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ABSTRACT

Excellence for All? University Honors Programs and Human Capital Formation*

Can public university honors programs deliver the benefits of selective undergraduate education within otherwise nonselective institutions? We evaluate the impact of admission to the Honors College at Oregon State University, a large nonselective public university. Admission to the Honors College depends heavily on a numerical application score. Nonlinearities in admissions probabilities as a function of this score allow us to compare applicants with similar scores, but different admissions outcomes, via a fuzzy regression kink design. The first stage is strong, with takeup of Honors College programming closely following nonlinearities in admissions probabilities. To estimate the causal effect of Honors College admission on human capital formation, we use these nonlinearities in the admissions function as instruments, combined with course-section fixed effects to account for strategic course selection. Honors College admission increases course grades by 0.10 grade points on the 0-4 scale, or 0.14 standard deviations. Effects are concentrated at the top of the course grade distribution. Previous exposure to Honors sections of courses in the same subject is a leading potential channel for increased grades. However, course grades of first-generation students decrease in response to Honors admission, driven by low performance in natural science courses. Results suggest that selective Honors programs can accelerate skill acquisition for high-achieving students at public universities, but not all students benefit from Honors admission.

JEL Classification: I21, I23, I26

Keywords: economics of education, higher education, university honors programs, regression kink design

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1 Introduction

Given the importance of college quality in adult outcomes (Dale and Krueger 2002, Dale and Krueger 2014, Andrews, Li and Lovenheim 2016, Chetty, Friedman, Saez, Turner and Yagan 2020), concerns over access to quality higher education have become paramount. Of particular interest are the outcomes of high-achieving students from underrepresented or socioeconomically disadvantaged backgrounds, who systematically under-enroll in higher quality institutions for which they are academically qualified (Hoxby and Avery 2013, Andrews, Imberman and Lovenheim 2020). Interventions targeting informational asymmetries, such as targeted informational packets or application help (Hoxby and Turner 2013, Carrell and Sacerdote 2017, Dynarski, Libassi, Michelmore and Owen 2021) and easing of borrowing constraints such as loans and scholarships (Solis 2017, Card and Solís 2021) have shown promise in increasing college enrollment. Improving college quality within otherwise nonselective colleges and universities also presents opportunities to improve the outcomes of high-achieving students.

Honors programs and honors colleges are one option towards promoting academic excellence within universities. Just as remedial education programs target students in the lower end of the college-readiness distribution, Honors programs and colleges target students on the upper end of the college-readiness distribution, i.e., students who are well prepared for the foundational curriculum offered by public universities. Honors programs and colleges typically offer elements of the academic experience available at smaller, highly selective colleges and universities, including small class sizes, a rigorous academic curriculum, and access to experiential learning and research opportunities. According to Scott and Smith (2016), approximately 1,503 higher education institutions across the United States had either an honors college (approximately 182 institutions) or an honors program (approximately 1,321 institutions).[1] Yet little research exists on the potential benefits of honors colleges or programs, none of which (to our knowledge) uses a rigorous approach to identifying causal effects.

This study examines whether an honors college within a large public university improves student outcomes. We use the universe of student records from the Oregon State University cohorts entering between 2005 and 2014. We identify the causal effect of honors admission by relying on the unique institutional features of the university's Honors College. In particular, admission to the Honors College depends in large part on a numerical score that summarizes the merits of each student's application. Nonlinearities in admissions probabilities as a function of this score allow us to compare applicants with similar scores, but different admissions outcomes, via a fuzzy regression kink design.

[1] Honors colleges function as distinct colleges within a university, while honors programs do not. The remainder of the paper uses the terms interchangeably, though our study focuses on an honors college.

The first stage is strong, with takeup of Honors College programming closely following nonlinearities in admissions probabilities, suggesting that this design allows for plausible identification of the causal effect of participation in OSU's Honors College on student outcomes.

To estimate the causal effect of Honors College admission on human capital formation, we use these nonlinearities in the admissions function as instruments, combined with course-section fixed effects to account for strategic course selection. We find that Honors College admission increases course grades by 0.10 grade points on the 0-4 scale, or 0.14 standard deviations. Effects are concentrated at the top of the course grade distribution. Previous exposure to Honors sections of courses in the same subject is a leading potential channel for increased grades, with peer interaction likely playing a more limited role. However, course grades of first-generation students decrease in response to Honors admission, relative to both non-first generation admitted Honors students and first generation Honors applicants denied admission. Grade declines among first generation Honors students are driven by low performance in natural science courses. Results suggest that selective honors programs can accelerate skill acquisition for high-achieving students at public universities, but not all students benefit from honors admission.

To our knowledge, ours is the first study of an honors college or program using plausibly exogenous variation in honors enrollment to estimate causal effects. Nonetheless, several prior studies have addressed the impact of university-level honors programs on student outcomes (Inkelas and Weisman 2003, Cosgrove 2004, Rinn 2004, Rinn 2007, Hébert and McBee 2007, Seifert, Pascarella, Colangelo and Assouline 2007, Slavin, Coladarci and Pratt 2008, Diaz, Farruggia, Wellman and Bottoms 2019, Brown, Winburn and Sullivan-González 2019, Patton, Coleman and Kay 2019). These studies sometimes rely on small samples of students (as few as 7 or 30 honors students, in the cases of Hébert and McBee (2007) and Cosgrove (2004), respectively), or suffer from other methodological flaws that conflate the causal effect of honors education with pre-existing differences between honors and non-honors students. Even when comparing students of similar abilities (Rinn 2007) or controlling for student characteristics (Slavin et al. 2008, Diaz et al. 2019, Brown et al. 2019, Patton et al. 2019), these studies risk attributing the impact of honors programs to unobserved differences in motivation, perseverance, or other qualities between honors and non-honors students.

Honors could confer two types of benefit to students. First, there may be signaling value to honors participation, beyond the value of the host university's degree. Honors admission from a competitive applicant pool may signal value to prospective employers or graduate degree programs. Second, honors may impart skills beyond those available to non-honors students at the university, accelerating the human capital formation of honors students. These signaling and human capital benefits are directly analogous to the potential benefits of higher education itself, in comparison to a high school diploma, or to selective versus nonselective universities.

Moreover, universities and society could benefit from honors. If student and college quality are complements, sorting students into universities by ability is efficient (Sallee, Resch and Courant 2008). But capacity constraints at selective colleges and widespread undermatching of students, particularly from low income or socioeconomic status households, suggest substantial frictions in this sorting mechanism (Hoxby and Avery 2013, Smith, Pender and Howell 2013). By facilitating better matches and providing a credible signal of degree quality *within* universities, honors could improve both efficiency and equity in higher education. At public universities, honors could also therefore generate greater returns for public investment.

Nonetheless, our finding of heterogeneous impacts of Honors admission on course grades, with grade declines among first generation students, suggests the potential for honors to promote equity across demographic groups is not assured. Our work therefore extends the literature on student match quality across universities (Smith et al. 2013, Dillon and Smith 2017, Dillon and Smith 2020) by identifying an example of potential overmatching within a university. In that sense, this study also relates to research on match quality between students and academic majors (Arcidiacono 2004, Altonji, Arcidiacono and Maurel 2016, Wiswall and Zafar 2014).

Because our data are limited to academic outcomes within Oregon State University, our results are not directly comparable to the literature estimating the labor market returns to attendance at selective universities. However, the advantage of our focus on academic outcomes is its isolation of the potential human capital benefits of the Honors College, as the signaling channel is unlikely to play a large role within the university. We further strengthen this focus when estimating the returns to Honors College admission *within* course sections, by removing the role of strategic course selection, instructor quality, and other potential confounds. By contrast, standard estimates of labor market returns conflate the signaling and human capital channels. Our finding of positive effects of Honors College admission on human capital formation suggests subsequent labor market benefits even in the absence of signaling value from an Honors degree.

2 Setting

2.1 Theoretical framework

To frame our analysis of the impact of honors on human capital accumulation, we adapt the Kaganovich and Su (2019) model of quality differentiation across universities via curricular standards. Consider a university with two programs, $p \in \{H, N\}$, for Honors and Non-honors. Each program is characterized by a minimum curricular standard c_p and a rate of human capital accumulation b_p. A student of academic ability a accumulates human capital h within each program according to the function:

$$h_p(a) = \begin{cases} b_p(a - c_p) & \text{if } a \geq c_p \\ 0 & \text{if } a < c_p \end{cases} \quad (1)$$

In other words, students failing to meet the program's minimum standard accumulate no human capital. Students meeting the standard accumulate human capital at rate b_p. We assume Honors is the more selective and rigorous program, hence $c_H > c_N$ and $b_H > b_N$.

Figure 1 depicts the relationship between academic preparation and human capital accumulation in each program. Students with preparation $a > a^*$ accumulate more human capital in the Honors program, while students with preparation less than a^* accumulate more human capital in Non-honors. Efficient sorting based on academic preparation maximizes the stock of human capital generated at the university.

2.2 Oregon State University Honors College

Oregon State University (OSU) is the largest university in the state, enrolling more than 32,000 students (82 percent undergraduate) across its flagship and regional campuses and its online E-campus program. The university admits more than 80 percent of undergraduate applicants. Undergraduates entered fall 2021 with an average ACT score of 25 (79th percentile) and high school GPA of 3.6. Undergraduate non-white enrollment is 38 percent (12 percent Hispanic). The undergraduate student body is 71 percent Oregon residents and 48 percent female.

The OSU Honors College seeks to promote academic excellence within an otherwise nonselective university, offering "all the benefits of a small college experience with all the opportunities of a premier research university."[2] The Honors College is a degree-granting college within the university, meaning students admitted to the College and satisfying its requirements earn bachelor's degrees designated as "Honors" (HBA/HBS, rather than the standard BA/BS). Honors classes are of two types: 1) Honors sections of existing courses (e.g., Honors Principles of Biology), and 2) courses unique to the Honors College. To earn an Honors degree, students must maintain a GPA of 3.25 or higher, complete at least 30 credit hours in Honors courses, and complete an Honors thesis. In addition to these academic experiences, the Honors College offers programs such as invited lectures and other events, a residence hall for entering students, and academic advising specific to Honors students.

[2] `https://honors.oregonstate.edu/book/future-students`. Accessed February 10, 2022.

The OSU Honors College has grown from 1,187 students in 2017-2018 to 1,494 in 2020-2021, with a projected steady state of 1,800 students in coming years. First-year admissions have similarly risen from 262 students in 2015-2016 to 537 in 2020-2021. These students span all majors at the university, with majors in the Colleges of Engineering and Science among the most popular. As of 2016, eighty-one percent of Honors students were Oregon residents, 59 percent were female, and 21 percent were non-white (8 percent Hispanic). The median ACT among first-year classes is above 30 (93rd percentile), along with nearly universal average high school grades in the A range. The Honors College charges a tuition premium of $1,500 per academic year above standard tuition ($12,444 annually for Oregon residents in 2021-2022). This tuition premium is another reason why estimating the returns to Honors admission is an important question.[3]

2.3 Honors College admissions

Admission to the Honors College follows a process distinct from admissions for the university, with an additional application and separate admissions committee. Students may apply for Honors College admissions at any point prior to reaching junior (third-year) status. Applications arrive in two batches, an early round and primary round. The Honors College evaluates applications for first-year student admission through a process separate from applications from current OSU students and transfer students from other universities. For simplicity, we consider only first-year applicants.

The Honors College assigns each application a score on a continuous scale of 0-65, using the following rubric:

1. High school GPA: 0-20 points.

2. Standardized test score (SAT or ACT): 0-20 points.

3. Essay: 0-20 points. The essay requires students to respond to a prompt which varies each year. Scores are assigned by a committee of faculty, staff, graduate student, and alumni readers.

4. Multicultural experience: 0-5 points. Applicants earn points through multiple experiences such as living or traveling abroad, extensive experience working in or living with diverse subcultures, and multicultural lived experiences. An Honors College admissions officer assigns scores following a rubric.

[3] Differential tuition for Honors students may affect selection into the sample of applicants. Because most of our analysis excludes non-applicants from the sample, this form of selection would not affect the internal validity of our estimates. Selection into the applicant sample would affect external validity, however, suggesting caution in extrapolating results outside the applicant sample.

The admissions committee decides on each application individually, but relies heavily on application scores. See Appendix A for additional details on admission decisions. With high probability, applicants with low scores are denied and high scores are admitted. Over an intermediate range of scores, admission is less certain. Within these ranges, the admissions committee discusses application materials in more detail before arriving at a decision. In principle, this process generates a range of intermediate scores over which applicants with similar qualifications face different admissions outcomes.[4]

The application score therefore serves two essential purposes in our evaluation. First, the score provides a rich source of information on student quality prior to entering the university. The essay and multicultural experience components augment more common measures of academic preparation such as high school GPA and standardized test scores. The essay and multicultural experience components are assessed by university "insiders" and are likely similar to assignments students will encounter in college courses. The application score may therefore capture aspects of student quality which would otherwise go unobserved. Second, the admission process provides plausibly arbitrary variation in admission outcomes within an intermediate range of application scores. We rely on this variation to identify the causal effect of Honors College admission on academic outcomes.

3 Data

3.1 Sample characteristics

Our data come from two sources within Oregon State University. The Honors College provided application scores for all its applicants from 2005-2015. The Office of the Registrar provided data on all students who attended OSU from 2005-2014, including demographics, transcripts, and degree completion. Merging these sources yields a dataset with academic outcomes and Honors College application scores for all students who attended OSU between 2005-2014. We further restrict our main sample to Honors College applicants for first-year admission. For repeat applicants, we consider only the first application. We classify students as "admitted" and "denied" based on this initial application outcome.

Sample sizes appear in Table 1. We split students into five categories based on Honors application status and OSU attendance. Our analysis sample includes Honors applicants who attended OSU, of whom 1,647 were admitted (column 2) and 1,425 were denied (column 4), for a total

[4]Our informal discussions with Honors College admissions committee members confirm this description. Applications with very low or high application scores generate little discussion unless a committee member requests closer inspection. Committee members report lively discussions, difficult choices, and no clear decision rule for applications with intermediate scores.

sample of 3,066. We show other columns to indicate the size of our estimation sample relative to the other groups.

Summary statistics for the analysis sample appear in Table 2. Compared to students whose applications were denied by the Honors College, admitted students are more likely to be female, Asian/multiple ethnicity, and nonwhite, and less likely to be a first generation student. Not surprisingly, admitted students score higher on their applications, by an average of 12 points on the 65-point scale. Among denied students, 10 percent subsequently apply, with 7 percent eventually gaining admission.[5] Admission is decisive in taking subsequent Honors courses, with 91 percent of admitted students taking at least one Honors course, compared to 7 percent of denied students. Similarly, 60 percent of admitted students earn an Honors degree, versus 7 percent of denied students. Honors admission therefore strongly predicts Honors course exposure and degree attainment.

Other academic outcomes also differ significantly between admitted and denied students. Admitted students earn higher grades at Oregon State, with the gap in grade point average (GPA) roughly equivalent to an A- average compared to B+. Admitted students take more credit hours, with the gap largely explained by differences in Honors credits. Admitted students have a higher graduation rate, including significantly higher likelihood of graduating within five and six years.

Applicants to the Honors College likely possess a combination of greater academic motivation and access to information than other Oregon State University students. (We report differences between Honors College applicants and other OSU students in Table A1.) Nonetheless, Table 2 shows that restricting the sample to Honors College applicants is insufficient to remove differences in observable characteristics between admitted and denied students. Simple comparisons between admitted and denied students are therefore likely confounded by underlying characteristics, both observed and unobserved. A sound identification strategy for the causal effect of Honors admission on academic outcomes must credibly account for these potential confounding factors.

3.2 Honors applications and admissions

Figure A1 shows the distribution of Honors application scores, separately by admission status. As expected, the distribution of admitted student scores lies well to the right of the denied score distribution. Despite these differences, the distributions overlap across a range of intermediate scores. This overlap suggests the sample contains a relatively large number of similarly qualified students who faced different Honors admission outcomes.

Figure 2 maps application scores to the probability of admission within bins of one application point. Scores below 40 appear to have little chance of admission, while scores above 50 are accepted

[5]Subsequent admission may be as a first-year, transfer student, or current OSU student.

with near certainty. Between these ranges of low and high scores, applicants enjoy a steep gradient of increasing admissions. The histogram (gray bars) in the figure shows a relatively high density of applicants within this intermediate range. Our identification strategy builds on these characteristics of the admissions process.

4 Methodology

Honors College admission decisions depend heavily on the application score. With high probability, applicants with low scores are denied and high scores are admitted. Over an intermediate range of scores, admission is more uncertain, with a steep gradient in the probability of admission.

This structure motivates a fuzzy regression kink design (RKD), with application score S as the running variable and Honors College admission, A, as the first-stage outcome. Two features of the setting make this a nonstandard application of fuzzy RKD, however. First, there are two kink points, bracketing the lower and upper threshold scores of admissions uncertainty. We will denote these points by the vector $\delta = (\delta^-, \delta^+)$. Second, the kink points δ are unknown, and therefore must be estimated.

Our first-stage equation is:

$$\begin{aligned} A_{ic} = \beta_0 + \beta_1 \cdot (S_{ic} - \delta^-) + I(\delta^- \leq S_{ic} \leq \delta^+) \times \left[\beta_2 + \beta_3 \cdot (S_{ic} - \delta^-)\right] \\ + I(S_{ic} > \delta^+) \times \left[\beta_4 + \beta_5 \cdot (S_{ic} - \delta^+)\right] + \gamma_c + \varepsilon_{ic} \end{aligned} \quad (2)$$

where i indexes students; c indexes cohorts; $I(\cdot)$ is the indicator function; γ is a cohort fixed effect; and ε is an error term.[6] In other words, we fit a linear spline in the application score, divided into three regions with boundaries at the kink points δ. Each segment of the spline can have a distinct intercept and slope. Centering scores on the kink points facilitates interpretation of parameters as marginal effects on the the probability of admission. The key parameters are (β_2, β_3), which capture changes in the intercept and slope in the intermediate region of scores with uncertain admissions outcomes.

The identifying assumption is a continuous, linear relationship between application scores and academic outcomes in the absence of Honors College admission. To make this assumption less restrictive, we also allow for differences in the relationship between scores and outcomes for particularly high scores, via the parameters (β_4, β_5).

[6] Data on early versus primary application round is available only for the 2010 and later cohorts. The number of early round applications in each cohort is relatively small, with as few as 28 early applicants in some cohorts, making inclusion of cohort-by-round fixed effects infeasible. We check robustness of our first-stage estimates to exclusion of early round applicants and for selection on early round status.

The reduced form version of the second stage replaces admissions outcomes with academic outcomes on the left-hand side of equation (2). Conditional on a strong first stage for Honors College admissions, we interpret a kinked shape of the reduced form within the range $\delta^- \leq S \leq \delta^+$ (i.e., rejections of the null hypothesis $H_0: \ \beta_2 = \beta_3 = 0$) as evidence of a causal effect of Honors College admissions on outcomes.

A strong first stage also motivates a two-stage least squares (2SLS) version of the second stage, in which we instrument for admission with the dummy for intermediate scores, $I(\delta^- \leq S \leq \delta^+)$ and its interaction with the (centered) application score:

$$y_{ic} = \alpha_0 + \rho A_{ic} + \alpha_1 \cdot (S_{ic} - \delta^-) + I(S_{ic} > \delta^+) \times \left[\alpha_2 + \alpha_3 \cdot (S_{ic} - \delta^+)\right] + \gamma_c + \varepsilon_{ic} \tag{3}$$

where y is an academic outcome. The coefficient ρ estimates the local average treatment effect for Honors College applicants whose admissions outcome depended on the shape of equation (2) over the range of intermediate application scores.

Our specification closely follows Clark and Del Bono (2016), who study elite UK secondary schools with a similar admissions structure. Unlike their setting, however, in our case the kink points δ are not set explicitly, but arise naturally in the admissions process. To estimate δ, we develop an algorithm to solve:

$$\min_{\beta,\delta} \sum_{i=1}^{N} \left[A_{ic} - A(\beta, \delta | S_{ic})\right]^2 \tag{4}$$

where $A(\beta, \delta | S_{ic})$ is the first stage equation (2). In other words, we choose parameters to minimize the mean-squared error (MSE) of the first stage.[7] The approach extends Hansen (2017), whose RKD estimator minimizes the MSE for an unknown kink point, to the case of two unknown kink points.

To solve the minimization problem in (4), we apply the expectation maximization (EM) algorithm to our context. The algorithm fixes candidate kink points within a search grid (expectation step), then estimates the regression parameters of the first stage by treating the kink points as known (maximization step). The full algorithm is:

1. *Initialize δ.* Choose initial kink points $\delta_0 = (\delta_0^-, \delta_0^+)$ by visual inspection of the first stage relationship between application scores and admissions outcomes.

2. *Set a search grid for δ.* Choose a radius r to set the search grid, $\Gamma = [\delta_0 - r, \delta_0 + r]$. We set $r = 5$, but check robustness of our main first stage results to $r = 10$.

[7] In principle, we also must choose the cohort fixed effects γ. In practice, we avoid estimating γ directly by demeaning outcomes by cohort prior to estimation.

3. *Expectation step.* Fix a candidate (δ^-, δ^+) integer pair within the search grid Γ.

4. *Maximization step: estimate first stage.* Estimate the first stage equation (2), treating δ as known from the expectation step. Record the mean-squared error (MSE) of the result.

5. *Repeat steps 3-4 for the entire search grid.*

6. *Find MSE-minimizing parameters.* Choose estimates $\hat{\beta}, \hat{\delta}$ to solve equation (4).

To estimate standard errors, we bootstrap estimates of (β, δ) by resampling applicant cohorts in their entirety to form a synthetic sample, then applying the EM algorithm to solve equation (4) for each bootstrap replication. This block bootstrap approach accounts for both the sampling variation from using estimates of δ in the maximization step, and for potentially correlated outcomes within cohorts. For outcomes other than the first stage equation (2), we calculate p-values using the wild cluster bootstrap (Cameron, Gelbach and Miller 2008, Roodman, Nielsen, MacKinnon and Webb 2019).

5 Results

5.1 First stage

Table 3 reports results from estimating equation (2), the first stage relationship between Honors College application scores and admission. We report estimates of the key parameters: the changes in intercept and slope over the range of intermediate scores (β_2, β_3) and the kink points $\delta = (\delta^-, \delta^+)$. We initialize the kink points by visual inspection of Figure 2 at $\delta_0 = (40, 53)$, then search over a grid of radius $r = 5$. To calculate standard errors, we block bootstrap by cohort over 500 replications. We also report the F statistic on the joint hypothesis $H_0: \ \beta_2 = \beta_3 = 0$, a measure of the strength of the first stage. We graph results in Figure A2.

In Table 3, column (1) we find changes in intercept and slope of 0.166 and 0.081, respectively, for intermediate application scores in comparison to low scores. In other words, moving into the intermediate range of scores increases the probability of admission by 16.6 percentage points, relative to a mean of 54 percent. Each additional application point in this range increases the probability by 8.1 percentage points, or 15 percent of the mean. The first stage is strong, with the slope parameter statistically significant at 1% and a first-stage F statistic of 51. The estimated kink points $\hat{\delta} = (44, 51)$ differ from the initial values and are precisely estimated. In fact, the 95% confidence interval for $\hat{\delta} = [40.1, 52.8]$ does not include the initial value δ_0, demonstrating the value of our procedure to estimate the kink points.[8]

[8] We calculate the 95% confidence interval as $[\hat{\delta}^- - 1.96 \cdot se(\hat{\delta}^-), \hat{\delta}^+ + 1.96 \cdot se(\hat{\delta}^+)]$.

The top left panel of Figure A2 shows these results, with predicted probabilities in the gray line and estimated kink points in the vertical red lines.[9] The marginal application point in the intermediate range is quite valuable compared to the marginal point in the low and high ranges. Students scoring 46 probably differ little, on average, from those scoring 45, but face strikingly different admissions probabilities. The abrupt change in admission probabilities over the intermediate range of application scores is the basis of our identification strategy.

Nonetheless, the graph also shows the poor fit to the data for very low scores, which occur with low frequency. In Table 3, columns (2)-(3) we focus on a narrower range of scores. By dropping outlying scores when estimating the first stage, these specifications are equivalent to local linear regressions with uniform kernels, restricted to bandwidths delineated by the kink points. Point estimates are similar as for the full sample, but the visual fit to the data improves greatly (Figure A2, second and third column of top row). The remaining columns of Table 3 assess robustness to including predetermined covariates, dropping early round applicants, increasing the kink point search radius to $r = 10$, and including applicants who did not attend OSU.[10] Point estimates for the change in slope for intermediate scores and the kink points remain stable and precisely estimated across all specifications. All first-stage F statistics round to 40 or above.

We prefer the first-stage specification in column (3), which restricts scores to the range [30,55]. This specification provides a close fit to the data (Figure 3) and focuses on a range of scores with both high density and high variation in admissions probabilities. In what follows, we restrict the estimation sample and set the kink points to $\hat{\delta} = (44, 50)$ to match this specification. The sample falling into this intermediate score range includes 1,129 students.

5.2 Selection and takeup

In addition to checking the robustness of the first stage, we also conduct a series of falsification tests. Manipulation of application scores at the kink points would be strange, as the admissions committee did not consciously choose these points, nor can applicants know them in advance. Nonetheless, we follow standard practice in regression discontinuity and regression kink designs and test for discontinuities in the application score density at the estimated kink points (McCrary 2008, Cattaneo, Jansson and Ma 2018). The top left panel of Figure 4 plots the score density. The density appears continuous at the left kink point, with suggestive visual evidence of bunching at the right kink point, perhaps because a score of 50 represents a psychological threshold for application

[9] Outcomes in the figure are demeaned by cohort, consistent with the use of cohort fixed effects in estimation. Demeaning leads some outcomes to fall outside the unit interval.

[10] Covariates in column (4) include age at time of application and dummies for female, US citizen, underrepresented minority, Asian/multiple ethnicity, and first generation student. In column (5), data on application round is available only for the 2010 cohort and later.

reviewers. Nonetheless, density tests fail to reject the null of a continuous density at each kink point (p-values of 0.52 and 0.46, respectively).

Another set of concerns involves non-random sample selection. In our context, student characteristics should not follow the same shape as the first-stage relationship between the application score and admission. The remainder of Figure 4 graphs a series of placebo tests based on this idea, with full results in Table A2.

Our main sample excludes applicants who did not attend OSU, because we lack data on academic or other outcomes for these students. The second column, first row of Figure 4 uses the full sample of applicants to plot the probability of OSU attendance as a function of application scores. The figure shows no apparent change in the gradient of OSU attendance across the kink points. Although there is some visual evidence for selection of early applicants (Figure 4, third column of first row), bootstrapped p-values for changes in the the slope and intercept at the kink points fail to reject the null of zero.

The remainder of the first three rows of Figure 4 show placebo tests for predetermined student characteristics (Engineering and Science in the third row refer to the student's college of admission, as OSU applicants must indicate their preferred major when applying). Across all characteristics, the gradient with application scores is very smooth across kink points. These tests increase our confidence that the first stage pattern is unique to Honors College admission, not reflective of other characteristics or choices.

The final row of Figure 4 plots the total application score against each of its individual components. Although a discontinuous gradient in score components would not necessarily invalidate our identification strategy, it would be useful to know if our RKD approach relies on some admissions criteria more than others. The gradients for standardized test score, high school GPA, and essay score are essentially flat. We see a slight decline in the gradient for multicultural experience score across the range of intermediate total scores, with the slope and intercept jointly significant (p=.05; Table A2, Panel C, column 4). We may therefore be concerned that our approach conflates kinks in the gradient of Honors admissions probabilities with student socioeconomic characteristics. However, the continuous gradient in demographic characteristics shown elsewhere in Figure 4, including underrepresented minority, Asian/multiple ethnicity, and first generation status, suggest this is not the case. Instead, the application score seems to capture a range of admissions criteria, as intended.

In Figure 5, we check whether takeup of opportunities available to Honors College students follows a similar pattern as the first stage for admissions. The outcome in the top left panel is whether the student was ever admitted to the Honors College, inclusive of all applications in the dataset. If the gradient for ever gaining admission were smooth across the kink points, we would be concerned that the estimated first-stage effect was undone by subsequent applications. The graph shows this is not the case. All other takeup measures—taking any Honors course, taking an Honors section of an Honors/non-Honors course pair,[11] number of Honors credit hours taken, living in the first-year Honors residence, and earning an Honors degree—exhibit the same kinked shape as the first stage. Numerical results in Table A2, Panel D confirm that changes in the slope between the kink points for these outcomes are large relative to the mean and statistically significant.

The similarity between the gradient for Honors College admission and participation in Honors College activities provides further confidence in our identification strategy. If we find a similar pattern in the gradient between application scores and other outcomes, we suspect Honors College admission to have played a central role.

5.3 Academic outcomes, student level

The first set of academic outcomes we analyze are observed once for each student, such as cumulative GPA and graduation. Table A3 reports estimates of the reduced-form and 2SLS equations (2) and (3) for these outcomes, with graphs of the reduced form in Figure A3. We find few statistically significant estimates for our coefficients of interest. In particular, we find no evidence that Honors College admission affects cumulative GPA (overall or when isolating non-Honors courses), graduation, or earning a degree from the Colleges of Science or Engineering. Honors College admission is unrelated to total credit hours but leads to fewer non-Honors credits, reflecting substitution of Honors credits to meet requirements for earning an Honors degree. We find a statistically significant decline of 6 percentage points in the probability of graduating within six years, a puzzling result.[12] We do not place high confidence in this estimate, however, as the decline fails to appear in the reduced form, and 95% of graduates complete their studies within 5 years. Overall, the results suggest little effect of Honors admission on these basic academic outcomes, which is unsurprising given the sample consists of high-achieving students regardless of admission.

5.4 Course grades

Does Honors College admission increase course grades? Student transcript data allow us to address this question at a granular level. The question is challenging to answer, however, because Honors students differ from non-Honors students in both their characteristics and course choices. Table A4

[11] Honors/non-Honors course pairs share a subject code, course number, and learning outcomes, but one section is designated Honors (for instance, ECON 201 and ECON 201H). For comparability, we further restrict course pairs to being offered in the same academic term and excluding research, seminar, or "Special Topics" courses which may differ within course pairs.

[12] A university administrator suggested that Honors student participation in industry-sponsored co-op programs in Civil Engineering and Business might explain this result. We cannot observe co-op participation in our data. However, dropping students in eligible degree programs does not change results (available upon request).

shows descriptive statistics from the transcripts of Honors College applicants. The unit of analysis is the student-course section, i.e., each observation represents one course in which an applicant enrolled at OSU. The dataset contains 128,328 observations. Admitted and denied Honors applicants differ greatly in course enrollment and results.

To estimate the impact of Honors admissions on course grades, we continue to restrict the sample to Honors applicants with scores $30 \leq S \leq 55$. To avoid confounding Honors application scores with differences in course preferences and strategic course enrollment, we augment the reduced-form and 2SLS equations (2) and (3) with course section fixed effects. The course section fixed effect accounts for a host of potential confounds, including course subject, level, instructor, class size, peer composition, academic year and term, and class days and times. In other words, we compare students who applied to the Honors College at the same time and now find themselves within the same classroom. The remaining variation in application scores plausibly isolates the exogenous variation in Honors admission probabilities identified in the first stage. Differences in grades earned within the same section reflect differences in skills.

Reduced-form estimates of equation (2) for course grades using transcript data appear in Figure 6. Grades increase with application scores, as expected. The lone exception is Honors courses, for which grades generally decline with application score in the low range of scores, perhaps because low-scoring applicants who select Honors courses are particularly strong in the chosen subjects. The course grade-application score gradient increases slightly across the intermediate range of scores for all types of courses shown. For Honors courses, the gradient shifts from negative to positive when crossing into the intermediate score range.

Numerical estimates appear in Table 4, Panel A. For the sample of all courses, the increase in slope for intermediate scores (β_3 in equation (2)) is 0.012, significant at 1%. This magnitude may appear small, but notice it captures only the non-linearity of a one-point change in application score over a narrowly defined range of scores corresponding to increased probability of Honors admission. The gradient has a similar magnitude and is precisely estimated for the other course types.

The reduced-form estimates for course grades follow our regression kink design, but do not directly quantify how Honors admission affects course grades. Table 4, Panel B shows two-stage least squares (2SLS) estimates of equation (3), where we instrument for Honors admission using the change in intercept and slope for intermediate application scores.[13] In the full sample of courses, Honors admission increases grades by 0.10 points, significant at 1% (Panel A, column 1). This magnitude is more than half the distance from the mean course grade (3.52) to a grade of A- (3.7).

[13] We cluster standard errors by course section via 500 block bootstrap replications, because we could not compute one-step instrumental variables estimates due to the large number of course section fixed effects.

Alternatively, the magnitude is 0.14 standard deviations.[14] The results are driven by non-Honors and lower division courses (numbered 299 or below, for introductory level; columns 4-5).

5.5 Course grade distribution, failure, and withdrawal

Impacts on average course grades may mask changes due to Honors College admission at other points in the course grade distribution. Because course grades are discrete, as outcomes we use indicators for course grades at least as high as each possible value in the transcript data (A, A-, B+, etc.). Table 5 shows reduced-form and 2SLS estimates (equations (2)-(3)) for these outcomes. In the reduced form, the gradient in intermediate application scores increases significantly for grades of at least A, A-, and B+. Point estimates are not statistically distinguishable from zero for grade thresholds below B, with steadily declining coefficients throughout the grade distribution. Figure A4 plots the reduced-form estimates for selected grade thresholds. In Table 5, Panel B, the 2SLS estimates mirror this pattern. Honors admission increases the likelihood of receiving an A, the highest grade, by 9.4 percentage points, significant at 1%. The Honors admission impact declines steadily for lower grade thresholds. In sum, Honors admission impacts the top of the grade distribution, as may be expected given the high-achieving students in the program.[15]

Failing or withdrawing from a course are also outcomes of interest. Figures A5 and A6 show reduced-form estimates for these outcomes, with numerical estimates in Table A5, Panels A-B. Course failure is generally continuous across the full range of application scores. The course withdrawal gradient increases modestly for intermediate scores. For the full sample, the change in slope for intermediate scores is .0013 (significant at 1%), about one tenth the course withdrawal rate of 1.6%. The magnitude doubles to .0027 for upper division courses (also significant at 1%). Students often withdraw from courses to avoid the likelihood of a poor grade appearing on their transcript. Honors College exposure may make students more sensitive to poor course outcomes, in order to remain in good standing within the College. Sensitivity to low grades may be greater for upper division courses as students prepare for the job market or graduate studies.

The increase in course withdrawal along the application score gradient suggests that our estimated grade effects may be inflated by missing grades from withdrawn courses. When imputing failing grades in place of course withdrawal, our estimates for course grades attenuate, but remain statistically significant for all but upper division courses (Table A5, Panel C).

[14] Calculated as 0.104/0.737, where the denominator is the standard deviation of grades in the estimation sample.

[15] Results follow the same pattern and are more precise when excluding Honors courses, given the compressed grade distribution in Honors courses. Results not shown but available upon request.

5.6 Alternative specifications

If the first stage regression kink design specification is invalid, our impact estimates may be biased. In this subsection, we probe robustness to alternative specifications.

In Table A6, we regress course grades on a dummy for Honors admission, with increasingly stringent identification restrictions across specifications. Column (1) reports the simple OLS regression without controls, to measure the unconditional difference in course grades between admitted and denied Honors College applicants. This unadjusted difference is 0.276 grade points. When adding course section fixed effects in column (2), the point estimate is similar and in fact slightly larger. Persistence of grade differences within course sections without additional controls suggests that the superior grades of admitted students are not driven by strategic selection of courses. Column (3) adds a full set of application score dummies, meaning we compare students with identical scores but different admission outcomes. The point estimate falls to .075, but remains very precisely estimated. Additional restrictions in the remaining columns—restricting to scores in the intermediate range $44 \leq S \leq 50$, including additional covariates, restricting to non-Honors courses, and imputing failing grades for course withdrawal—result in precisely estimated treatment effects of around 0.10 grade points, very similar to our RKD estimates.

We draw two conclusions from Table A6. First, the effect of Honors admission on course grades is highly robust to alternative specifications. Second, Honors College admission accounts for at least one-fourth, and perhaps more than one-third, of the unadjusted grade difference between admitted and denied applicants. As a final alternative specification, we use inverse propensity score-weighted (IPW) regressions (Hirano, Imbens and Ridder 2003, Abadie 2005). Propensity score methods assume potential outcomes are independent of treatment, conditional on the propensity score, in this case the probability of Honors College admission. Although the method assumes selection on observable characteristics, the application score provides a rich source of information. We further augment the application score with predetermined student characteristics to estimate the propensity score. Specifically, we run a logistic regression of Honors admission on the same function of the application score as equation (2), plus controls for each component of the application score and dummies for female, underrepresesented minority, Asian, first generation student, US citizen, age at application, early application, and cohort. We then trim the sample to scores $44 \leq S \leq 50$, for consistency with our RKD approach and to benefit from the superior performance of reweighting relative to matching when overlap in the density of propensity scores is good (Robins and Rotnitzky 1995, Busso, DiNardo and McCrary 2014, King and Nielsen 2019). With appropriate choice of weights, this approach facilitates estimation of the average treatment effect (ATE), treatment on the treated (ATT), and treatment on the untreated (ATU).

Table A7 presents results of these IPW regressions. For the full sample, the ATE of Honors admissions on course grades is 0.125 (Panel A, column 1). The ATT is 0.106, nearly identical to the 2SLS estimate in Table 4. The ATU of 0.148 is even larger than the ATT, suggesting denied applicants would gain more from Honors admission than the students actually admitted. The remaining columns of Table A7 follow a similar pattern, with positive and precise point estimates for all subsamples (except Honors courses), and larger estimates of the ATU than ATT. We conclude that Honors admission increases course grades across a range of alternative identification strategies.

5.7 Heterogeneous treatment effects

Honors College admission may influence outcomes differently among different types of students. To explore this possibility, we allow the effect of Honors admission to differ by whether the student is female or first generation.[16] We augment the 2SLS equation (3) by including the main effect of female or first generation, and interactions between all application score terms and this characteristic in the first stage. In the second stage, we instrument for Honors admission and its interaction with the female or first generation indicator, using all intermediate application score terms from the first stage. This specification relies on a similar identification strategy as the 2SLS estimates reported in Table 4, with additional variation from allowing the first-stage RKD specification to vary by a student's observable characteristics.

Table 6 reports results. The first column uses transcript data, allowing us to include fixed effects and to cluster standard errors by course section. In Panel A, we find no differential effects of Honors admission for females. Columns (2)-(8) use student-level data for cumulative GPA and graduation outcomes. Below each coefficient, we report standard errors clustered by cohort (in parenthesis), and p-values calculated by 500 replications of the wild-t bootstrap (in brackets), to account for the small number of clusters. Again we find no evidence of differential effects for female students.[17]

For first generation students, we find a differential negative effect of 0.26 points on course grades, significant at 1% (Panel B, column 1). This result implies that Honors admission reduced course grades by more than a quarter of a GPA point for first generation students relative to non-first generation students. Moreover, the sum of the main effect and interaction is also negative and statistically significant, implying that Honors admission reduced course grades of first generation students relative to observationally similar first generation applicants denied admission. Despite

[16] We were also interested in differential effects for underrepresented minorities (URM), but only 46 URM students who attended OSU had application scores in the intermediate range, limiting statistical power and leading to weak instruments.

[17] Weak instruments in some specifications limit the validity of the corresponding inferences.

these lower grades, we find no evidence of differential graduation outcomes for first generation students in response to Honors admission (columns 2-8).

The result for course grades is consistent with first generation Honors students having less academic preparation than necessary to benefit from the faster rate of human capital accumulation offered by the Honors College. These students are overmatched relative to the curriculum (Sallee et al. 2008, Dillon and Smith 2017), as in our theoretical framework (Figure 1). However, the finding is robust to including controls for high school GPA and standardized test score (Table A8), suggesting we are not just picking up differences in academic skills between first generation and non-first generation students. Instead, first generation students might lack the tacit knowledge necessary to benefit fully from Honors admission.[18]

The large and negative effects on course grades for first generation students in response to Honors admission warrants further exploration, which we pursue in Table 7. One possible explanation is that first generation students do not perform as well in potentially more demanding Honors courses. However, declines in course grades among first generation students are limited to non-Honors courses (Panel A, columns 1-2). Or perhaps first generation students struggle in introductory courses due to lack of familiarity with college. However, we find larger grade declines in upper division courses (columns 3-4). A third possibility is that first generation students enroll in more difficult courses. We fail to find evidence for this hypothesis, using median course grade among non-applicants to the Honors College as the measure of difficulty (column 5). In Panel A, columns (6)-(10), we find that declines in grades for first generation students stem from lower proportions earning top grades, rather than differences in course withdrawal or DFW rates.

Table 7, Panel B explores whether grade declines for first generation students are concentrated in certain subjects. We find large declines in grades for first generation students in College of Science (hereafter Science) courses, which include programs in natural sciences, math, and statistics popular among Honors students. We fail to find reduced grades for first generation Honors students in College of Engineering courses (another source of popular programs) or in non-College of Science courses. Given College of Science courses are the apparent source of grade declines, the remaining columns in the panel look within these courses. We find large and precisely estimated grade decreases in non-Honors Science courses and natural sciences (biology, chemistry, physics, and related fields) courses, with no evidence of declines in Honors Science courses, nor in math or statistics courses. Effect sizes are large: a differential decline among first generation students of 0.53 grade points in all Science courses, and 0.58 grade points in natural sciences, or nearly the difference between a B+ and B-.

The first three columns of Panel C narrow the focus to natural sciences courses. First generation

[18] Jack (2019) applies a similar argument using qualitative data on student experiences at an elite college.

Honors students do not enroll in more challenging natural science courses than their counterparts (column 1). Grade declines in natural science courses for first generation Honors students are concentrated among students whose college of admission was not Science (columns 2-3). This finding suggests that mismatch between student course of study and natural science courses might explain grade declines among first generation Honors students.

Does Honors admission influence first generation students to enroll in Science courses in which they earn lower grades? The remaining columns of Table 7, Panel C explore this question, using as outcomes dummy variables for enrollment in the same course types as Panel B. We find that Honors College admission *reduces* the likelihood that first generation students will enroll in Science courses, by 13 percentage points in comparison to non-first generation admitted students. Enrollment declines are of similar magnitude in natural sciences courses. These results suggest that first generation students are aware of the challenges they may face in Science courses and choose other subjects instead. The combined effect of lower achievement and diminished presence of first generation students in natural science courses suggest obstacles in this potential pipeline from the Honors College to STEM fields.

5.8 Mechanisms

The transcript data revealed significant, relatively large, and robust effects of Honors admission on course grades. What mechanisms drive these results? We hypothesize two potential channels. First, access to Honors courses may change the academic experiences of Honors students relative to applicants denied admission. Second, Honors admission may facilitate interactions among high-achieving peers, which can improve academic outcomes among college students (Sacerdote 2001, Carrell, Fullerton and West 2009). We call these the academic and social channels, respectively.

For the academic channel, we focus on taking an Honors section of a previous course in a subject. For instance, taking Honors Introduction to Microeconomics may provide a stronger foundation for later success in Economics than the standard Introduction to Microeconomics course. For the analysis, the Honors sections must be part of an Honors/non-Honors course pair. Course pairs share a subject code, course number, learning outcomes, and academic term in which they are offered, but one section is designated Honors (for instance, ECON 201 and ECON 201H). For the social channel, we focus on living in the first-year residence hall for Honors College students.[19] The Honors residence hall offers events for residents, study opportunities, and social interaction. Takeup of each of these potential mechanisms closely followed the Honors admission gradient (Figure 5).

[19]The residence hall, known as the "Honors Living and Learning Community," was not fully reserved for Honors College students. Its location also varied across years. For simplicity, we refer to it simply as the "Honors residence hall" here.

For each channel, we run the two-stage least squares specification of equation (3), replacing Honors admission with the potential mechanism. This specification relies on implausible exclusion restrictions, because application scores in the intermediate range (the instruments) could affect course grades through other channels. Nonetheless, it continues to rely on the exogenous variation in Honors exposure due to kinks in the application score gradient. We think the results offer instructive bounds on the role of these potential mechanism on course grades. Table 8 presents results.

For the full sample, taking the Honors section of a course is associated with a 1.06-point increase in grades, or the difference between a grade of B and A (Panel A, column 1). The result is driven by non-Honors and lower division courses (columns 2-5). Panel B restricts the sample to students who enrolled in an Honors/non-Honors course pair in the same subject. Here, the implied comparison is between Honors applicants within the same course section, where some took an Honors section of a prior course within the same subject and others did not, and where this choice resulted from plausibly exogenous variation in Honors admission.[20] The coefficients shrink in magnitude relative to Panel A, but remain significant for the same subsamples. Although we find the magnitudes implausible due to likely violations of the exclusion restriction, we consider the results suggestive evidence of the academic channel.

By contrast, the coefficient for living in the Honors residence hall is not significant for most subsamples of courses. The notable exception is lower division courses, for which the coefficient is 0.107 grade points and precisely estimated. This result is sensible, as enrollment in lower division courses likely coincides with living in the Honors residence hall as a first-year student, when peer interaction is likely at its highest intensity. We view this as suggestive evidence of the social channel, though with magnitudes smaller than the academic channel.

6 Conclusion

Our results reveal relatively large and precisely estimated increases in course grades in response to plausibly exogenous variation in Honors admission. Course section fixed effects avoid a host of potential confounding factors related to course content, instructor, and timing. Exposure to prior Honors coursework within the same subject appears to be a key mechanism underlying grade increases. Social interaction with Honors peers through a dedicated residence hall appears to play a more limited role. Other mechanisms are possible, but data limitations prevent further exploration.

[20]Put another way: in Panel A, the control group is Honors applicants who did not take the Honors section of a course pair. In Panel B, the control group is limited to Honors applicants who took the non-Honors section of the course pair.

Although we do not observe students after they leave the university, we can make a back-of-envelope calculation of the labor market return to higher grades. Gemus (2010) finds a Mincerian return of 0.079 log points in annual earnings ten years after college graduation for a one-unit increase in cumulative GPA.[21] Average earnings of college graduates working full-time ten years after graduation was $59,000 in 2014, or $1.4 million in present value of lifetime income (Hamilton Project 2014, amounts in 2018 dollars). We find no significant effect of Honors admission on cumulative GPA. If our main estimate of a 0.104-point increase in course grades carried over to all courses, however, the return would be $485 in annual earnings after ten years, or $11,995 in lifetime income.[22] Although these estimates may overstate the returns because course-level grades may not translate to gains in cumulative GPA, there may be additional returns to earning an Honors degree. With an annual tuition premium of $1,500 to enroll in the Honors College, these private returns pass a cost-benefit test for students with typical graduation times, even before including the potential signaling value or social returns.

Despite the robust evidence on increases in average course grades, we also find evidence that Honors admission led to grade declines among first generation students, in comparison to both non-first generation Honors students and first generation Honors applicants who were not admitted. These results are driven by natural science courses. The finding is discouraging, given the hope for Honors programs to provide higher quality academic experiences for students who may qualify for admission to more selective institutions but face additional barriers to attendance, such as first generation students. Nonetheless, the signaling value of an Honors degree or gains on other margins could exceed the cost of any grade declines. Indeed, the policy conclusion we draw from our findings is *not* to suggest first generation students would be better served outside the Honors College. Disadvantaged students on the margin for admission can still benefit from enrolling in higher quality university programs (Bleemer 2022). Instead, targeted support for first generation Honors students interested in natural sciences or adoption of "second chance" polices such as grade forgiveness (Jiang, Chen, Hansen and Lowe 2021) may help to reduce the performance gap.

[21] Tan (2022) also finds substantial labor market returns to course grades, using data from Singapore.

[22] Annual earnings: $\$59,000 \times .079 \times .104 = \$485$. Lifetime earnings: $\$1.4\text{m} \times .079 \times .104 = \$11,995$.

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A Honors College admissions process details

Additional detail on Honors College (HC) application scoring:

- High school GPA and standardized test score (SAT or ACT): 0-20 points each. The Honors College mapped these components to a 20-point scale, with annual adjustments as necessary. These components allowed no discretion in scoring.

- Essay: 0-20 points. The essay requires students to respond to a prompt which varies each year. Scores are assigned by a committee of faculty, staff, graduate students, and alumni readers. Two readers score each essay. Beginning with the 2014 cohort, readers were provided training, a scoring rubric, and payment for their time. Also beginning in 2014, scores which diverged by more than one point between readers triggered a third reading. The essay score averages each reader's score.

- Multicultural experience: 0-5 points. Applicants earn points through multiple experiences such as living or traveling abroad, extensive experience working in or living with diverse sub-cultures, and multicultural lived experiences. An Honors College admissions officer assigned scores following a rubric, using information provided by applicants with their application.

The Honors College Admissions Committee decides which applicants are admitted. The committee includes 4-7 members: the Dean of the Honors College, the Honors College Director of Admission, an Honors College academic advisor, and other HC staff. The committee relies heavily on application scores in admissions decisions. Two members of the committee review each application and decide to accept or deny. Unanimous decisions are final. If the decision is split, a third reader reviews the application and decides. At the end of the process, the HC Director of Admissions reviews all denied applicants and decides to forward any applications to the Dean for reconsideration. The Dean reviews these files and makes final decisions.

B Tables and figures

Table 1: Sample size, by cohort and Honors application status

	non-Honors applicants	Honors applicants					
		admitted		denied			
attended OSU	yes	yes	no	yes	no	total	proportion
cohort	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2005	2,916	116	118	84	76	3,310	0.08
2006	3,008	98	129	76	45	3,356	0.08
2007	3,171	93	122	67	56	3,509	0.09
2008	3,200	112	123	83	71	3,589	0.09
2009	3,558	118	131	100	71	3,978	0.10
2010	3,620	181	176	96	85	4,158	0.10
2011	3,513	196	200	80	81	4,070	0.10
2012	3,382	215	236	187	168	4,188	0.11
2013	3,434	211	352	378	606	4,981	0.13
2014	3,276	303	410	272	446	4,707	0.12
total	33,078	1,643	1,997	1,423	1,705	39,846	1.00
proportion	0.83	0.04	0.05	0.04	0.04	1.00	

Table shows sample size within each cell. For non-Honors applicants, cell reports number of entering freshmen. For Honors applicants, cell reports number of first-year Honors applicants. Cohort refers to year of first OSU attendance (non-Honors applicants) and year of intended OSU attendance (Honors applicants).

Table 2: Summary statistics

variable	all Honors applicants (1)	admitted yes (2)	admitted no (3)	difference (2)-(3)
Demographics				
age (at application)	18.3	18.3	18.3	0.0
female	0.51	0.54	0.48	0.06***
US citizen	0.99	0.99	0.99	0.00
white/unknown ethnicity	0.81	0.79	0.83	-0.05**
underrepresented minority	0.05	0.06	0.05	0.01
Asian/multiple ethnicity	0.14	0.16	0.12	0.04***
nonwhite	0.19	0.21	0.17	0.05**
first generation student	0.10	0.07	0.13	-0.06***
OSU legacy	0.12	0.12	0.11	0.01
Honors application status				
application score	45.0	50.6	38.6	12.0***
admitted (initial application)	0.54	1.00	0.00	N/A
applied multiple times	0.05	0.01	0.10	-0.09***
admitted (ever)	0.57	1.00	0.07	0.93***
University outcomes				
ever took an Honors course at OSU	0.52	0.91	0.07	0.84***
lived in 1st-year Honors residence	0.22	0.40	0.01	0.40***
OSU GPA	3.46	3.63	3.27	0.36***
OSU GPA, Honors courses	3.69	3.69	3.73	-0.04
OSU GPA, non-Honors courses	3.46	3.63	3.27	0.36***
credits taken	117.7	128.0	105.8	22.2***
credits taken in Honors College	10.7	19.1	0.9	18.2***
credits taken outside Honors College	107.1	108.9	104.9	4.1***
graduated from OSU	0.81	0.84	0.75	0.09***
Honors degree	0.40	0.60	0.07	0.53***
graduated in $\leq$ 4 years	0.56	0.57	0.54	0.04
graduated in $\leq$ 5 years	0.83	0.87	0.76	0.11***
graduated in $\leq$ 6 years	0.86	0.89	0.80	0.09***
N	3,066	1,643	1,423	

Sample is first-year Honors applicants who attended OSU, 2005-2014 cohorts. Table shows sample means in columns (1)-(3). Column (4) reports differences across indicated samples (* significant at 10%, ** significant at 5%, *** significant at 1%). Cohort refers to year of first OSU attendance (non-Honors applicants) and year of intended OSU attendance (Honors applicants). Graduation dummies set to missing for cohorts without at least four years in data (x years in data in case of dummies for graduation in x years or less). All statistical tests include cohort fixed effects and cluster standard errors by cohort.

Table 3: First stage results: Honors College admission

	Outcome: Honors College admission						
	full sample	$20 \leq S \leq 60$	$30 \leq S \leq 55$	includes covariates	drop early applicants	search grid $\delta_0 \pm 10$	include non-OSU attendees
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
running variable							
$I(\delta^- \leq S \leq \delta^+)$	0.166	0.159	0.140	0.027	0.154	0.166	0.033
	(0.144)	(0.150)	(0.147)	(0.148)	(0.130)	(0.144)	(0.060)
$I(\delta^- \leq S \leq \delta^+) \times (S - \delta^-)$	0.081***	0.080***	0.079***	0.083***	0.084***	0.081***	0.089***
	(0.018)	(0.020)	(0.023)	(0.018)	(0.015)	(0.020)	(0.010)
kink points							
δ^-	44***	44***	44***	42***	44***	44***	43***
	(2.0)	(1.9)	(1.6)	(2.0)	(1.9)	(2.0)	(1.4)
δ^+	51***	51***	50***	51***	50***	51***	51***
	(0.9)	(0.9)	(1.0)	(1.0)	(0.9)	(1.0)	(0.7)
N	3,066	3,041	2,742	3,066	2,507	3,066	6,768
Mean outcome	0.54	0.54	0.53	0.54	0.54	0.54	0.54
First-stage F	51.0	48.1	42.5	40.9	39.9	41.7	86.2

Table shows estimates of first-stage equation (1). Sample is Honors College applicants, 2005-2014 cohorts. Sample limited to applicants who attended OSU, except for column (7). Right-hand side includes linear spline in application score S, as indicated in equation (1). Regression kink points $\delta = (\delta^-, \delta^+)$ estimated by finding the MSE-minimizing values over a integer-valued grid from $\delta_0 + / - r$, where r is the search radius. Initial $\delta_0 = (40, 53)$. Default $r = 5$, but set to $r = 10$ in column (6). All regressions include cohort fixed effects. Additional covariates included in column (4) are age at time of application and dummies for female, US citizen, underrepresented minority, Asian/multiple ethnicity, and first generation student. Standard errors calculated by bootstrap resampling of cohorts in their entirety to form synthetic sample, then repeating estimation procedure over 500 bootstrap replications. First-stage F-statistic from test of intercept and slope terms for intermediate scores $(\delta^- \leq S \leq \delta^+)$. * significant at 10%, ** significant at 5%, *** significant at 1%

Table 4: Course grades

	outcome: course grade (GPA points)				
	full	Honors course?		course division	
	sample	no	yes	lower	upper
	(1)	(2)	(3)	(4)	(5)
Panel A: reduced form					
$I(\delta^- \leq S \leq \delta^+)$	-0.021	-0.033	0.144	-0.012	-0.039
	(0.013)	(0.014)**	(0.042)***	(0.016)	(0.023)*
$I(\delta^- \leq S \leq \delta^+) \times (S - \delta^-)$	0.012	0.015	0.018	0.016	0.009
	(0.003)***	(0.003)***	(0.007)***	(0.003)***	(0.004)**
Panel B: 2SLS					
Honors admission	0.104***	0.106***	-0.395	0.153***	0.035
	(0.029)	(0.026)	(0.269)	(0.035)	(0.046)
N	86,662	77,706	8,956	52,755	32,271
Course sections	16,782	15,752	1,030	9,385	6,880
Mean outcome	3.52	3.50	3.75	3.55	3.48
1st-stage F statistic	2,775.6	3,433.0	39.5	1,756.0	943.0

Sample is transcript data of freshman Honors applicants who attended OSU, i.e., unit of analysis is a course taken by students in this category. Sample restricted to applicants with application scores between 30-55, for 2005-2014 application cohorts. Outcome is course grade, on 0-4 scale. Table reports estimates of equation (2). Panel B reports two-stage least squares (2SLS) estimates of equation (3). Instruments are indicator for application score in intermediate range ($30 \leq S \leq 55$) and this indicator interacted with the application score. All regressions include linear term in application score, intercept and slope for scores above 55, and cohort and course section fixed effects. Singleton observations dropped from sample. Samples restricted to Honors/non-Honors courses; or lower (100-200 level) or upper (300-400) division as indicated. Standard errors clustered by course section, calculated by 500 block bootstrap replications over two stages of estimation. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 5: Course grade distribution

			outcome: course grade at least ...					
	A	A-	B+	B	B-	C+	C	C-
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: reduced form								
$I(\delta^- \leq S \leq \delta^+)$	-0.012	-0.006	0.001	-0.007	-0.010	-0.007	-0.002	-0.004
	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)*	(0.005)	(0.004)	(0.004)
$I(\delta^- \leq S \leq \delta^+) \times (S - \delta^-)$	0.010	0.007	0.005	0.002	0.002	0.001	0.001	0.001
	(0.001)***	(0.001)***	(0.001)***	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
N	96,426	96,426	96,426	96,426	96,426	96,426	96,426	96,426
Course sections	18,625	18,625	18,625	18,625	18,625	18,625	18,625	18,625
Mean outcome	0.48	0.61	0.69	0.79	0.82	0.85	0.88	0.88
Panel B: 2SLS								
Honors admission	0.094***	0.066***	0.060***	0.011	0.007	0.002	0.004	0.002
	(0.017)	(0.016)	(0.017)	(0.015)	(0.013)	(0.012)	(0.009)	(0.009)
N	96,426	96,426	96,426	96,426	96,426	96,426	96,426	96,426
Course sections	18,625	18,625	18,625	18,625	18,625	18,625	18,625	18,625
Mean outcome	0.48	0.60	0.69	0.79	0.82	0.85	0.88	0.88
1st-stage F statistic	2775.6	2775.6	2775.6	2775.6	2775.6	2775.6	2775.6	2775.6

Sample is transcript data of first-year Honors applicants who attended OSU, i.e., unit of analysis is a course taken by students in this category. Sample restricted to applicants with application scores between 30-55, for 2005-2014 application cohorts. Table reports estimates of equation (2) in Panel A and equation (3) in Panel B. Outcome is indicator for course grade above indicated threshold. All regressions include linear term in application score, intercept and slope for scores above 55, and cohort and course section fixed effects. Singleton observations dropped from sample. Standard errors clustered by course section. In Panel B, standard errors calculated by 500 block bootstrap replications over two stages of estimation.* significant at 10%, ** significant at 5%, *** significant at 1%.

Table 6: Academic outcomes, heterogeneous treatment effects

	grades			degree attainment				
		cumulative			conditional on graduating			
	per course	all	non-Honors	graduated	$\leq$ 4 years	$\leq$ 5 years	$\leq$ 6 years	Engineering/Science
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: female								
Honors admission	0.070	0.119	0.118	0.072	-0.179	0.019	-0.027	-0.016
	(0.040)	(0.202)	(0.211)	(0.111)	(0.104)	(0.077)	(0.019)	(0.151)
		[0.61]	[0.62]	[0.58]	[0.16]	[0.84]	[0.32]	[0.92]
Honors admission*female	0.063	-0.016	-0.006	-0.340	0.357	-0.180	-0.065	-0.048
	(0.050)	(0.261)	(0.269)	(0.237)	(0.198)	(0.092)	(0.065)	(0.238)
		[0.95]	[0.98]	[0.31]	[0.17]	[0.10]	[0.33]	[0.87]
p(admission+interaction)	[0.00]	[0.60]	[0.55]	[0.29]	[0.17]	[0.03]	[0.21]	[0.63]
1st-stage F statistic	746.8	27.6	27.6	18.1	13.8	7.4	6.7	13.8
Panel B: first generation								
Honors admission	0.131***	0.166	0.176	-0.076	0.035	-0.068	-0.062	-0.032
	(0.032)	(0.139)	(0.139)	(0.101)	(0.058)	(0.047)	(0.026)*	(0.074)
		[0.3]	[0.25]	[0.51]	[0.59]	[0.28]	[0.09]	[0.69]
Honors admission*first generation	-0.263***	-0.221	-0.250	-0.012	-0.330	0.100	0.060	-0.256
	(0.074)	(0.135)	(0.152)	(0.240)	(0.349)	(0.042)	(0.025)	(0.180)
		[0.20]	[0.21]	[0.97]	[0.45]	[0.11]	[0.28]	[0.27]
p(admission+interaction)	[0.05]	[0.81]	[0.75]	[0.76]	[0.45]	[0.64]	[0.75]	[0.31]
1st-stage F statistic	321.8	49.8	49.8	41.8	26.9	20.6	17.9	26.9
N	86,662	2,740	2,740	1,692	1,353	1,135	927	1,353
Course sections	16,782	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mean outcome	3.52	3.46	3.46	0.80	0.70	0.95	0.99	0.68

Table reports 2SLS estimates of equation (2), augmented with interactions between application score terms and dummy for demographic group. Intercept and slope for intermediate application scores and their interactions with the student demographic group dummy are the excluded instruments for Honors admission and Honors admission interacted with student demographic group. Demographic groups listed in each panel. Sample limited to applicants who attended OSU. Sample in column (1) is transcript data of Honors College applicants with application score 30-55, 2005-2014 cohorts, for which the unit of observation is academic course. DFW is grade of D, F, or withdraw from course. Sample in columns (2)-(8) uses student as unit of observation. For graduation outcomes, sample limited to cohorts 2012 or earlier (2011 and 2010 for 5- and 6-year graduation outcomes, respectively). Engineering or Science refer to earning a degree from College of Engineering or College of Science, respectively. Columns (5)-(8) condition on graduating from OSU. Singleton observations dropped from sample. Regression kink points set at delta=(44,50) based on first-stage results. All regressions include main effect of demographic group, cohort fixed effects, and (where applicable) course section fixed effects. Standard errors in parentheses, clustered by course section in column (1) and by cohort in columns (2)-(8). Standard errors calculated by 500 block bootstrap replications over two stages of estimation. * significant at 10%, ** significant at 5%, *** significant at 1%. p-values in brackets for columns (2)-(8) calculated by 500 replications of wild-t bootstrap. p(admission+interaction) reports bootstrap p-value on sum of Honors admission plus admission*group interaction coefficients. Final row of each panel reports first-stage Kleibergen-Paap F statistic on excluded instruments (specific to admission*group interaction for column 1).

Table 7: Course grades and selection, heterogeneous effects by first generation status

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: grades, all subjects										
	Honors course		lower	upper	section	course grade at least...			withdraw	DFW
	yes	no	division	division	median	A	B	C		
Honors admission	-0.352	0.134***	0.192***	0.034	0.107***	0.111***	0.023	0.013	0.015**	0.001
	(0.334)	(0.028)	(0.037)	(0.051)	(0.024)	(0.018)	(0.016)	(0.010)	(0.005)	(0.009)
Honors admission*1st generation	0.133	-0.264***	-0.220*	-0.379**	-0.035	-0.181***	-0.113**	-0.055*	0.011	0.023
	(0.364)	(0.067)	(0.093)	(0.132)	(0.066)	(0.044)	(0.037)	(0.026)	(0.013)	(0.021)
N	8,956	77,706	52,755	32,271	88,518	96,426	96,426	96,426	96,426	96,426
course sections	1,030	15,752	9,385	6,880	17,194	18,625	18,625	18,625	18,625	18,625
mean outcome	3.75	3.50	3.55	3.48	3.17	0.48	0.79	0.88	0.02	0.04
p(admission+interaction)	0.17	0.04	0.75	0.00	0.27	0.09	0.01	0.09	0.03	0.20
1st-stage F statistic	178.4	352.8	219.3	81.0	1420.1	321.8	321.8	321.8	321.8	321.8
Panel B: grades, specific subjects										
	course within College of:					College of Science courses only				
	Science	Engineering	not Science	Honors course		lower	upper	Natural	Math or	
				yes	no	division	division	Sciences	Statistics	
Honors admission	0.308***	0.085	0.022	-1.444	0.294***	0.325***	0.254*	0.255***	0.446***	
	(0.062)	(0.060)	(0.031)	(1.117)	(0.061)	(0.072)	(0.119)	(0.073)	(0.134)	
Honors admission*1st generation	-0.530***	-0.123	-0.114	1.508	-0.504***	-0.459*	-0.491*	-0.584***	-0.251	
	(0.137)	(0.496)	(0.087)	(1.225)	(0.125)	(0.180)	(0.207)	(0.141)	(0.329)	
N	31,410	15,703	55,252	4,368	27,042	19,949	11,396	22,989	8,421	
course sections	3,794	2,204	12,988	410	3,384	2,239	1,527	2,403	1,391	
mean outcome	3.34	3.49	3.63	3.62	3.29	3.34	3.33	3.37	3.24	
p(admission+interaction)	0.07	0.94	0.26	0.87	0.06	0.43	0.15	0.01	0.54	
1st-stage F statistic	144.8	19.4	178.8	122.6	142.8	79.0	115.7	134.4	23.7	
Panel C: Natural Science grades and course selection										
	Natural Science course GPA			course selection						
				College of		College of Science courses only				
	section	Science admit?		Science	Honors course		lower	upper	Natural	Math/
	median	yes	no		yes	no	division	division	Sciences	Statistics
Honors admission	0.026	0.089	0.273	-0.023	0.077	-0.100	-0.011	-0.013	-0.026	0.003
	(0.063)	(0.152)	(0.078)***	(0.037)	(0.015)***	(0.033)**	(0.017)	(0.031)	(0.037)	(0.016)
	[0.70]			[0.54]	[0.00]	[0.03]	[0.55]	[0.68]	[0.54]	[0.87]
Honors admission*first generation	0.028	-0.194	-0.956***	-0.130	-0.044	-0.086	-0.058	-0.074	-0.147	0.017
	(0.062)	(0.227)	(0.270)	(0.059)*	(0.017)**	(0.054)	(0.044)	(0.055)	(0.072)*	(0.026)
	[0.75]			[0.06]	[0.05]	[0.22]	[0.29]	[0.27]	[0.08]	[0.55]
p(admission+interaction)	0.44	0.52	0.01	0.06	0.01	0.02	0.23	0.27	0.08	0.36
1st-stage F statistic	240.4	141.3	226.0	1485.2	1485.2	1485.2	1485.2	1485.2	1485.2	1485.2
N	22,851	9,991	12,169	96,426	96,426	96,426	96,426	96,426	96,426	96,426
Mean outcome	2.96	3.39	3.36	0.35	0.05	0.31	0.23	0.12	0.26	0.09

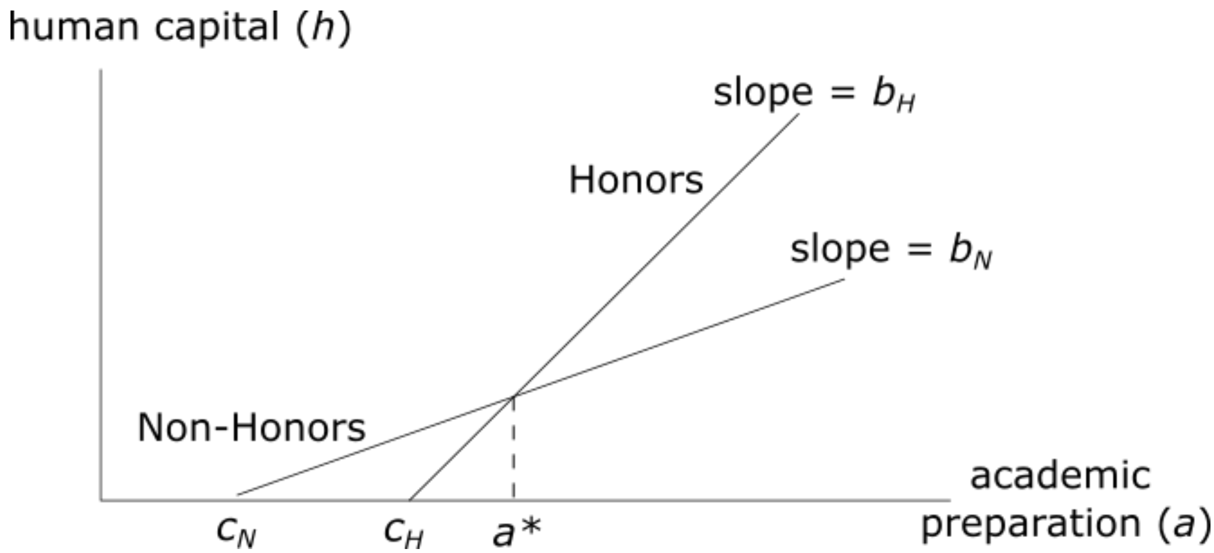
Table reports 2SLS estimates of equation (3), augmented with interactions between application score terms and dummy for first generation student. Intercept and slope for intermediate application scores and their interactions with first generation dummy are the excluded instruments for Honors admission and Honors admission interacted with first generation. Sample is transcript data of Honors College applicants with application score 30-55, 2005-2014 cohorts. Sample limited to applicants who attended OSU. Unit of observation is academic course. Outcomes in Panels A-B and Panel C columns (1)-(3) are course grades. Outcome in Panel C columns (4)-(10) is course selection, i.e. dummy equal to one if student enrolled in course within category labeled in column. Median grade refers to entire course section, calculated out of sample among non-applicants to Honors College. All other outcomes are individual student grades. Lower/upper division courses are those numbered below/at least 300. DFW is grade of D, F, or withdraw from course. "Not Science" refers to all courses other than those within College of Science. Singleton observations dropped from sample. Regression kink points set at delta=(44,50) based on first-stage results. All regressions include main effect of first generation, cohort fixed effects. Regressions in Panels A-B and Panel C columns (2)-(3) also include course section fixed effects. Standard errors in parentheses, clustered by course section (Panels A-B, C columns 2-3) or cohort (all other columns in Panel C), calculated by 500 block bootstrap replications. Regressions with standard errors clustered by cohort calculate p-values by wild-t bootstrap. * significant at 10%, ** significant at 5%, *** significant at 1%. p(admission+interaction) reports bootstrap p-value on sum of Honors admission plus admission*first generation interaction. Final row of each panel reports first-stage F statistic on excluded instruments (specific to admission*group interaction for Panels A-B and C columns 2-3, Kleibergen-Paap F statistic for all other columns in Panel C.).

Table 8: Mechanisms

	outcome: course grade (GPA points)				
	full	Honors course?		course division	
	sample	yes	no	lower	upper
	(1)	(2)	(3)	(4)	(5)
Panel A: previous Honors course in subject					
previous Honors course	1.058***	-2.536	1.040***	1.874***	0.379
	(0.276)	(1.616)	(0.232)	(0.466)	(0.273)
N	86,662	8,956	77,706	52,755	32,271
Course sections	16,782	1,030	15,752	9,385	6,880
Mean outcome	3.52	3.75	3.50	3.55	3.48
1st-stage F statistic	89.8	3.8	111.4	48.6	45.0
Panel B: previous Honors course in subject (conditional on course pair)					
previous Honors course	0.398**	-1.554	0.343*	1.037***	-0.117
	(0.146)	(3.209)	(0.133)	(0.272)	(0.167)
N	16,097	2,437	13,660	8,577	7,472
Course sections	2,584	327	2,257	1,093	1,469
Mean outcome	3.34	3.63	3.29	3.34	3.35
1st-stage F statistic	101.2	1.5	131.6	46.7	64.9
Panel C: lived in Honors residence hall					
Honors residence hall	0.039	-0.007	0.045	0.107**	-0.077
	(0.033)	(1.959)	(0.031)	(0.041)	(0.057)
N	65,296	6,892	58,404	41,817	22,747
Course sections	11,766	744	11,022	6,960	4,587
Mean outcome	3.52	3.75	3.49	3.54	3.47
1st-stage F statistic	1780.9	0.8	2035.7	1167.5	612.1

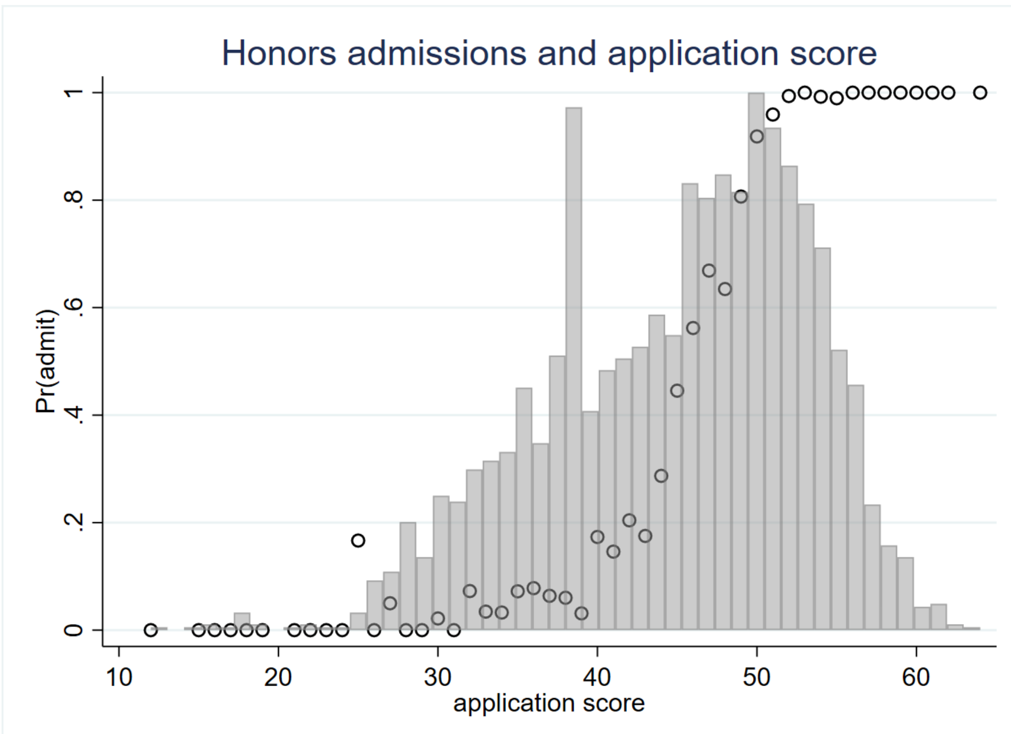
Sample is transcript data of freshman Honors applicants who attended OSU, i.e., unit of analysis is a course taken by students in this category. Sample restricted to applicants with application scores between 30-55, for 2005-2014 application cohorts. Table reports two-stage least squares (2SLS) estimates of equation (3), replacing Honors admission with potential mechanism indicated in panel. Outcome is course grade, on 0-4 scale. Potential mechanism in Panel A-B is indicator for taking a previous Honors section of a course within the same academic subject as the outcome when offered a choice between Honors and non-Honors section in the same term. Panel B restricts sample to students who previously enrolled in a Honors/non-Honors course pair within the same subject. Potential mechanism in Panel C is indicator for ever living in Honors residence hall. Instruments are indicator for application score in intermediate range ($30 \leq S \leq 55$) and this indicator interacted with the application score. All regressions include linear term in application score, intercept and slope for scores above 55, and cohort and course section fixed effects. Singleton observations dropped from sample. Samples restricted to Honors/non-Honors courses; lower (100-200 level) or upper (300-400) division; or students who took a course within an Honors/non-Honors course pair as indicated. Standard errors clustered by course section, calculated by 500 block bootstrap replications over two stages of estimation. * significant at 10%, ** significant at 5%, *** significant at 1%.

Figure 1: Program standards and human capital accumulation



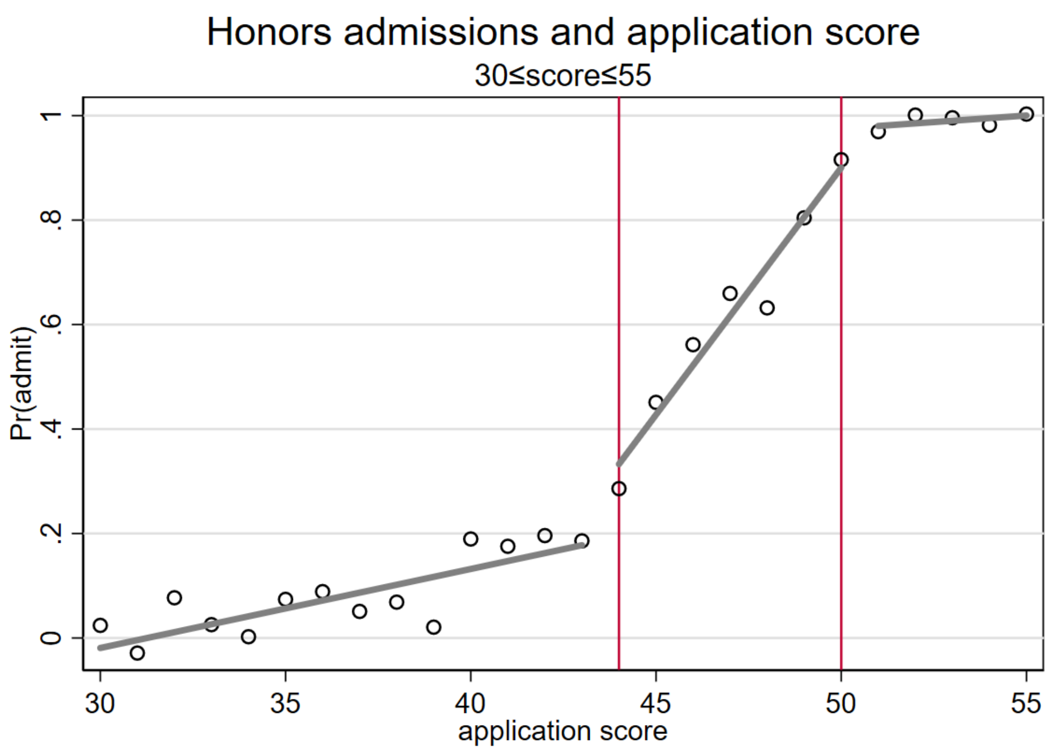
Based on a simlar figure in Kaganovich, Sarpça and Su (2022).

Figure 2: Honors admissions and application scores



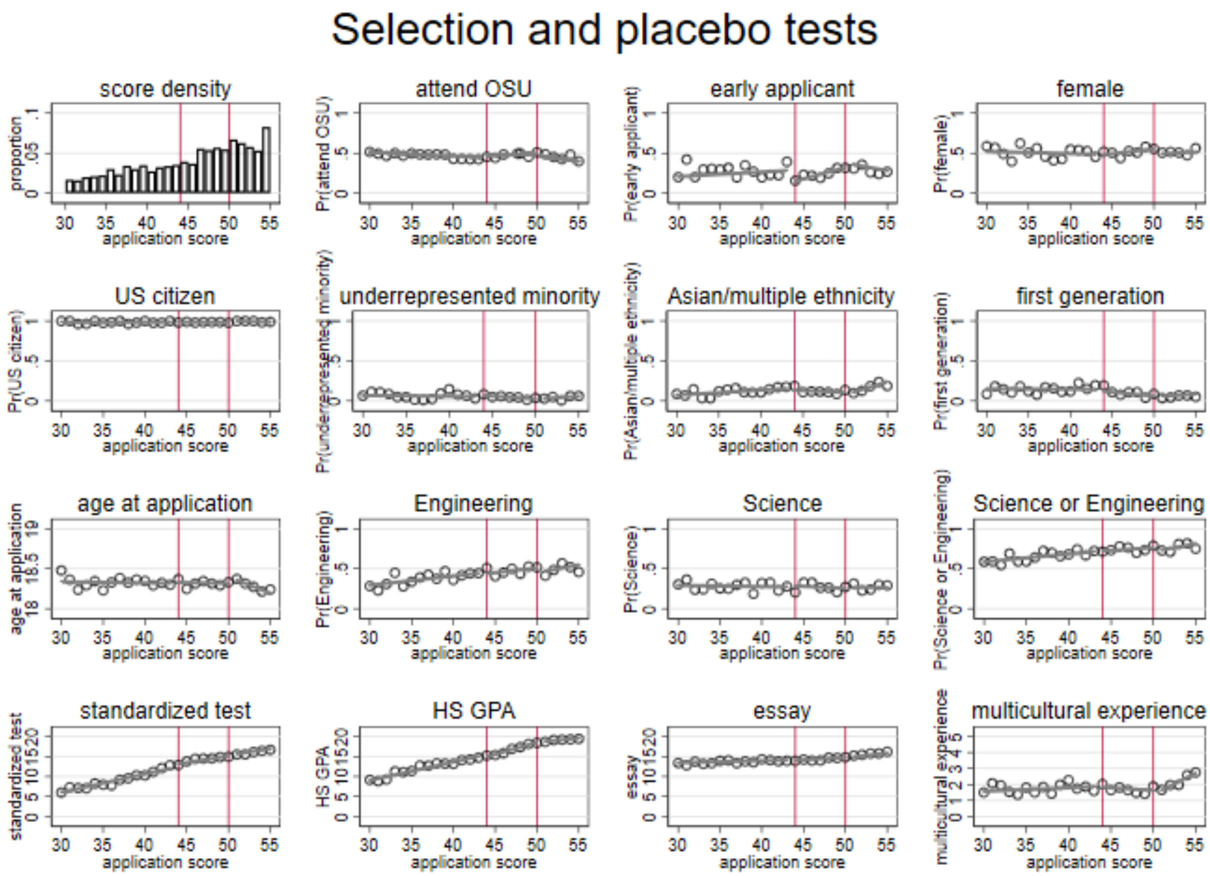
Sample is all Honors College applicants who attended OSU, 2005-2014 cohorts. Circles show mean Honors College admission probability within bins of application scores (bin width=1). Bars show histogram of observations by application score.

Figure 3: First stage



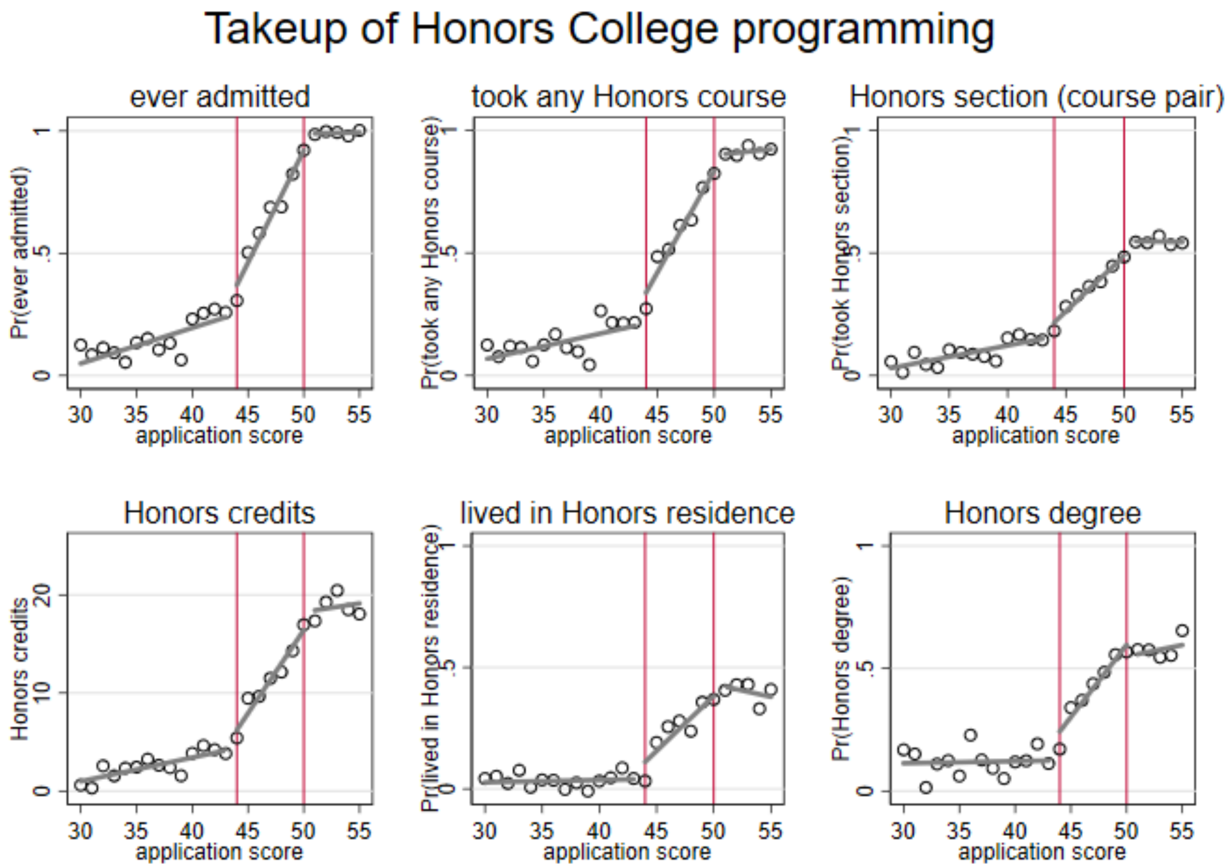
Sample is all Honors College applicants who attended OSU, 2005-2014 cohorts. Circles show mean Honors College admission probability within bins of application scores (bin width=1). Outcomes demeaned by cohort, consistent with cohort fixed effects used in estimation. Gray line is predicted probability. Red lines are estimated kink points. Results from Table 3, column (3).

Figure 4: Selection and placebo tests



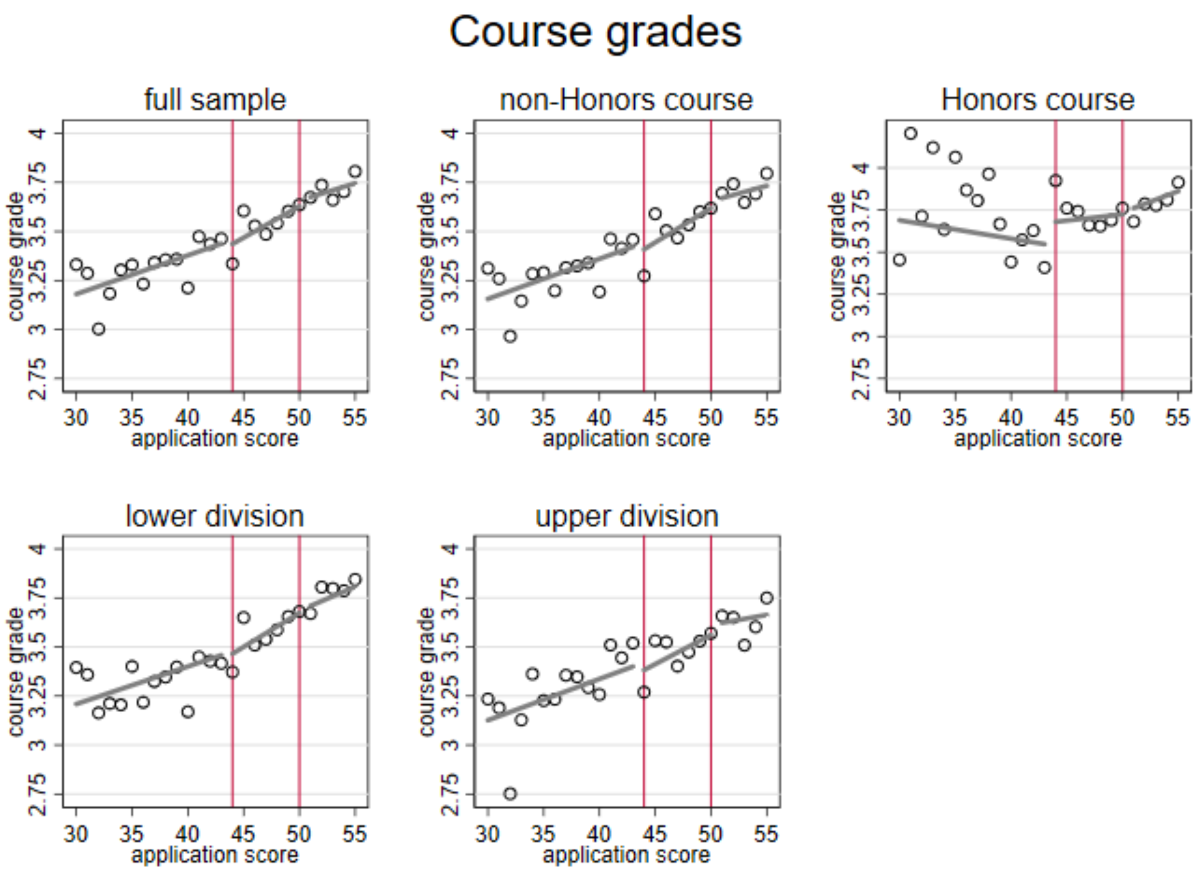
Sample is all Honors College applicants with application scores 30-55, 2005-2014 cohorts. Limited to applicants who attended OSU, except where OSU attendance is outcome. Results for early applicant limited to 2010-2014 cohorts. Engineering and Science refer to colleges at admission. Circles show mean outcome within bins of application scores (bin width=1). Gray line is predicted outcome. Red lines are kink points estimated from first stage.

Figure 5: Takeup of Honors College programming



Sample is all Honors College applicants with application scores 30-55 who attended OSU, 2005-2014 cohorts. "Honors section (course pair)" uses transcript datai.e., unit of analysis is a course taken by students in this category. Unit of analysis for all other outcomes is student. Results for Honors degree limited to 2005-2012 cohorts. Circles show mean outcome within bins of application scores (bin width=1). Outcomes demeaned by cohort, consistent with cohort fixed effects used in estimation. "Honors section (course pair)" demeaned by cohort and course section. Gray line is predicted outcome. Red lines are kink points estimated from first stage.

Figure 6: Course grades, by course type



Sample is all Honors College applicants with application scores 30-55 who attended OSU, 2005-2014 cohorts. Results from transcript data of first-year Honors applicants who attended OSU, i.e., unit of analysis is a course taken by students in this category. Outcome is course grade, 0-4 scale. Circles show mean outcome within bins of application scores (bin width=1). Outcomes demeaned by cohort and course section, consistent with fixed effects used in estimation. Gray line is predicted outcome. Red lines are kink points estimated from first stage.

Table A1: Summary statistics, all OSU students

variable	all OSU students (1)	non-Honors applicants (2)	Honors applicants admitted? yes (3)	no (4)	differences admitted v. non-applicant (2)-(3)	denied v. non-applicant (2)-(4)	admitted v. denied (3)-(4)	F-test for joint orthogonality (p-value) (8)
Demographics								
female	0.48	0.48	0.54	0.48	-0.06***	0.00	0.06***	0.00
uscitizen	0.95	0.95	0.99	0.99	-0.04***	-0.04***	0.00	0.00
underrepresented minority	0.10	0.10	0.06	0.05	0.05***	0.06***	0.01	0.00
Asian/multiple ethnicity	0.10	0.10	0.16	0.12	-0.06***	-0.02**	0.04***	0.00
nonwhite	0.20	0.20	0.21	0.17	-0.01	0.03***	0.05**	0.00
first generation student	0.13	0.14	0.07	0.13	0.06***	0.00**	-0.06***	0.01
OSU legacy	0.07	0.06	0.12	0.11	-0.06**	-0.05***	0.01	0.01
Academic outcomes								
ever took an Honors course at OSU	0.05	0.01	0.91	0.07	-0.90***	-0.07***	0.84***	0.00
OSU GPA	2.82	2.76	3.63	3.27	-0.88***	-0.51***	0.36***	0.00
OSU GPA, Honors courses only	3.67	3.54	3.69	3.73	-0.15***	-0.19***	-0.04	0.00
OSU GPA, non-Honors courses only	2.82	2.76	3.63	3.27	-0.87***	-0.51***	0.36***	0.00
credits taken	113.3	112.9	128.0	105.8	-15.15***	7.07***	22.22***	0.00
credits taken in Honors College	0.95	0.05	19.09	0.93	-19.04***	-0.88***	18.16***	0.00
credits taken outside Honors College	112.3	112.8	108.9	104.9	3.89**	7.96***	4.06***	0.00
graduated from OSU	0.60	0.59	0.84	0.75	-0.25***	-0.16***	0.09***	0.00
Honors degree	0.04	0.00	0.60	0.07	-0.60***	-0.07***	0.53***	0.00
graduated in $\leq$ 4 years	0.36	0.35	0.57	0.54	-0.22***	-0.19***	0.04	0.00
graduated in $\leq$ 5 years	0.57	0.55	0.87	0.76	-0.32***	-0.21***	0.11***	0.00
graduated in $\leq$ 6 years	0.62	0.60	0.89	0.80	-0.29***	-0.20***	0.09***	0.00
N	36,144	33,078	1,643	1,423				

Sample is 2005-2014 cohorts. For non-Honors applicants, sample is entering OSU freshmen. For Honors applicants, sample is first-year Honors applicants who attended OSU. Table shows sample means in columns (1)-(4). Columns (5)-(7) report differences across indicated samples (* significant at 10%, ** significant at 5%, *** significant at 1%). Column (8) reports p-value of F-test for joint orthogonality of variable across samples. Cohort refers to year of first OSU attendance (non-Honors applicants) and year of intended OSU attendance (Honors applicants). Graduation dummies set to missing for cohorts without at least four years in data (x years in data in case of dummies for graduation in x years or less). All statistical tests include cohort fixed effects and cluster standard errors by cohort.

Table A2: Selection and takeup

	(1)	(2)	(3)	(4)	(5)
Panel A: selection					
	attended OSU	early applicant	female	US citizen	underrepresented minority
$I(\delta^- \leq S \leq \delta^+)$	0.026	-0.137	-0.003	0.000	0.014
	(0.037)	(0.045)	(0.047)	(0.017)	(0.019)
	[0.61]	[0.13]	[0.96]	[0.99]	[0.62]
$I(\delta^- \leq S \leq \delta^+) \times (S - \delta^-)$	0.008	0.023	0.015	-0.001	-0.006
	(0.005)	(0.009)	(0.010)	(0.003)	(0.004)
	[0.14]	[0.19]	[0.22]	[0.8]	[0.20]
N	5,885	1,888	2,742	2,742	2,742
mean outcome	0.47	0.26	0.51	0.99	0.05
joint test p-value	[0.4]	[0.19]	[0.42]	[0.96]	[0.45]
Panel B: selection (continued)					
	Asian/multiple ethnicity	first generation	age at application	admit college Engineeering	admit college Science
$I(\delta^- \leq S \leq \delta^+)$	-0.026	-0.023	0.011	-0.016	0.015
	(0.029)	(0.038)	(0.021)	(0.045)	(0.041)
	[0.36]	[0.53]	[0.6]	[0.72]	[0.72]
$I(\delta^- \leq S \leq \delta^+) \times (S - \delta^-)$	-0.011	-0.010	-0.001	0.000	-0.004
	(0.008)	(0.007)	(0.007)	(0.008)	(0.007)
	[0.30]	[0.18]	[0.96]	[0.97]	[0.61]
N	2,742	2,742	2,742	2,742	2,742
mean outcome	0.13	0.11	18.3	0.45	0.27
joint test p-value	[0.04]	[0.38]	[0.86]	[0.96]	[0.83]
Panel C: Honors application score					
	SAT/ACT score	HS GPA	essay	multicultural experience	
$I(\delta^- \leq S \leq \delta^+)$	0.722	-0.535	-0.135	-0.054	
	(0.814)	(0.725)	(0.170)	(0.146)	
	[0.36]	[0.47]	[0.41]	[0.74]	
$I(\delta^- \leq S \leq \delta^+) \times (S - \delta^-)$	-0.135	0.128	0.064	-0.057	
	(0.094)	(0.144)	(0.070)	(0.033)	
	[0.23]	[0.51]	[0.47]	[0.19]	
N	2,740	2,740	2,742	2,742	
mean outcome	12.9	15.8	14.4	1.8	
joint test p-value	[0.31]	[0.55]	[0.58]	[0.05]	
Panel D: Honors take-up					
	ever admitted	took course	credits	first-year residence	degree
$I(\delta^- \leq S \leq \delta^+)$	0.117	0.125	1.850	0.071	0.118
	(0.075)	(0.075)	(1.449)	(0.035)	(0.045)*
	[0.26]	[0.23]	[0.27]	[0.12]	[0.07]
$I(\delta^- \leq S \leq \delta^+) \times (S - \delta^-)$	0.077	0.072	1.453	0.044	0.058
	(0.012)***	(0.011)***	(0.271)***	(0.012)*	(0.006)***
	[0.00]	[0.00]	[0.00]	[0.07]	[0.00]
N	2,742	2,742	2,742	2,742	1,353
mean outcome	0.56	0.51	10.2	0.21	0.38
joint test p-value	[0.02]	[0.03]	[0.00]	[0.07]	[0.00]

Table shows estimates of first-stage equation (1). Sample is Honors College applicants with application score 30-55, 2005-2014 cohorts. Sample limited to applicants who attended OSU, except for Panel A, column (1). Regression for early applicant (Panel A, column (2)) limited to 2010-2014 cohorts. Panel D refers to Honors College outcomes (e.g., Honors courses, Honors first-year residence, Honors degree). Regression for Honors degree limited to 2005-2012 cohorts. Right-hand side includes linear spline in application score S, as indicated in equation (1). Regression kink points set at delta=(44,50) based on first-stage results. All regressions include cohort fixed effects. Standard errors in parentheses, clustered by cohort. p-values in brackets, calculated by 500 replications of wild-t bootstrap. Joint test p-value from test of null that reported coefficients jointly equal zero. * significant at 10%, ** significant at 5%, *** significant at 1%

Table A3: Academic outcomes

	grades		credit hours		graduated	degree, conditional on graduating			
	all	non-Honors	all	non-Honors		$\leq$ 4 years	$\leq$ 5 years	$\leq$ 6 years	Science/Engineering
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: reduced form									
$I(\delta^- \leq S \leq \delta^+)$	-0.033	-0.040	-2.2	-4.1	-0.006	0.009	-0.055	-0.024	-0.072
	(0.038)	(0.039)	(2.7)	(2.6)	(0.052)	(0.068)	(0.043)	(0.018)	(0.059)
	[0.41]	[0.32]	[0.46]	[0.08]	[0.91]	[0.88]	[0.16]	[0.19]	[0.27]
$I(\delta^- \leq S \leq \delta^+) \times (S - \delta^-)$	0.017	0.018	0.2	-1.3	-0.008	0.000	0.001	-0.004	0.002
	(0.013)	(0.013)	(0.6)	(0.663)*	(0.007)	(0.007)	(0.009)	(0.002)	(0.007)
	[0.28]	[0.23]	[0.74]	[0.02]	[0.21]	[0.93]	[0.95]	[0.13]	[0.83]
N	2,740	2,740	2,742	2,742	1,692	1,353	1,135	927	1,353
mean outcome	3.46	3.46	116.8	106.6	0.80	0.70	0.95	0.99	0.68
joint test p-value	[0.47]	[0.39]	[0.24]	[0.12]	[0.42]	[0.95]	[0.16]	[0.03]	[0.55]
Panel B: 2SLS									
Honors admission	0.132	0.138	-0.8	-18.2	-0.077	0.013	-0.062	-0.057	-0.066
	(0.134)	(0.132)	(9.0)	(8.265)**	(0.090)	(0.036)	(0.042)	(0.025)**	(0.067)
	[0.43]	[0.41]	[0.95]	[0.02]	[0.44]	[0.75]	[0.26]	[0.09]	[0.39]
N	2,740	2,740	2,742	2,742	1,692	1,353	1,135	927	1,353
Mean outcome	3.46	3.46	116.8	106.6	0.80	0.70	0.95	0.99	0.68
1st-stage F statistic	41.2	41.2	40.8	40.8	238.3	87.7	56.2	72.6	87.7

Panel A shows estimates of reduced-form equation (2). Panel B shows 2SLS estimates of equation (3), using intercept and slope for intermediate application scores as instruments for Honors admission. Sample is Honors College applicants with application score 30-55, 2005-2014 cohorts. Sample limited to applicants who attended OSU. For graduation outcomes, sample limited to cohorts 2012 or earlier (2011 and 2010 for 5- and 6-year graduation outcomes, respectively). Engineering/Science refer to earning a degree from College of Engineering or College of Science. Columns (6)-(9) condition on graduating from OSU. Regression kink points set at δ=(44,50) based on first-stage results. All regressions include cohort fixed effects. Standard errors in parentheses, clustered by cohort. p-values in brackets, calculated by 500 replications of wild-t bootstrap. Panel A reports joint test p-value from test of null that reported coefficients jointly equal zero. Panel B reports first-stage F statistic on excluded instruments using same bootstrap procedure. * significant at 10%, ** significant at 5%, *** significant at 1%

Table A4: Summary statistics, Honors College applicants who attended OSU, transcript data

variable	all Honors applicants (1)	admitted yes (2)	admitted no (3)	difference (2)-(3)
Honors course (any)	0.10	0.17	0.01	0.16***
Honors section	0.07	0.11	0.01	0.11***
Honors colloquium	0.02	0.02	0.00	0.02***
Honors thesis	0.01	0.02	0.00	0.02***
grade	3.54	3.67	3.36	0.31***
grade, Honors courses	3.76	3.76	3.78	-0.02
grade, non-Honors courses	3.52	3.66	3.36	0.30***
withdrew from course	0.02	0.01	0.02	-0.01***
failed course	0.01	0.01	0.02	-0.01***
Grade of D, F, or withdraw in course	0.04	0.02	0.06	-0.03***
number of students	91.9	82.7	105.2	-22.6***
number of students, non-Honors course	100.2	95.3	106.2	-11.0***
number of students, Honors course	20.4	20.4	19.0	1.4***
lower division course	0.58	0.54	0.63	-0.10***
upper division course	0.39	0.43	0.34	0.09***
Honors/non-Honors course pair	0.13	0.13	0.13	0.00***
Honors section of course pair	0.05	0.07	0.00	0.07***
N	128,328	75,712	52,616	

Sample is transcript data of first-year Honors applicants who attended OSU, i.e., unit of analysis is a course taken by students in this category. Honors/non-Honors course pair refers to same course being offered in Honors and non-Honors sections in same academic term, excluding research, seminar, or "Special Topics" courses. Table shows sample means in columns (1)-(3). Column (4) reports differences across indicated samples (* significant at 10%, ** significant at 5%, *** significant at 1%. All statistical tests include cohort fixed effects and cluster standard errors by cohort.

Table A5: Course failure and withdrawal

sample	full sample	Honors course? no	Honors course? yes	course division lower	course division upper
	(1)	(2)	(3)	(4)	(5)
Panel A: fail					
$I(\delta^- \leq S \leq \delta^+)$	0.0007	0.0015	-0.0033	-0.0004	0.0032
	(0.0019)	(0.0021)	(0.0031)	(0.0023)	(0.0035)
$I(\delta^- \leq S \leq \delta^+) \times (S - \delta^-)$	-0.0003	-0.0007	0.0014	-0.0006	0.0001
	(0.0004)	(0.0004)*	(0.0006)**	(0.0005)	(0.0006)
N	96,426	85,110	11,316	58,054	36,249
Course sections	18,625	17,368	1,257	10,409	7,541
Mean outcome	0.010	0.010	0.003	0.010	0.010
Panel B: withdraw					
$I(\delta^- \leq S \leq \delta^+)$	0.0025	0.0036	-0.0157	-0.0002	0.0084
	(0.0022)	(0.0023)	(0.0096)	(0.0028)	(0.0037)**
$I(\delta^- \leq S \leq \delta^+) \times (S - \delta^-)$	0.0013	0.0012	-0.0011	0.0006	0.0027
	(0.0004)***	(0.0005)***	(0.0014)	(0.0005)	(0.0008)***
N	96,426	85,110	11,316	58,054	36,249
Course sections	18,625	17,368	1,257	10,409	7,541
Mean outcome	0.016	0.017	0.013	0.017	0.015
Panel C: grades, imputing failure if withdrew					
$I(\delta^- \leq S \leq \delta^+)$	-0.030	-0.045	0.196	-0.010	-0.071
	(0.015)**	(0.016)***	(0.056)***	(0.018)	(0.026)***
$I(\delta^- \leq S \leq \delta^+) \times (S - \delta^-)$	0.009	0.011	0.025	0.014	0.002
	(0.003)***	(0.003)***	(0.008)***	(0.004)***	(0.005)
N	88,407	79,317	9,090	53,887	32,873
Course sections	17,060	16,018	1,042	9,568	6,970
Mean outcome	3.46	3.44	3.69	3.49	3.42

Sample is transcript data of first-year Honors applicants who attended OSU, i.e., unit of analysis is a course taken by students in this category. Sample restricted to applicants with application scores between 30-55, for 2005-2014 application cohorts. Table reports estimates of equation (2). Outcomes are grade of F (Panel A), withdraw from course (Panel B), and course grade, imputing grade of F if withdrew from course (Panel C). All regressions include cohort and course section fixed effects. Singleton observations dropped from sample. Samples restricted to Honors/non-Honors courses; lower (100-200 level) or upper (300-400) division as indicated. Standard errors clustered by course section. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table A6: Course grades, robustness checks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Honors admission	0.276	0.286	0.075	0.105	0.098	0.096	0.110
	(0.006)***	(0.006)***	(0.008)***	(0.013)***	(0.014)***	(0.014)***	(0.016)***
N	102,258	86,662	86,662	24,932	24,932	21,414	21,865
Course sections	32,378	16,782	16,782	6,488	6,488	5,740	5,848
Mean outcome	3.55	3.52	3.52	3.53	3.53	3.50	3.50
course section fixed effects		x	x	x	x	x	x
cohort dummies			x	x	x	x	x
application score dummies			x	x	x	x	x
restrict to $44 \leq S \leq 50$				x	x	x	x
include covariates					x	x	x
restrict to non-Honors courses						x	x
impute failing grade for course withdrawal							x

Sample is transcript data of first-year Honors applicants who attended OSU, i.e., unit of analysis is a course taken by students in this category. Sample restricted to applicants with application scores between 30-55, for 2005-2014 application cohorts. Table reports OLS estimates, with controls as indicated at bottom of table. Outcome is course grade, on 0-4 scale. Covariates are indicators for female, underrepresesented minority, Asian, first generation student, US citizen, age at application, early application, and each component of application score. Singleton observations dropped from estimation sample in columns 2-7. Standard errors clustered by course section. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table A7: Course grades, inverse propensity score-weighted regressions

sample	full sample	Honors course? no	Honors course? yes	course division lower	course division upper
		outcome: course grade (GPA points)			
	(1)	(2)	(3)	(4)	(5)
Panel A: average treatment effect (ATE)					
Honors admission	0.125	0.129	0.023	0.128	0.124
	(0.014)***	(0.014)***	-0.049	(0.017)***	(0.024)***
Panel B: average treatment effect on the treated (ATT)					
Honors admission	0.106	0.110	0.037	0.103	0.119
	(0.015)***	(0.016)***	(0.056)	(0.019)***	(0.027)***
Panel C: average treatment effect on the untreated (ATU)					
Honors admission	0.148	0.154	-0.032	0.151	0.143
	(0.017)***	(0.017)***	(0.050)	(0.021)***	(0.029)***
N	24,932	21,414	3,518	15,988	8,803
Course sections	6,488	5,740	748	3,857	2,581
Mean outcome	3.53	3.50	3.71	3.56	3.47

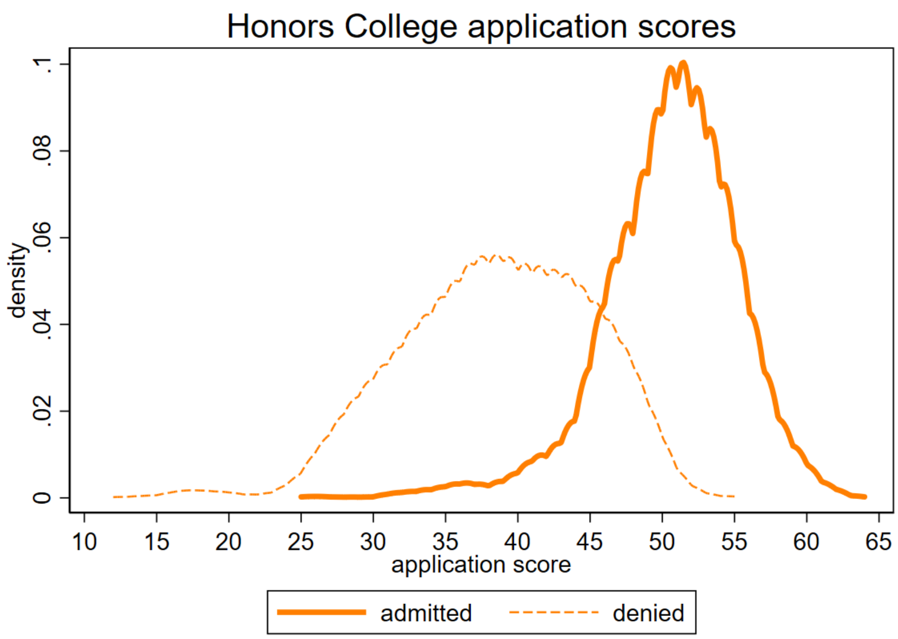
Sample is transcript data of first-year Honors applicants who attended OSU, i.e., unit of analysis is a course taken by students in this category. Sample restricted to applicants with application scores between 30-55, for 2005-2014 application cohorts. Table reports inverse propensity score-weighted estimates of treatment effect of Honors College admission. Outcome is course grade, on 0-4 scale. Propensity score is logit regression of Honors College admission on indicators for female, underrepresesented minority, Asian, first generation student, US citizen, age at application, early application, cohort, application score as specified in equation (2), and each component of application score. Sample then trimmed to exclude those outside common support of propensity score distribution or with application scores outside the interval [44,50]. Panels A/B/C show estimates of regression of course grade on indicator for Honors College admission, including course section fixed effects and weighted by inverse propensity score. Panel A uses average treatment effect weights, $w_{ATE} = A \times \frac{1}{p} + (1 - A) \times \frac{1}{1-p}$. Panel B uses average treatment effect on the treated weights, $w_{ATT} = A + (1 - A) \times \frac{p}{1-p}$. Panel C uses average treatment effect on the untreated weights, $w_{ATU} = A \times \frac{1-p}{p} + (1 - A)$. Singleton observations dropped from estimation sample. Samples restricted to Honors/non-Honors courses; lower (100-200 level) or upper (300-400) division as indicated. Standard errors clustered by course section. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table A8: Academic outcomes, heterogeneous treatment effects (with controls for HS GPA and SAT/ACT score)

		grades				degree attainment		
	per	cumulative				conditional on graduating		
	course	all	non-Honors	graduated	$\leq$ 4 years	$\leq$ 5 years	$\leq$ 6 years	Engineering/Science
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: female								
Honors admission	0.055	0.123	0.121	0.071	-0.174	0.026	-0.027	-0.018
	(0.037)	(0.201)	(0.212)	(0.107)	(0.107)	(0.076)	(0.018)	(0.151)
		[0.56]	[0.58]	[0.57]	[0.18]	[0.77]	[0.3]	[0.91]
Honors admission*female	0.039	-0.074	-0.064	-0.347	0.356	-0.181	-0.061	-0.051
	(0.052)	(0.274)	(0.281)	(0.216)	(0.200)	(0.083)*	(0.064)	(0.239)
		[0.83]	[0.85]	[0.26]	[0.16]	[0.06]	[0.36]	[0.86]
p(admission+interaction)	0.01	[0.76]	[0.7]	[0.24]	[0.18]	[0.02]	[0.23]	[0.62]
1st-stage F statistic	767.4	27.6	27.6	19.0	14.5	7.8	7.4	14.5
Panel B: first generation								
Honors admission	0.094***	0.119	0.128	-0.082	0.047	-0.060	-0.060	-0.050
	(0.028)	(0.113)	(0.118)	(0.093)	(0.065)	(0.055)	(0.026)**	(0.081)
		[0.3]	[0.26]	[0.46]	[0.55]	[0.36]	[0.08]	[0.59]
Honors admission*first generation	-0.204**	-0.127	-0.155	-0.010	-0.346	0.104	0.062	-0.235
	(0.075)	(0.125)	(0.135)	(0.249)	(0.342)	(0.057)	(0.028)	(0.158)
		[0.36]	[0.32]	[0.98]	[0.42]	[0.2]	[0.33]	[0.29]
p(admission+interaction)	0.12	[0.95]	[0.86]	[0.77]	[0.43]	[0.1]	[0.77]	[0.28]
1st-stage F statistic	326.6	49.9	49.9	43.9	28.3	21.9	19.4	28.3
N	86,562	2,738	2,738	1,690	1,351	1,133	925	1,351
Course sections	16,752	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mean outcome	3.52	3.46	3.46	0.80	0.70	0.95	0.99	0.68

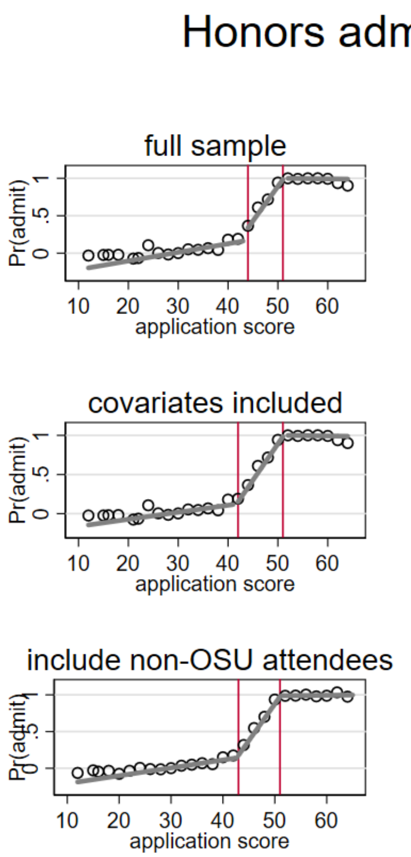
Table reports 2SLS estimates of equation (2), augmented with interactions between application score terms and dummy for demographic group. Intercept and slope for intermediate application scores and their interactions with the student demographic group dummy are the excluded instruments for Honors admission and Honors admission interacted with student demographic group. Demographic groups listed in each panel. Sample limited to applicants who attended OSU. Sample in column (1) is transcript data of Honors College applicants with application score 30-55, 2005-2014 cohorts, for which the unit of observation is academic course. DFW is grade of D, F, or withdraw from course. Sample in columns (2)-(8) uses student as unit of observation. For graduation outcomes, sample limited to cohorts 2012 or earlier (2011 and 2010 for 5- and 6-year graduation outcomes, respectively). Engineering or Science refer to earning a degree from College of Engineering or College of Science, respectively. Columns (5)-(8) condition on graduating from OSU. Singleton observations dropped from sample. Regression kink points set at delta=(44,50) based on first-stage results. All regressions include main effect of demographic group, HS GPA, SAT/ACT score (using Honors College application score scale), cohort fixed effects, and (where applicable) course section fixed effects. Standard errors in parentheses, clustered by course section in column (1) and by cohort in columns (2)-(8). Standard errors calculated by 500 block bootstrap replications over two stages of estimation. * significant at 10%, ** significant at 5%, *** significant at 1%. p-values in brackets for columns (2)-(8) calculated by 500 replications of wild-t bootstrap. p(admission+interaction) reports bootstrap p-value on sum of Honors admission plus admission*group interaction coefficients. Final row of each panel reports first-stage Kleibergen-Paap F statistic on excluded instruments (specific to admission*group interaction for column 1).

Figure A1: Honors application score distribution



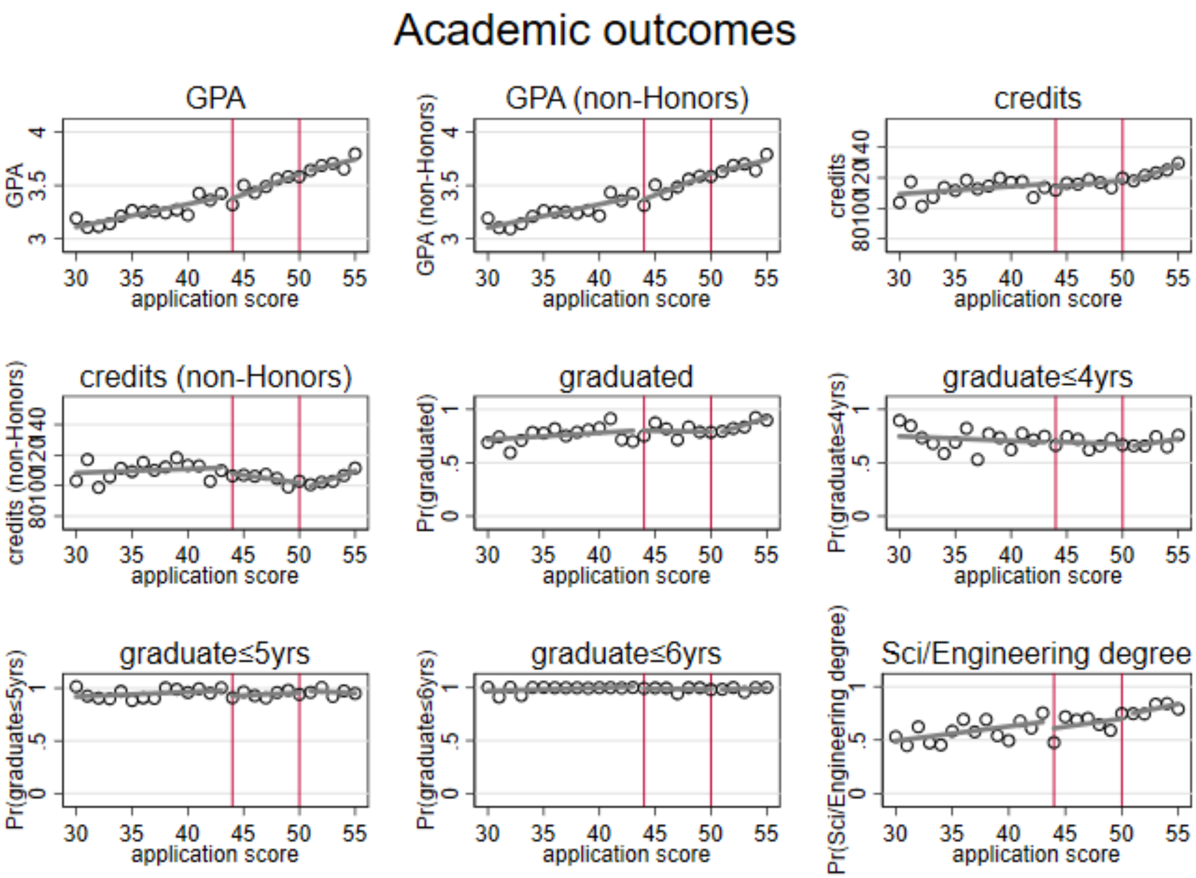
Sample is all Honors College applicants who attended OSU, 2005-2014 cohorts.

Figure A2: First stage results, all specifications



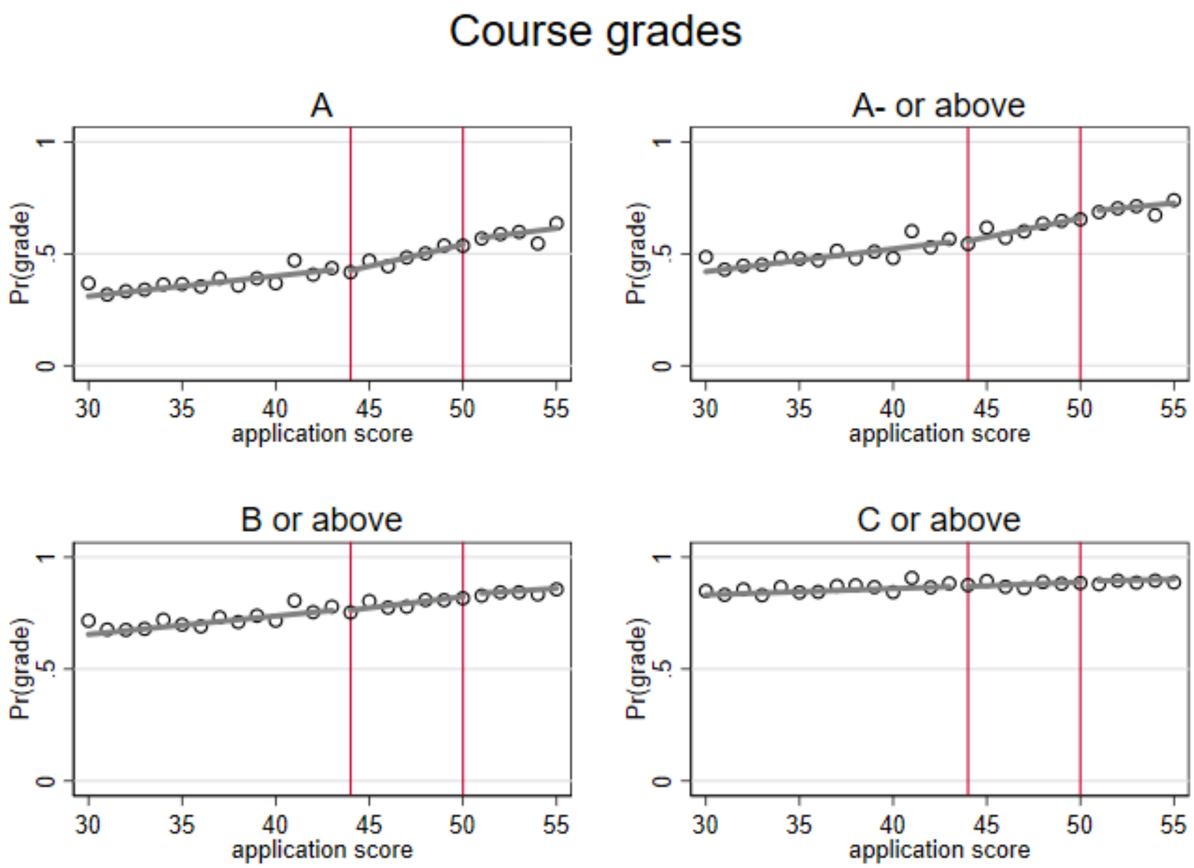
Each graph represents a regression reported in Table 3. Sample is all Honors College applicants, 2005-2014 cohorts. Restricted to students who attended OSU unless otherwise noted. Circles show mean Honors College admission probability within bins of application scores (bin width=2). Outcomes demeaned by cohort, consistent with cohort fixed effects used in estimation. Gray line is predicted probability. Red lines are estimated kink points.

Figure A3: Academic outcomes, student level



Each graph represents a regression reported in Table A3. Sample is all Honors College applicants who attended OSU, 2005-2014 cohorts. For graduation outcomes, sample limited to cohorts 2012 or earlier (2011 and 2010 for 5- and 6-year graduation outcomes, respectively). All panels following "graduated" condition on graduating from OSU. Engineering/Science degree refer to degrees awarded by College of Engineering or College of Science. Regression kink points set at delta=(44,50) based on first-stage results. All regressions include cohort fixed effects. Circles show mean outcome within bins of application scores (bin width=1). Outcomes demeaned by cohort, consistent with cohort fixed effects used in estimation. Gray line is predicted probability.

Figure A4: Course grades, by letter grade threshold

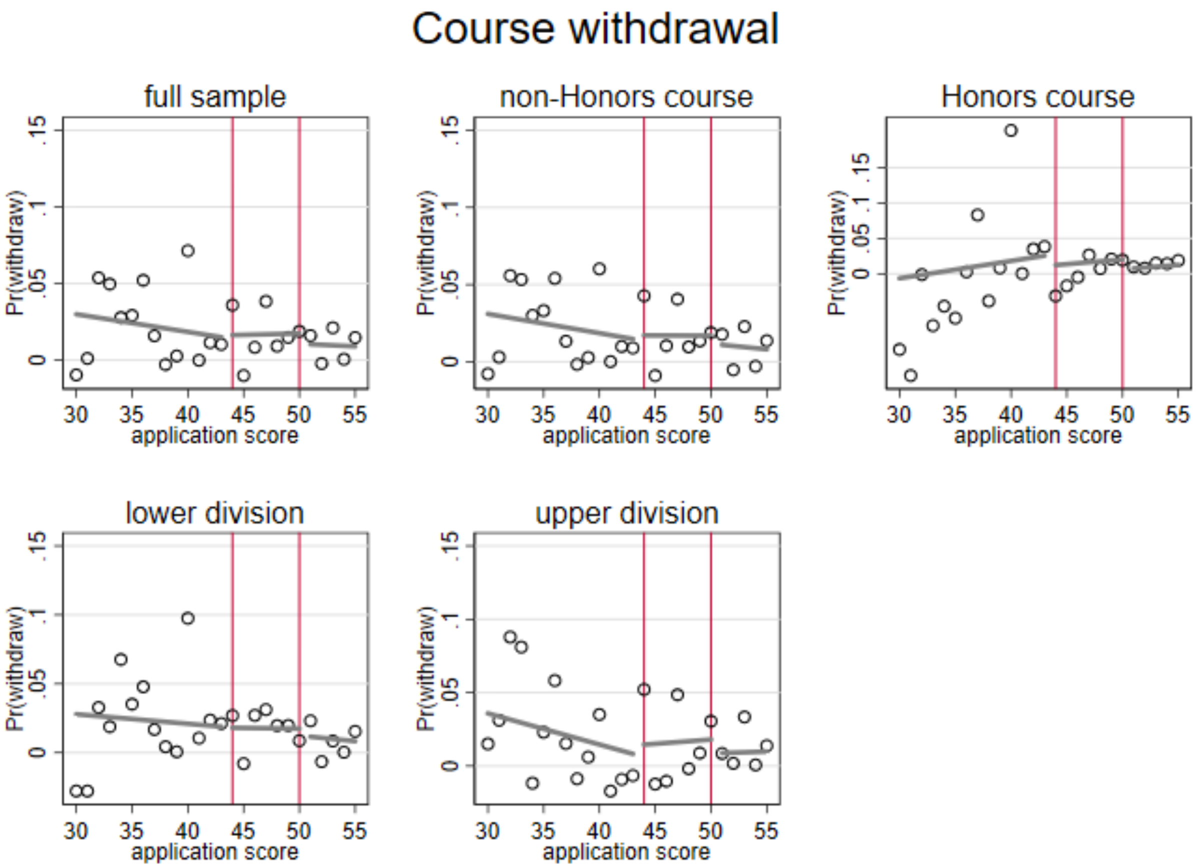


Sample is all Honors College applicants with application scores 30-55 who attended OSU, 2005-2014 cohorts. Results from transcript data of first-year Honors applicants who attended OSU, i.e., unit of analysis is a course taken by students in this category. Outcome is indicator for course grade at or above indicated threshold. Circles show mean outcome within bins of application scores (bin width=1). Gray line is predicted outcome. Red lines are kink points estimated from first stage.

Figure A5: Course failure

Sample is all Honors College applicants with application scores 30-55 who attended OSU, 2005-2014 cohorts. Results from transcript data of first-year Honors applicants who attended OSU, i.e., unit of analysis is a course taken by students in this category. Outcome is indicator for failing course. Circles show mean outcome within bins of application scores (bin width=1). Outcomes demeaned by cohort and course section, consistent with fixed effects used in estimation. Gray line is predicted outcome. Red lines are kink points estimated from first stage.

Figure A6: Course withdrawal



Sample is all Honors College applicants with application scores 30-55 who attended OSU, 2005-2014 cohorts. Results from transcript data of first-year Honors applicants who attended OSU, i.e., unit of analysis is a course taken by students in this category. Outcome is indicator for withdrawing from course. Circles show mean outcome within bins of application scores (bin width=1). Outcomes demeaned by cohort and course section, consistent with fixed effects used in estimation. Gray line is predicted outcome. Red lines are kink points estimated from first stage.