# The Effect of Honors College Participation on Student Outcomes

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Abstract

*Honors colleges are common programs for high achieving students at U.S. post-secondary institutions. These programs provide high achieving students benefits such as the ability to enroll in exclusive courses with small class size, to live in special dorms, and to enroll in classes earlier then non-honors students. These changes to a student's college experience may change their academic outcomes in ways that concern students and policymakers. Results in most prior research on the effect of honors college participation on academic outcomes may be biased by unobserved differences between students in and not in an honors college. For example, students who go out of their way to participate in honors programs likely care more about their education and spend more time studying than non-honors students with similar academic backgrounds. This paper addresses these unobserved differences by studying an honors college that uses GPA admissions cutoffs. The Michigan State University Honors College considers for admission all students in the top 10% of the freshmen fall semester GPA distribution of each non-honors college. I use a regression discontinuity research design to compare outcomes of students above and below the cutoffs, and attribute differences in outcomes to differences in honors college participation. I find that participation in the honors college may reduce the time for students to get their first degree and increases the probability that first-generation college students will graduate.*

## I. Introduction and Motivation

Honors education refers to special programs that colleges and universities in the United States (U.S.) provide to high-achieving students. Colleges have these programs to improve the educational experience of high-achieving students and incentivize high-achieving students to attend their college[1]. In 2016 there were at least 1,035 honors colleges and honors programs in the U.S.[2] (Scott, Smith, and Congnard-Black 2017). While the specifics of the programs vary widely, common program elements include: having honors courses, having honors housing, and requiring students to complete a thesis (Scott, Smith, and Congnard-Black 2017). These patterns are similar to patterns I found when looking at honors programs in national universities with similar rankings to Michigan State University (MSU), the subject of this study[3]. MSU describes its honors courses in the following way: compared to non-honors courses, honors courses are limited to honors students, have smaller class sizes, cover more material, cover material at a faster pace, and have more classroom interaction[4].

In this paper I study how a student's participation in an honors program changes their academic outcomes. While honors programs have aspects which have been shown to improve student outcomes, research on K-12 programs for high achieving students have shown mixed results. One reason an honors student might do better academically then a non-honors student is that they are in classes with fewer

[1] Large colleges often advertise their honors programs as creating the features of a small college. This seems to be done to incentivize academically gifted students who want to attend a small college to attend a larger one. To the extent that students going to a small college causes students to have different academic outcomes, replicating those features in an honors program may cause the program to affect academic outcomes in a similar way. For an example of an honors college that advertises itself as having a "small-college atmosphere" see https://honorscollege.msu.edu/about/index.html

[2] In 2016 honors education was offered at an estimated 59% of U.S. public and non-profit undergraduate post-secondary institutions, 42% of two-year public and non-profit U.S. post-secondary institutions, and 68% of 4-year post-secondary institutions. 59% of both public and private non-profit post-secondary institutions offered honors education in 2016 (Scott and Smith 2016).

[3] See Appendix A for a summary of these findings. One of the findings is that like at MSU, 20 of 53 honors programs that I looked at offered priority registration for honors students. This means that honors students can register for classes earlier then non-honors students.

[4] https://honorscollege.msu.edu/admissions/honors-experiences.html. Honors courses in other universities likely have similar features especially having small class sizes.

students. A key feature of honors programs is to allow students access to exclusive classes with small class sizes. Quasi-experimental research in higher education settings has found smaller class sizes to improve students rating of courses (Monks and Schmidt 2011; Sapelli and Illanes 2016). Another reason honors students might do better academically then non-honors students is that they have higher ability peers. Prior research has found that in some cases being in post-secondary settings with higher ability peers improves a student's GPA (Carrrell, Fullerton, and West 2009; Brady, Isnler, and Rahman 2017)[5]. Peers also affect a variety of other outcomes for college students such as if they smoke, how much they binge drink, and if they support affirmative action (Sacerdote 2011). Like post-secondary honors education, gifted and talented programs in primary and secondary schools allow high-achieving students to take classes that go through advanced material with other high-achieving students. Some studies have found positive effects on grades (Booij, Haan, and Plug 2017), reading and math achievement (Card and Giuliano 2014), high school graduation and college enrollment (Cohodes 2020) for gifted and talented education at the K - 12 level. However, other research finds no effect (Bui, Craig, and Imberman 2014; Abdulkadiroglu et al. 2014) or a mix of positive, negative, and insignificant effects (Barrow, Sartain, and De La Torre 2020)[6]. This discrepancy between positive outcomes for smaller classes and better peers and the mixed outcomes of K-12 programs makes it unclear what the effect of honors programs will be. This motivates me to study the effect of honors programs on student outcomes.

Another motivation for this study is most other research on this topic is not able to credible control for unobservable differences between honors and non-honors

[5] Other studies have peer effect findings consistent with little or no effect of peer ability on high ability students (Carrell, Sacerdote, and West 2013; Booij, Leuven, and Oosterbeek 2017)

[6] Barrow, Sartain, and De La Torre (2020) study the effect of being above cutoffs to get into selective high schools in Chicago. Their findings include no effect on ACT scores, negative effect on GPA especially for students from low-SES neighborhoods, and positive effects on student perceptions of personal safety and peer relationships.

students. Most other studies compare honors and non-honors students based on the assumption that students select into honors programs based on observable characteristics like grades[7]. This assumption is wrong and leads to biased results because students who select into joining honors programs are different on unobservable characteristics such as organizational skills and motivation. These differences would lead honors students to have better outcomes even if honors programs did not change their college experience.

In this paper I study the effect of honors college participation on academic outcomes while controlling for selection on unobservable factors. I do this by studying effect participating in the Michigan State University (MSU) Honors College. The MSU Honors College considers for admission freshmen whose GPA is high relative to other freshmen students with similar majors. They do this by admitting first-year students whose cumulative GPA during their fall semester is above the cumulative GPA's of at least 90% of other freshmen in their non-honors college. This policy allows me to use a regression discontinuity research design to compare individuals above and below the GPA cutoffs and to attribute differences in outcomes to differences in honors college participation. Because students can not precisely control their GPA, being just above or just below a cutoff is as good as random. This allows me to address omitted variable bias by comparing honors students to non-honors students who are similar on unobservable characteristics like organization and motivation. Overall, I do not find evidence of large effects on student outcomes from honors college participation. A possible exception to this is that honors college participation may reduce time to degree. However, I am likely to find a significant effect because I check 9 outcomes and that finding is not robust to removing covariates or using a doughnut sample. In heterogeneity analysis I find

[7] Cosgrove 2004, Hartleroad 2005, Rinn 2007, Slavin et al. 2008, Patton et al. 2019, and Smeaton and Walsh 2019 estimate the effect of honors college participation on student outcomes by comparing honors students to non-honors students with high GPA's. This incorrectly assumes that the there are no other differences between honors and non-students students that cause their outcomes to be different.

that honors college participation increases the probability that first-generation college students graduate from MSU. This finding is consistent with significant effects on total number of credits completed and credits completed at the 300 level. However, the coefficients have large standard errors because of the low number of high GPA first generation students in my sample and the results are not robust to using a bandwidth of 0.10.

## II. Literature Review

Many studies attempt to measure the causal effect of honors college participation on student academic outcomes by comparing honors students to observably similar non-honors students[8]. Most study programs at large 4-year public colleges (Cosgrove 2004; Hartleroad 2005, Rinn 2007; Slavin et al. 2008; Keller and Lacy 2013; Furtwengler 2015; Diaz et al. 2019; Brown et al 2019; Lishinski and Micomonaco 2020) while others study smaller 4-year public colleges (Patton et al. 2019; Smeaton and Walsh 2019) and community colleges (Honeycutt 2019). These studies look at differences in average outcomes between honors students and high ability non-honors students (Cosgrove 2004; Hartleroad 2005; Rinn 2007; Slavin et al. 2008; Patton et al. 2019; Smeaton and Walsh 2019), use matching methods (Shushok 2006; Keller and Lacy 2013; Futwengler 2015; Brown et al. 2019; Honeycutt 2019; Lishinski and Micomonaco 2020), and use hierarchical models (Diaz et al. 2019). They find that honors college participation is associated a student having a: higher GPA (Harleroad 2004; Cosgrove 2004; Shushok 2006[9]; Rinn 2007; Furtwengler 2015; Diaz et al. 2019; Brown et al. 2019; Honeycutt 2019; Lishinski and Micomonaco 2020), higher retention rate (Shushok 2006[10]; Slavin et

[8] See Rinn and Plucker (2017) for a literature review of papers published from 2002 to 2017 on the effects of honors programs on student outcomes. Some papers in the review are referenced later in the paragraph.

[9] Shushok (2006) found that honors students GPA's are statistically significantly higher than the GPA's of matched non-honors students at the end of freshmen year. The difference in GPA's was not statistically significant when Shushok collected GPA's 3 years later in April 2004.

[10] Shushok (2006) finds that first year retention rates for honors students are statistically significantly higher than 1st year retention rates for matched non-honors students at the end of freshmen year. The difference in retention rates was not statistically significant when Shushok collected data 3 years later in April 2004. This may simply be due to the study's small sample size as only 9 honors students and 15 non-honors students left the college during the period being analyzed.

al. 2008; Keller and Lacy 2013; Diaz et al. 2019; Patton et al. 2019; Brown et al. 2019; Smeaton and Walsh 2019) higher graduation rate (Cosgrove 2004; Slavin et al. 2008; Keller and Lacy 2013; Diaz et al. 2019; Patton et al. 2019; Honeycutt 2019; Lishinski and Micomonaco 2020), longer time to graduate (Cosgrove 2004), more credits earned (Diaz et al. 2019), and taking more upper level courses (Lishinski and Micomonaco 2020)[11].

There is one recent study on the effect of honors college participation on academic outcomes that uses a methodology that can credibly control for selection on both observables and unobservable characteristics. Pugatch and Thompson (2022) study the Oregon State University honors college. They use a regression kink research design based on the change in slope of the probability of honors college admission as a function of a student's honors college application score. Using student-course level data they find that overall honors college participation increases course GPA but that it decreases course GPA for first generation college students.

Similar to this study, the researchers also use student level data to look at academic outcomes. They look at the effect of honors college participation on overall grades, non-honors grades, overall number of credit hours, non-honors credit hours, ever graduating, graduating in less 4, 5, and 6 years, and graduating in science or engineering. They do not find a significant impact on student's overall GPA. However, their point estimate is positive and of a similar magnitude to their course level data estimate. They find significant negative effects on the number of non-honors credits and graduating in less than 6 years. The authors dismiss the later finding partially because 99% of students in their data graduate within 6 years.

[11] There are also papers which associate honors college participation with variables I do not study such as higher academic self-concept (Rinn 2007), increased interaction with faculty members (Shushok 2006), students taking classes with better teaching practices (Seifert et al. 2007; Miller and Dumford 2018), and getting a higher standardized exam scores (Seifert et al. 2007).

Their point estimate on the probability of ever graduating is large and negative at 7.7 percentage points but is not significant.

This study compliments Pugatch's and Thompson's study in several ways. One is by producing a credible causal estimate of honors college participation at a different university. Another is that in the Pugatch and Thompson study students were admitted while they were in high school while I study students who were admitted when they were already in college. Further, I study a variety of outcomes that Pugatch and Thompson do not including number of minors, time to degree, and credits in upper-level courses. Finally, due to a larger sample size, I can provide more precise estimates.

The admissions policy of the MSU's Honors College allows me to study the effect of an honors program on academic outcomes with a regression discontinuity research design (RDD). This research design is considered to have high internal validity because, absent manipulation of the running variable, being on either side of the cutoff is as good as random (Lee and Lemieux 2011). In other words, the RDD is less subject to potential omitted variable bias then other studies that rely on a selection on observables assumption. Studies which compare differences in outcomes between honors students and high ability non-honors students may not be able to control for differences in other observable factors between these students. Studies that use matching techniques can account for observable factors that affect student outcomes but may not completely control for unmeasured factors such as a student's level of ambition or how much a student cares about their college education. One downside of an RDD is that estimates only apply to students who are are the margin of entry into the honors college, in this particular case, who do not join the honors college when they are in high school, whose freshmen GPA is near a GPA cutoff, and who would join the honors college if their GPA is above a cutoff. The effect of honors college participation for the students admitted into the Honors College when they are in high school, for the highest achieving students, or

for students with average GPA's, may be significantly different from my estimates. This methodologies allows me to provide information about what might happen to student outcomes in the case the GPA cutoffs were lowered and more students were invited to join the honors college.

## III. Institutional Background: The MSU Honors College

MSU is a large 4-year public university located in East Lansing, Michigan. 83% of students who applied to the university in Fall 2021 were admitted. In Fall 2020 38,491 undergraduate students were enrolled in the university. These students were 90% full time, 68% white, and 80% of them were from the state of Michigan[12].

The MSU Honors College invites first-year students with high GPA's[13] to join the college. MSU is organized into 17 different non-honors colleges. These colleges represent specific categories of study such as business, communication arts and sciences, and education. Freshmen students are assigned to colleges based on their expected majors. The MSU Honors College invites all students in the top 10% of each non-honors college's GPA distribution[14]. Transfer students can also be invited into the honors college this way if they transfer to MSU as first year students[15]. There are no additional fees for being in the college and there are no punishments if a student starts out in the college and leaves it later. A large minority of students invited into the college this way do not accept their invitation[16].

[12] https://nces.ed.gov/collegenavigator/?q=Michigan+State+University&s=all&id=171100 The years were chosen based on the data available on the above website.

[13] GPA stands for grade point average. Each course grade at MSU is assigned one of the following scores: 0, 1, 1.5, 2, 2.5, 3, 3.5, and 4. The better a student does in a class, the higher their course grade. Each class is a certain number of credits depending on how many hours the class meets each week. To calculate GPA, you first multiply a student's course grades by the number of credits in their classes to get the number of grade points they earned in each class. You then sum the grade points the student earned and divide by the number of credits the student took at MSU. While GPAs are generally determined using grades on assignments and exams, some students may be able to change their GPA by requesting a professor raise their grade. This information is taken from https://natsci.msu.edu/students/current-students/student-success-resources/academic-success/habits-to-develop-outside-of-class/calculating-your-gpa/

[14] Students who participate in specific enrichment programs and are in the top 15% of their college's GPA distribution are also invited to the join the MSU Honors College. Only a small percent of students who are invited into the MSU Honors College are between the 85$^{th}$ and 90$^{th}$ percentile of the GPA distribution.

[15] Students who transfer as something other than first year students can also petition to join the honors college.

[16] From academic years 2017 – 2018 to 2021 – 2022 54% of freshmen admitted into the college accepted their offer.

The benefits of being in the college include: more flexible general education requirements, the ability to enroll in classes on the first day of each enrollment period, the ability to enroll in graduate courses, honors courses, and honors sections of regular courses, the ability to live on honors-only floors of residence halls, the ability to meet with honors college advisors and the ability to apply for special scholarships. See Appendix B for more details about the benefits of being enrolled in the MSU Honors college.

Students must fulfill certain requirements to stay in the college. These requirements include completing at least 3 honors experiences (explained below) by the end of their second spring semester, maintaining a GPA of at least 3.2, and completing an Honors College Academic Progress Plan once a year. The Honors College Academic Promise plan is used to approve courses for the college's general education requirements and to have students reflect on their accomplishments and professional goals.

Students in the college who engage in enough honors activities are recognized as having graduated from the college. To graduate a student must complete at least 8 Honors experiences[17]. Honors experiences include participation in honors courses, participating in honors sections, taking the honors option in a non-honors course, and taking a graduate course. During an honors option students do a project related to course material not required by other students such as writing a business plan in an accounting course or writing a report on an additional experiment in a chemistry course[18]. If a student graduates from the Honors College, that fact is recorded on the student's diploma and on their official MSU transcript. They are also recognized during graduation ceremonies with an Honors College stole and affiliation with the MSU Honors College being noted in the graduation program.

[17] Students must complete 10 Honors experiences if they have 2 degrees and want both degrees to be labeled as honors degrees.
[18] See https://honorscollege.msu.edu/academics/honors-option-examples.html for other examples of honors option projects.

## IV. Data and Sample

This project uses student level administrative data from MSU's Office of the Registrar. I restrict the sample to students whose first semester at MSU as an undergraduate was fall semester 2009, 2010, 2011, 2012, or 2013. Students who were in a college whose 90th percentile GPA I was unable to identify[19] are removed because I do not know how close those students GPA's are to a cutoff to be considered for admission to the Honors College. Students in colleges and cohorts where the GPA cutoff is 4.0 are removed as they do not provide an ability to estimate the running variable above the cutoff. After removing those students, the analysis sample has 37,705 observations[20].

Table 1 - Summary Statistics Honors and Non-Honors Students

| | Honors Student | | Non-Honors Student | |
|---|---|---|---|---|
| Variable | Mean | Standard Deviation | Mean | Standard Deviation |
| Female Indicator | 0.60 | 0.49 | 0.50 | 0.50 |
| White Indicator | 0.78 | 0.41 | 0.61 | 0.49 |
| Black Indicator | 0.04 | 0.18 | 0.09 | 0.29 |
| First Gen Indicator | 0.19 | 0.39 | 0.28 | 0.45 |
| Age First Term | 17.9 | 0.53 | 18.1 | 0.79 |
| ACT Score | 28.5 | 3.4 | 24.4 | 3.4 |
| First Semester GPA | 3.7 | 0.42 | 2.7 | 1.1 |
| Number of Observations | N = 3,505 | | N = 34,200 | |

Notes: Honors students are students who are in the Honors College at least 1 semester. All other students are non-honors students. 9.5% of honors students and 22% of non-honors students having missing ACT scores. N = 3,171 for ACT statistics for honors students. N = 26,804 for ACT statistics for non-honors students.

Table 1 shows summary statistics for honors and non-honors students. Close to 10% of students in the sample are honors students. Compared to non-honors students, honors students are more likely to be female, more likely to be white, less likely to be black, less likely to be a first-generation college student, and have higher ACT scores and first semester GPA's. Honors and non-honors students on

[19] These include students who first college was recorded as being in: the Honors College, the College of Human Medicine, the Associate Provost for Undergraduate Education or the Associate Provost for Undergraduate Services. Students do not have to declare a major until they have 56 credits. If students do not declare a major, their major is recorded as exploratory preference. Over 99% of Associate Provost for Undergraduate Education students have exploratory preference as their freshmen major. The most common majors for Associate Provost for Undergraduate Services are Study Abroad Course Access Track (33%) and Class Connection Tracking (24%). All College of Human Medicine students have the major of Bioethics, Humanities and Society.

[20] I start with a sample of 43,267 students who first undergraduate term is Fall 2009, Fall 2010, Fall 2011, Fall 2012, or Fall 2013. 3,594 of those students are in a first college whose 90$^{th}$ percentile GPA I am unable to identify and 1,968 are in a starting year and first college whose 90$^{th}$ percentile GPA was 4.0.

average start college when they are the same age, but the variability of ages is greater for non-honors students[21].

To the extent honors college participation causes students to substitute non-honors peers for honors peers, participation will likely increase the ACT scores and grades of the students' peers. This is because honors students have higher ACT scores and first semester GPA's then non-honors students. Honors students are encouraged to have other honors students as peers though access to things like honors classes and honors-only floors of resident's halls. Prior research has found that peers significantly impact a variety of outcomes in higher education settings such as GPA and level of binge drinking (Carrrell, Fullerton, and West 2009; Sacerdote 2011). Therefore, I expect honors students to have improved academic outcomes if only because they have higher ability peers.

Table 2 - Summary Statistics Analysis Sample and Close to Cutoffs Sample

| | Close to Cutoffs Sample | | All GPA's Sample | |
|---|---|---|---|---|
| Variable | Mean | Standard Deviation | Mean | Standard Deviation |
| Female Indicator | 0.58 | 0.49 | 0.51 | 0.50 |
| White Indicator | 0.77 | 0.42 | 0.63 | 0.48 |
| Black Indicator | 0.03 | 0.17 | 0.09 | 0.28 |
| First Gen Indicator | 0.20 | 0.40 | 0.27 | 0.44 |
| Age First Term | 18.0 | 0.79 | 18.1 | 0.77 |
| ACT Score | 26.5 | 3.2 | 24.8 | 3.6 |
| First Semester GPA | 3.8 | 0.11 | 2.8 | 1.1 |
| Number of Observations | N = 5,557 | | N = 37,705 | |

Notes: Students in the close to cutoff sample have a first semester GPA minus the 90$^{th}$ percentile GPA for their year and college (running variable) of between -0.15 and 0.15. 12% of students in the Close to Cutoffs Sample and 20% of students in the All GPA's Sample having missing ACT scores. N = 4,864 for ACT statistics for the Close to Cutoffs Sample. N = 29,975 for ACT statistics for the All GPA's Sample.

Table 2 shows summary statics for all students in my sample (All GPA's Sample) and for a sample of students who are close to the cutoffs. Compared to the students in the All GPA's Sample, the students close to the cutoff are more likely to be female, and white, less likely to be black or first gen students and have higher

[21] In results available upon request, I get summary statistics for students admitted into MSU's Honors College when they are in high school and for students admitted into the Honors College when they are already at MSU. Compared to students admitted when they were in high school, students admitted when they were in college are more likely to be female, less likely to be white, have lower ACT scores, and have higher first semester GPA's. The All GPA's Sample contains 1,486 high school admits and 2,019 college admits.

ACT scores and first semester GPA's. The two groups are similar in the age during their first term.

## V. Empirical Methodology

My equation of interest is:

(1) $Outcome_{ict} = \beta_0 + \beta_1 HonorsCollege_{ict} + \boldsymbol{\beta X}_i + \theta_{ct} + \epsilon_{ict}$

$Outcome_{ict}$ represents an outcome for student i who started in non-honors college c and in year t. The outcomes I study include: the student's cumulative GPA at the end of their 4th and 8th semesters at MSU[22], if the student graduated from MSU, how long it took the student to get their first BA or BS degree, the number of majors the student completed, the number of minors the student completed, the total number of credits the student earned, the number of credits the student earned for classes at the 300 level, and the number of credits the student earned for classes at the 400 level.

$\mathbf{X_i}$ is a vector of covariates for student i. This vector contains indicator variables for the student's race[23], gender and if the student is a first-generation college student[24]. It also contains student's age when they entered MSU as a continuous variable.

$\theta_{ct}$ is a fixed effect for the combinations of a student's first non-honors college a student enrolled in at MSU and what year, 2009 – 2013, the student was a freshman. Cutoffs depend on a student's first college-year combination. This fixed effect allows me to compare students who face the same GPA cutoff.

[22] When counting semesters for cumulative GPA as an outcome, I do not count summers. For example, if a student started in Fall 2009 then their 3rd semester cumulative GPA would be their cumulative GPA at the end of Fall 2010 even if they took classes at MSU during Summer 2010. I also do not account for students who leave MSU for a semester and return later. For example, if a student started in Fall 2009, took no class in Spring 2010 or Fall 2010 and returned in Spring 2011, then their 3rd semester cumulative GPA (Fall 2010) would be missing.

[23] Some students in my data have a race that is either not reported or not requested. I leave these students in the sample and consider not reported and not requested as two races.

[24] Being a first-generation college student means that none of the student's ancestors such as parents, grandparents, or great grandparent's attended college or university.

$HonorsCollege_{ict}$ is an indicator variable for the student being in the MSU Honors College for at least 1 semester.

Because students are chosen to be in the honors college based on their academic achievement, an OLS regression would be inconsistent with $\hat{\beta}_1$ likely being too large. $\hat{\beta}_1$ would include not only the causal effect of being in the college, but also the difference in unobserved factors that affect academic outcomes between honors and non-honors students. These factors might include how much a student studies and how much a student enjoys attending lectures[25]. To address this issue, I use a fuzzy[26] regression discontinuity design where having a high enough 1st semester GPA to be considered for admission to the Honors College is an instrument for being in the college for at least 1 semester. With this research design $\beta_1$ is an estimate of the causal effect of ever being a part of the Honors College on an outcome for students whose GPA is both close to one of the cutoffs and who would be admitted to and join the Honors College if their GPA is above a cutoff.

The empirical methodology for this project relies on the fact that the MSU Honors College uses GPA cutoffs when considering which freshmen get invited to join the college. The Honors College invites all freshmen into the college who are in the top 10% of GPA's among freshmen in their non-honors college. For example, assume that there were 100 freshmen in the College of Music in Fall of 2009, that each student had a different GPA, and that the 10th highest GPA among those students was a 3.75. In that case, the Honors College invite the 10 freshmen in The College of Music who had a GPA of greater than or equal to 3.75 to join the college[27].

[25] Other examples of possible unobserved differences that OLS regressions might not account for include differences in innate intelligence or differences in the quality of schools students attend before they start attending MSU.
[26] This is a fuzzy regression discontinuity design because the probability of being in the MSU Honors College does not go from 0 to 1 at the GPA cutoffs. One reason some students below the cutoff are in the MSU Honors College is because they were invited into the college when they were in high school. Another reason some students above the cutoff are not in the MSU Honors College is because they turned down their offer of admission to the college.
[27] The cutoffs are calculated rounding to 2 decimal places. If more than 10% of students are above a cutoff, say because many students have the same GPA, then the records of all students at or above the cutoff are reviewed.

Because students do not know what the cutoffs are, and because students cannot precisely control their GPA, those just above and just below the cutoffs should be similar in both observable and unobservable characteristics unrelated to Honors College participation. This allows me to attribute differences in academic outcomes between students with similar GPAs on different sides of the GPA cutoffs to the difference in participation in the honors college at the cutoffs.

The first stage estimating equation is

$$
\begin{aligned}
(2)\ HonorsCollege_{ict} &= \beta_0 + \beta_1 AboveCutoff_{ict} \\
&+ \beta_2 (FreshmenGPA_{ict} - GPACutoff_{ct}) \\
&+ \beta_3 AboveCutoff_{ict} (FreshmenGPA_{ict} - GPACutoff_{ct}) + \boldsymbol{\beta X}_i \\
&+ \theta_{ct} + \epsilon_{ict}
\end{aligned}
$$

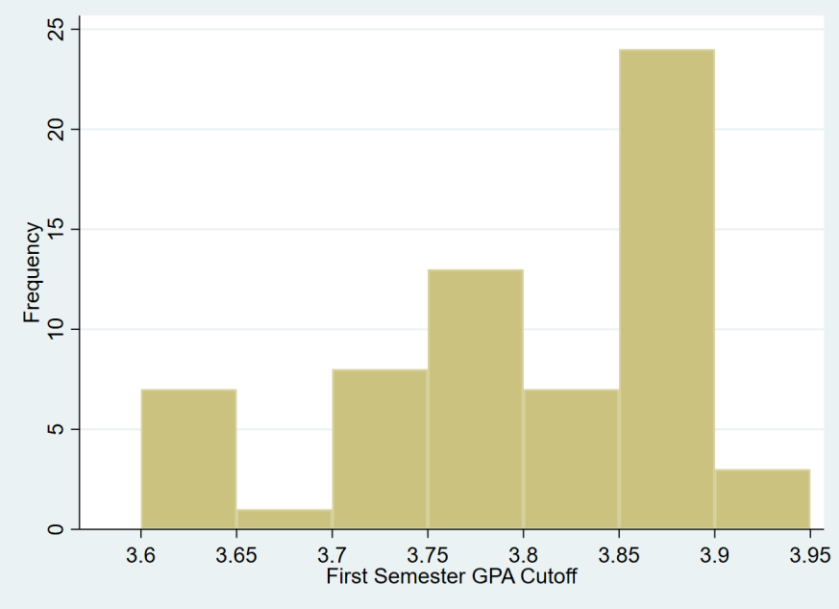
The second stage estimating equation is

$$
\begin{aligned}
(3)\ Outcome_{ict} &= \beta_0 + \beta_1 HonorsCollege_{ict} \\
&+ \beta_2 (FreshmenGPA_{ict} - GPACutoff_{ct}) \\
&+ \beta_3 AboveCutoff_{ict} (FreshmenGPA_{ict} - GPACutoff_{ct}) + \boldsymbol{\beta X}_i \\
&+ \theta_{ct} + \epsilon_{ict}
\end{aligned}
$$

$AboveCutoff_{ict}$ is an indicator variable for if the student is above a GPA cutoff. $GPACutoff_{ct}$ is the minimum GPA the student needs to earn for them to be considered for admission into the Honors College. It is specific both to the non-honors college the student was in when they were freshmen and the year the student

was a freshman. The distribution of GPA cutoffs used in my analysis is shown below in Figure 1. In both equations the coefficients of interest $\beta_1$.

Figure 1 – Distribution of GPA Cutoffs




Notes: N = 63. Cutoffs range from 3.6 to 3.93. While some colleges had cutoffs of 4.0, they are not included in the graph because those colleges and years were not included in my analysis.

I also use equations 2 and 3 to measure how much students close to the cutoff participate in the MSU Honors College. I do this by looking at the following outcomes: the number of semesters a student is in the college, if the student graduated from the college, and the number of Honors experiences the student completed. The more students do things that they can only do as honors students, the more intense the treatment of being admitted to the honors program is, and the more likely the program will change academic outcomes. The longer a student is in the Honors College the more time they can engage in honor student only activities. Most of things that count as Honors experiences including enrolling in honors courses, honors sections and graduate courses, are things only honors students can do[28]. The more honors experiences students have the more being admitted into the Honors College changes their college experience. Graduating from the Honors

[28] Honors options also count as honors experiences but both non-honors and honors students can do honors options. Honors students have a much stronger incentive to do them because only for honors students do they count towards getting a degree from the Honors College.

College means a student has completed least 8 honors experiences and completed a yearly academic plan. Those students have engaged a lot with honors only coursework, much more so than students who were admitted into the college but who did not have any honors experiences.

If there are discontinuities in observable differences at the GPA cutoffs, this may be evidence that students on either side of the cutoffs are different in ways other than their participation in the Honors College. I test for this using the following equation

$$(4)\ Covariate_{ict} = \beta_0 + \beta_1 AboveCutoff_{ict} + \beta_2(FreshmenGPA_{ict} - GPACutoff_{ct}) + \beta_3 AboveCutoff_{ict}(FreshmenGPA_{ict} - GPACutoff_{ct}) + \epsilon_{ict}$$

The models as specified above assume a linear relationship between a student's freshmen fall semester GPA and the outcome variables, allowing for different slopes on each side of the GPA cutoffs. I use a bandwidth of 0.15 for all regressions in the main body of the paper. I include alternative specifications in the Appendix. These other specifications include using a bandwidth of 0.10, using a bandwidth of 0.20, and using a bandwidth and calculating confidence intervals using the method described in Calonico, Cattaneo, and Titiunik (2014).

To test for differences in the effect of Honors College participation for different subgroups, I use the following equation

$$(5)\ Outcome_{icts} = \beta_0 + \beta_1 HonorsCollege_{icts} + \beta_2(FreshmenGPA_{icts} - GPACutoff_{ct}) + \beta_3 AboveCutoff_{icts}(FreshmenGPA_{icts} - GPACutoff_{ct}) + \beta_4 Subgroup_s + \beta_5 Subgroup_s HonorsCollege_{icts} + \beta_6 Subgroup_s(FreshmenGPA_{icts} - GPACutoff_{ct}) + \beta_7 Subgroup_s AboveCutoff_{ict}(FreshmenGPA_{icts} - GPACutoff_{ct}) + \epsilon_{icts}$$

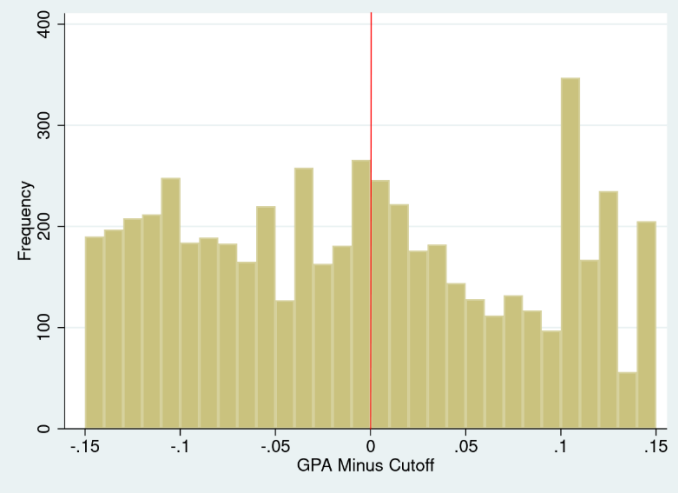
Subscript s denotes if individual i is a member of subgroup s. $Subgroup_s$ is a subgroup indicator variable. This equation models the relationship between the

running variable and the dependent variable differently for students who are and are not subgroup members. I estimate Equation 5 by instrumenting $HonorsCollege_{icts}$ and $Subgroup_s HonorsCollege_{icts}$ with $AboveCutoff_{icts}$ and $Subgroup_s AboveCutoff_{icts}$. The coefficients of interest are $\beta_1$ and $\beta_5$. $\beta_1$ is the treatment effect of honors college participation for students who are not member of the subgroup. $\beta_1 + \beta_5$ is the treatment effect for students who are members of the subgroup. The statistical test on $\beta_5$ test whether the treatment is different for subgroup members and non-subgroup members.

## VI. Results

### *A. Identification Test: Discontinuity in Density*

Figure 2 – Histogram Students Close to Cutoff




Notes: N = 5,557. Each bar in this histogram has a width of 0.01. The histogram starts at GPA Minus Cutoff = -0.15.

A sudden change in the density of observations at the cutoff may be evidence that individuals on different sides of the cutoff are different in ways that are not related to participation in the Honors College. Figure 2 shows the density of observations for values of the running variable between -0.15 and 0.15. For this study the running variable (GPA Minus Cutoff) is a student's freshmen fall semester GPA minus the $90^{th}$ percentile of cumulative GPA's for the student's

cohort and first college[29]. The graph shows a small decrease in the number observations where the running variable equals 0. I test for this change in the density of observations at the cutoff using the test described in Cattaneo, Jansson and Ma (2018) which builds on foundational work for this type of test in McCrary (2008). I find that this decrease is not significant with a test statistic of 1.3197 and a p-value of 0.19[30].

### *B. Identification Test: Discontinuities in Covariates*

Table 3 – Discontinuity in Covariates

| | Female | First Gen | Age First Semester | ACT Score[31] | White | Black |
|---|---|---|---|---|---|---|
| Above Cutoff | -0.0175 | 0.0099 | -0.0228 | -0.1235 | -0.0105 | 0.0206** |
| | (0.0361) | (0.0180) | (0.0418) | (0.2214) | (0.0227) | (0.0096) |
| Mean Outcome | 0.51 | 0.27 | 18 | 25 | 0.63 | 0.09 |
| | American Native | Asian | Pacific Islander | Hawaiian | Hispanic | Two or More Races |
| Above Cutoff | 0.0058** | -0.0049 | 0.0005 | -0.0002 | -0.0061 | -0.0046 |
| | (0.0024) | (0.0171) | (0.0005) | (0.0005) | (0.0073) | (0.0071) |
| Mean Outcomes | 0.00 | 0.05 | 0.00 | 0.00 | 0.04 | 0.02 |
| | Race Not Reported | Race Not Requested | | | | |
| Above Cutoff | 0.0025 | -0.0030 | | | | |
| | (0.0044) | (0.0162) | | | | |
| Mean Outcome | 0.01 | 0.16 | | | | |

Notes: ** means the coefficient is significant at the 5% level. Bandwidth = 0.15. Standard errors are clustered at the first college – cohort level. The regressions above use estimating equation 4 from Section 5 of this paper. N = 5,557 except for ACT Score were N = 4,864. The outcomes are indicator variable for being female, being white, being black, being a first-generation college student, the student's age during their first semester at MSU and the student's ACT score. Mean outcomes for the All GPA's Sample are shown.

In Table 3 I test if there is a statistically significant discontinuity at the cutoffs for variables that should not be affected by a student enrolling in the Honors College. Most the coefficients are small and statistically insignificant. There is a statistically significant discontinuity in the proportion of black students and American native students at the cutoff.

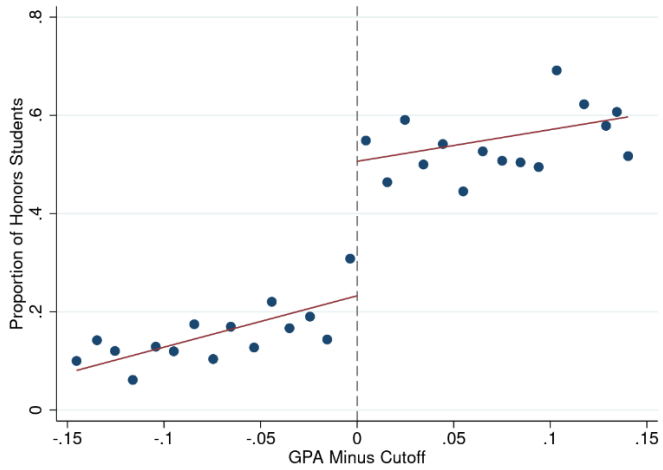
[29] 90th percentile GPAs by year and college were obtained from the MSU Enrollment and Term End Reports Ranking of Cumulative GPAs by Class and Level of Primary Major. See https://reg.msu.edu/roinfo/ReportView.aspx?Report=CTE-RankCumGPAs

[30] This is for an algorithmically chosen bandwidth of 0.079. Specifying a bandwidth of 0.15 the T statistic is 2.8964 and the p-value is 0.004.

[31] In results not shown, I test for a discontinuity in the probability a student's ACT score is missing at the cutoffs. The discontinuity, at a decline of 0.3%, was small and insignificant.

## *C. Discontinuities in Honors College Participation at the Cutoffs*

Figure 2 – Discontinuity in Proportion of Honors Students




Notes: N = 5,557. Only students who have a running variable between -0.15 and 0.15 are included in the graph. I define an honors student as a student who was in the MSU Honors College for at least 1 semester. Each dot is the proportion of honors students whose running variable is an element of [x, x + 0.01). For the left most dot x = -0.15.

Figure 2 shows a binned scatter plot of the proportion of honors students for values of the running variable around the cutoffs. In the figure the proportion of students who are honors students discontinuously increases from 0.25 to 0.5 at the cutoffs.

Table 4 – Discontinuity in Ever Being in the Honors College

| | Ever in Honors College | Ever in Honors College |
|---|---|---|
| Above Cutoff | 0.2824*** | 0.2953*** |
| | (0.0232) | (0.0232) |
| Covariates | N | Y |
| Mean Outcome | 0.09 | 0.09 |

Notes: N = 5,557. Bandwidth = 0.15. Standard errors are clustered at the first college – cohort level. *** means the coefficient is significant at the 1% level. Covariates include the student's age when the entered MSU and indicators for being female, being a specific race, being a first-generation college student, and being in a particular freshmen year-first college combination. Mean outcomes for the All GPA's sample are shown.

Table 4 shows that the increase in the proportion of honors students at the GPA cutoffs is large and significant for a bandwidth of 0.15. This means that there

are many students below the cutoffs who would have joined the honors college if their GPA was a bit higher and they were considered for admission.

Table 5 – Intensity of Honors College Participation for Marginal Students

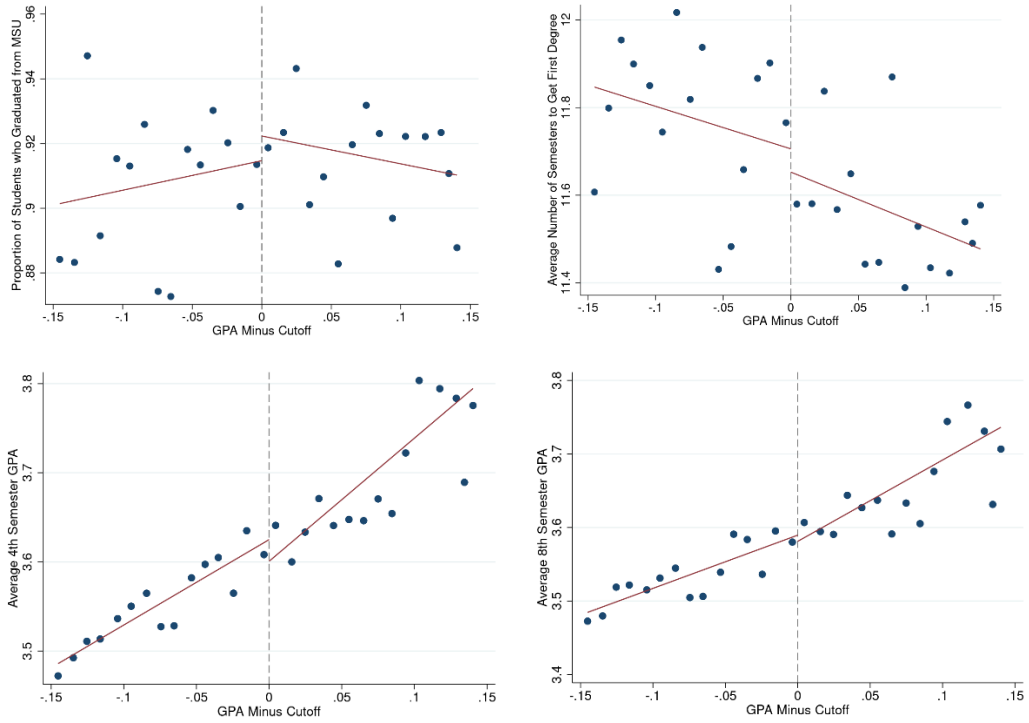
| | Number of Semesters in the Honors College | Number of Semesters in the Honors College | Number of Honors Experiences | Number of Honors Experiences | Graduating from Honors College | Graduating from Honors College |
|---|---|---|---|---|---|---|
| Treatment Effect | 7.7373*** (0.4225) | 7.9596*** (0.3828) | 5.0256*** (0.4142) | 5.3090*** (0.3499) | 0.5018*** (0.0591) | 0.5277*** (0.0534) |
| Covariates | N | Y | N | Y | N | Y |
| Mean Outcome College Admits | 7.9 | 7.9 | 5.4 | 5.4 | 0.54 | 0.54 |

Notes: N = 5,557. Bandwidth = 0.15. Standard errors are clustered at the first college – cohort level. *** means the coefficient is significant at the 1% level. The coefficients are 2SLS estimates for the treatment effect of ever participating in the Honors College. Covariates include the student's age when the entered MSU and indicators for being female, being a specific race, being a first-generation college student, and having a particular freshmen year-first college combination. Mean outcomes for honors students in the All GPA's Sample whose first semester in the honors college is not their first semester at MSU are shown.

Table 5 shows different measures of Honors College participation for students near the cutoffs. These students were very active in the Honors College. They stayed in college for an average of 8.0 semesters and completed an average of 5.3 Honors experiences. About 53% of them ended up graduating from the college meaning they completed at least 8 Honors experiences. These results shows that Honors College participation significantly changed the college experience of students near the cutoffs.

## *D. Results: Discontinuities in Academic Outcomes*

Figure 3 – Discontinuities in Selected Outcomes




Notes: N = 5,557 for the top left graph. N = 5,066 for the top right graph. N = 5,244 for bottom left graph. N = 4,609 for bottom right graph. The top left graph has the most observations because some students left MSU before they earned a degree or before their 4th or 8th semesters. For the top right graph time to degree includes counts summers as 1 semester even if the student did not take any summer classes. For the bottom two graph the variable is cumulative GPA at the end of the term. Each dot is the average outcome for students whose running variable is an element of [x, x + 0.01). For the left most dot x = -0.15.

Figure 3 contains binned scatter plots for proportion of students who graduated (top left), number of semesters to get first degree (top right), 4th semester GPA (bottom right), and 8th semester GPA (bottom left). All outcomes have a small discontinuity at the cutoff.

Table 6 – Effect of Honors College Participation on Student Outcomes

| | Graduate MSU | Graduate MSU | Time to Degree | Time to Degree | 4th Semester GPA | 4th Semester GPA |
|---|---|---|---|---|---|---|
| Treatment Effect | 0.0220 (0.0484) | 0.0287 (0.0475) | -0.3057 (0.4374) | -0.7358** (0.3269) | -0.0778 (0.0653) | -0.0077 (0.0564) |
| Covariates | N | Y | N | Y | N | Y |
| Number of Observations | 5,557 | 5,557 | 5,066 | 5,066 | 5,244 | 5,244 |
| Mean Outcome | 0.80 | 0.80 | 13 | 13 | 3.1 | 3.1 |
| | 8th Semester GPA | 8th Semester GPA | Total Credit Hours | Total Credit Hours | Credit Hours 300 Level | Credit Hours 300 Level |
| Treatment Effect | -0.0191 (0.0703) | 0.0359 (0.0559) | -0.8087 (4.5282) | -1.0309 (4.2331) | 0.1315 (3.0473) | 0.3587 (1.7484) |
| Covariates | N | Y | N | Y | N | Y |
| Number of Observations | 4,609 | 4,609 | 5,557 | 5,557 | 5,557 | 5,557 |
| Mean Outcome | 3.2 | 3.2 | 106 | 106 | 25 | 25 |
| | Credit Hours 400 Level | Credit Hours 400 Level | More than One Degree | More than One Degree | Number Minors | Number Minors |
| Treatment Effect | 1.9440 (2.8731) | 0.6507 (2.0249) | -0.0543 (0.0415) | -0.0519 (0.0391) | -0.1346 (0.0902) | -0.0342 (0.0735) |
| Covariates | N | Y | N | Y | N | Y |
| Number of Observations | 5,557 | 5,557 | 5,066 | 5,066 | 5,557 | 5,557 |
| Mean Outcome | 17 | 17 | 0.03 | 0.03 | 0.15 | 0.15 |

Notes: ** means the coefficient is significant at the 5% level. Standard errors are clustered at the first college – cohort level. Coefficients are 2SLS estimates for the treatment effect of ever participating in the Honors College. Covariates include the student's age when they enter MSU and indicators for being female, being a specific race, being a first-generation college student, being in a particular freshmen year-first college combination. For all regressions the bandwidth is 0.15. Mean outcomes for students in the All GPA's Sample are shown. Time to degree counts summers as 1 semester. For the GPA regressions, 4th semester and 8th semester are calculated ignoring summers. GPA is cumulative GPA at the end of the semester. For more one than one degree only students who have at least 1 degree are included in the regression.

Table 6 shows treatment effect estimates for ever being in the Honors College on academic outcomes. Almost all outcomes have insignificant coefficients with or without covariates. The only exception to this is the negative coefficient on time to degree with covariates. According to that estimate, being in the Honors College causes students near the cutoff to graduate 0.7 semester sooner. This a reduction in the number of semesters to graduate of about 5%.[32] The magnitude for time to degree is about 50% smaller without covariates and not statistically significant. It might also be a spurious result given that the 8 other outcomes I check

[32] The denominator for this calculation is the average of 13 semesters it took students in the All GPA's Sample to get their first degree.

insignificant and the more outcomes I check the more likely 1 is significant even if all true effects are 0. Based on these results, it seems like honors college participation does not affect student outcomes with the possible exception of the time it takes students to get their first degree.

Appendix Table E1 looks at outcomes not in Table 5 including cumulative GPA for other semesters, retention for 2nd to 8th semester, and time to first degree ignoring summers. No coefficient in Table E1 is statistically significant at the 5% level. This includes the coefficients on time to degree when calculated ignoring summer semesters.

### *D. Alternative Specifications: Full Sample*

In Appendix C I re-create Tables 3 to 6 using algorithmically chosen bandwidths and bias corrected confidence intervals from Calonico, Catteno, and Titiunik (2014). The results are qualitatively similar to those above.

Also, in Appendix C I re-do the analysis from Tables 3 to 6 for a bandwidth of 0.10 and a bandwidth of 0.20. The results are presented in Tables C5 to C8. In most cases changing the bandwidth does not change the significance of the results. The coefficient on the proportion of black students is significant at a 10% level for a bandwidth 0.20 but not significant for a bandwidth of 0.10. With a bandwidth of 0.15 the coefficient is significant at the 5% level. The negative treatment effect of Honors College participation on time to degree is only significant at the 10% level for a bandwidth of 0.20. The treatment effect is significant at the 5% level for bandwidths of 0.10 and 0.15.

Finally, I re-create Tables 3 to 6 using a doughnut sample. This sample removes students who have a GPA Minus Cutoff of between -0.01 and 0.01. The goal of this was to remove the significant discontinuity in the proportion of black students and address identification issues arising from the jump in the proportion of honors students of about 10 percentage points between the two dots just to the left of the cutoff in Figure 2. With the doughnut sample no covariates have a

significant discontinuity at the cutoff at the 5% level. The proportion of honors students still increases significantly at the cutoff and the treatment effect on honors college related outcomes is about the same as it is in Table 5. However, unlike Table 6, no outcome has a significant coefficient at the 5% level when covariates are included. In particular, the estimated treatment effect for time to degree is about half the magnitude it is in Table 6 and is not significant even at the 10% level. This result is consistent with the significant time to degree in Table 6 being due to random variation rather than due to a real causal effect.

Another possible concern with my main specification is that I may not have enough a large enough range of observations above the cutoff to properly estimate the sample. To address this in results available upon request I re-create Tables 3 to 6 dropping all students whose cutoffs is 3.9 or greater. Results are similar to the main specification with a first stage of 29 percentage points and a significant effect on time to degree with covariates of -0.80 semester.

### *E. Placebo Tests Full Sample*

In Appendix D I do a placebo test where I look for a discontinuity in the proportion of students who were admitted into the Honors College when they were in high school. I identify these students based on their being in the Honors College during their first term at MSU. Because those students are already in the Honors College when the cutoffs are determined there should be no discontinuity in high school admits at the cutoffs. This is what I find in Appendix Figure D1 and Table D1. The discontinuity for high school admits is close to 0 and statistically insignificant.

In a second placebo test, I re-do my main analysis using cutoffs from the year after students enrolled at MSU. Because those cutoffs are based on the GPA's of a future cohort, they should not influence honors college participation. However, from 2009 – 2014 of the 70 changes in cutoff by year and college, 18 of those changes were for a GPA of either 0 or 0.01. Including those students might give a

significant first stage because the cutoff from the correct year was used. Before doing the test, I remove students who's cutoff if they started in the following year would either be the same or be different by only 0.01 grade points. In results available upon request, I find a discontinuity in the proportion of honors students at the placebo cutoffs of less then 1 percentage point. Estimating the effect of honors college participation on outcomes using the placebo cutoffs, I have very large standard errors and no effect is statistically significant.

### *F. Heterogeneity: Female vs Male*

Table 7 – Male and Female Treatment Effect of Honors College Participation

| | Graduate MSU | Time to Degree | 4th Semester GPA | 8th Semester GPA | Total Credit Hours | Credit Hours 300 |
|---|---|---|---|---|---|---|
| In Honors College | 0.0422 | -0.9725 | -0.0452 | 0.0004 | -2.2197 | -0.8209 |
| | (0.0898) | (0.7182) | (0.0971) | (0.1114) | (7.3129) | (4.6188) |
| In Honors College * Female | -0.0353 | 1.1321 | -0.0554 | -0.0302 | 2.6225 | 1.6913 |
| | (0.1232) | (0.8063) | (0.1192) | (0.1227) | (9.0144) | (6.0916) |
| P(In Honors College + Interaction) | 0.92 | 0.73 | 0.21 | 0.68 | 0.94 | 0.83 |
| Number of Observations | 5,557 | 5,066 | 5,244 | 4,609 | 5,557 | 5,557 |
| Mean Outcome Males | 0.78 | 13 | 3.0 | 3.1 | 104 | 25 |
| Mean Outcome Females | 0.82 | 12 | 3.1 | 3.2 | 108 | 25 |
| | Credit Hours 400 | More Than One Degree | Number Minors | | | |
| In Honors College | 2.6163 | 0.0058 | 0.0420 | | | |
| | (4.7442) | (0.0477) | (0.1465) | | | |
| In Honors College * Female | -1.1082 | -0.1045 | -0.3096 | | | |
| | (4.7523) | (0.0721) | (0.2350) | | | |
| P(In Honors College + Interaction) | 0.58 | 0.11 | 0.07 | | | |
| Number of Observations | 5,557 | 5,066 | 5,557 | | | |
| Mean Outcome Males | 16 | 0.02 | 0.13 | | | |
| Mean Outcome Females | 18 | 0.04 | 0.18 | | | |

Notes: * means the coefficient is significant at the 10% level. Standard errors are clustered at the first college – cohort level. Regressions are 2SLS regressions where Above Cutoff and Above Cutoff * Female are instruments for In Honors College and In Honors College * Female. All regressions have a bandwidth of 0.15. Time to degree only uses students who graduated and counts summers as 1 semester. For the GPA regressions, 4$^{th}$ semester and 8$^{th}$ semester were calculated ignoring summers. GPA is cumulative GPA at the end of the semester. Mean outcomes are for all male or all female students in the All GPA's Sample. For more one than one degree only students who have at least 1 degree are included in the regression.

Table 7 shows results of regressions that explore differences in the effect of Honors College participation female and male students. There are no male or female treatment effects that are significant at the 10% level.[33]

[33] Appendix Table E1 shows gender heterogeneity results for bandwidths of 0.10 and 0.20. Results are qualitative similar to those in Table 7. The only coefficient that is significant at the 5% level is the negative time to degree treatment effect of honors college participation for males using a bandwidth of 0.20.

## *F. Heterogeneity: First Generation College Students vs Second and Above Generation Students*

Table 8 –First Gen and Second and Above Gen Treatment Effect of Honors College Participation

| | Graduate MSU | Time to Degree | 4th Semester GPA | 8th Semester GPA | Total Credit Hours | Credit Hours 300 Level |
|---|---|---|---|---|---|---|
| In Honors College | -0.0385 | -0.3282 | -0.0990 | -0.0518 | -6.2204 | -2.3369 |
| | (0.0491) | (0.4365) | (0.0693) | (0.0671) | (4.6327) | (3.2152) |
| In Honors College * First Gen | 0.3010** | 0.0205 | 0.1224 | 0.1761 | 26.7548** | 12.3579** |
| | (0.1267) | (1.0605) | (0.1204) | (0.1576) | (12.2293) | (4.9707) |
| P(In Honors College + Interaction) | 0.03 | 0.77 | 0.84 | 0.45 | 0.08 | 0.03 |
| Number of Observations | 5,557 | 5,066 | 5,244 | 4,609 | 5,557 | 5,557 |
| Mean Outcome 2nd and Above Gen | 0.82 | 12 | 3.1 | 3.2 | 108 | 26 |
| Mean Outcome First Gen | 0.74 | 13 | 2.9 | 3.0 | 102 | 23 |

| | Credit Hours 400 Level | More Than One Degree | Number Minors |
|---|---|---|---|
| In Honors College | 1.9211 | -0.0533 | -0.1334 |
| | (3.0996) | (0.0426) | (0.1058) |
| In Honors College * First Gen | 0.1932 | -0.0008 | -0.0012 |
| | (4.8340) | (0.0782) | (0.2408) |
| P(In Honors College + Interaction) | 0.65 | 0.49 | 0.51 |
| Number of Observations | 5,557 | 5,066 | 5,557 |
| Mean Outcome 2nd and Above Gen | 17 | 0.03 | 0.16 |
| Mean Outcome First Gen | 16 | 0.03 | 0.14 |

Notes: ** means that the coefficient is significant at the 5% level. Standard errors are clustered at the first college – cohort level. Regressions are 2SLS regressions where Above Cutoff and Above Cutoff * First Gen are instruments for In Honors College and In Honors College * First Gen. All have a bandwidth of 0.15. The regression for time to degree only includes students who graduated and counts summers as 1 semester. For the GPA regressions, 4th semester and 8th semester were calculated ignoring summers. GPA is cumulative GPA at the end of the semester. Mean outcomes are for 2nd and above generation or first-generation students in the All GPA's Sample.

Table 8 shows differences in the effect of Honors College participation for students who are and are not first-generation college students. Three treatment effects are significant at the 5% level for first generation college students. These effects suggest that honors college participation makes first generation students more likely to graduate from MSU, earn more credits from MSU, and earn more credits in classes at the 300 level. All these effects are significantly different from the effect for second and above generation students at the 5% level. This suggests honors college participation increases the graduate rates of first-generation college

by causing them to earn more credits at MSU about half of which are in classes at the 300 level[34].

## VII. Discussion and Conclusion

In this paper I study how a student's participation in the MSU Honors College changes certain academic outcomes. The MSU Honors College considers for admission all students whose GPA is in the top 10% of the GPA distribution in their non-honors college during their freshmen fall semester. This creates a large discontinuity in the probability of ever being in the college at these 90th percentile GPA cutoffs. This discontinuity allows me to use a regression discontinuity research design to study the effect of participation in the Honors College on student outcomes by looking for discontinuities in student outcomes at those GPA cutoffs.

Overall, I do not find that honors college participation has a large effect on student outcomes. For 8 of 9 outcomes, I check my estimated effects are statistically insignificant. I do find a significant effect for time to degree, but this effect is not robust to excluding coefficients or to using a doughnut sample. Because I am checking 9 outcomes there is a good chance, I randomly find at 1 significant effect even if all true treatment effects are 0. Time to degree may just be a result of random variation.

Honors students may get their degree faster because honors students can enroll in classes before non-honors students. For example, this preference may prevent honors students from having to stick around for an additional semester because there was no more room to enroll in a class, they needed to get their degree. If so, then perhaps this preference could also be extended to other students who will significantly benefit from faster graduation such as those most likely to drop out or

[34] Appendix Table E2 shows first gen and second and above gen heterogeneity results for bandwidths of 0.10 and 0.20. No coefficient is significant at the 5% level for a bandwidth of 0.10. Both the interaction coefficient and the treatment effect for first gen students are significant at that level for graduating MSU, total credit hours and credit hours 300 level for a bandwidth of 0.20.

those who, because of their or their family's financial situation, are least able to pay the cost of staying an additional semester.

The main economic effect of a student finishing their degree sooner is that they can enter the workforce sooner. A student could enter the workforce about 4 months soon by graduating a semester earlier. Assuming the students earns the median earnings for MSU graduates of $61,101, this means marginal students who enter the Honors College could make an additional $16,294 because they graduated earlier then they would have if that had not joined the Honors College[35]. The additional time in the labor force might also increase future earnings by increasing the amount of time the students have on the job experience.

In heterogeneity analysis I find some evidence that honors college participation has a large positive effect on the outcomes of first-generation students. Participation may make those students more likely to graduate and to earn more credits with many of those credits being in upper-level classes. These results are robust to using a larger bandwidth. However, because of the small number of high GPA first generation students in my sample I do not have much power to detect significant effects. This is especially true when using a bandwidth of 0.10 leading to no significant effects with it at the 5% level. The estimated treatment effect on graduation rate of 30 percentage points seems unreasonable large given that the 91% of students in the Close of the Cutoffs sample graduate from MSU.

This effect might be due to a combination of the extra support from the Honors College in the form of advisers specifically for honors students, having high ability peers, and having smaller classes. It may be the case that these benefits matter more for first generation students then for other students.

One way the Honors College participation could increase the graduation rate of 1st generation students is by increasing the number of semesters those students stay

[35] Earnings of MSU graduates are from U.S. Department of Education's College Scorecard at the following URL. https://collegescorecard.ed.gov/school/?171100-. The statistics was taken from the website on 7/26/2022.

at MSU. In results available upon request, I test the effect of honors college participation on staying at MSU for the 2nd to 8th semesters using equation 5. If the mechanism for increasing graduation is to increase retention, then I should find large positive coefficient on In Honors College * First Gen. However, 5 of 7 of the coefficients are negative. The only coefficient that is significant at the 10% level is on retention to 8th Semester. That coefficient is consistent with the Honors College making students much less likely to stay at MSU for their 8th semester. Therefore, increasing retention does not seem to be the mechanism for increasing the graduation rate of first generation students.

One likely economic effect of increased graduation rates is to increase the future incomes of first-generation students. College graduates make significantly higher incomes then those without a college degree. Graduating from college also opens up the opportunity to get advanced degrees such as masters degrees and Medical degrees which also are associated with higher incomes.

One of my most surprising findings compared to prior literature is the lack of a significant effect of honors college participation on a student's GPA. Several previous studies have found honors college participation to be associated with earning a higher GPA. One possibility is that the GPA effect is small and positive but that I don't have enough observations to detect the effect. This would be consistent with my positive estimate of the effect of honors college participation on 8th semester GPAs for the full sample. Another possibility is that effect of honors college participation on GPA is positive for honors students on average, but that the effect is 0 for students who are on the margin of being admitted into the Honors College. A third possibility is that the real effect of Honors College participation is 0 and other studies were unable to control for unobserved variables that explain the GPA difference between honors and non-honors students. This would not explain the results from Pugatch and Thompson (2022) who find that on average honors

college participation increase course GPA but that it decreases course GPA for first-generation students.

There are many additional questions related to this research that future projects could explore. One set of questions relates to which aspects of the MSU Honors College cause the effects found in this paper. Is the faster time to degree due to being able to enroll in classes first or due to something else? What is the effect of being able to take graduate classes, being in a dorm with other honors students, or having access to an honors advisor separate from all the other benefits of being in the college? Another set of questions relates to what the causal effect of honors college participation is on student outcomes for types of students not studied in this paper. How would participation in an honors college affect students in other parts of the GPA distribution? Do higher GPA students or lower GPA students benefit more from honors college participation? If the structure of the MSU Honors College was recreated at another university, would students at that college experience the same effects as students at MSU? Are the effects limited to large 4-year public universities or would students at other types of institutions, like community colleges, benefit from participating in an honors college?

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## Appendix A: Common Features of Similarly Ranked Honors Programs

To learn about honors programs outside of MSU, I looked online for information about honors programs in similarly ranked U.S. universities. I limited my search to national universities whose U.S. News and World Report 2022 ranking was within 20 spots of MSU's ranking. In the process I checked the websites of 53 universities for information about the university's honors program. 50 of those universities had honors programs. 48 of the programs had courses for honors students as a key feature of the program. 35 programs had honors housing, 29 programs had honors advising, 20 programs had priority registration allowing honors students to register for classes before non-honors students, and 20 programs required honors students to complete a thesis or capstone project to finish the program.

## Appendix B: Benefits of Being Enrolled in the MSU Honors College

- A different, more flexible set of general education requirements[36].
- The ability to enroll in classes on the first day of each enrollment period. This is before most other students at MSU can enroll in courses.
- The ability to enroll in courses without being in the course's required major or having the required prerequisites. This may require approval from the department that teaches the course.
- The ability to enroll in graduate-level courses as an undergraduate[37].
- The ability to take honors courses. These courses are only available to honors students. On its website the MSU Honors College describes the benefits of honors courses over regular courses as[38]: having smaller class sizes, covering the material in greater depth, covering the material at a faster pace, and having more classroom interaction.
- The ability to enroll in honors sections of courses. Courses with large numbers of students are often divided into multiple sections. Generally, all sections of a course are taught by the same professor, take the same exams, and have the same homework assignments. The main difference is that each section is assigned to attend in-person meetings, such as lectures, at different times. Honors sections cover the same material and fulfill the same major and prerequisite requirements as non-honors sections. However, honors sections

[36] The general education requirements for students enrolled in the MSU Honors College are: one course in introductory writing, two courses in arts and humanities, two lecture classes in natural sciences and two social science courses. Each course must be 3 or 4 credits. By contrast the university wide requirements are: 8 credits in Arts and Humanities, 8 credits in Social, Behavioral, and Economic Sciences, 3 Credits in Biological Sciences, 3 credits in Physical Sciences and 2 credits of lab in either biological or physical sciences. Both the honors and non-honors general education requirements can be at least partially completed using AP, IB, or Dual Enrollment credits. See https://honorscollege.msu.edu/admissions/general-education-requirements.html for honors college general education requirements and https://reg.msu.edu/Forms/ESAF/IS_DN_FAQ.aspx#IS1 for non-honors general education requirements

[37] Students pay the same tuition for graduate classes as they do for undergraduate classes. I learned this in an email from an Associate Dean of the MSU Honors College.

[38] https://honorscollege.msu.edu/academics/honors-experiences.html

compared to non-honors sections have many of the benefits of honors courses such as smaller section sizes and covering the material in greater depth.

- The ability to have meetings with Honors College advisors. Honors College advisors can help students with a variety of topics including making plans to fulfill requirements to graduate from the Honors College, enroll in non-standard courses and make course plans consistent with their post-college graduation goals.
- The ability to apply to have an Honors College peer mentor. Mentors are expected to share their experiences of being in the Honors College and respond to communications from their mentee. Mentors are available to first- and second-year students.
- The ability to live on honors-only floors of residence halls. Students on honors only floors often organize floor-specific events[39].
- Access to a variety of merit scholarships available only to students enrolled in the MSU Honors College. Some of these scholarships are only available to students accepted into the college from high school[40]. Other scholarships are available to all students who are currently members of the college[41]. Because only a minority of students in the MSU Honors College receive these scholarships, and because these scholarships are merit based, I do not think they would have much effect on the students near the GPA cutoffs. Therefore, I do not expect them to influence my results.

[39] This may not have much effect on students who were admitted to the MSU Honors College when they are freshmen. While students at MSU are required to live on campus their first year, many students move off campus after their first year.
[40] https://honorscollege.msu.edu/admissions/freshman-scholarships.html
[41] https://honorscollege.msu.edu/programs/scholarships-for-current-students.html

# Appendix C: Alternative Specifications All Students Near Cutoffs

## Bias-Corrected Results

Table C1 – Discontinuity in Covariates

| | Female | First Gen | Age First Semester | ACT Score[42] | White | Black |
|---|---|---|---|---|---|---|
| Above Cutoff | -0.0155 | 0.0145 | -0.0206 | -0.0696 | -0.0116 | 0.0189** |
| | [-0.08,0.04] | [-0.02,0.08] | [-0.09,0.08] | [-0.47,0.44] | [-0.06,0.04] | [0.00,0.04] |
| Bandwidth | 0.152 | 0.171 | 0.197 | 0.125 | 0.162 | 0.175 |
| Number of Observations | 5,901 | 6,413 | 7,064 | 4,029 | 6,114 | 6,546 |
| Mean Outcome | 0.51 | 0.27 | 18 | 25 | 0.63 | 0.09 |
| | American Native | Asian | Pacific Islander | Hawaiian | Hispanic | Two or More Races |
| Above Cutoff | 0.0056* | -0.0056 | 0.0000 | -0.0002 | -0.0090 | -0.0052 |
| | [-0.00,0.01] | [-0.04,0.02] | [0.00,0.00] | [-0.00,0.00] | [-0.03,0.01] | [-0.02,0.01] |
| Bandwidth | 0.222 | 0.156 | 0.501 | 0.150 | 0.171 | 0.203 |
| Number of Observations | 7,952 | 5,978 | 14,072 | 5,885 | 6,414 | 7,427 |
| Mean Outcome | 0.00 | 0.05 | 0.00 | 0.00 | 0.04 | 0.02 |
| | Race Not Reported | Race Not Requested | | | | |
| Above Cutoff | 0.0021 | 0.0051 | | | | |
| | [-0.01,0.01] | [-0.03,0.04] | | | | |
| Bandwidth | 0.170 | 0.135 | | | | |
| Number of Observations | 6,270 | 5,040 | | | | |
| Mean Outcome | 0.01 | 0.16 | | | | |

Notes: ** means the coefficient is significant at the 5% level and * significant at the 10% level using a robust p-value. The method for selecting bandwidths and calculating confidence intervals is from Calonico, Cattaneo, and Titiunik (2014). Robust 95% confidence intervals are below the coefficients in brackets. The outcomes are indicator variable for being female, being white, being black, being a first-generation college student, the student's age during their first semester at MSU and the student's ACT score. Mean outcomes for the All GPA's Sample are shown.

Table C2 – Discontinuity in Ever Being in the Honors College

| | Ever in Honors College | Ever in Honors College |
|---|---|---|
| Above Cutoff | 0.2633*** | 0.2840*** |
| | [0.19,0.32] | [0.22,0.33] |
| Covariates | N | Y |
| Bandwidth | 0.114 | 0.131 |
| Number of Observations | 4,162 | 4,937 |
| Mean Outcome | 0.09 | 0.09 |

Notes: *** means the coefficient is significant at the 1% level using a robust p-value. The method for selecting bandwidths and calculating confidence intervals is from Calonico, Cattaneo, and Titiunik (2014). Covariates include the student's age when the entered MSU and indicators for being female, being a specific race, being a first-generation college student, and being in a particular freshmen year-first college combination. Robust 95% confidence intervals are below the coefficients in brackets. Mean outcomes for the All GPA's sample are shown.

[42] In results not shown, I test for a discontinuity in the probability a student's ACT score is missing at the cutoffs. The discontinuity, at a decline of 0.3%, was small and insignificant.

Table C3 – Intensity of Honors College Participation for Marginal Students

| | Number of Semesters in the Honors College | Number of Semesters in the Honors College | Number of Honors Experiences | Number of Honors Experiences | Graduating from Honors College | Graduating from Honors College |
|---|---|---|---|---|---|---|
| Treatment Effect | 7.2281*** [5.8,8.1] | 7.8006*** [6.9,8.5] | 4.9416*** [3.9,6.0] | 5.2651*** [4.5,6.1] | 0.4632*** [0.28,0.59] | 0.5193*** [0.39,0.63] |
| Covariates | N | Y | N | Y | N | Y |
| Bandwidth | 0.131 | 0.177 | 0.125 | 0.156 | 0.145 | 0.193 |
| Number of Observations | 4,948 | 6,582 | 4,596 | 5,965 | 5,426 | 6,975 |
| Mean Outcome Honors Students | 8.5 | 8.5 | 5.7 | 5.7 | 0.57 | 0.57 |

Notes: *** means the coefficient is significant at the 1% level using robust p-values. The method for selecting bandwidths and calculating confidence intervals is from Calonico, Cattaneo, and Titiunik (2014). The coefficients are 2SLS estimates for the treatment effect of ever participating in the Honors College. Covariates include the student's age when the entered MSU and indicators for being female, being a specific race, being a first-generation college student, and having a particular freshmen year-first college combination. Robust standard errors are used. Robust 95% confidence intervals are below the coefficients in brackets. Mean outcomes for honors students in the All GPA's Sample are shown.

Table C4 – Effect of Honors College Participation on Student Outcomes

| | Graduate MSU | Graduate MSU | Time to Degree | Time to Degree | 4th Semester GPA | 4th Semester GPA |
|---|---|---|---|---|---|---|
| Treatment Effect | 0.0228 [-0.13,0.18] | 0.0495 [-0.08,0.18] | -0.3740 [-1.2,0.41] | -1.2789*** [-2.1, -0.64] | 0.0194 [-0.12, 0.16] | 0.0827 [-0.03,0.22] |
| Covariates | N | Y | N | Y | N | Y |
| Bandwidth | 0.088 | 0.099 | 0.113 | 0.097 | 0.095 | 0.093 |
| Number of Observations | 3,182 | 3,467 | 3,771 | 3,131 | 3,190 | 3,140 |
| Mean Outcome | 0.80 | 0.80 | 13 | 13 | 3.1 | 3.1 |
| | 8th Semester GPA | 8th Semester GPA | Total Credit Hours | Total Credit Hours | Credit Hours 300 Level | Credit Hours 300 Level |
| Treatment Effect | 0.0372 [-0.11,0.19] | 0.1012* [-0.01,0.24] | -1.0772 [-15,12] | -1.0288 [-12, 9] | -3.0875 [-9.7,2.7] | -1.8829 [-7.1,2.9] |
| Covariates | N | Y | N | Y | N | Y |
| Bandwidth | 0.099 | 0.109 | 0.092 | 0.114 | 0.097 | 0.110 |
| Number of Observations | 2,875 | 3,279 | 3,257 | 4,160 | 3,433 | 3,948 |
| Mean Outcome | 3.2 | 3.2 | 106 | 106 | 25 | 25 |
| | Credit Hours 400 Level | Credit Hours 400 Level | More than One Degree | More than One Degree | Number Minors | Number Minors |
| Treatment Effect | 4.6942* [-0.4,9.9] | 0.4959 [-4.0,4.7] | -0.0653 [-0.17,0.03] | -0.0475 [-0.15,0.03] | -0.1853 [-0.49,0.06] | -0.0843 [-0.32,0.10] |
| Covariates | N | Y | N | Y | N | Y |
| Bandwidth | 0.112 | 0.138 | 0.102 | 0.117 | 0.111 | 0.159 |
| Number of Observations | 4,141 | 5,149 | 3,457 | 3,915 | 4,120 | 6,058 |
| Mean Outcome | 17 | 17 | 0.03 | 0.03 | 0.15 | 0.15 |

Notes: *** means the coefficient is significant at the 1% level and * means the coefficient is significant at the 10% level using robust p-values. The method for selecting bandwidths and calculating confidence intervals is from Calonico, Cattaneo, and Titiunik (2014). Coefficients are 2SLS estimates for the treatment effect of ever participating in the Honors College. Covariates include the student's age when they enter MSU and indicators for being female, being a specific race, being a first-generation college student, and being in a particular freshmen year-first college combination. Mean outcomes for students in the All GPA's Sample are shown. Time to degree counts summers as 1 semester. For the GPA regressions, 4$^{th}$ semester and 8$^{th}$ semester are calculated ignoring summers. GPA is cumulative GPA at the end of the semester. For more one than one degree only students who have at least 1 degree are included in the regression.

## Additional Bandwidths All Students Near the Cutoffs

Table C5 – Discontinuity in Covariates

| | Female | Female | First Gen | First Gen | Age First Semester | Age First Semester |
|---|---|---|---|---|---|---|
| Above Cutoff | -0.0038 | -0.0035 | 0.0260 | -0.0048 | -0.0235 | -0.0206 |
| | (0.0427) | (0.0272) | (0.0189) | (0.0180) | (0.0447) | (0.0375) |
| Bandwidth | 0.10 | 0.20 | 0.10 | 0.20 | 0.10 | 0.20 |
| Number of Observations | 3,492 | 7,107 | 3,492 | 7,107 | 3,492 | 7,107 |
| Mean Outcome | 0.51 | 0.51 | 0.27 | 0.27 | 18 | 18 |
| | ACT Score | ACT Score | White | White | Black | Black |
| Above Cutoff | -0.0084 | -0.0390 | 0.0022 | -0.0182 | 0.0180 | 0.0146* |
| | (0.2481) | (0.1567) | (0.0317) | (0.0207) | (0.0122) | (0.0086) |
| Bandwidth | 0.10 | 0.20 | 0.10 | 0.20 | 0.10 | 0.20 |
| Number of Observations | 3,046 | 6,198 | 3,492 | 7,107 | 3,492 | 7,107 |
| Mean Outcome | 25 | 25 | 0.63 | 0.63 | 0.09 | 0.09 |
| | American Native | American Native | Asian | Asian | Pacific Islander | Pacific Islander |
| Above Cutoff | 0.0062** | 0.0061*** | -0.0055 | -0.0018 | N/A[43] | 0.0001 |
| | (0.0028) | (0.0024) | (0.0203) | (0.0133) | | (0.0001) |
| Bandwidth | 0.10 | 0.20 | 0.10 | 0.20 | 0.10 | 0.20 |
| Number of Observations | 3,492 | 7,107 | 3,492 | 7,107 | 3,492 | 7,107 |
| Mean Outcome | 0.00 | 0.00 | 0.05 | 0.05 | 0.00 | 0.00 |
| | Hawaiian | Hawaiian | Hispanic | Hispanic | Two or More Races | Two or More Races |
| Above Cutoff | -0.0007 | -0.0001 | -0.0165 | -0.0110 | -0.0025 | -0.0061 |
| | (0.0007) | (0.0006) | (0.0102) | (0.0073) | (0.0090) | (0.0061) |
| Bandwidth | 0.10 | 0.20 | 0.10 | 0.20 | 0.10 | 0.20 |
| Number of Observations | 3,492 | 7,107 | 3,492 | 7,107 | 3,492 | 7,107 |
| Mean Outcome | 0.00 | 0.00 | 0.04 | 0.04 | 0.02 | 0.02 |
| | Race Not Reported | Race Not Reported | Race Not Requested | Race Not Requested | | |
| Above Cutoff | 0.0009 | 0.0014 | -0.0021 | 0.0151 | | |
| | (0.0051) | (0.0047) | (0.0217) | (0.0144) | | |
| Bandwidth | 0.10 | 0.20 | 0.10 | 0.20 | | |
| Number of Observations | 3,492 | 7,107 | 3,492 | 7,107 | | |
| Mean Outcome | 0.01 | 0.01 | 0.16 | 0.16 | | |

Notes: * means significant at the 10% level, ** means the coefficient is significant at the 5% level, and *** means the coefficient is significant at the 1% level. Standard errors are clustered at the first college – cohort level. The regressions above use estimating equation 4 from Section 5 of this paper. The outcomes are indicator variable for being female, being white, being black, being a first-generation college student, the student's age during their first semester at MSU and the student's ACT score. Mean outcomes for the All GPA's Sample are shown.

[43] There are no pacific islanders in the 0.10 bandwidth sample.

Table C6 – Discontinuity in Ever Being in the Honors College

| | Ever in Honors College | Ever in Honors College | Ever in Honors College |
|---|---|---|---|
| Above Cutoff | 0.3070*** | 0.2953*** | 0.3063*** |
| | (0.0311) | (0.0232) | (0.0236) |
| Bandwidth | 0.10 | 0.15 | 0.20 |
| Number of Observations | 3,492 | 5,577 | 7,107 |
| Mean Outcome | 0.09 | 0.09 | 0.09 |

Notes: *** means the coefficient is significant at the 1% level. Standard errors are clustered at the first college – cohort level. All regressions include the following covariates: the student's age when the entered MSU and indicators for being female, being a specific race, being a first-generation college student, and being in a particular freshmen year-first college combination. Mean outcomes for the All GPA's sample are shown.

Table C7 – Intensity of Honors College Participation for Marginal Students

| | Number of Semesters in the Honors College | Number of Semesters in the Honors College | Number of Semesters in the Honors College | Number of Honors Experiences | Number of Honors Experiences | Number of Honors Experiences |
|---|---|---|---|---|---|---|
| Above Cutoff | 7.6798*** | 7.9596*** | 7.9071*** | 5.3187*** | 5.3090*** | 5.2913*** |
| | (0.4829) | (0.3828) | (0.3790) | (0.3861) | (0.3499) | (0.3351) |
| Bandwidth | 0.10 | 0.15 | 0.20 | 0.10 | 0.15 | 0.20 |
| Number of Observations | 3,492 | 5,557 | 7,107 | 3,492 | 5,557 | 7,107 |
| Mean Outcome College Admits | 7.9 | 7.9 | 7.9 | 5.4 | 5.4 | 5.4 |
| | Graduating from Honors College | Graduating from Honors College | Graduating from Honors College | | | |
| Above Cutoff | 0.5139*** | 0.5277*** | 0.5307*** | | | |
| | (0.0598) | (0.0534) | (0.0532) | | | |
| Bandwidth | 0.10 | 0.15 | 0.20 | | | |
| Number of Observations | 3,492 | 5,557 | 7,107 | | | |
| Mean Outcome College Admits | 0.54 | 0.54 | 0.54 | | | |

Notes: *** means the coefficient is significant at the 1% level. Standard errors are clustered at the first college – cohort level. The coefficients are 2SLS estimates for the treatment effect of ever participating in the Honors College. All regressions include the following covariates: the student's age when the entered MSU and indicators for being female, being a specific race, being a first-generation college student, and having a particular freshmen year-first college combination. Mean outcomes for honors students in the All GPA's Sample whose first semester in the honors college is not their first semester at MSU are shown.

Table C8 – Effect of Honors College Participation on Student Outcomes

| | Graduate MSU | Graduate MSU | Graduate MSU | Time to Degree | Time to Degree | Time to Degree |
|---|---|---|---|---|---|---|
| Above Cutoff | 0.0308 | 0.0287 | 0.0311 | -0.8535** | -0.7358** | -0.5091* |
| | (0.0688) | (0.0475) | (0.0311) | (0.3856) | (0.3269) | (0.2870) |
| Bandwidth | 0.10 | 0.15 | 0.20 | 0.10 | 0.15 | 0.20 |
| Number of Observations | 3,492 | 5,557 | 7,107 | 3,187 | 5,066 | 6,473 |
| Mean Outcome | 0.80 | 0.80 | 0.80 | 13 | 13 | 13 |
| | 4th Semester GPA | 4th Semester GPA | 4th Semester GPA | 8th Semester GPA | 8th Semester GPA | 8th Semester GPA |
| Above Cutoff | 0.0511 | -0.0077 | -0.0317 | 0.0833 | 0.0359 | 0.0038 |
| | (0.0761) | (0.0564) | (0.0491) | (0.0715) | (0.0559) | (0.0535) |
| Bandwidth | 0.10 | 0.15 | 0.20 | 0.10 | 0.15 | 0.20 |
| Number of Observations | 3,291 | 5,244 | 6,711 | 2,896 | 4,609 | 5,885 |
| Mean Outcome | 3.1 | 3.1 | 3.1 | 3.2 | 3.2 | 3.2 |
| | Total Credit Hours | Total Credit Hours | Total Credit Hours | Credit Hours 300 Level | Credit Hours 300 Level | Credit Hours 300 Level |
| Above Cutoff | -2.3197 | -1.0309 | 0.7681 | -2.0762 | 0.3589 | 0.6027 |
| | (5.4753) | (4.2331) | (3.3293) | (2.1088) | (1.7484) | (1.4872) |
| Bandwidth | 0.10 | 0.15 | 0.20 | 0.10 | 0.15 | 0.20 |
| Number of Observations | 3,492 | 5,557 | 7,107 | 3,492 | 5,557 | 7,107 |
| Mean Outcome | 106 | 106 | 106 | 25 | 25 | 25 |
| | Credit Hours 400 Level | Credit Hours 400 Level | Credit Hours 400 Level | More than One Degree | More than One Degree | More than One Degree |
| Above Cutoff | 0.6049 | 0.6507 | 1.6872 | -0.0216 | -0.0519 | -0.0078 |
| | (2.4763) | (2.0249) | (1.7736) | (0.0462) | (0.0391) | (0.0313) |
| Bandwidth | 0.10 | 0.15 | 0.20 | 0.10 | 0.15 | 0.20 |
| Number of Observations | 3,492 | 5,557 | 7,107 | 3,187 | 5,066 | 6,473 |
| Mean Outcome | 17 | 17 | 17 | 0.03 | 0.03 | 0.03 |
| | Number Minors | Number Minors | Number Minors | | | |
| Above Cutoff | -0.1466* | -0.0342 | -0.0104 | | | |
| | (0.0844) | (0.0735) | (0.0710) | | | |
| Bandwidth | 0.10 | 0.15 | 0.20 | | | |
| Number of Observations | 3,492 | 5,557 | 7,107 | | | |
| Mean Outcome | 0.15 | 0.15 | 0.15 | | | |

Notes: * means the coefficient is significant at the 10% level and ** means the coefficient is significant at the 5% level. Standard errors are clustered at the first college – cohort level. Coefficients are 2SLS estimates for the treatment effect of ever participating in the Honors College. All regressions include the following covariates: the student's age when they enter MSU and indicators for being female, being a specific race, being a first-generation college student, being in a particular freshmen year-first college combination. Mean outcomes for students in the All GPA's Sample are shown. Time to degree counts summers as 1 semester. For the GPA regressions, 4$^{th}$ semester and 8$^{th}$ semester are calculated ignoring summers. GPA is cumulative GPA at the end of the semester. For more one than one degree only students who have at least 1 degree are included in the regression.

## Results Using Doughnut Sample

The doughnut sample is the All GPA's Sample without students who have a GPA Minus Cutoff between -0.01 and 0.01.

Table C9 – Discontinuity in Covariates

| | Female | First Gen | Age First Semester | ACT Score | White | Black |
|---|---|---|---|---|---|---|
| Above Cutoff | -0.0234 | -0.0200 | -0.0199 | -0.1532 | 0.0100 | 0.0080 |
| | (0.0421) | (0.0248) | (0.0564) | (0.2749) | (0.0264) | (0.0104) |
| Mean Outcome | 0.51 | 0.27 | 18 | 25 | 0.63 | 0.09 |
| | American Native | Asian | Pacific Islander | Hawaiian | Hispanic | Two or More Races |
| Above Cutoff | 0.0045* | -0.0045 | 0.0008 | -0.0003 | -0.0063 | -0.0055 |
| | (0.0025) | (0.0167) | (0.0007) | (0.0007) | (0.0092) | (0.0093) |
| Mean Outcome | 0.00 | 0.05 | 0.00 | 0.00 | 0.04 | 0.02 |
| | Race Not Reported | Race Not Requested | | | | |
| Above Cutoff | 0.0014 | -0.0083 | | | | |
| | (0.0063) | (0.0207) | | | | |
| Mean Outcome | 0.01 | 0.16 | | | | |

Notes: * means the coefficient is significant at the 10% level. Standard errors are clustered at the first college – cohort level. Bandwidth = 0.15. The regressions above use estimating equation 4 from Section 5 of this paper. N = 5,045 except for ACT Score where N = 4,404. The outcomes are indicator variables for being female, being white, being black, being a first-generation college student, the student's age during their first semester at MSU and the student's ACT score. Mean outcomes for the All GPA's Sample are shown.

Table C10 – Discontinuity in Ever Being in the Honors College

| | Ever in Honors College | Ever in Honors College |
|---|---|---|
| Above Cutoff | 0.3065*** | 0.3200*** |
| | (0.0287) | (0.0294) |
| Covariates | N | Y |
| Mean Outcome | 0.09 | 0.09 |

Notes: N = 5,045. Bandwidth = 0.15. *** means the coefficient is significant at the 1% level. Standard errors are clustered at the first college – cohort level. Covariates include the student's age when the entered MSU and indicators for being female, being a specific race, being a first-generation college student, and being in a particular freshmen year-first college combination. Mean outcomes for the All GPA's sample are shown.

Table C11 – Intensity of Honors College Participation for Marginal Students

| | Number of Semesters in the Honors College | Number of Semesters in the Honors College | Number of Honors Experiences | Number of Honors Experiences | Graduating from Honors College | Graduating from Honors College |
|---|---|---|---|---|---|---|
| Treatment Effect | 7.7796*** | 7.8920*** | 4.8221*** | 5.0734*** | 0.4892*** | 0.5058*** |
| | (0.4710) | (0.4314) | (0.4952) | (0.4007) | (0.0731) | (0.0651) |
| Covariates | N | Y | N | Y | N | Y |
| Mean Outcome College Admits | 7.9 | 7.9 | 5.4 | 5.4 | 0.54 | 0.54 |

Notes: N = 5,045. Bandwidth = 0.15. *** means the coefficient is significant at the 1% level. Standard errors are clustered at the first college – cohort level. The coefficients are 2SLS estimates for the treatment effect of ever participating in the Honors College. Covariates include the student's age when the entered MSU and indicators for being female, being a specific race, being a first-generation college student, and having a particular freshmen year-first college combination. Mean outcomes for honors students in the All GPA's Sample whose first semester in the honors college is not their first semester at MSU are shown.

Table C12 – Effect of Honors College Participation on Student Outcomes

| | Graduate MSU | Graduate MSU | Time to Degree | Time to Degree | 4th Semester GPA | 4th Semester GPA |
|---|---|---|---|---|---|---|
| Treatment Effect | 0.0224 | 0.0268 | -0.1515 | -0.3310 | -0.1410** | -0.0934 |
| | (0.0491) | (0.0500) | (0.4925) | (0.3875) | (0.0707) | (0.0581) |
| Covariates | N | Y | N | Y | N | Y |
| Number of Observations | 5,045 | 5,045 | 4,597 | 4,597 | 4,762 | 4,762 |
| Mean Outcome | 0.80 | 0.80 | 13 | 13 | 3.1 | 3.1 |
| | 8th Semester GPA | 8th Semester GPA | Total Credit Hours | Total Credit Hours | Credit Hours 300 Level | Credit Hours 300 Level |
| Treatment Effect | -0.0534 | -0.0346 | -0.5432 | 0.0777 | 0.6617 | 0.1258 |
| | (0.0685) | (0.0575) | (5.0717) | (4.7605) | (2.9675) | (1.8356) |
| Covariates | N | Y | N | Y | N | Y |
| Number of Observations | 4,178 | 4,178 | 5,045 | 5,045 | 5,045 | 5,045 |
| Mean Outcome | 3.2 | 3.2 | 106 | 106 | 25 | 25 |
| | Credit Hours 400 Level | Credit Hours 400 Level | More than One Degree | More than One Degree | Number Minors | Number Minors |
| Treatment Effect | 1.1995 | 1.3488 | -0.0500 | -0.0480 | -0.1871 | -0.0580 |
| | (2.8017) | (2.1065) | (0.0440) | (0.0406) | (0.1230) | (0.0908) |
| Covariates | N | Y | N | Y | N | Y |
| Number of Observations | 5,045 | 5,045 | 4,597 | 4,597 | 5,045 | 5,045 |
| Mean Outcome | 17 | 17 | 0.03 | 0.03 | 0.15 | 0.15 |

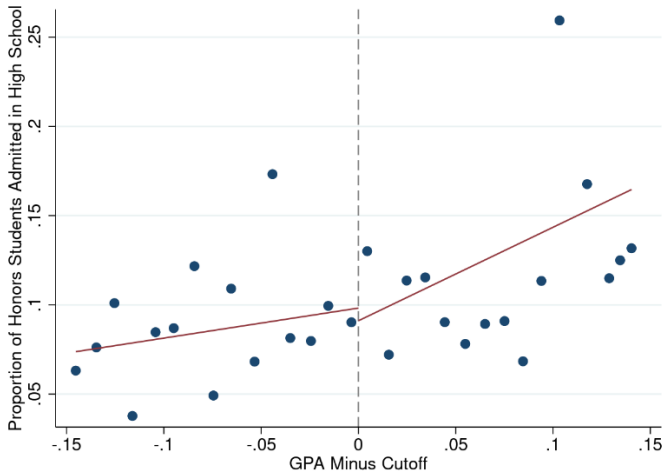
Notes: ** means the coefficient is significant at the 5% level. Standard errors are clustered at the first college – cohort level. Coefficients are 2SLS estimates for the treatment effect of ever participating in the Honors College. Covariates include the student's age when they enter MSU and indicators for being female, being a specific race, being a first-generation college student, and being in a particular freshmen year-first college combination. For all regressions the bandwidth is 0.15. Mean outcomes for students in the All GPA's Sample are shown. Time to degree counts summers as 1 semester. For the GPA regressions, 4$^{th}$ semester and 8$^{th}$ semester are calculated ignoring summers. GPA is cumulative GPA at the end of the semester. For more one than one degree only students who have at least 1 degree are included in the regression.

## Appendix D: Placebo Test

### Placebo Check: Discontinuity in Honors Students Admitted in High School

A student is identified as being admitted into the Honors College when they are in high school if the student is enrolled in the Honors College during their first term at MSU.

Figure D1 – Discontinuity in the Proportion of Honors Students Admitted in High School




Notes: N = 5,557. Only students who have a running variable between -0.15 and 0.15 are included in the graph. I define an honors student admitted in high school as a student who was in the MSU Honors College during their first semester at MSU. Each dot is the proportion of honors students admitted in high school whose running variable is an element of [x, x + 0.01). For the left most dot x = -0.15.

Table D1 – Discontinuity in Honors Students Admitted in High School

| | High School Honors College Admit | High School Honors College Admit |
|---|---|---|
| Above Cutoff | -0.0063 | -0.0013 |
| | (0.0180) | (0.0158) |
| Covariates | N | Y |
| Mean Outcome | 0.04 | 0.04 |

Notes: N = 5,557. Bandwidth = 0.15. *** means the coefficient is significant at the 1% level. Standard errors are clustered at the first college – cohort level. Covariates include the student's age when the entered MSU and indicators for being female, being a specific race, being a first-generation college student, and being in a particular freshmen year-first college combination. Mean outcomes for the All GPA's sample are shown.

# Appendix E: Alternative Specifications Heterogeneity Analysis

## Additional Bandwidths Male and Female Heterogeneity

Table E1 – Male and Female Treatment Effect of Honors College Participation

| | Graduate MSU | Graduate MSU | Time to Degree | Time to Degree | 4th Semester GPA | 4th Semester GPA |
|---|---|---|---|---|---|---|
| In Honors College | 0.1198 (0.1216) | 0.0170 (0.0729) | -1.0571 (0.9113) | -1.0455** (0.5337) | 0.0438 (0.1116) | -0.0086 (0.0877) |
| In Honors College * Female | -0.1688 (0.1484) | -0.0029 (0.1026) | 1.4464 (0.9812) | 1.1309 (0.6981) | -0.0814 (0.1297) | -0.0331 (0.1124) |
| P(In Honors College + Interaction) | 0.55 | 0.79 | 0.50 | 0.84 | 0.67 | 0.51 |
| Bandwidth | 0.10 | 0.20 | 0.10 | 0.20 | 0.10 | 0.20 |
| Number of Observations | 3,492 | 7,107 | 3,187 | 6,473 | 3,291 | 6,711 |
| | 8th Semester GPA | 8th Semester GPA | Total Credit Hours | Total Credit Hours | Credit Hours 300 Level | Credit Hours 300 Level |
| In Honors College | 0.0653 (0.1402) | 0.0392 (0.0952) | 1.3786 (9.8720) | -2.7063 (6.0223) | -2.3639 (8.1105) | 0.1106 (3.1636) |
| In Honors College * Female | -0.0612 (0.1347) | -0.0452 (0.1141) | -4.2231 (12.0890) | 4.3429 (7.3324) | 0.8378 (8.5658) | 1.9061 (4.9533) |
| P(In Honors College + Interaction) | 0.96 | 0.93 | 0.69 | 0.71 | 0.75 | 0.52 |
| Bandwidth | 0.10 | 0.20 | 0.10 | 0.20 | 0.10 | 0.20 |
| Number of Observations | 2,896 | 5,885 | 3,492 | 7,107 | 3,492 | 7,107 |
| | Credit Hours 400 Level | Credit Hours 400 Level | More than One Degree | More than One Degree | Number Minors | Number Minors |
| In Honors College | 6.6915 (7.3989) | 0.6218 (3.5208) | 0.0446 (0.0644) | 0.0462 (0.0414) | -0.1435 (0.1556) | 0.0685 (0.1378) |
| In Honors College * Female | -3.3089 (6.7386) | 0.2043 (3.8895) | -0.1340 (0.0876) | -0.0953 (0.0632) | -0.0964 (0.2536) | -0.2304 (0.1904) |
| P(In Honors College + Interaction) | 0.38 | 0.71 | 0.20 | 0.32 | 0.15 | 0.12 |
| Bandwidth | 0.10 | 0.20 | 0.10 | 0.20 | 0.10 | 0.20 |
| Number of Observations | 3,492 | 7,107 | 3,187 | 6,473 | 3,492 | 7,107 |

Notes: * means the coefficient is significant at the 10% level and ** significant at the 5% level. Standard errors are clustered at the first college – cohort level. Regressions are 2SLS regressions where Above Cutoff and Above Cutoff * Female are instruments for In Honors College and In Honors College * Female. Time to degree only uses students who graduated and counts summers as 1 semester. For the GPA regressions, 4$^{th}$ semester and 8$^{th}$ semester are calculated ignoring summers. GPA is cumulative GPA at the end of the semester. For more one than one degree only students who have at least 1 degree are included in the regression. Means outcomes are for all male or all female students in the All GPA's Sample.

## Additional Bandwidths First Gen and Second and Above Gen Heterogeneity

Table E2 –First Gen and Second and Above Gen Treatment Effect of Honors College Participation

| | Graduate MSU | Graduate MSU | Time to Degree | Time to Degree | 4th Semester GPA | 4th Semester GPA |
|---|---|---|---|---|---|---|
| In Honors College | -0.0351 | -0.0383 | -0.0721 | -0.3007 | -0.0086 | -0.0530 |
| | (0.0654) | (0.0400) | (0.5719) | (0.3737) | (0.0806) | (0.0532) |
| In Honors College * First Gen | 0.2997* | 0.2777** | -0.8737 | -0.5570 | 0.0641 | 0.1334 |
| | (0.1592) | (0.1218) | (1.4282) | (0.7951) | (0.1859) | (0.1179) |
| P(In Honors College + Interaction) | 0.10 | 0.03 | 0.47 | 0.20 | 0.75 | 0.47 |
| Bandwidth | 0.10 | 0.20 | 0.10 | 0.20 | 0.10 | 0.20 |
| Number of Observations | 3,492 | 7,107 | 3,187 | 6,473 | 3,291 | 6,711 |
| | 8th Semester GPA | 8th Semester GPA | Total Credit Hours | Total Credit Hours | Credit Hours 300 Level | Credit Hours 300 Level |
| In Honors College | -0.0029 | -0.0098 | -6.0991 | -5.2167 | -3.6124 | -1.0033 |
| | (0.0805) | (0.0528) | (5.7765) | (4.3530) | (4.4941) | (2.0602) |
| In Honors College * First Gen | 0.1982 | 0.1235 | 26.4233* | 25.8373** | 9.6799 | 11.5172** |
| | (0.2314) | (0.1529) | (15.1815) | (11.5627) | (6.9118) | (4.6871) |
| P(In Honors College + Interaction) | 0.40 | 0.47 | 0.19 | 0.04 | 0.47 | 0.02 |
| Bandwidth | 0.10 | 0.20 | 0.10 | 0.20 | 0.10 | 0.20 |
| Number of Observations | 2,896 | 5,885 | 3,492 | 7,107 | 3,492 | 7,107 |
| | Credit Hours 400 Level | Credit Hours 400 Level | More than One Degree | More than One Degree | Number Minors | Number Minors |
| In Honors College | 4.8811 | 0.6970 | -0.0319 | 0.0075 | -0.2375* | -0.0507 |
| | (4.4885) | (2.4183) | (0.0530) | (0.0315) | (0.1369) | (0.0895) |
| In Honors College * First Gen | -0.6636 | -0.0022 | -0.0055 | -0.0888 | 0.2422 | -0.0726 |
| | (6.4541) | (4.9372) | (0.0979) | (0.0684) | (0.2788) | (0.2241) |
| P(In Honors College + Interaction) | 0.56 | 0.87 | 0.71 | 0.26 | 0.98 | 0.52 |
| Bandwidth | 0.10 | 0.20 | 0.10 | 0.20 | 0.10 | 0.20 |
| Number of Observations | 3,492 | 7,107 | 3,187 | 6,473 | 3,492 | 7,107 |

Notes: * means the coefficient is significant at the 10% level and ** means that the coefficient is significant at the 5% level. Standard errors are clustered at the first college – cohort level. Regressions are 2SLS regressions where Above Cutoff and Above Cutoff * First Gen are instruments for In Honors College and In Honors College * First Gen. Time to degree only uses students who graduated and counts summers as 1 semester. For the GPA regressions, 4th semester and 8th semester are calculated ignoring summers. GPA is cumulative GPA at the end of the semester. For more one than one degree only students who have at least 1 degree are included in the regression. Means outcomes are for 2nd and above generation or first-generation students in the All GPA's Sample.

# Appendix F: Additional Outcomes Analysis Sample

Table F1 – Effect of Honors College Participation on Student Outcomes

| | Time to Degree Ignoring Summers | Time to Degree Ignoring Summers | Retention to 4th Semester | Retention to 4th Semester | Retention to 8th Semester | Retention to 8th Semester |
|---|---|---|---|---|---|---|
| Treatment Effect | -0.0539 | -0.3068 | 0.0481 | 0.0563 | 0.0396 | 0.0255 |
| | (0.3053) | (0.2293) | (0.0395) | (0.0354) | (0.0646) | (0.0666) |
| Covariates | N | Y | N | Y | N | Y |
| Number of Observations | 4,396 | 4,396 | 5,557 | 5,557 | 5,557 | 5,557 |
| | 2nd Semester GPA | 2nd Semester GPA | 3rd Semester GPA | 3rd Semester GPA | 5th Semester GPA | 5th Semester GPA |
| Treatment Effect | -0.0638 | -0.0225 | -0.0651 | -0.0136 | -0.0556 | 0.0124 |
| | (0.0407) | (0.0330) | (0.0531) | (0.0462) | (0.0693) | (0.0583) |
| Covariates | N | Y | N | Y | N | Y |
| Number of Observations | 5,466 | 5,466 | 5,301 | 5,301 | 5,126 | 5,126 |
| | 6th Semester GPA | 6th Semester GPA | 7th Semester GPA | 7th Semester GPA | Retention to 2nd Semester | Retention to 2nd Semester |
| Treatment Effect | -0.0322 | 0.0323 | 0.0022 | 0.0575 | 0.0113 | 0.0214 |
| | (0.0731) | (0.0589) | (0.0779) | (0.0597) | (0.0234) | (0.0233) |
| Covariates | N | Y | N | Y | N | Y |
| Number of Observations | 5,044 | 5,044 | 4,902 | 4,902 | 5,557 | 5,557 |
| | Retention to 3rd Semester | Retention to 3rd Semester | Retention to 5th Semester | Retention to 5th Semester | Retention to 6th Semester | Retention to 6th Semester |
| Treatment Effect | 0.0328 | 0.0444 | -0.0168 | -0.0081 | -0.0182 | -0.0091 |
| | (0.0343) | (0.0323) | (0.0465) | (0.0431) | (0.0441) | (0.0416) |
| Covariates | N | Y | N | Y | N | Y |
| Number of Observations | 5,557 | 5,557 | 5,557 | 5,557 | 5,557 | 5,557 |
| | Retention to 7th Semester | Retention to 7th Semester | | | | |
| Treatment Effect | -0.0238 | -0.0258 | | | | |
| | (0.0480) | (0.0474) | | | | |
| Covariates | N | Y | | | | |
| Number of Observations | 5,557 | 5,557 | | | | |

Notes: No coefficient in the table is significant at the 10% level. Standard errors are clustered at the first college – cohort level. Coefficients are 2SLS estimates for the treatment effect of ever participating in the Honors College. Covariates include the student's age when the entered MSU and indicators for being female, being a specific race, being a first-generation college student, and being in a particular freshmen year-first college combination. For all regressions the bandwidth is 0.15. For Time to Degree Ignoring Summers all students who got their first degree during a summer semester are dropped and summer semesters count as 0 semesters. For the GPA regressions, the semester numbers are calculated ignoring summers. GPA is cumulative GPA at the end of the semester. Retention to semester X is measured as having a cumulative GPA at the end of semester X with semester number calculated ignoring summers.