

DISCUSSION PAPER SERIES

IZA DP No. 17300

**The Effect of Distance to Colleges on
Application Behavior**

Judith Delaney
Paul J. Devereux

SEPTEMBER 2024

DISCUSSION PAPER SERIES

IZA DP No. 17300

The Effect of Distance to Colleges on Application Behavior

Judith Delaney

University of Bath, University College London and IZA

Paul J. Devereux

University College Dublin, CEPR, IZA and NHH

SEPTEMBER 2024

Any opinions expressed in this paper are those of the author(s) and not those of IZA. Research published in this series may include views on policy, but IZA takes no institutional policy positions. The IZA research network is committed to the IZA Guiding Principles of Research Integrity.

The IZA Institute of Labor Economics is an independent economic research institute that conducts research in labor economics and offers evidence-based policy advice on labor market issues. Supported by the Deutsche Post Foundation, IZA runs the world's largest network of economists, whose research aims to provide answers to the global labor market challenges of our time. Our key objective is to build bridges between academic research, policymakers and society.

IZA Discussion Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available directly from the author.

ISSN: 2365-9793

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

The Effect of Distance to Colleges on Application Behavior*

We find substantial differences in college applications for students who have equal college opportunities and prior achievement but vary in distance to the nearest selective and non-selective college. Students who live closer to a selective college are more likely to list prestigious programs and colleges as their top choice. This results in differences in enrollment outcomes with the largest associations for those in the middle of the achievement distribution.

JEL Classification: I21, I23, I24

Keywords: distance, college application, college enrollment, test score

Corresponding author:

Judith M. Delaney
University of Bath
Claverton Down
Bath
BA2 7AY
United Kingdom
E-mail: judithmdelaney@gmail.com

* We are grateful to the Central Applications Office for providing access to the data used in this paper.

1. Introduction

Are students less likely to choose selective colleges and programs because they live further away from them? Despite the importance of college selectivity for future outcomes (Belfield et al., 2018), there is little evidence about the effects of distance on the selectivity of desired institutions and college programs. We analyze this issue using Irish administrative data on college applications that allow us to compare the top choices and enrollment outcomes of students who have equal prior achievement but differ in distance from prestigious and less-prestigious institutions.

In Ireland, college admissions are centralized and students provide a preference ranking of college programs.¹ The program offered to the prospective student depends both on performance (measured in “points”) in a set of exams at the end of high school (the Leaving Certificate exams) and on the preference ranking over programs provided by the candidate. Each program has a minimum points level that is required to enter. Thus, we can compare first choice programs across students who have equal opportunities (equal points) but are from different places.²

College enrollment is determined both by student application behavior and acceptance decisions by colleges. To isolate desired programs of students one needs information on college applications and also to be able to control for all factors that influence admission decisions as these will affect application behavior. Our administrative data on college applications include a rich set of controls for prior achievement, including the Leaving Certificate points that determine admission to college. Additionally, our large administrative dataset allows us to examine how the effects of distance differ by student achievement and how enrollment outcomes differ by distance.

¹ Programs are both subject- and institution-specific. For example, a person’s first preference could be science in University College Dublin and second preference could be engineering in Trinity College Dublin.

² In Ireland, tuition fees are the same in each institution so students do not choose on that basis.

There is much evidence that students are less likely to enroll in colleges that are further away (Gibbons and Vignoles, 2012), and mixed evidence about whether distance affects whether students enroll in college at all (Do, 2004; Frenette, 2006; Gibbons and Vignoles, 2012; Cullinan et al., 2013). However, there is little literature about how application behavior responds to distance (exceptions include Griffith and Rothstein (2009) and Hoxby and Avery (2013), both of whom use US data). A limitation of this literature is that distance may be related to college preparation and, unlike us, the authors cannot control for all factors that affect student admissions.

2. Institutional Background and Data

At the end of high school, students sit the Leaving Certificate examinations, typically in 7 or 8 subjects, and grades in the student's 6 best subjects are used to calculate their total Leaving Certificate points. Applicants apply to all colleges using a single application and can list up to 10 level 8 (honors bachelor's degree programs) and 10 level 6/7 programs (ordinary bachelor's degrees and higher certificates). Students are offered the highest ranked program for which they have enough points. A student can be offered both a level 6/7 and a level 8 program and choose between them.

Our data include program preferences for all individuals who sat the Leaving Certificate between 2015 and 2017.³ We restrict the sample to applicants between the ages of 16 and 20 who applied to a college in Ireland in the year that they first sat the Leaving Certificate.

We use two different variables to characterize selectivity. First, whether the institution is a university – in Ireland, the universities are generally considered more prestigious than other

³ 83% of students who sit the Leaving Certificate apply to college. We have verified that, once we control for school characteristics, there is no significant relationship between the proportion of students from a school who apply to college and the distance to the nearest selective and non-selective college.

colleges, most of which are institutes of technology.⁴ Second, we measure program selectivity as the median points of all persons starting the program (measured over the 3 years).

Like most of the literature, we do not know home addresses so we calculate distance as kilometers by road from the high school attended to a particular college (commuting by car or bus is much more common in Ireland than using trains). We create indicators for each quintile of distance to the closest university and distance to the closest non-university.⁵ There are fewer universities than non-universities: For universities, the quintile categories are (in kilometers) {0-6, 6-24, 24-57, 57-95, 95+} while, for non-universities, the quintiles are {0-5, 5-13, 13-33, 33-49, 49+}. In Appendix Figure A1, we show a map of Ireland with schools and colleges marked. Descriptive statistics for the sample are in Table 1. Average distance to the nearest university is 55km; average distance to the nearest non-university is 28km.

Table 1: Descriptive Statistics

	Mean	Standard Deviation	Min	Max	N
Age	17.36	0.64	16	20	124703
Year	2015.99	0.81	2015	2017	124703
Female	0.51	0.50	0	1	124703
Leaving Certificate Points	376.01	117.03	0	625	124703
Distance to Nearest University (km)	55	55	0	283	124703
Distance to Nearest Non-University (km)	28	24	0	123	124703
University First Choice	0.67	0.47	0	1	124703
Median Points First Choice	446.51	82.23	100	625	124255
Enroll in College	0.71	0.45	0	1	124703
Enroll in University (if enroll in college)	0.59	0.49	0	1	88410
Median Points on Enrolled Program	410.88	86.26	100	625	88410

⁴ 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 (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.

⁵ Some non-universities are very small and/or specialized so, when calculating difference to the nearest non-university, we ignore the locations of 15 institutions who receive fewer than 100 first preferences per year.

3. Empirical Strategy

The specification we use is

$$y_i = \beta_0 + \sum_{j=2}^5 \gamma_{ju} D_{ju} + \sum_{j=2}^5 \gamma_{jn} D_{jn} + \delta' X + u$$

where y is the outcome variable and D_{ju} (D_{jn}) refers to distance in quintiles to the nearest university (non-university). X is a vector of controls including indicators for student age, year, a quadratic function of Leaving Certificate points, indicators for whether the student took each of the 27 most popular subjects in high school along with the grade achieved in each subject, and indicator variables for whether the student satisfies several common program requirements (many programs have subject and grade requirements that must be satisfied to enter the program). By controlling for these achievement variables, we can study differences in application behavior by distance category for students who are academically observationally equivalent in high school. We also control for school size and include indicators for whether the student attended a non-fee-paying secondary school, a fee-paying school, a community or comprehensive school, a vocational school, an Irish-medium school, a school designated as disadvantaged, and a same-sex or co-ed school. Additionally, we have control variables, measured in 2016 at the enumerative district level, relating to the affluence of the area in which the school is located.⁶

We study several outcome variables (y). First, for comparability with previous literature, we examine whether the student enrolls in any college ($y = 1$ if they enroll in a college and $y = 0$ otherwise). We then study two measures of selectivity based on the student's

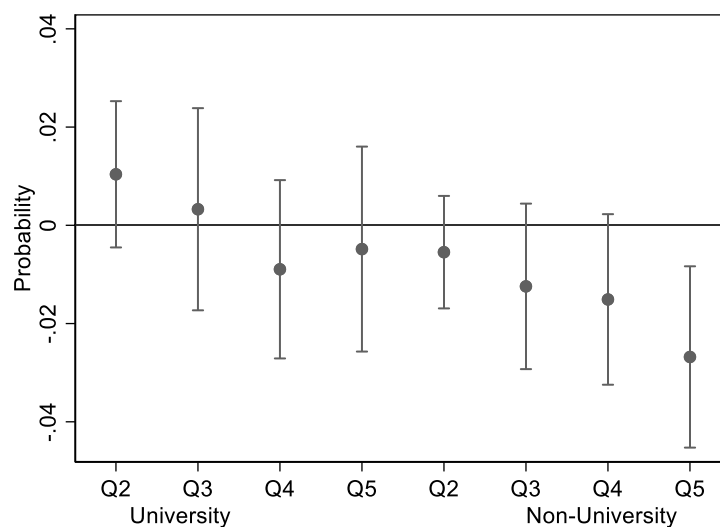
⁶ These variables include population, population growth, percentage of population aged under 15 or over 64 years of age, the percentage of population with a primary school education only, the percentage of population with a college education, the percentage of households with children aged under 15 years and headed by a single parent, the mean number of persons per room, the percentage of households headed by professionals or managerial and technical employees, including farmers with 100 acres or more, the percentage of households headed by semi-skilled or unskilled manual workers, including farmers with less than 30 acres, the male unemployment rate, the female unemployment rate, the percentage of houses that are rented from the local authority, the percentage of houses that are privately rented, and the percentage of houses that are owned.

top ranked program choice, irrespective of whether they are subsequently offered that program. The first dependent variable equals 1 if the student’s top ranked program is in a university and equals 0 otherwise. The second outcome measure is the median points (measured over the 3 years) of all persons starting the student’s top ranked program and so is a measure of the selectivity of the top ranked program. Moving beyond student preferences, we are also interested in the selectivity of the program into which the student enrolls. These variables are defined only for those who enroll in some college. The first of these outcome variables equals 1 if the student enrolls in a university and equals 0 if they enroll in some other type of college. The second outcome variable is the median points (measured over the 3 years) of all persons that started the program that the student enrolls in.

4. Results

We show the coefficients on the distance indicators from the regressions in pictures. First, we show (in Figure 1) that the distance variables have little meaningful relationship with whether students go to college (consistent with prior findings for the UK and Ireland but not for the US).

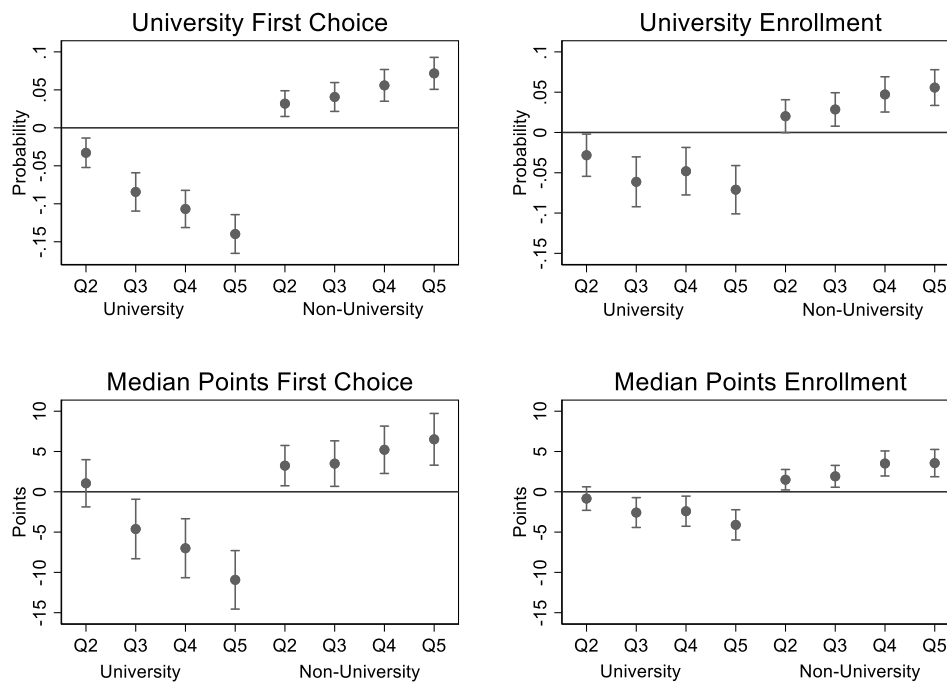
Figure 1: Effect of Distance to Nearest University/Non-University on Enrolling in any College



Note: The controls discussed in section 3 are included in all regressions. Robust standard errors clustered by school with upper and lower bars denoting upper and lower 95% confidence intervals. Q1 to Q5 refer to distance quintile with Q1 being the shortest distances and Q5 being the longest. Distances to the closest university and non-university are separately measured. Q1 is the omitted category for distance to both universities and non-universities.

However, distance has an important and monotonic relationship with the selectivity of the program ranked as first choice by students (if a student listed both level 6/7 and level 8 programs, we use the characteristics of the first listed level 8 program). In Figure 2, we see that being in the fifth distance quintile from a university (the furthest away) is associated with a 14 percentage points decrease in the likelihood of listing a university as first choice; being in the fifth distance quintile from a non-university is associated with an 8 percentage points increase in the probability of listing a university as first choice. When we study college enrollees (in the right panel of Figure 2), we see qualitatively similar but smaller associations, suggesting that the differences in preferences are somewhat mitigated by the allocation system. However, they remain large – the 6 percentage point gap in university enrollment between the first and fifth distance quintile to the nearest university is considerable given that we are comparing students who have the same achievement profile.

Figure 2: Effect of Distance to Nearest University/Non-University on College Application and Enrollment Outcomes

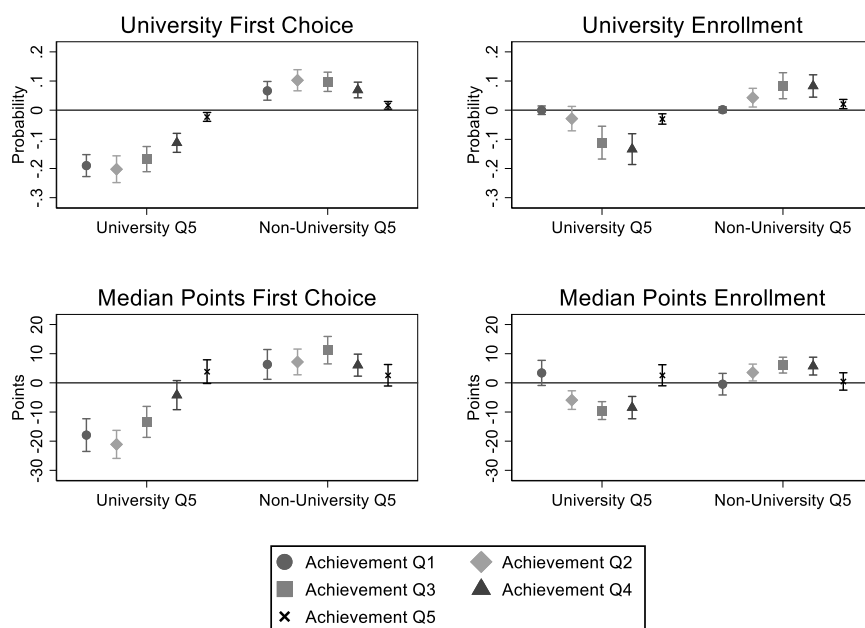


Note: The controls discussed in section 3 are included in all regressions. Robust standard errors clustered by school with upper and lower bars denoting upper and lower 95% confidence intervals. Q1 to Q5 refer to distance quintile with Q1 being the shortest distances and Q5 being the longest. Distances to the closest university and non-university are separately measured. Q1 is the omitted category for distance to both universities and non-universities.

When we look at program selectivity, we see that being located closer to universities and further from non-universities is related to listing first choice programs that have higher median points. As with institution selectivity, the pattern is similar for enrollees, but the magnitudes of the relationship are smaller.

Next, we split the sample by quintile of achievement, measured using Leaving Certificate points and we carry out separate regressions for each achievement quintile. For clarity, in Figure 3 we report estimates that show the difference of being in the fifth distance quintile relative to the first distance quintile. We show estimates for each achievement quintile, with “Achievement Q1” referring to the lowest achieving students and “Achievement Q5” referring to the highest achieving students. Interestingly, there is no significant relationship between distance and the selectivity of first choices for the highest achievers. Also, among enrollees, the relationship between distance and the selectivity of the program only exists for the middle achievement quintiles as low achievers tend not to get admitted to their top preferences.

Figure 3: Effect of Distance to Nearest University/Non-university by Achievement Quintiles



Note: The controls discussed in section 3 are included in all regressions. Robust standard errors clustered by school with upper and lower bars denoting upper and lower 95% confidence intervals. Separate regressions are estimated for each achievement quintile. “Achievement Q1” refers to the lowest achieving students and “Achievement Q5” refers to the highest achieving students. The estimates show the difference in being in the fifth distance quintile (furthest away) relative to the first distance quintile (closest) for both universities and non-universities.

5. Conclusions

In this paper, we have compared the application behavior of students who have the same college opportunities and prior achievement but vary in distance from the nearest selective and non-selective college. We find a relationship between distance and application behavior, with a large association between distance and the selectivity of institutions and programs chosen as first choices. The centralized applications system partially undoes this relationship, but there are still substantial enrollment differences by distance for persons in the middle of the achievement distribution.

Our research suggests a disparity in access to higher education opportunities based on geographic location with students in rural or remote areas disadvantaged compared to their counterparts who live closer to universities. Education policies can address these disparities by improving access to higher education for students in remote areas. This can include creating a more geographically dispersed university system (such as through creating satellite campuses), developing transportation initiatives to make commuting to university easier, providing housing subsidies that lessen the cost of moving away from home to go to university, or designing financial aid packages and scholarships specifically aimed at students from distant or underserved areas to reduce the financial burden of relocating or commuting. On the other hand, it is noteworthy that the centralized admissions system reduces geographic disparities as the geographic differences in enrolment are smaller than those in application behavior.

References

Belfield, Chris, Jack Britton, Franz Buscha, Lorraine Dearden, Matt Dickson, Laura van der Erve, Luke Sibieta, Anna Vignoles, Ian Walker, and Yu Zhu (2018). “The returns of different subjects and university choices in England,” Department for Education Report.

Cullinan, J., Flannery, D., Walsh, S. and McCoy, S. (2013). Distance Effects, Social Class and the Decision to Participate in Higher Education in Ireland. *The Economic and Social Review*, Vol.44, Issue 1.

Do, C. (2004). The effects of local colleges on the quality of college attended. *Economics of Education Review*, 23(3), 249–257.

Frenette, M. (2006). Too far to go on? Distance to school and university participation. *Education Economics*, 14(1), 31–58.

Gibbons, S. and A. Vignoles (2012). Geography, Choice and Participation in Higher Education in England. *Regional Science and Urban Economics*, Vol. 42, pp. 1-38.

Griffith, Amanda L. and Rothstein, Donna S. (2009). Can't get there from here: The decision to apply to a selective college. *Economics of Education Review*, Elsevier, vol. 28(5), pages 620-628, October.

Hoxby, Caroline M. and Christopher Avery (2013). The Missing ‘One-Offs’: The Hidden Supply of High-Achieving, Low Income Students. *Brookings Papers on Economic Activity* Spring: 1-65.

Figure A1: Map of Ireland showing location of Schools and Colleges

