lowest points level 8 programme listed as this affects the probability the student gets offered an honours degree programme. Interestingly, we find that, for this variable, the female effect is positive – on average, the lowest points honours degree programme listed by girls requires about 2 more

[30] Using a survey of college applicants in Turkey and a slightly different definition of safe choices, Saygin (2016) finds that, on average, girls list 0.40 more safe choices than boys. She does not report how this varies across the achievement distribution.

points than the equivalent programme for boys. However, as before, we see that the female effect is negative for high achievers.

Taken together, our findings for lowest points and number of safe choices imply that low-achieving females may be slightly less likely than low-achieving males to manage the risk of not obtaining an offer by listing a sufficient number of low points programmes. On the other hand, high-achieving females are much more likely to mitigate this risk than equivalent males.

A useful summary measure of the extent to which students balance both applying for selective programmes with their first choice while managing the risk of getting no offer is the difference between the median entry points for the first ranked programme and the required points of the lowest-points programme listed. We refer to this variable as the "Range of Points" in Table 2. We find that this points range is larger for females by 14 points (2 points if we calculate the lowest points using only level 8 programmes). Consistent with our earlier estimates, the effect is much larger for high-achieving females (Figure 4). However, the gender gap is present throughout the achievement distribution, suggesting that females are generally better than males at balancing applying for selective programs with managing the risk of receiving no offer.

5.3. Clustering of Top 3 Choices

Since we see the entire rankings of students, our data provide a rare opportunity to examine the clustering of top ranked programmes and better understand how students make choices. Do they choose a field and then list programmes from that field, do they choose a level of selectivity and then perhaps include programmes from different fields, or do they tend to

choose a college and choose multiple programmes from that college? We explore these types of clustering by examining the characteristics of the top 3 preferences.[31]

We examine whether the top 3 are in the same college to see whether students tend to view institution as being more important than programme. We also examine whether the top 3 programmes have similar median entry points (within 50 points of each other) to see whether students appear to list programmes based on selectivity. Additionally, we examine whether the top 3 are in the same field of study to see whether students are determined to access a particular subject area.

Table 3 shows the pooled estimates for each outcome. We see that girls are about 3 percentage points more likely to list their top 3 level 8 programmes from the same field. Here, we define field using the 10 ISCED categories.[32] We also find that girls are 2 percentage points more likely to list all 3 top programmes of a similar points level. On the other hand, boys are about 3 percentage points more likely to list all three from the same college. Figure 5 shows that gender gaps in these outcomes are quite similar across the achievement distribution. The magnitudes of these effects are non-trivial with girls being about 7% more likely to list their top 3 programmes in the same field, 6% more likely to list all three top choices of a similar points level, and over 12% less likely to have their top 3 choices be from the same college, relative to the overall average levels.

While looking at clustering of top 3 programmes on one dimension is informative, it is not clear if girls are more likely to list similar points programmes because programmes within a field tend to have similar median entry points or if boys are listing their top 3 from the same

[31] There is a gender gap in the probability of listing at least 3 programmes: 88% of males list at least 3 level 8 preferences compared with 93% of females. Conditional on our full set of controls, females are a statistically significant 1.8 percentage points more likely to list at least 3 preferences.

[32] The 10 ISCED fields include the following: Education; Arts and humanities; Social sciences, journalism and information; Business, administration, and law; Natural sciences, Mathematics and Statistics; Information and communications technologies; Engineering, manufacturing, and construction; Agriculture, forestry, fisheries and veterinary; Health and welfare; Services.

college because a college is offering programmes from a particular field. Therefore, we also look at 3 other outcomes variables: whether the top 3 programmes are from the same college but have different fields, whether they are of a similar median points level but different fields, or whether they are in the same college but have different median points.[33] We find that females are less likely to list top choices from the same college but in different fields or to have top choices of similar median points level but in different fields. This suggests that the strongest gender difference in the clustering of top 3 choices is that girls are more likely than boys to cluster based on field of study. These results suggest that girls may be making decisions that are less driven by a desire to go to a particular college and more motivated by a desire to access a particular field of study.

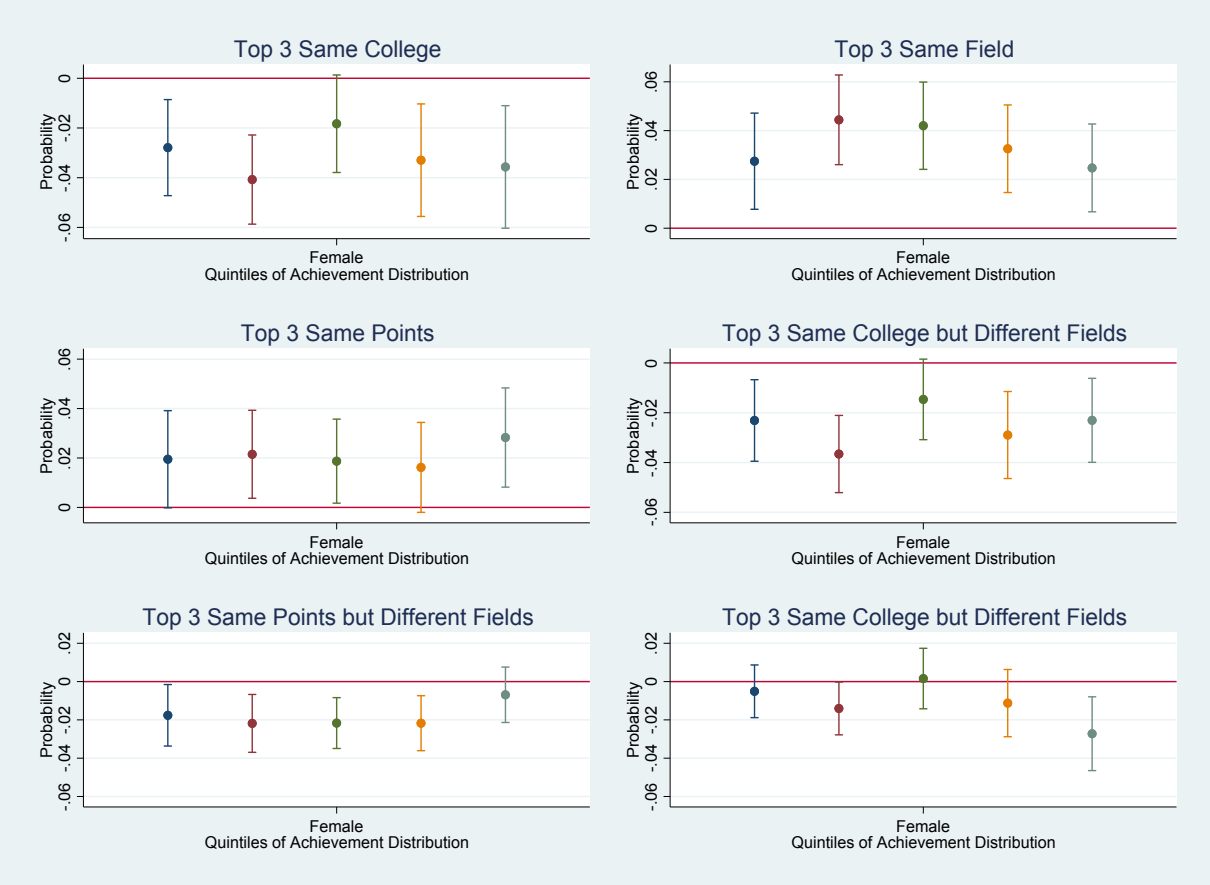
[33] We define the fields to be different if at least one of the 3 fields differs from another field. Likewise, we define the points levels to be different if the absolute value of the distance between the median entry points for any two preferences is greater than 50.

Table 3: Gender and Clustering of Top 3 Preferences

VARIABLES	(1) Same College	(2) Same Field	(3) Same Points	(4) Same College but Different Fields	(5) Same Points but Different Fields	(6) Same College but Different Points
Female	-0.031***	0.032***	0.023***	-0.024***	-0.016***	-0.012**
	(0.008)	(0.005)	(0.005)	(0.006)	(0.004)	(0.006)
Observations	111,839	111,839	110,243	111,839	110,243	110,243
R-squared	0.029	0.035	0.032	0.022	0.013	0.020

Note: Robust standard errors clustered by school in parentheses. *** p<0.01; ** p<0.05. Age, year, quadratic in Leaving Certificate points (interacted with 2017), subject requirements, subject fixed effects, grade fixed effects (interacted with subject), school-cohort rank, school characteristics and indicators for quartiles of distance to nearest university and nearest non-university included in all regressions.

Figure 5: Gender and Clustering of Top 3 Preferences



Note: Quintiles based on the applicant points distribution. Separate regressions are run for each quintile. Figures display female coefficients and 95% confidence interval for each quintile. Regressions include controls for age, year, quadratic in Leaving Certificate points (interacted with 2017), subject requirements, subject fixed effects, grade fixed effects (interacted with subject), school-cohort rank, school characteristics and indicators for quartiles of distance to nearest university and nearest non-university.

5.4 The Role of Field of Study

It is well established that there are large gender differences in preferences for field of study. Particular emphasis has been placed on females being much less likely to choose STEM fields in college (Delaney and Devereux, 2019; Speer, 2017; Card and Payne, 2017). We have verified that our findings do not simply result from a greater male preference for STEM – all our findings are robust to adding a control for whether the top ranked programme is in STEM, with just minor changes in the coefficient on female (Table 4).[34] This suggests that the results are not driven by gender differences in preferences for STEM fields.

Moving beyond the STEM/non-STEM dichotomy, there are other differences in field choices by gender with, for example, males more likely to study business and females more likely to study arts and humanities. Given that some fields have more highly selective programmes than others, preferences across fields may lead to differences in programme selectivity. To assess this, we calculate the median points of students who enrol in 10 different fields and find that girls list first choice programmes from fields that enrol students with median points about 7.5 higher. While this effect is seen for all achievement quintiles, it is largest for low achievers (Figure A1). Given the effect sizes are about the same as we saw for programme selectivity in Figure 3, we cannot distinguish between two competing stories: (1) gender differences in field preferences lead to gender differences in selectivity of the programmes they wish to do and (2) differences in preferences for programme selectivity lead to gender differences in field choices – for example, a student may choose a programme in social sciences rather than arts and humanities because of the greater selectivity of the social sciences programme.

[34] Given that students may choose fields after choosing institutions, we acknowledge that the STEM indicator may be endogenous. However, the effect on the estimates is still informative.

In Column 3 of Table 4, we report estimates for our application outcomes where we add controls for 10 indicators for the field of study of the first choice programme.[35] As our results for median field points suggest, the findings for median points and university change as a result – females choose more selective programmes because they apply to fields that are generally more selective. However, our findings for risk management are largely unchanged – we continue to find that girls list more safe choices, have lowest-points programmes with lower points and list programmes with a greater range of points than boys. Likewise, our results regarding the clustering of the top 3 choices are quite similar to before. In Figure A2 in the appendix, we show estimates by achievement quintile for our most important outcome variables and, once again, find that while the selectivity outcomes are sensitive to field controls, results for the other outcomes are largely unaffected. Overall, our conclusion is that the large gender differences in field preferences complicate the interpretation of our selectivity findings but appear largely unrelated to the gender differences in risk management and in clustering of the top 3 choice programmes.

[35] We use the 10 ISCED fields discussed in footnote 32.

Table 4: Robustness to Field of Study Controls

	Baseline	Control for STEM	Control for 10 Fields
Aspirations			
Median Points 1st Choice	3.542***	3.929***	-2.072***
	(0.614)	(0.624)	(0.593)
University 1st Choice	0.023***	0.018***	0.007
	(0.004)	(0.004)	(0.004)
Risk Management			
Choose Both Levels	0.050***	0.056***	0.056***
	(0.007)	(0.007)	(0.007)
Total Safe Choices	0.255***	0.291***	0.391***
	(0.056)	(0.056)	(0.057)
Lowest Points	-10.022***	-10.069***	-14.393***
	(1.662)	(1.661)	(1.664)
Range of Points	13.526***	13.939***	12.273***
	(1.681)	(1.680)	(1.670)
Lowest Points (level 8s only)	1.804**	2.035***	-2.423***
	(0.725)	(0.729)	(0.718)
Range of Points (level 8s only)	1.593**	1.739**	0.224
	(0.772)	(0.779)	(0.765)
Clustering			
Top 3 Same College	-0.031***	-0.029***	-0.021***
	(0.008)	(0.008)	(0.008)
Top 3 Same Field	0.032***	0.039***	0.034***
	(0.005)	(0.005)	(0.005)
Top 3 Same Points	0.023***	0.022***	0.003
	(0.005)	(0.005)	(0.005)
Same College Different Field	-0.024***	-0.023***	-0.020***
	(0.006)	(0.006)	(0.006)
Same Points Different Field	-0.016***	-0.019***	-0.017***
	(0.004)	(0.004)	(0.004)
Same College Different Points	-0.012**	-0.012**	-0.008
	(0.006)	(0.006)	(0.006)

Note: Robust standard errors clustered by school in parentheses. *** p<0.01; ** p<0.05. Age, year, quadratic in Leaving Certificate points (interacted with 2017), subject requirements, subject fixed effects, grade fixed effects (interacted with subject), school-cohort rank, school characteristics and indicators for quartiles of distance to nearest university and nearest non-university included in all regressions. Column (2) adds an indicator for field of first preference being STEM and column (3) adds indicators for field of first preference being any of 10 ISCED categories.

5.5 Heterogeneous Effects

The results in the previous section show that gender differences vary greatly across the achievement distribution. In this section, we test whether there also exist heterogeneous effects

by the level of disadvantage of the high school attended and whether the high school is mixed-sex or same-sex.[36]

Recent research (Autor et al. 2019) has shown that boys are more susceptible to disadvantage and therefore we might expect to see gender results being different amongst disadvantaged students. We have no measure of individual socio-economic status, so we use a school-based measure. In Ireland, high schools with high concentrations of students from socioeconomically disadvantaged backgrounds have been designated as "DEIS" schools and receive extra supports from the state (somewhat lower pupil-teacher ratios and extra state funding for other purposes).[37] We test for whether gender differences are larger in such disadvantaged schools by adding interactions of gender with a dummy variable indicating whether the school is DEIS or not.

We also hypothesise that gender effects may differ across mixed-sex and same-sex schools. In our sample, roughly 60% of students attend mixed-sex schools. It is possible that individuals may make very different decisions when they are surrounded by members of the opposite sex than if they were attending school with students of the same-sex.[38] We test for this by also interacting gender with a dummy variable indicating whether the school is mixed-sex or same-sex. We use the usual set of control variables but also add interactions of female with a quadratic function of points to the control set to allow for correlations between achievement and school type.

[36] We have also checked whether the gender effect differs by distance to college by augmenting the specification with interactions of gender with indicators for each quartile of distance to the nearest university and nearest non-university. We find little evidence of statistically significant gender differences in response to distance. The estimates are shown in Appendix Table A5.

[37] DEIS denotes *Delivering Equality of Opportunity in Schools*.

[38] There is a burgeoning literature examining the effect of the sex composition of peers on college choices. For example, Brenoe and Zolitz (2020) find that having more female peers decreases the probability of females enrolling in STEM in college but increases the probability for males and Anelli and Peri (2019) find that males who are in high school with over 80% males are more likely to choose male dominated fields for college.

The estimates are in Table 5. None of the interactions of gender with mixed-sex school are statistically significant at the 5% level and the coefficients are generally quite small. The only systematic finding for disadvantaged schools is that girls in disadvantaged schools have fewer safe choices and higher lowest points (relative to boys) than girls in other schools, suggesting diversification of girls in these schools is more like that of boys than is the case in other schools. Overall, we find little evidence of systematic differences in application behaviour by gender across school types.[39]

[39] We have also done this analysis by quintile of achievement and found few systematic patterns. This is unsurprising as we lose power when we split the sample into quintiles.

Table 5: Heterogeneous Effects by School Type

	Female Baseline Model	Female*DEIS Model 2	Female*Mixed-Sex Model 2
Aspirations			
Median Points 1st Choice	3.542***	0.039	1.754
	(0.614)	(1.529)	(1.263)
University 1st Choice	0.023***	0.001	-0.000
	(0.004)	(0.012)	(0.009)
Risk Management			
Choose Both Levels	0.050***	-0.013	-0.014
	(0.007)	(0.011)	(0.014)
Total Safe Choices	0.255***	-0.282***	-0.238**
	(0.056)	(0.109)	(0.115)
Lowest Points	-10.022***	8.325***	5.130
	(1.662)	(3.069)	(3.382)
Lowest Points (level 8s only)	13.526***	2.638	2.444*
	(1.681)	(1.732)	(1.460)
Range of Points	1.804**	-8.276**	-3.291
	(0.725)	(3.206)	(3.423)
Range of Points (level 8s only)	1.593**	-2.409	-0.529
	(0.772)	(1.752)	(1.577)
Clustering			
Top 3 Same College	-0.031***	0.006	0.021
	(0.008)	(0.014)	(0.017)
Top 3 Same Field	0.032***	-0.021*	0.006
	(0.005)	(0.012)	(0.010)
Top 3 Same Points	0.023***	-0.007	0.005
	(0.005)	(0.009)	(0.009)
Same College Different Field	-0.024***	0.007	0.013
	(0.006)	(0.011)	(0.013)
Same Points Different Field	-0.016***	0.004	0.001
	(0.004)	(0.007)	(0.006)
Same College Different Points	-0.012**	0.007	0.016
	(0.006)	(0.010)	(0.012)

Note: Robust standard errors clustered by school in parentheses. *** p<0.01; ** p<0.05; * p<0.10. Age, year, quadratic in Leaving Certificate points (interacted with 2017), subject requirements, subject fixed effects, grade fixed effects (interacted with subject), school-cohort rank, school characteristics and indicators for quartiles of distance to nearest university and nearest non-university included in all regressions. In model 2 we extend our baseline model by adding an interaction of female with an indicator for mixed-sex school and also with an indicator for a DEIS school. We also add an interaction of female with a quadratic in Leaving Certificate points.

6. Enrolment Outcomes

We have seen that there are systematic differences in application behaviour by gender. Conceptually, these may or may not lead to different enrolment outcomes by gender. For example, if all students aim very high with their first preference, differences in their exact level of ambition may not matter as the actual programme they receive will be determined by their

Leaving Certificate points. Therefore, in this section, we examine differences in college entry by gender. We focus on honours degree (level 8) enrolment since all individuals in our sample have listed at least one level 8 programme and are, presumably, aiming to enter honours degree programmes.

Column 1 of Table 6 examines the probability of enrolling in an honours degree programme (61% of applicants do). We find that, conditional on the controls, females are 1 percentage point less likely to enrol than males. When we look by achievement (Figure 6), we see that evidence of gender gaps exists only for the second lowest achievement quintile with a gap of about 3 percentage points for this quintile. What explains the gender gap in this quintile? We suspect it arises because, as we saw earlier (Figure 4), low achieving girls tend to list lowest-points level 8 programmes that require slightly higher points than the equivalent for boys. Also, girls in the second-lowest quintile tend to list fewer level 8 safe choices than boys.[40] The lack of a difference for the top 3 quintiles is unsurprising as a high proportion of students in these quintiles are offered a programme. While high-achieving girls are more likely to list low points programmes, it makes little difference to enrolment outcomes as they generally receive one of their higher preference choices.

Consistent with our earlier findings that girls list first ranked programmes that have higher required points, we find that girls are 2 percentage points less likely to enrol in their first preference programme – here the gender gaps are statistically significant only for the second and third lowest achievement quintiles. The lack of a gender effect in the lowest quintile is unsurprising as only about 2% of students in this quintile enter an honours degree programme (Table A3).

[40] Having multiple "safe" choices can matter as students may have enough points to qualify for a programme but not be offered it either because not everybody on the minimum points was admitted or because they did not satisfy other programme requirements such as having achieved a particular grade in a particular subject.

Next, we restrict the sample to enrolees and study the selectivity of the programme they enrol in. There is little evidence of any gender difference in the selectivity of the programme enrolled in, suggesting that the meritocratic centralized applications system undoes most of the differences we have seen in the application behaviour of boys and girls. This finding is consistent with work from the UK by Campbell et al. (2019) who find very little gender difference in the level of academic mismatch among college enrolees.[41] However, we do see that, conditional on enrolment, girls are more likely to enter a university. This reflects the fact that STEM courses, which are disproportionately taken by boys, are relatively more common in the Institutes of Technology rather than in the universities.

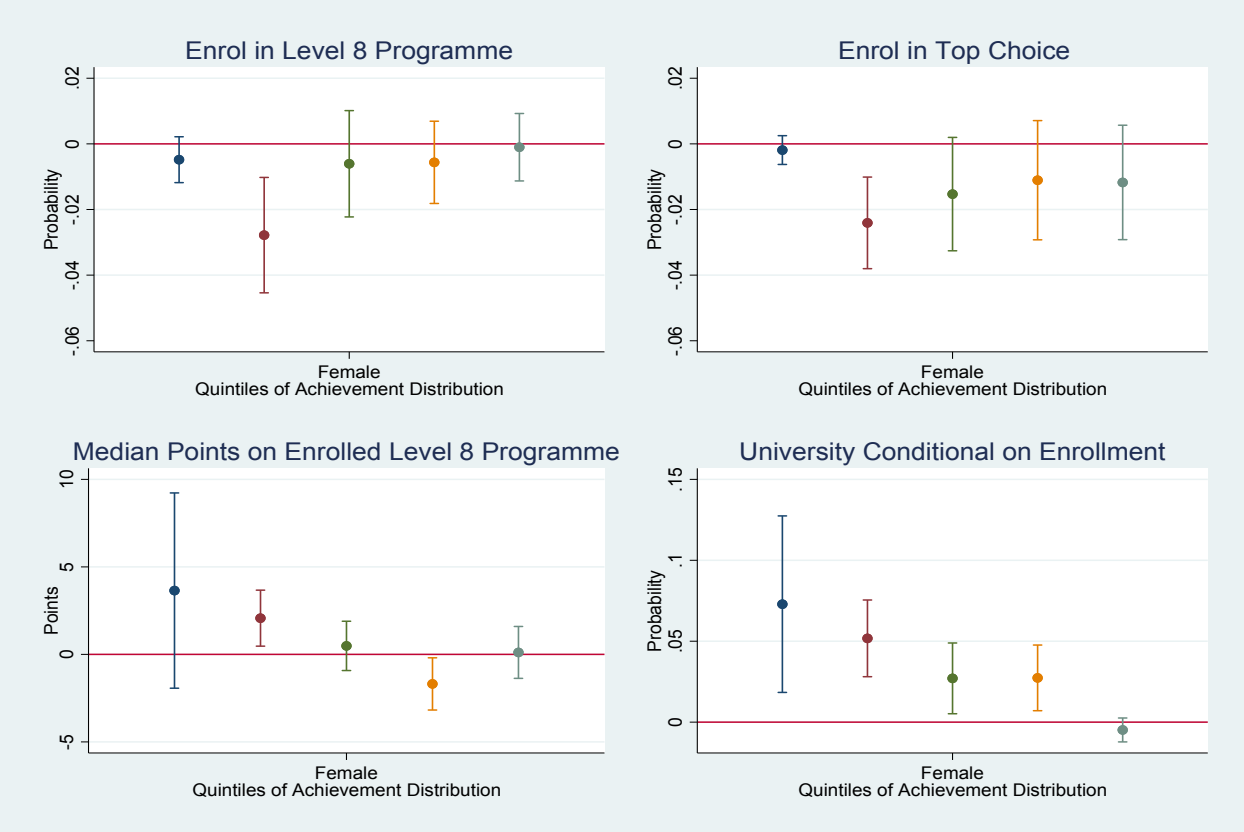
[41] Indeed, if we create a measure of academic mismatch of enrolees and use it as the dependent variable, we find a precisely estimated zero coefficient on gender.

Table 6: Gender and Enrolment Outcomes

VARIABLES	(1) Enrol in an Honours Degree Programme	(2) Enrol in Top Choice	(3) Median Points of Enrolled Programme	(4) University Conditional on Enrolment
Female	-0.013***	-0.015***	0.014	0.021***
	(0.003)	(0.004)	(0.402)	(0.006)
Observations	123,656	123,656	75,010	75,010
R-squared	0.456	0.256	0.748	0.300

Note: Robust standard errors clustered by school in parentheses. *** p<0.01. Age, year, quadratic in Leaving Certificate points (interacted with 2017), subject requirements, subject fixed effects, grade fixed effects (interacted with subject), school-cohort rank, school characteristics and indicators for quartiles of distance to nearest university and nearest non-university included in all regressions.

Figure 6: Gender and Enrolment Outcomes



Note: Quintiles based on the applicant points distribution. Separate regressions are run for each quintile. Figures display female coefficients and 95% confidence interval for each quintile. Regressions include controls for age, year, quadratic in Leaving Certificate points (interacted with 2017), subject requirements, subject fixed effects, grade fixed effects (interacted with subject), school-cohort rank, school characteristics and indicators for quartiles of distance to nearest university and nearest non-university.

7. Conclusion

It is well established that there are gender differences in choice of college major. However, less is known about whether gender differences exist in how students apply for college. We use unique data from Ireland to look at whether there are gender differences in college applications relating to applying to selective colleges and programmes, how students manage the risk of not being offered any college programme, and how clustered college choice rankings are.

We find differences in college application behaviour with females and males who have similar academic background ranking their college choices in systematically different ways: Females are more likely to apply to selective colleges and programmes and appear to better manage the risk of not obtaining any college offer by listing more low-requirement programmes to which admission is very likely. They also have a higher tendency to cluster their top choices by field of study. We find that these effects vary considerably across the achievement distribution with low achieving females being more likely than equivalent males to aspire to more selective institutions and programmes, while higher achieving females are much more likely than equally high achieving males to diversify their college choice rankings by including many low entry points programmes.

Our results add further support to the large literature that finds evidence of behavioural differences between males and females and extends the literature by studying the high stakes college application setting.[42] Students may fail to include low points programmes on their lists due to good outside opportunities (if only a small number of college programmes were deemed preferable to a non-college option), low risk aversion, or lack of care in making choices. Our finding that the largest gender differences in diversification are found for the highest achieving

[42] The majority of papers elicit gender differences by drawing on evidence from laboratory experiments.

students is unlikely to result from females having better outside (non-college) options as this explanation is less relevant to very high achieving students.[43] Therefore, we believe that the higher female likelihood among high achievers of listing low entry requirement programmes is most likely due to higher levels of risk aversion or greater attention to managing the risk of not obtaining an offer.

We find that the relatively meritocratic college admissions system in Ireland results in gender differences in college application behaviour leading to little difference in enrolment outcomes -- the high achieving girls who are more likely to list low entry requirement programmes ultimately gain admission to one of their higher ranked choices. However, there are many countries, such as the US, where college admissions are not centralized and gender differences in college applications may manifest in gender differences in enrolment outcomes. Overall, our findings that boys are less likely to diversify by listing additional low entry requirement programmes may suggest a role for greater guidance counselling to help them better understand and target their preferred programme of study while managing the risk of not obtaining an offer.

[43] It is unlikely that high achievers would consider taking a job instead of going to college. In Ireland, in 2016, the median earnings for male workers with an honours bachelor's degree was €44,482 compared to €23,298 for male workers with just a high school degree. The corresponding figures for females were €34,258 and €17,010, respectively. Source: https://www.cso.ie/en/releasesandpublications/ep/p-gpii/geographicalprofilesofincomeinireland2016/education/.

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Appendix

Appendix Table A1: Mapping from Grades to Leaving Certificate Points

2015 and 2016

Grade	Marks (%)	Points	Points (Math)
Higher Level			
A1	90% to 100%	100	125
A2	85% to 89%	90	115
B1	80% to 84%	85	110
B2	75% to 79%	80	105
B3	70% to 74%	75	100
C1	65% to 69%	70	95
C2	60% to 64%	65	90
C3	55% to 59%	60	85
D1	50% to 54%	55	80
D2	45% to 49%	50	75
D3	40% to 44%	45	70
E	25% to 39%	0	0
F	10% to 24%	0	0
NG	0% to 9%	0	0
Lower Level			
A1	90% to 100%	60	60
A2	85% to 89%	50	50
B1	80% to 84%	45	45
B2	75% to 79%	40	40
B3	70% to 74%	35	35
C1	65% to 69%	30	30
C2	60% to 64%	25	25
C3	55% to 59%	20	20
D1	50% to 54%	15	15
D2	45% to 49%	10	10
D3	40% to 44%	5	5
E	25% to 39%	0	0
F	10% to 24%	0	0
NG	0% to 9%	0	0

2017

Grade	Marks (%)	Points	Points (Math)
Higher Level			
H1	90% to 100%	100	125
H2	80% to 89%	88	113
H3	70% to 79%	77	102
H4	60% to 69%	66	91
H5	50% to 59%	56	81
H6	40% to 49%	46	71
H7	30% to 39%	37	37
H8	0 to 29%	0	0
Lower Level			
O1	90% to 100%	56	56
O2	80% to 89%	46	46
O3	70% to 79%	37	37
O4	60% to 69%	28	28
O5	50% to 59%	20	20
O6	40% to 49%	12	12
O7	30% to 39%	0	0
O8	0 to 29%	0	0

Source: State Examinations Commission.

Table A2: Descriptive Statistics Overall and by Gender

	Male Mean	Female Mean	Overall mean
Female	0	1	0.52
Age	17.39	17.35	17.37
Year	2016.00	2016.00	2016.00
LC Points	373.35	392.68	383.39
Math points (excluding bonus points)	51.71	46.66	49.09
English points	57.90	64.08	61.11
Mixed-sex School	0.63	0.56	0.59
Fee-Paying Secondary School	0.11	0.07	0.09
Disadvantaged (DEIS) School	0.16	0.14	0.15
Vocational School	0.25	0.21	0.23
Comprehensive School	0.17	0.15	0.16
Non fee-paying Secondary School	0.57	0.60	0.59
Grind School	0.02	0.03	0.03
Total Preferences Listed	9.30	9.93	9.63
Total Level 7 Preferences Listed	2.87	2.77	2.82
Total Level 8 Preferences Listed	6.44	7.15	6.81
List Both Level 7 and 8 Programmes	0.69	0.68	0.69
Total Safe Programmes	4.56	4.82	4.69
Lowest Point Programme Listed	237.16	240.46	238.88
Lowest Point Programme Listed (level 8s only)	309.77	318.84	314.49
Range of Points	211.08	219.05	215.22
Range of Points (level 8s only)	139.38	141.17	140.31
Median Points 1st Choice Programme	448.17	459.21	453.90
Median Points 2nd Choice Programme	438.26	447.38	443.05
Median Points 3rd Choice Programme	434.00	442.55	438.55
University 1st Choice Programme	0.65	0.74	0.70
University 2nd Choice Programme	0.63	0.72	0.68
University 3rd Choice Programme	0.61	0.70	0.66
Distance to Closest University (km/100)	0.52	0.55	0.53

Distance to Closest non-University (km/100)	0.28	0.28	0.28
Enrol in 1st Choice Level 8 Programme	0.31	0.32	0.32
Enrol in Level 8 Programme	0.58	0.63	0.61
Observations	*59424*	*64232*	*123656*
	Conditional on Enrolment		
Median Programme Points	435.75	438.09	437.01
Enrol in University	0.68	0.75	0.72
Observations	*34494*	*40516*	*75010*
	Top 3 Choices		
Top 3 All Same College	0.24	0.19	0.22
Top 3 All Same Field	0.42	0.46	0.44
Top 3 All Similar Points	0.36	0.41	0.39
Top 3 Same College & Different Fields	0.17	0.13	0.15
Top 3 Same Points & Different Fields	0.20	0.18	0.19
Top 3 Same College & Different Points	0.14	0.12	0.13
Observations	*52342*	*59497*	*111839*

Source: Authors' calculation from Central Admissions Office (CAO) data covering 2015 - 2017 period.

Table A3: Descriptive Statistics by Achievement Quintile

	Quintile 1 mean	Quintile 2 Mean	Quintile 3 Mean	Quintile 4 Mean	Quintile 5 mean
Female	0.44	0.50	0.54	0.57	0.55
Age	17.26	17.32	17.37	17.42	17.47
Year	2015.93	2016.03	2016.01	2016.00	2016.01
LC Points	216.92	326.46	392.23	453.00	535.43
Math points (excluding bonus points)	15.42	29.70	44.11	63.87	94.16
English points	38.62	54.64	63.39	70.60	79.21
Mixed-sex School	0.63	0.63	0.61	0.57	0.52
Fee-Paying Secondary School	0.04	0.05	0.08	0.11	0.18
Disadvantaged (DEIS) School	0.27	0.19	0.14	0.09	0.06
Vocational School	0.27	0.27	0.24	0.20	0.16
Comprehensive School	0.18	0.18	0.16	0.15	0.12
Non fee-paying Secondary School	0.53	0.54	0.57	0.62	0.68
Grind School	0.01	0.02	0.02	0.03	0.04
Total Preferences Listed	9.25	9.67	9.78	9.79	9.66
Total Level 7 Preferences Listed	3.89	3.31	2.76	2.30	1.78
Total Level 8 Preferences Listed	5.36	6.36	7.02	7.49	7.88
List Both Level 7 and 8 Programmes	0.86	0.80	0.71	0.60	0.46
Total Safe Programmes	1.59	3.92	5.04	5.87	7.14
Lowest Point Programme Listed	185.52	207.67	234.89	262.46	306.24
Lowest Point Programme Listed (level 8s only)	279.65	288.50	307.06	329.84	368.14
Range of Points	203.39	209.67	216.88	223.56	223.06
Range of Points (level 8s only)	109.93	129.44	145.03	156.36	161.11
Median Points 1st Choice Programme	389.29	417.32	451.46	485.74	528.96
Median Points 2nd Choice Programme	386.08	407.22	435.96	468.57	511.88
Median Points 3rd Choice Programme	385.64	403.69	429.35	459.20	501.75
University 1st Choice Programme	0.36	0.57	0.75	0.88	0.95
University 2nd Choice Programme	0.34	0.52	0.70	0.85	0.94
University 3rd Choice Programme	0.34	0.50	0.67	0.81	0.91
Distance to Closest University (km/100)	0.54	0.58	0.56	0.53	0.46

Distance to Closest non-University (km/100)	0.27	0.29	0.30	0.28	0.25
Enrol in 1st Choice Level 8 Programme	0.02	0.21	0.30	0.42	0.65
Enrol in Level 8 Programme	0.05	0.48	0.73	0.87	0.92
Observations	*24928*	*25827*	*24183*	*24275*	*24443*
		Conditional on Enrolment			
Median Programme Points	321.52	360.13	397.15	443.46	511.47
Enrol in University	0.08	0.36	0.62	0.80	0.95
Observations	*1267*	*12427*	*17773*	*21058*	*22485*
		Top 3 Choices			
Top 3 All Same College	0.21	0.20	0.21	0.23	0.23
Top 3 All Same Field	0.38	0.38	0.42	0.47	0.54
Top 3 All Similar Points	0.35	0.34	0.35	0.40	0.47
Top 3 Same College & Different Fields	0.14	0.14	0.14	0.15	0.15
Top 3 Same Points & Different Fields	0.20	0.19	0.18	0.19	0.19
Top 3 Same College & Different Points	0.11	0.12	0.13	0.14	0.14
Observations	*19050*	*22690*	*22626*	*23483*	*23990*

Source: Authors' calculation from Central Admissions Office (CAO) data covering 2015 - 2017 period.

Table A4: Distribution of Points by Leaving Certificate Points Quintile

Quintile	*LC Points Range*
Quintile 1	0-285
Quintile 2	286-360
Quintile 3	361-420
Quintile 4	421-485
Quintile 5	486-625

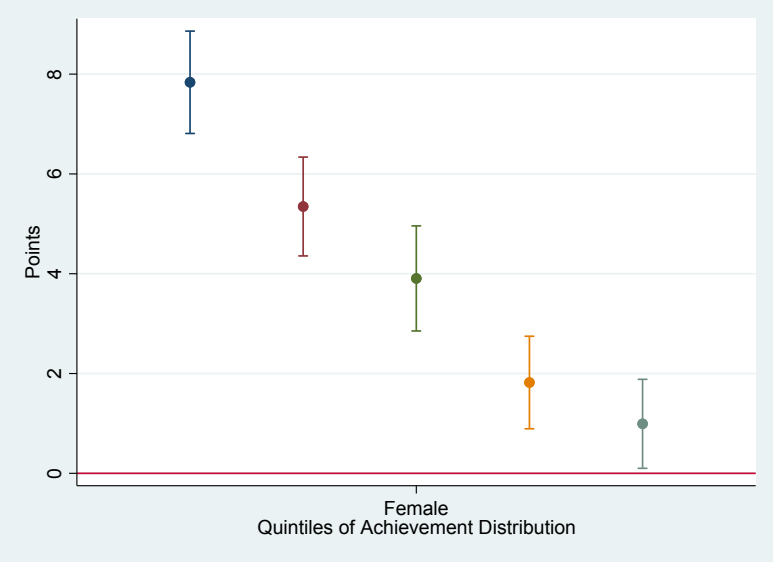
Source: Authors' calculation from Central Admissions Office (CAO) data covering 2015 - 2017 period.
Note: Within each quintile, the points range is the same for males and females.

Table A5: The Effect of Distance Interacted with Gender on Selected Outcomes

VARIABLES	(1) Median Points 1st Choice	(2) University 1st Choice	(3) List Both Level 7 and 8	(4) Total Safe Choices	(5) Lowest Points	(6) Range of Points	(7) Same College	(8) Same Fields	(9) Same Points
Female*Distance Non-University Q2	0.393	-0.002	-0.021	-0.168	6.164	-5.720	0.019	0.004	-0.007
	(1.818)	(0.013)	(0.019)	(0.142)	(4.414)	(4.433)	(0.029)	(0.014)	(0.013)
Female*Distance Non-University Q3	-1.077	-0.016	-0.002	0.105	-2.363	1.310	-0.004	0.012	0.011
	(1.874)	(0.014)	(0.018)	(0.151)	(5.020)	(5.028)	(0.023)	(0.013)	(0.013)
Female*Distance Non-University Q4	1.536	-0.017	-0.015	-0.070	1.817	-0.273	-0.002	0.018	0.013
	(2.039)	(0.015)	(0.018)	(0.146)	(5.122)	(5.320)	(0.022)	(0.014)	(0.014)
Female*Distance to University Q2	-0.521	0.007	-0.015	-0.195	5.274	-5.444	0.006	-0.001	-0.001
	(1.808)	(0.013)	(0.019)	(0.143)	(4.456)	(4.412)	(0.027)	(0.015)	(0.013)
Female*Distance to University Q3	0.161	-0.021	-0.010	0.010	5.593	-5.471	0.022	0.005	0.004
	(2.109)	(0.015)	(0.021)	(0.175)	(5.911)	(5.970)	(0.026)	(0.015)	(0.015)
Female*Distance to University Q4	-0.608	-0.034**	-0.002	0.027	3.540	-3.850	0.027	0.004	-0.002
	(2.067)	(0.016)	(0.020)	(0.153)	(4.832)	(4.963)	(0.027)	(0.014)	(0.013)
Observations	123,232	123,656	123,656	122,602	122,602	122,187	111,839	111,839	110,243
R-squared	0.505	0.296	0.135	0.272	0.186	0.030	0.027	0.035	0.032

Note: Robust standard errors clustered by school in parentheses. ** p<0.05. Age, female, year, quadratic in Leaving Certificate points (interacted with 2017), subject requirements, subject fixed effects, grade fixed effects (interacted with subject), school-cohort rank, school characteristics, and indicators for quartiles of distance to nearest university and nearest non-university included in all regressions.

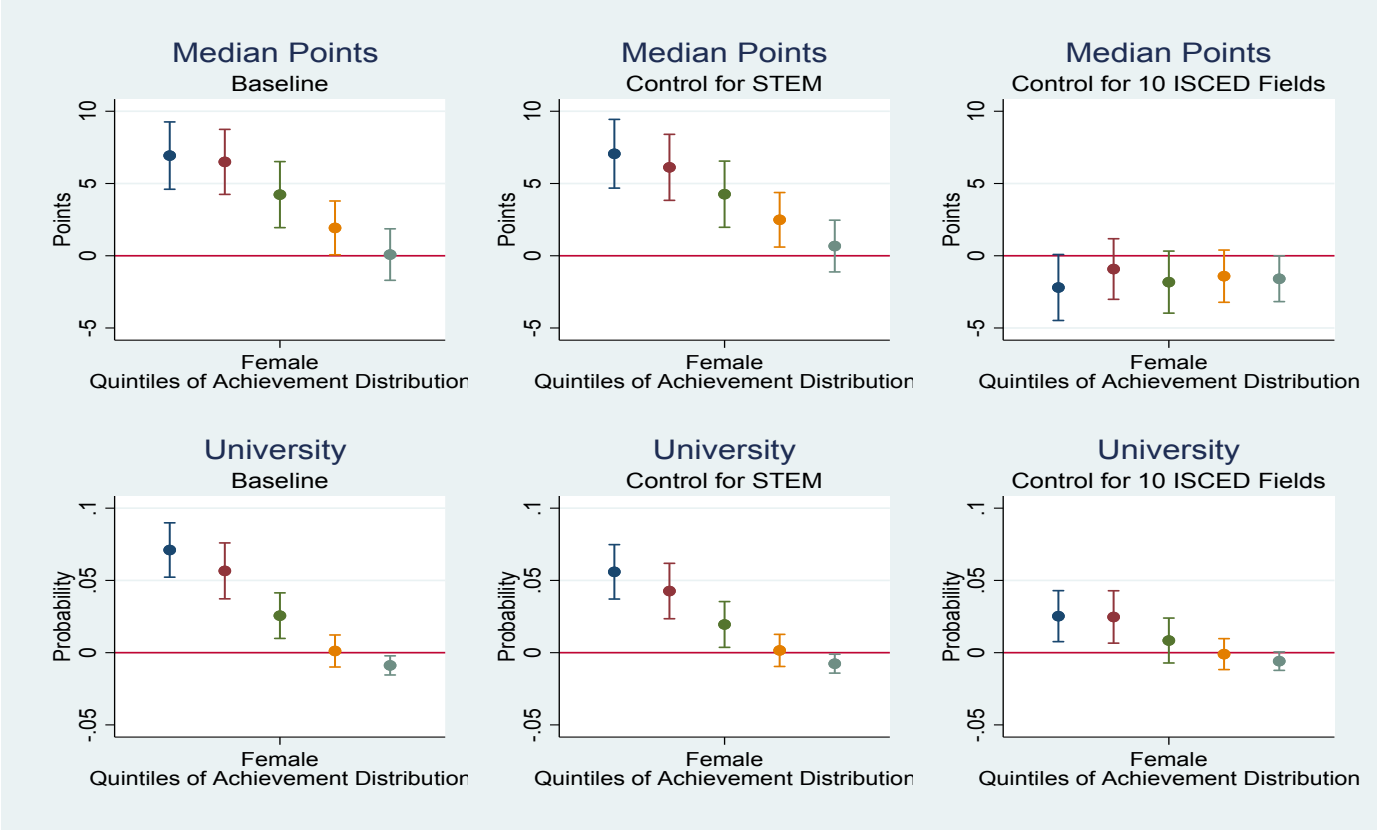
Figure A1: Median Points of the Field Listed as First Preference



Note: Quintiles based on the applicant points distribution. Separate regressions are run for each quintile. Figures display female coefficients and 95% confidence interval for each quintile. Regressions include controls for age, year, quadratic in Leaving Certificate points (interacted with 2017), subject requirements, subject fixed effects, grade fixed effects (interacted with subject), school-cohort rank, school characteristics and indicators for quartiles of distance to nearest university and nearest non-university.

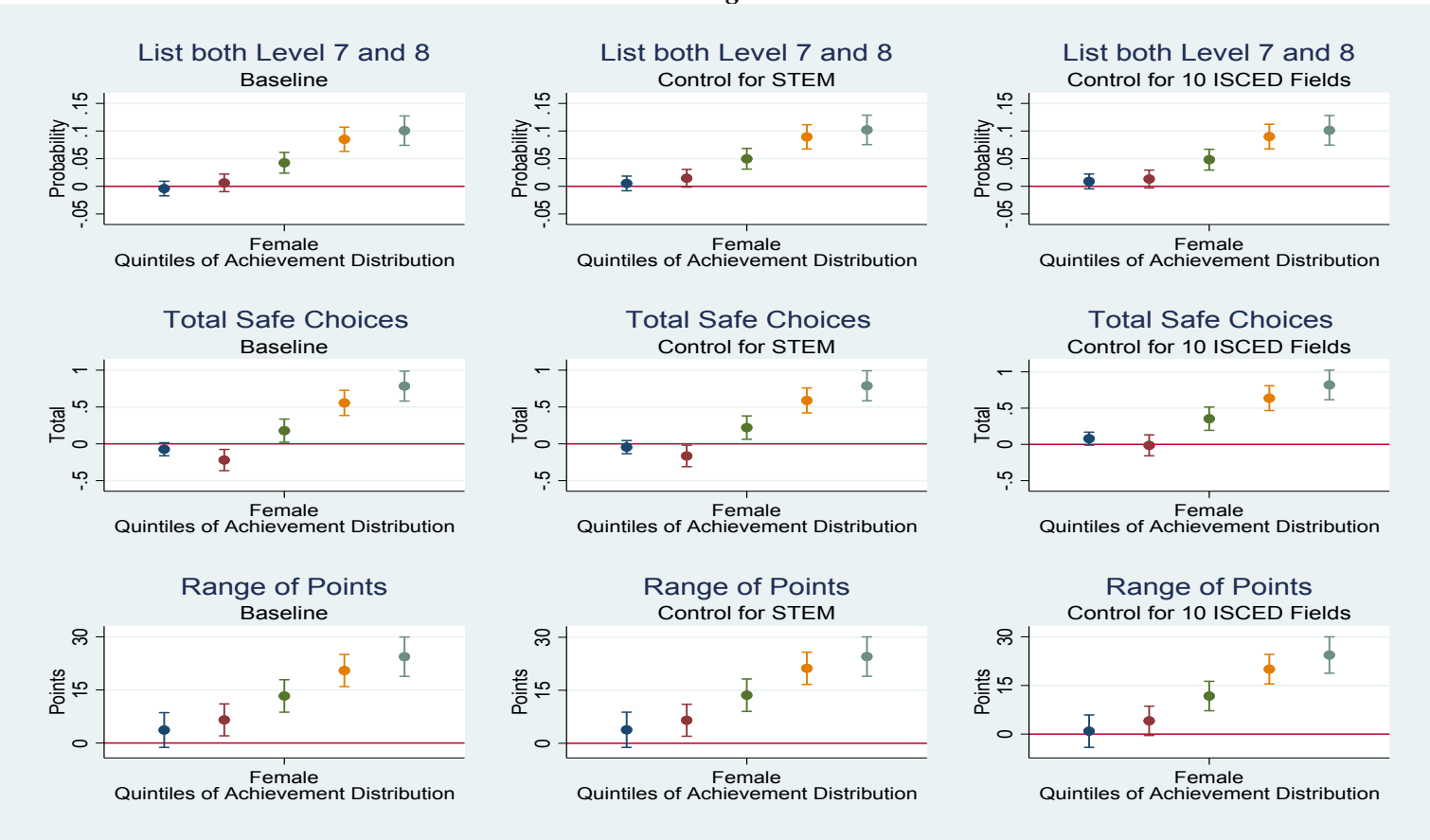
Figure A2: Robustness to Field of Study

Panel 1: First Preference Median Points and University



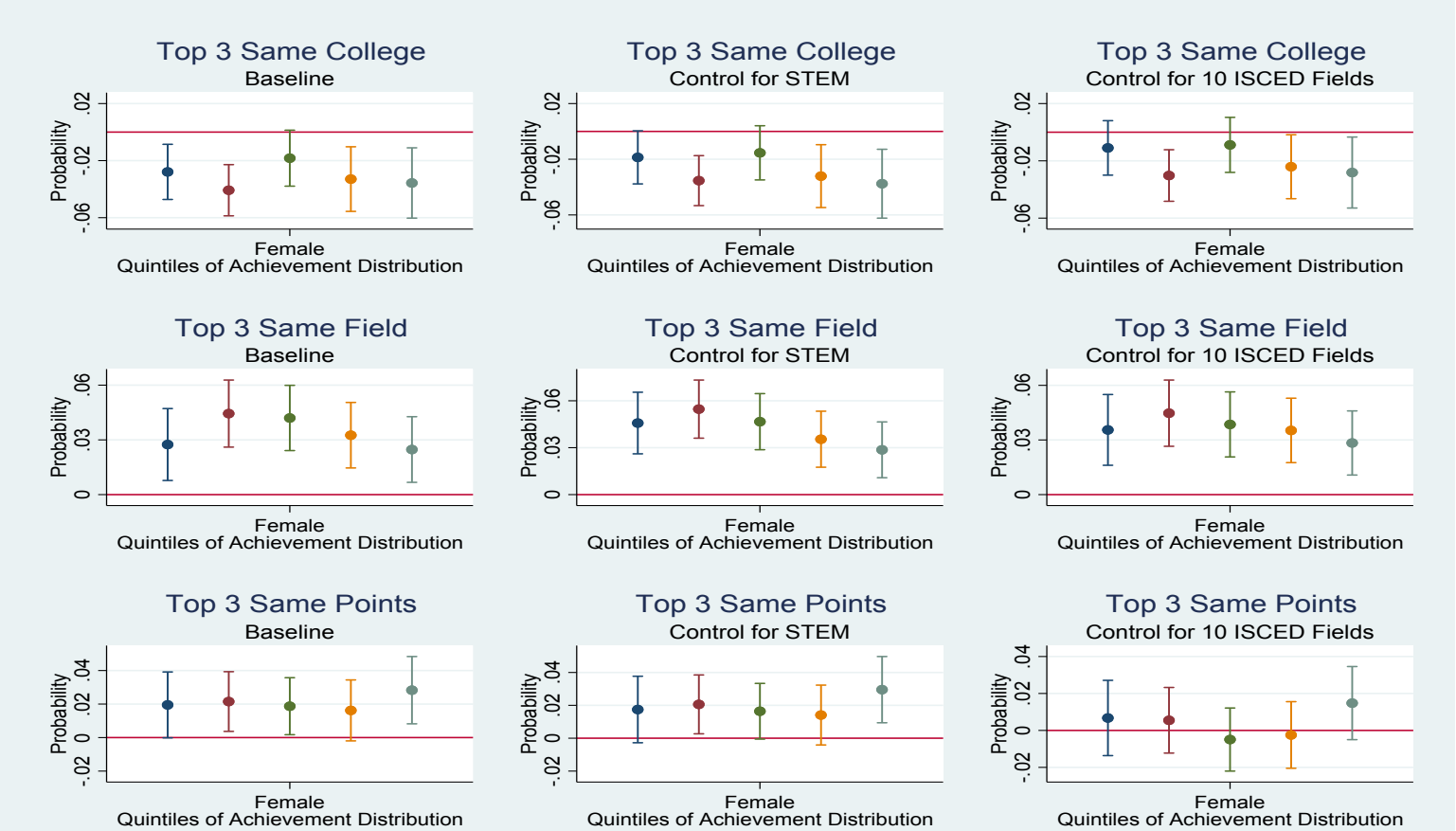
Note: Quintiles based on the applicant points distribution. Separate regressions are run for each quintile. Figures display female coefficients and 95% confidence interval for each quintile. Regressions include controls for age, year, quadratic in Leaving Certificate points (interacted with 2017), subject requirements, subject fixed effects, grade fixed effects (interacted with subject), school-cohort rank, school characteristics and indicators for quartiles of distance to nearest university and nearest non-university.

Panel 2: Risk Management Outcomes



Note: Quintiles based on the applicant points distribution. Separate regressions are run for each quintile. Figures display female coefficients and 95% confidence interval for each quintile. Regressions include controls for age, year, quadratic in Leaving Certificate points (interacted with 2017), subject requirements, subject fixed effects, grade fixed effects (interacted with subject), school-cohort rank, school characteristics and indicators for quartiles of distance to nearest university and nearest non-university.

Panel 3: Clustering Outcomes



Note: Quintiles based on the applicant points distribution. Separate regressions are run for each quintile. Figures display female coefficients and 95% confidence interval for each quintile. Regressions include controls for age, year, quadratic in Leaving Certificate points (interacted with 2017), subject requirements, subject fixed effects, grade fixed effects (interacted with subject), school-cohort rank, school characteristics and indicators for quartiles of distance to nearest university and nearest non-university.