NBER WORKING PAPER SERIES

COLLEGE CONSUMPTION AMENITIES, ACADEMIC PERFORMANCE, AND DONATION BEHAVIOR

Joshua M. Hyman
Isaac McFarlin Jr.

Working Paper 30481
http://www.nber.org/papers/w30481

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
September 2022

We are grateful to Diego Briones for excellent research assistance. Thank you to Roger Blair, Eric Brunner, Charlie Clotfelter, Jeff Greenspan, Patrick Lapid, Jason Lindo, Paco Martorell, Brian McCall, Una Osili, Dan Rosenbaum, Stephen Ross, Hector Sandoval, Caroline Theoharides, Glen Waddell, seminar participants at Tufts University and the University of Michigan, and audience members at the 2020 Northeast Economics of Education Workshop, 2022 Association for Education Finance and Policy conference, and 2022 Society of Labor Economists for their helpful comments. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

College Consumption Amenities, Academic Performance, and Donation Behavior
Joshua M. Hyman and Isaac McFarlin Jr.
NBER Working Paper No. 30481
September 2022
JEL No. I2,I23

ABSTRACT

Colleges compete to attract students by investing in amenities such as athletics, dormitories, and student activities. We examine the effect of student consumption of postsecondary amenities on academic achievement and future donation behavior in the context of Big-Time college sports. We resolve the selection issue using data from a large, public university with a highly-ranked men's basketball team, where student season tickets are awarded by lottery. Game attendance has small negative effects on academic performance but no impact on donation behavior. Negative academic effects are concentrated at the bottom of the achievement distribution and driven by in-state students and students attending during seasons when the team reaches the postseason tournament. We uncover no evidence of spillover effects to roommates. Our results suggest that certain postsecondary amenities may hinder academic performance, with little upside from future giving.

Joshua M. Hyman
Department of Economics
Amherst College
Amherst, MA 01002-5000
jhyman@amherst.edu

Isaac McFarlin Jr.
College of Education
University of Florida
2-230D Norman Hall
P.O. Box 117049
Gainesville, FL 32611
and NBER
imcfar@ufl.edu

I. Introduction

Colleges compete to attract students by investing in consumption amenities such as athletics, dormitories, and student activities. Among the approximately 1,300 four-year nonprofit postsecondary institutions in the U.S., for every dollar spent on academics, more than fifty cents is spent on amenities (Jacob, McCall, and Stange, 2018). These investments have received criticism for being anti-academic and unproductive: one *Wall Street Journal* piece, for example, highlights a recently constructed luxury dormitory at a public university featuring "gaming rooms" with wall-to-wall TVs and video game systems, questioning the academic benefits of these investments (Wotapka, 2012). On the other hand, while non-academic in nature, such amenities could provide well-needed breaks from the pressures of studying, improving student mental health, helping students develop social networks, and increasing students' connection with the college, all of which could lead to improved academic performance.

Despite colleges' large investments in amenities and the uncertainty about whether these investments are beneficial to students, there is surprisingly little causal evidence on the impact of student consumption of these amenities on academic achievement. This is primarily due to the selection issue, whereby students who consume amenities differ from students who do not. For example, Jacob, McCall, and Stange (2018) show that the academically strongest students have a lower taste for amenities, such that colleges competing for less-academically skilled students are those that invest in amenities most heavily. Without plausibly exogenous variation in student participation, it is challenging to separate the effects of consumption amenities on student outcomes from the underlying differences between students who do and do not consume such amenities.

In this paper, we investigate the causal impact of student consumption of postsecondary amenities in the context of Big-Time college sports, one of the most prolific and well-funded amenities in postsecondary education (Clotfelter, 2011). We examine effects of game attendance on students' academic outcomes as well as its impact on future alumni giving, solving the selection issue by leveraging student season ticket lotteries. Specifically, we use nine years of student lottery data from a large, public flagship university with a consistently high-ranked men's basketball team where, due to excess demand, student season tickets are assigned by lottery. We match all student lottery applicants, and their on-campus roommates, to academic transcripts from the registrar and university foundation records to examine the effects of game attendance on grades, credits earned, and degree completion as well as on alumni giving.

Comparing lottery winners to lottery losers, we find that winning the lottery causes small reductions in GPA and credits earned during the current academic year. The GPA reduction is concentrated at the bottom of the achievement distribution and persists through students' final cumulative GPA. These declines in GPA and credits earned are driven by in-state students and students who attend games during seasons in which the team reaches the March Madness postseason tournament. When examining heterogeneity by student race, Asians, who comprise the largest racial minority group on campus, experience the greatest negative impacts. These student subgroups whose academic performance is most harmed by winning the lottery are ultimately less likely to complete college and earn a Bachelor's degree. We uncover no evidence that the negative academic effects of winning the lottery spillover to the applicants' roommates.

As to whether student consumption of postsecondary amenities increases their connection to the university, and thus their donations after graduating, we find no evidence that winning the lottery increases the likelihood or amount of donations by either the student or their parents up to 10 years after students leaves the university. If anything, we find suggestive evidence that the parents of students experiencing the greatest academic declines due to game attendance *reduce* their giving to the university.

Our comparisons of lottery winners to lottery losers estimate the intent-to-treat (ITT) effect of game attendance. Lottery winners may choose not to attend games or may resell or give away their tickets to other students. Unfortunately, the university does not track which students actually use the ticket. To provide an informal scaling of our estimates into treatment-on-the-treated (TOT) effects, we conduct a survey distributed via email by the university athletics department in spring 2018 to all current and former students who applied to the fall 2014, 2015, 2016, or 2017 student season ticket lotteries. We ask about the number of games attended in each year, subsequently using the difference in attendance between lottery winners and lottery losers to scale our ITT effects into TOT estimates. Focusing on the TOT effects, we find that attending an average number of games in a single season reduces students' current GPA during the semester after the lottery by 0.05 points (7% of a standard deviation) and their final cumulative GPA by 0.02 points (5% of a standard deviation).

As an attempt to examine mechanisms, we include two questions in the survey asking about how game attendance may affect student behavior, finding that students report having less time for studying and being more likely to skip class surrounding days they attended basketball games. We additionally ask students whether attending games made students feel more or less connected to the University. Students overwhelmingly responded positively, suggesting that game attendance may increase students' feelings of connectedness to the University in ways not reflected in their donation behavior.

Our paper contributes to two literatures in the economics of higher education. First, Jacob, McCall, and Stange (2018) bring renewed economic attention to the literature examining markets in higher education by showing that consumption amenities are one of the primary attributes in which colleges invest and over which students sort across colleges. However, an open question in this literature is whether such college catering to demand-side market pressures for amenities helps or hinders student academic performance and whether these college investments have future payoffs in the form of increased financial support from alumni. To the best of our knowledge, this paper is among the first to examine the causal impact of student participation in college consumption amenities on these outcomes. In related prior work, Webber and Ehrenberg (2010) use institution-level data from the Integrated Postsecondary Education Data System (IPEDS) to examine the effects of non-instructional spending on student completion rates, but lack plausibly exogenous variation in spending, relying on institution fixed effects for identification.

A few studies have shown that when college sports teams perform better, non-athlete academic performance declines (Clotfelter, 2011; Lindo, Swensen, and Waddell, 2012) and philanthropic contributions increase (Meer and Rosen, 2009; Anderson, 2017). For example, Clotfelter (2011) finds that the number of JSTOR articles viewed at university libraries decreases around the time of the March Madness postseason basketball tournament for institutions with a team in the tournament. Lindo, Swensen, and Waddell (2012) use administrative data from a single university, examining effects of team success on students' GPA. Leveraging team success provides plausibly exogenous variation in non-athlete student engagement with Big-Time sports, but one disadvantage of this design is that the identifying variation is across-season and all students in a given season are treated, raising concern that estimates may be attenuated due to grade curving. To avoid this concern, the authors focus on the GPA gender gap, finding that GPA declines more for males than for females. In contrast, our lottery design compares students within a given season, yielding estimates that are unlikely to be biased by grade curving. In addition, comparisons across years when a team performs better or worse capture one margin along which student engagement in Big-Time sports responds, but tell us little about the underlying effects when team success is relatively stable across seasons, or about effects of student engagement regardless of team success. Similar to Clotfelter (2011) and Lindo, Swensen, and Waddell (2012), we find that game attendance decreases academic performance more so during seasons when the team performs better. But in contrast to Meer and Rosen (2009) and Anderson (2017), we find no increase in philanthropic behavior due to game attendance, even during those better-performing seasons.

Our paper also contributes to the literature attempting to identify and reduce barriers to postsecondary academic success and completion. While rates of college entry have risen in recent decades, rates of college completion have not kept pace (Bound, Lovenheim, and Turner, 2010; Bailey and Dynarski, 2011). In response, economists and education researchers have turned their attention to identifying barriers to academic success, and to finding ways to dismantle these barriers (e.g., Stinebrickner and Stinebrickner, 2004; Bettinger and Baker, 2014; Holzer and Baum 2017; Andrew, Imberman, and Lovenheim, 2020; Oreopoulos, 2021; Oreopoulos et al., Forthcoming). Academic coaching and financial support have had some success (Bettinger and Baker 2014; Goldrick-Rab et al., 2012) while efforts to increase study time have failed (Oreopoulos et al., Forthcoming). Critics of postsecondary amenity spending claim these investments contribute to poor academic performance, reduced studying time, and lower college completion rates, yet student consumption of such amenities has received little attention in this literature. We show that consumption amenities may play a role in academic success and college completion. While seemingly small, the declines in GPA and credit completion that we find are of similar magnitudes as the increases brought about by an offer of $3,500 in financial aid in a randomized control trial examining the impacts of financial aid on student academic performance and persistence (Goldrick-Rab et al., 2012).

Our results also have important policy implications for the financing of public higher education. The overwhelming majority of postsecondary students in the U.S. attend public colleges or universities, where public funds support college investments. As public universities increase their investment in consumption amenities in response to demand-side pressure, it raises the question of whether such investments are an efficient use of taxpayer money in terms of their effects on both student academic success as well as future savings due to alumni giving. While we are unable to conduct a comprehensive welfare calculation, our results suggest that while such investments increase enrollment (Jacob, McCall, and Stange, 2018), they may in fact hinder student performance with little future financial benefit, and thus may be an inefficient use of taxpayer resources.

Big-Time college sports attendance is just one specific type of consumption amenity in which colleges invest to attract students, and the effects of student participation in amenities may differ for various amenities. Further, as noted by Jacob, McCall, and Stange (2018), it is possible that student participation in such amenities could improve non-academic skills or social networks rewarded in the labor market that we cannot observe using our administrative data. While we leave these questions for future research, we offer some of the first causal evidence that college catering to student preferences for consumption may hinder student academic success, with little future financial payoff to universities.

II. Background on the Season Ticket Lottery

Our study uses data from an unnamed large, public flagship university with a consistently well-ranked men's basketball team. Due to greater demand for student tickets to attend games than there are seats, every fall the athletic ticket office holds a lottery to award student season tickets. All undergraduate and graduate students are emailed an invitation to apply electronically to the ticket lottery in mid-to-late September. Students have three days to decide whether to enter the lottery, which they can do by entering their student ID at the lottery website. There is no cost to enter the lottery and entering the lottery does not obligate students to purchase season tickets if they win the lottery. A few days after entering the lottery, winning students are emailed purchase instructions and losing students are also notified. Winners then have three days to purchase their season ticket package, which always almost sell out, but never do completely due to a small number of winners not claiming their season tickets. These unclaimed season tickets are then sold online on a first-come basis and universally sell out. The basketball season runs from November through March, with 16 to 19 home games. Lottery winners must purchase the tickets to all of the home games. During our sample period, the price per ticket was $5, for a total price for the season ticket package ranging between $80 to $95.

The student season ticket lottery is weighted by grade level such that first-years and graduate students have the lowest chance of winning and seniors have the greatest chance. The student IDs for seniors are entered five times into the lottery, juniors four times, sophomores three, first-years and most graduate students two, and medical, dental, and business graduate students once. The lottery process is conducted by a third-party consultant. After duplicating the student IDs the appropriate number of times, the consultant enters the IDs into a single column in Excel, then sorts the column by a randomly generated number, and denotes the top IDs as winners moving down the column until the number of unique winning IDs equals the number of available season tickets. While the number of winners is nearly identical across years, the number of students applying to the lottery varies, such that the probability of winning is higher in years when fewer students apply.

Appendix Table 1 shows the number of lottery applicants and fraction winning the lottery by grade level and year in our data. From fall 2009 through fall 2017 there were between about 5,500 and 8,000 applicants per year for a total of 57,909 lottery applicants.[1] Some students apply for the lottery in more than one year; the total number of unique students in our sample is 30,299. Seniors (15,063 total applications) and juniors (15,919) were the most likely to apply, followed by sophomores (13,909), first-years (11,593), and graduate students (1,425). The winning percentage varies inversely with the number of applicants, ranging across years from 28% to 46%, with an average win percentage across all grades of 36%, and of 47% for seniors, 40% for juniors, 32% for sophomores, 22.4% for first-years, and 21.6% for graduate students.

III. Data

Our study uses student data from several departments across an unnamed large, public flagship university. We merge 1) lottery data from the athletic ticket office, 2) housing assignments from the on-campus housing authority, 3) student transcripts from the Registrar, and 4) donation records from the University Foundation. We (rather than the University departments or a central office of Institutional Research) conduct all of the merges using Student ID as the matching variable. Below, we provide more detail about the information contained in each data source.

<u>Season Ticket Lottery</u>: We use nine years of lottery records provided by the athletic ticket office, from fall 2009 through fall 2017. The records contain the list of applicant names, student

[1] Approximately a third of undergraduate students enrolled at the University applied to the lottery each year. We consider only undergraduate students for this calculation, because they make up nearly all of the lottery applicants, but only about 70% of all students at the University.

IDs, grade level, the rank of the IDs randomly assigned during lottery process, and which IDs were assigned as lottery winners.

Housing Assignments: We merge the lottery records with the universe of on-campus housing assignment records, containing dorm name, room number, and bed number. We include all lottery applicants' roommates during their lottery year in our dataset.

Student Transcripts: We then merge all lottery applicants and their roommates with transcripts from the Registrar as of July 2018. The transcript data contain basic demographics (i.e., race and sex), in-state versus out-of-state status, legacy status, course-level grades and credits earned, semester-level current and cumulative GPA and credits earned, final cumulative GPA, declared major, and degrees received with dates they were earned.

Donations: Finally, we merge all lottery applicants and their roommates to the universe of university giving records through August 2018. These data contain the complete history of all donations by each student and his or her parent(s), including date, amount, and any designation (e.g., athletics).

We combine these data sources into a student-by-lottery-application-year panel from 2009-2017 containing 57,909 observations and 30,299 unique students. Columns 1 and 2 of Table 1 show sample means and standard deviations for available pre-lottery sample characteristics. 70% of the sample is White, 9% Asian, 7% Hispanic, and 4% Black (with 9% unreported race). Almost half (49.5%) of the sample is female. Seventy-three percent of the sample is considered in-state while 12% comprise legacy students.[2] Cumulative GPA and credits earned as of the semester prior to lottery application (dropping first-years) are 3.25 and 71 respectively. Thirty percent of parents donated to the University prior to the lottery semester. Summing across all past donations, the average unconditional donation is $678, though this is highly skewed, with a standard deviation greater than $22,000.[3] Sixty-two percent of the sample lives on campus and has at least one roommate during their lottery semester, while 12% live on campus and have multiple roommates.

[2] While we only have administrative data on the lottery applicants and their roommates, we compare the lottery sample to the overall university student population using data from IPEDS during our sample period. In addition to the lottery sample being skewed toward undergraduates, and among undergraduates toward upper-classmen (as shown in Section II), it is also skewed somewhat toward in-state students (73% lottery sample versus 66% overall) and white students (70% lottery versus 62% overall). The lottery sample is nearly identical to the University population with respect to gender (49.5% lottery versus 49.6% overall).

[3] We show that our null result on donation amount is robust to several ways of addressing the skewed nature of the donation distribution.

Thirty-eight percent of the sample has at least one roommate who also applied to the lottery that year, and 14% has at least one roommate who applied to and won the lottery that year.

IV. Methodology and the Student Survey

To identify the causal impact of winning the lottery on student outcomes, we estimate the following OLS regression:

$$Y_{igy} = \beta_0 + \beta_1 WIN_{igy} + X_{igy} + \delta_{igy} + \varepsilon_{igy} \quad (1)$$

where Y_{igy} is the outcome for student, i, who was in grade, g, when they applied for the lottery during year, y, *WIN* is a dummy for whether the student won the lottery, X is the set of student and student-year level covariates presented in Table 1, and δ is a set of grade-by-year fixed effects. The fixed effects are necessary to ensure that comparisons are drawn within grade and year, as that was the level of random assignment. Omission of the fixed effects would cause β_1, the parameter of interest, to conflate the effect of winning with the effect of being in a grade or year with a higher likelihood of winning. We cluster the standard errors at the grade-year level.

Table 1 shows that the lottery was well-implemented and that we achieve balance across our baseline characteristics. We estimate equation (1) where each of the characteristics shown in Table 1 is the dependent variable, and report β_1 in column 3 and its standard error in column 4. All coefficients are near zero and statistically insignificant, and an F-test of the joint significance of all of the characteristics fails to reject the null that they jointly equal zero.

Equation (1) estimates the Intent-to-Treat (ITT) effect of game attendance, given the small amount of incomplete take-up of purchasing season tickets by winners, and more importantly, given the fact that the University does not require that student tickets be used by the purchaser. Anyone with a student ID at the time of admission can attend the game, and there is an active secondary market for selling and purchasing tickets to individual games (and occasionally entire season ticket packages). For example, during our sample period there was a dedicated Facebook page titled “Buy and Sell [University] Basketball Tickets.”

In spite of this active secondary market, lottery winners made very little, if any, money selling their tickets. To understand whether lottery winners made substantial amounts of money selling tickets, and whether this additional “income effect” could be one mechanism for the ITT effect estimated, we tracked all of the entries on the above-referenced Facebook page for an entire year (the 2017-18 season). Student postings to sell tickets usually asked for face value ($5), with a small number of posts for particularly desirable games asking somewhat above face-value ($8 or $10), and on very rare occasion, requesting larger amounts, such as $30, for the most desirable games. We also conducted several informal interviews with students who had applied to the lottery, and the winners described that they would typically receive face value for their sold tickets. No students we interviewed reported earning a profit of more than $50 in a season for their tickets, with the overwhelming majority earning far less or even zero profit. Thus, given the relatively small cost of the season tickets (less than $100), and relatively little profit made from selling tickets, we believe there is little room for an income effect to play much role in the effects we find.

Unfortunately, the University does not track who uses the tickets, and so we have no way to observe which of the lottery applicants in our data actually attend games. As such, in order to informally scale our estimates into a Treatment-on-the-Treated (TOT) effect of game attendance, we fielded a student survey. The email-based survey was conducted via Qualtrics in April 2018 (after the 2017-18 basketball season was complete) by the athletic ticket office. Every email included a unique link connected to each student ID so that we could merge our lottery data with the survey data. The survey was emailed to all 16,318 current and former students who applied to the ticket lottery during fall 2014, 2015, 2016, or 2017, comprising over half of the 30,299 students in our main sample. Of those emailed, 1,641 (10.1%) responded with a valid set of survey responses. Importantly, winning the lottery had no effect on whether a student responded to the survey, i.e., the survey data does not suffer from differential response by treatment status.[4]

The primary purpose of the survey was to query students on how many games they attended each year (e.g., 2014-15, 2015-16, etc.), so that we could compare the number of games attended by lottery winners to the number attended by lottery losers.[5] To do this, we estimate equation (1) on the sample of survey respondents, reporting results in Appendix Table 2. We find that winning the lottery causes a 0.603 game (SE=0.151), or 20.7%, increase in the number of games attended, compared to a control mean of 2.9 games attended.[6] Given this 20.7% effect of winning the lottery on game attendance, in our results presented below in Section V, we scale our ITT effects by 4.76

[4] We estimate equation (1) on the sample of 2014, 2015, 2016, and 2017 lottery applicants, where the dependent variable was a dummy for responding to the survey. The point estimate is 0.004 (i.e., 0.4 percentage points) and the standard error is also 0.004.

[5] We also asked a couple questions in the survey to explore possible mechanisms: we asked students whether they studied more or less, and were more or less likely to skip class, during days on or surrounding games they attended.

[6] This nearly 3 game average attendance among lottery losers, and almost 21% greater attendance among lottery winners, is consistent with our understanding from the student interviews that most students attended a handful of games per season regardless of winning or losing the lottery.

(=1 / 0.207) to provide suggestive estimates of the TOT effects. A similar approach is used by Hoxby and Turner (2013), who estimate TOT effects of their light-touch, college-going intervention by scaling the ITT estimates by the fraction of treated students who recall receiving the intervention.

V. Results

V.I Academic Performance

Table 2 presents effects of game attendance on student academic outcomes. Column 1 presents the ITT effect without covariates. Column 2, our preferred specification, presents the ITT effect including the covariates listed in Table 1. We focus on the preferred specification with covariates presented in column 2, noting that the results are similar in column 1.

We begin by examining effects on students' current GPA during the semesters that overlap with the basketball season, which include the fall semester of the lottery and the following spring semester. We find no statistically significant effect of winning the lottery on GPA during the fall semester of the lottery. However, we find a small decrease in the spring semester after the lottery of about 0.010 GPA points.[7] Combining GPAs across both semesters, the impact on average GPA in the academic year of the lottery is negative 0.007 points. This effect on GPA persists through final cumulative GPA, with lottery winners experiencing a 0.005 point decline.

We find that the effects on current and final cumulative GPA are concentrated in the bottom of the GPA distribution. Figure 1 presents quantile treatment effects for both spring semester and final cumulative GPA, presenting effects at the 10^{th}, 20^{th},.., 90^{th} deciles of the unconditional GPA distributions.[8] Figure 1a shows very small, statistically insignificant declines in spring semester GPA near the top of the GPA distribution (i.e., 70^{th}-90^{th} percentiles), about 0.01 point declines near the middle of the distribution (i.e., 30^{th}-60^{th}), and the greatest declines at the bottom: nearly

[7] One reason that negative GPA effects could emerge during the spring, but not fall semester, is that while there are a similar number of home games during the fall and spring semester, the games that are more desirable to attend occur primarily during the spring semester. The fall semester includes mostly nonconference games where teams play lesser known teams outside of their conference, whereas later in the season teams play other teams in their conference, including established rivals. Additionally, the postseason tournament, if the team performs well enough to play in it, occurs during the spring semester.

[8] Specifically, following Firpo, Fortin, and Lemieux (2009) we estimate unconditional quantile regressions using re-centered influence functions (RIFs) ordinary least squares (OLS), presenting partial effects of winning the lottery on each decile of the outcome. We follow equation (1), including the covariates and fixed effects, and clustering the standard errors at the grade-year level.

0.02 points at the 20th percentile and 0.03 points at the 10th percentile. Figure 1b shows a similar, though slightly less precise pattern for final cumulative GPA, with a –0.014 effect at the 10th decile. In both cases, the effect at the 10th decile of the GPA distribution is about three times as large as the mean effect, providing strong evidence that the academically weakest students are those whose academic performance is most harmed by game attendance.[9]

We next examine credits earned during the semesters that overlap with the basketball season. Game attendance could reduce credits earned if it causes students to fail or withdraw from classes, or to attempt fewer classes. Similar to GPA, we find no effect on credits earned during the fall semester of the lottery, and a small decline in the spring after the lottery of 0.05 credits (Table 2). The coefficient on total fall plus spring credits during the academic year of the lottery is -0.08. The point estimate for final total credits is similar in magnitude to that during the spring after the lottery, but is statistically insignificant.

Finally, given the negative academic effects found thus far, we examine whether winning the lottery reduces students' likelihood of completing college and earning a Bachelor's degree. We find a marginally insignificant 0.4 percentage point decline (standard error of 0.2 percentage points) in Bachelor's degree receipt.[10]

Column 3 of Table 2 scales the point estimates and standard errors to estimate TOT effects using results from the student survey. As reported in Section IV, winning the lottery increases the number of games attended in a season by 20.7%. Thus, we report in column 3 the estimates from column 2 multiplied by 4.76 (=1/0.207). These TOT estimates can be interpreted as the effects of attending the average number of games attended for a single basketball season relative to attending no games in that season.

The effect of attending the average number of games in season is a 0.048 GPA point reduction during the spring semester following the lottery, and a 0.023 point reduction in final cumulative GPA. These represent small, but arguably non-trivial effects on current and final

[9] An alternative approach to estimating heterogeneity by academic performance is to examine heterogeneity by GPA in the prior semester. However, we prefer the quantile treatment effect approach, because first-years, who comprise a fifth of our sample, have no such prior GPA.

[10] Note that the sample size for our analysis of degree receipt is somewhat smaller (50,426 rather than 57,909), because we drop the recent cohorts for whom we cannot observe on-time degree receipt in our data, which ends during summer 2018. These cohorts include juniors in fall 2017, sophomores in fall 2016 and 2017, and freshmen in fall 2015, 2016, and 2017. We show the effects on GPA and credits earned for this sample in column 5 of Table 4.

cumulative GPA equivalent to 7.2% and 4.8% of a standard deviation, respectively.[11] For comparison, a randomized control trial evaluating the effects of a state scholarship program found that an offer of $3,500 in financial aid for currently enrolled college students caused increases in final cumulative GPA of 0.05 points, about the same size as the negative effect we find on current spring GPA, and approximately twice as large as the negative effect we find on final cumulative GPA (Goldrick-Rab et al., 2012). We find that attending an average number of games in a season reduces credits earned during that year by 0.4, compared to a 0.5 credit per year increase in Goldrick-Rab et al. (2012).

V.II Heterogeneity in the Academic Performance Effects

Some students may experience disproportionate effects of winning the lottery on their academic performance. For instance, their academic performance may be more sensitive to game attendance, or winning the lottery may cause a greater increase in the number of games they attend. Table 3 explores heterogeneity in the ITT effects of game attendance by two candidate student groups: in-state students, and students applying to the lottery during seasons when the basketball team makes the March Madness postseason tournament. Columns 1 and 2 show effects by in-state status, revealing that the negative effects on academic performance are driven entirely by in-state students. These students see a 0.013 GPA reduction in the spring semester, a 0.007 reduction in their final cumulative GPA, a 0.059 credit reduction in the spring semester, and a 0.6 percentage point reduction in degree completion, all of which are statistically significant at the 95% or 99% level. All of the coefficients are substantially smaller (or positive), for out-of-state students, and none is statistically significant.[12]

We next present effects separately for students applying to the lottery during seasons when the team made the March Madness postseason tournament (column 3) versus students applying when the team did not make the tournament (column 4). The pattern of results, while less stark than by in-state status, suggests that the negative effects on academic performance were concentrated among students applying during March Madness seasons. The pattern is most

[11] Among lottery losers the standard deviations of current GPA during the spring semester after the lottery, and of final cumulative GPA, are 0.664 and 0.475, respectively.

[12] While this pattern is prominent, with precise effects for nearly all outcomes for in-states students, and zero effects for out-of-state students, given the smaller sample size of the out-of-state group, and thus limited statistical precision, the only outcome for which the difference between the effects across columns 1 and 2 is statistically significant is degree receipt (p-value of 0.066).

pronounced for credits earned and degree receipt: students during March Madness seasons experience a statistically significant 0.7 percentage point decline in degree receipt, while the point estimate for students during seasons when the team did not make the tournament is 0.000 (SE=0.003).[13]

We next examine effects by the two basic student demographic variables in our data: race and sex. To examine heterogeneity by student race, we combine Hispanic and Black students (column 7) into one subgroup given their relatively small sample sizes, also examining effects for White (column 5) and Asian (column 6) students, the largest minority group in our sample. We find that the effects are concentrated among Asian students. For example, Asian students experience a 0.040 GPA point reduction in the spring semester due to winning the lottery, four times greater than the 0.010 effect among all students. They experience a 0.032 point reduction in the average fall and spring GPA, more than four times greater than the 0.007 point effect among all students. They experience a 0.013 point reduction in final cumulative GPA, almost three times larger than the 0.005 point effect among all students. There are no statistically significant effects among Whites or Blacks and Hispanic students.[14] Asian students also see effects on credits earned that are greater than those for all students. For example, the effect on spring credits earned is a marginally significant 0.172 credit reduction, compared to 0.052 among all students. The point estimate for degree receipt is -0.6 percentage points, the same magnitude as for in-state students; however, the effect is statistically insignificant given the smaller sample size for this group.

Finally, we examine heterogeneity by student gender, revealing no clear pattern. The GPA effects appear to be somewhat concentrated among females, who see a 0.007 point reduction in final cumulative GPA. However, the effects on credits earned and degree receipt appear to be somewhat concentrated among males, who see a 0.7 percentage point decline in degree receipt.[15]

Given the statistically significant declines in degree receipt that we observe among the most affected student groups (e.g., in-state students, males), we attempt to explore whether these groups also experience increases in their time-to-degree among those who eventually earn a degree.

[13] None of the differences by March Madness season is statistically significant.

[14] The differences between White and Asian students in the effect on spring and full-year GPA are statistically significant (p-values 0.058 and 0.031, respectively).

[15] We can reject equality of the degree receipt effect by sex with a p-value of 0.064. We also examine heterogeneity by legacy status and by grade level (i.e., first-year, sophomore, junior, senior), and find no pattern of differential effects by these student characteristics. We similarly find no differential effect of winning the lottery by whether the applicant won the lottery in a previous year. While we would like to examine effects by other student characteristics, for example, whether students belong to a fraternity or sorority, we do not observe these characteristics in our data.

Nineteen percent of degree earners in our sample earn their degree in five or more years, as opposed to within four years. We restrict our sample for this analysis to only those students who we can observe for six or more years after their freshman year. While the results are relatively imprecise, we observe a pattern of declines in the likelihood of earning a degree within four years, and increases in the likelihood of earning a degree in five or more years, suggesting possible effects of winning the lottery not only on degree receipt, but also on time-to-degree (see Appendix Table 3).

As described at the beginning of this section, the larger ITT effect of game attendance for certain students could reflect either a greater sensitivity to game attendance or a larger effect of winning the lottery on game attendance. As one way to attempt to separate out these possible mechanisms, we examine effects of winning the lottery on game attendance for each of the student subgroups examined in Table 3. Appendix Table 2, columns 2-10 present these results. As a reminder, column 1 shows a 0.603 game, or 20.7%, increase in games attended by lottery winners relative to lottery losers. Columns 2 and 3 show that the effect on games attended among in-state versus out-of-state students was very similar (0.558 and 0.635 games, or, 19% vs 23% respectively). This leads to similar TOT scale factors across these two groups, and thus, we conclude that the effects concentrated among in-state students reflect heterogeneity in the effects of game attendance rather than differing propensities to attend games after winning the lottery. On the other hand, students winning the lottery during March Madness seasons attended substantially more games than winners during other seasons, suggesting that much or all of the greater effect of winning the lottery during March Madness seasons could be due to a greater treatment intensity, rather than academic performance being more sensitive to game attendance during those seasons. Finally, effects by race lie somewhere in the middle, with Asian students experiencing a larger effect on game attendance than White students, but less than Black and Hispanic students, suggesting that some of the greater effects for Asians compared to Whites may be due to the greater number of games attended by Asian lottery winners.

V.III Robustness of Academic Performance Effects

We present several robustness checks for the effects of winning the lottery on students' academic outcomes in Table 4. Column 1 presents our baseline estimates using our preferred ITT specification with covariates (column 2 from Table 2). Given that we cluster our standard errors at the grade-year level, and that the number of clusters, 54 (6 lottery grade levels by 9 years), is not very large, we present in Column 2 estimates using heteroskedasticity-robust, but not clustered, standard errors. The precision of our estimates is similar, and all of our previously statistically significant estimates remain significant with the exception of the average fall and spring GPA, which loses statistical significance.

Given that the overwhelming majority of students in our sample is undergraduates, and grading, credit accumulation, and degree receipt work differently for undergraduate and graduate students, in column (3) we drop the small number of lottery applications by graduate students (1,425 observations). The effects are nearly identical focusing only on undergraduates. Next, in column 4, we drop first-years from our sample, because they are missing prior cumulative GPA and credits earned, two covariates that we include in our estimating equation.[16] Again, the effects are nearly identical on this reduced sample. One minor difference is that we now see a marginally significant negative effect on credits earned in the fall semester of the lottery. Moving to our next check, as described in footnote 6, our effects on degree receipt are estimated using a somewhat smaller sample, and so we show the GPA and credits earned results for this sample in column 5. Once again, the effects are very similar, and again, one minor difference is that there is a statistically significant decline in credits earned in the fall semester of the lottery. Finally, given that lottery applicants' subsequent decisions to apply to the lottery in later years is endogenous, we keep only students' first lottery application year. Column 6 shows the results estimated using this student-level sample, revealing similarly sized effects on cumulative GPA, final credits earned, and degree receipt, with somewhat larger effects (though not statistically significantly so) on contemporaneous GPA and credits earned. Overall, while there are small changes in the magnitude and precision of our point estimates, the effects of winning the lottery on students' academic outcomes are quite robust.[17]

[16] In our main specification, we set missing values to zero and include a dummy variable for missing prior GPA and credits earned.

[17] One additional concern is that our results may be biased due to grade curving if the lottery winners' worse academic performance causes lottery winner performance to mechanically increase. We believe this would be a cause for concern if the lottery winners represented a substantial portion of the student population. However, only about 12% of undergraduate students (=0.33 x 0.36, because 33% of students apply, and 36% of those win) win the lottery each year, so we think it is unlikely that their small GPA reduction would cause any meaningful increase among the other 88% of students.

V.IV Donation Behavior

We present effects of game attendance on parental and student donations to the University in Table 5. Due to the timing of our data, we are limited to examining donations up to 10 years after graduating for the oldest cohorts in our sample, and for a smaller number of years for most of our cohorts. Subsequently, the recent graduates in our data donate smaller amounts than their parents. Thus, we begin by combining student and parent donations. We examine whether winning the lottery affected whether either the student or parent donates, the total combined donation amount of the student and parents, and whether the total combined student and parent donations were at or greater than the 90th percentile of the conditional student plus parent donation distribution.

As noted in Section III, donations are extremely skewed: the (unconditional) mean combined student and parent donations is \$350, and the standard deviation is \$10,827. Most students have zero combined student and parent donations, the 90th percentile of the (unconditional) distribution is \$125, the 95th percentile is \$340 (smaller than the mean), the 99th percentile is \$3,190, and top values are in the millions of dollars. Clearly, this is not a distribution that lends itself to OLS regression. We use several approaches to estimate effects on donations in the face of this unique distribution. For the sake of simplicity and ease of interpretation, the approach that we use in our main analysis is to set donation values greater than the 99th percentile of the unconditional distribution to equal the value of the 99th percentile threshold, and then use OLS to estimate effects on this censored total donation variable. We show in Appendix Table 4 that our results are robust to estimating OLS censored at different percentiles, Poisson, zero-inflated Poisson, negative binomial, quantile treatment effects, and distribution regressions estimating effects on dummies for donating above quantiles other than the 90th. We also show in Appendix Table 4 zero effects on the number of donations by students and their parents.

Table 5 reveals no effects of game attendance on student or parent donations. We find precisely estimated zero effects of game attendance on the likelihood of donating, either by students or by parents. For example, the effect of winning the lottery on either the student or parent donating (row 1, column 1) is -0.000 (SE=0.004). We can rule out with 95% confidence a 0.8 percentage point (2.2%) increase in the likelihood of donating. We estimate a statistically insignificant \$0.79 decline in total combined donations by the student and parents (SE=\$3.75), and a -0.000 effect on the likelihood of donating at or above the 90th percentile of donations. We can rule out with 95% confidence a \$6.58 (7%) effect on total donations and a 0.2 percentage point (5%) increase in the likelihood of donating at or above the 90th percentile. Separately examining donations by students versus parents reveals a similar pattern of zero effects for both the student and parents on the likelihood of ever donating, donating at or above the 90th percentile, and on total donations.

We explore heterogeneity in the effects of winning the lottery on donation behavior by the same student subgroups explored previously. We generally find consistent evidence across all student subgroups of zero effect of winning the lottery on donations. The sole exception is Asian students, whose parents donate *less* when their child wins the lottery. Specifically, Asian students' parents are 1.7 percentage points less likely to donate, their total donation amounts are \$12 smaller, and their likelihood of donating at or greater than the 90th percentile of parent donations is 0.4 percentage points lower. Asian students themselves see no effects of winning the lottery on donation behavior. One possible explanation for this negative effect among parents of Asian students, given the large negative academic effects on these students, is that their parents are unhappy with their students' experience of winning the lottery and attending games, and blame the University. Whatever behavioral effects attending games had on these students that caused their academic performance to decline, these effects may have soured their parents to the University, and subsequently caused these parents to reduce their giving.

V.V Peer Effects

Given the negative effects of game attendance on student academic outcomes, and the large literature documenting the importance of peer effects in college (e.g., Sacerdote 2001; Carrell, Fullterton, and West, 2009; Carrell, Hoekstra, and West, 2011; Garlick 2018), we examine whether the negative effects on academic performance spillover onto lottery applicants' roommates. In addition to traditional spillover effects, it could also be possible that lottery winners give some of their tickets to their roommates, such that roommates of lottery winners have greater game attendance than roommates of lottery losers.

Table 7 presents effects of winning the lottery on the academic outcomes of lottery applicants' roommates. The analysis is restricted to the 62% of the sample who live on campus and have a roommate. For the almost one-fifth of this sample (12% of the main sample) that have multiple roommates, the outcomes are averaged across the roommates. Looking across GPA, credits earned, and degree receipt, we find no evidence that winning the lottery affected the academic performance of the lottery applicants' roommates. The point estimates are near zero, most are slightly positive, and no estimate is statistically significant. We do not interpret these null results as evidence that peer effects are unimportant in college academics but rather that the main effects on academic performance are small enough in this context that they do not appear to generate any meaningful spillovers to lottery applicants' roommates.[18,19]

VI. Conclusion

Consumption amenities are an important determinant of student preferences in sorting across colleges, and colleges cater to these preferences by investing heavily in such amenities in order to attract students (Jacob, McCall, and Stange 2018). Yet little causal evidence exists on the effects of student consumption of postsecondary amenities due to a lack of exogenous variation. We examine the causal impact of student consumption of postsecondary amenities on academic performance and future donation behavior in the context of Big-Time college sports, one of the most prolific and well-funded college consumption amenities (Clotfelter 2011). We avoid selection bias by using nine years of lottery data from a large, public flagship university with a consistently high-ranked men's basketball team, where student season tickets are awarded by lottery. Matching the lottery data to registrar and university donation records, we show that game attendance has small negative effects on GPA, concentrated in the bottom of the GPA distribution, and on credits earned, with no impact on donation behavior. The negative academic effects are driven by in-state students, students attending during years when the basketball team makes the March Madness postseason, and Asian students. The stronger negative effects for these specific groups extend as far as reducing rates of degree completion. We find no evidence of spillover effects to roommates. While the academic effects are small in magnitude, our results suggest that college investments in consumption amenities to attract students may hinder student academic success, with little upside in the form of increased future donations.

[18] Another possible explanation could be that the effect of winning the lottery on academic performance is smaller for the subset of lottery applicants with an on-campus roommate. We find limited support for this explanation: Effects on credits earned and final cumulative GPA are nearly identical to those for the main sample, and the effect on spring GPA is smaller than that for the main sample (0.005 instead of 0.010 points), but statistically indistinguishable.
[19] In additional analyses, we do not find any evidence that the effect is greater for lottery winners whose roommate applied to or won the lottery, or who were living in a dorm or on a floor with a greater number of lottery applicants or greater number of lottery winners.

One shortfall of our study is that the university administrative data that we use, while rich in many dimensions, does not allow for an examination of mechanisms for the negative academic effects we find. In order to shed light on possible mechanisms, we include a couple questions on the student survey related to how game attendance might affect student behavior. When students were asked whether they studied more or less, or were more or less likely to skip class, on days on or surrounding games they attended, students responded that they were less likely to study, and more likely to miss class (Figures 2a and 2b reports these results). These responses support potential mechanisms for the negative academic effects we find, though we still lack a more comprehensive examination of mechanisms.

Another weakness of our study is that we only observe one measure of student connection to the University after they graduate – donation behavior – and game attendance may have increased students' feelings of connection to the University in other ways not reflected in their donations. This seems to be the case: we also asked on the student survey whether game attendance made students feel more or less connected to the University, and students overwhelmingly responded positively (see Figure 2c). Thus, it seems plausible that attendance may have improved students' feeling of connection to the University, in spite of our observed zero effect on donations.[20]

Big-Time college sports is just one specific type of consumption amenity in which colleges invest to attract students, and the effects of student participation in amenities may differ for various amenities. Further, as highlighted by Jacob et al (2018), it is possible that student participation in such amenities could improve non-academic skills or social networks rewarded in the labor market that we cannot observe using our university administrative data.

While we leave these questions for future research, our study offers some of the first causal evidence that college catering to student preferences for consumption may hinder student academic performance, with little future financial payoff to universities.

[20] We estimate the effects of winning the lottery on all three of these outcomes from the student survey by including them as the dependent variable in Equation 1. Unfortunately, given that the sample size is less than one tenth of that of our main sample, the results are too imprecise to be informative.

References

Anderson, Michael (2017) “The Benefits of College Athletic Success: An Application of the Propensity Score Design.” *Review of Economics and Statistics*, 99(1): 119–134.

Andrew, Rodney, Scott Imberman, and Michael Lovenheim (2020) “Recruiting and Supporting Low Income, High Achievers at Flagship Universities.” *Economics of Education Review*, 74.

Bailey, Martha J. and Susan M. Dynarski (2011) “Gains and Gaps: A Historical Perspective on Inequality in College Entry and Completion." In Greg Duncan and Richard Murnane, eds. Social Inequality and Educational Disadvantage, Russell Sage.

Bettinger, Eric P. and Rachel B. Baker (2014) “The Effects of Student Coaching: An Evaluation of a Randomized Experiment in Student Advising.” *Educational Evaluation and Policy Analysis*, 36(1), 3–19.

Bound, John, Michael Lovenheim, and Sarah E. Turner (2010) “Why Have College Completion Rates Declined? An Analysis of Changing Student Preparation and Collegiate Resources.” *American Economic Journal: Applied Economics* 2(3): 1–31.

Carrell, Scott, Richard Fullerton, and James West (2009) “Does Your Cohort Matter? Measuring Peer Effects in College Achievement.” *Journal of Labor Economics*, 27(3): 439–464.

Carrell, Scott, Mark Hoekstra, and James West (2011) “Is Poor Fitness Contagious? Evidence From Randomly Assigned Friends.” *Journal of Public Economics,* 95(7-8):657–663.

Clotfelter, Charles T. (2011) *Big-Time Sports in American Universities*. Cambridge, MA: Cambridge University Press

Firpo, Sergio P., Nicole M. Fortin, and Thomas Lemieux (2009) “Unconditional Quantile Regressions.” *Econometrica* 77(3): 953–73.

Garlick, Robert (2018) “Academic Peer Effects with Different Group Assignment Rules: Residential Tracking versus Random Assignment.” *American Economic Journal: Applied Economics*, 10(3), 345–369.

Goldrick-Rab, Sara, Douglass Harris, Robert Kelchen, and James Benson (2012) “Need-Based Financial Aid and College Persistence.” Working Paper.

Holzer, Harry J., and Sandy Baum (2017) *Making College Work: Pathways to Success for Disadvantaged Students,* The Brookings Institution, Washington D.C.

Hoxby, Caroline, and Sarah Turner (2013) “Expanding College Opportunities for High-

Achieving, Low-Income Students.” Stanford Institute for Economic Policy Research Discussion Paper No. 12–014.

Jacob, Brian, Brian McCall, and Kevin Stange (2018) “College as Country Club: Do Colleges Cater to Students’ Preferences for Consumption?” *Journal of Labor Economics*, 36(2): 309–348.

Lindo, Jason, Isaac Swensen, and Glen Waddell (2012) “Are Big-Time Sports a Threat to Student Achievement?” *American Economic Journal: Applied Economics*, 4(4): 254–274.

Meer, Jonathan and Harvey S. Rosen (2009) “The Impact of Athletic Performance on Alumni Giving: An Analysis of Microdata.” *Economics of Education Review*, 28(3): 287–294.

Oreopoulos, Philip (2021) “What Limits College Success? A Review and Further Analysis of Holzer and Baum’s *Making College Work*,” *Journal of Economic Literature*, 59(2): 546–73.

Oreopoulos, Philip, Richard Patterson, Uros Petronijevic, and Nolan Pope (Forthcoming) “Low-Touch Attempts to Improve Time-Management Among Traditional and Online College Students,” *Journal of Human Resources*.

Sacerdote, Bruce (2001) “Peer Effects with Random Assignment: Results for Dartmouth Roommates,” *Quarterly Journal of Economics*, 116, 681–704.

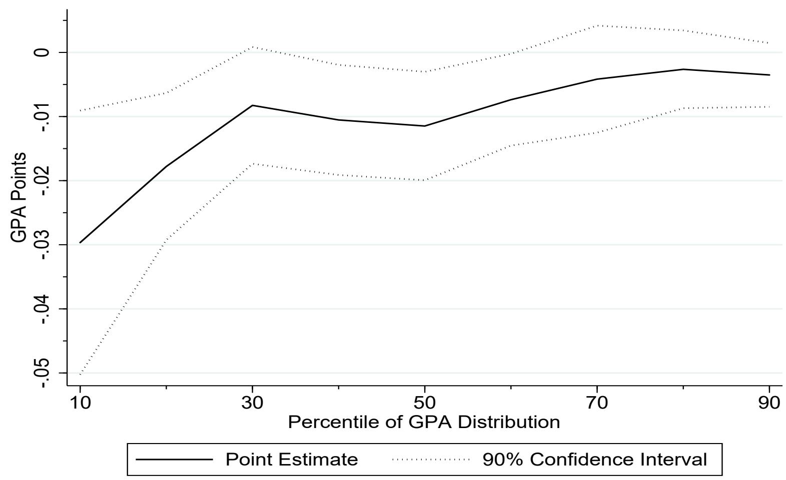
Stinebrickner, Ralph and Todd R. Stinebrickner (2004) “Time-Use and College Outcomes.” *Journal of Econometrics*, 121: 243–269.

Webber, Douglas A., and Ronald G. Ehrenberg (2010) “Do Expenditures Other Than Instructional Expenditures Affect Graduation and Persistence Rates in American Higher Education?” *Economics of Education Review*, 29 (6): 947–58.

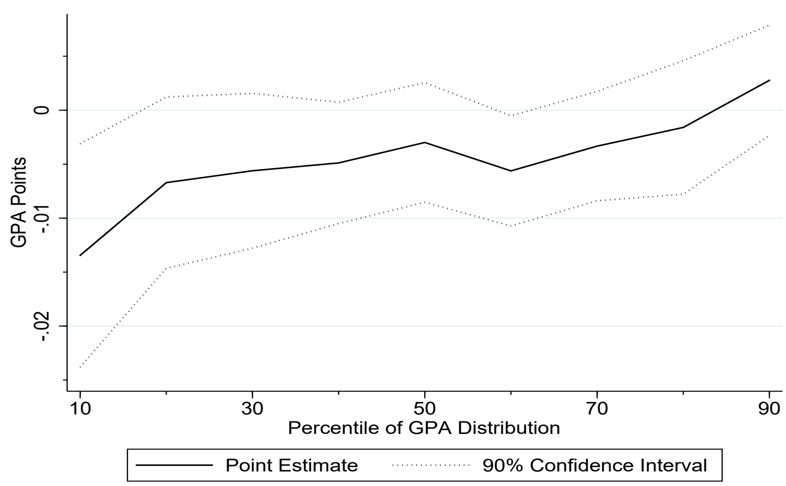
Wotapka, Dawn (2012) “Resort living comes to campus.” *Wall Street Journal*, December 6.

Figure I: Quantile Treatment Effects of Winning the Lottery on GPA

(a) Spring Semester GPA



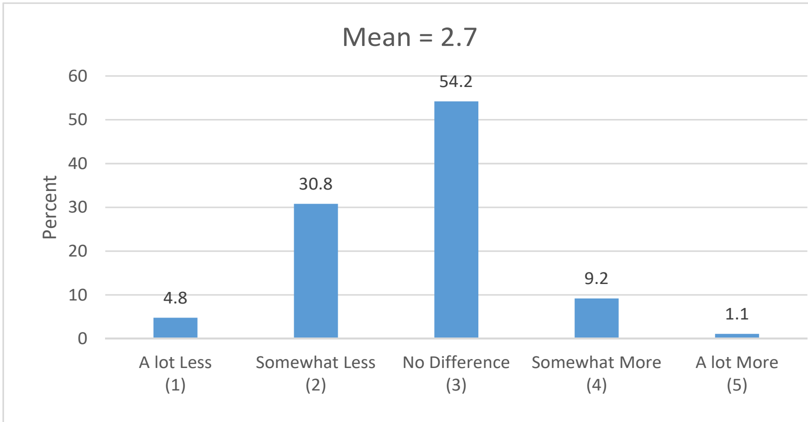
(b) Final Cumulative GPA



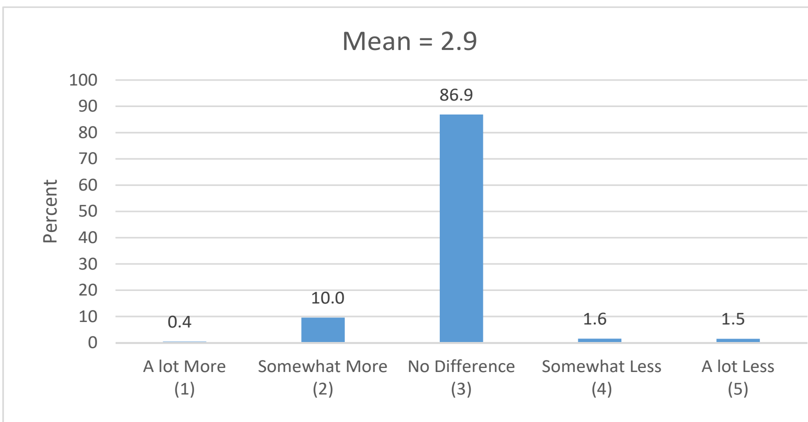
Notes: The figures present quantile treatment effects of winning the lottery on spring semester GPA (a) and final cumulative GPA (b) at the 10th, 20th,.., 90th deciles of the GPA distributions. We follow Firpo, Fortin, and Lemieux (2009) to estimate unconditional quantile regressions using re-centered influence functions (RIFs) ordinary least squares. See main text for more details.

Figure II: Effects of Game Attendance on Studying, Class Attendance, and Connectedness

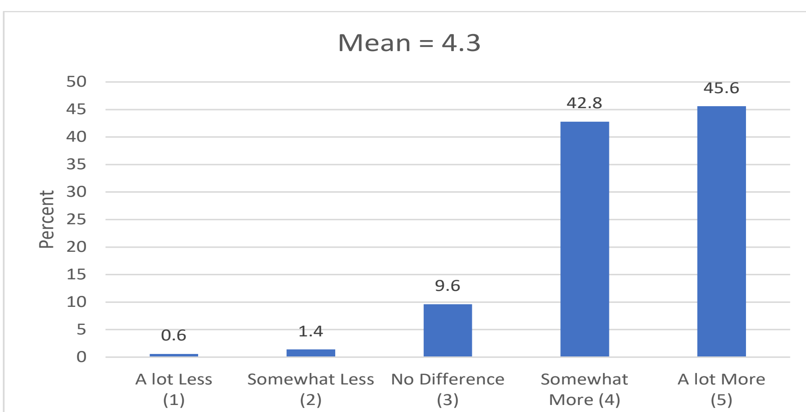
(a) More or Less Time Studying



(b) More or Less Likely to Skip Class



(c) More or Less Connected to University



Notes: The figures show responses to questions from the student and alumni survey about game attendance, student behavior, and feelings of connectedness to the University. Subfigure (a) shows responses to the question: "Do you study more or less on the days surrounding basketball games that you *do* attend compared to the days surrounding games that you do not attend (so when you either watch the game on TV or not at all)?" Subfigure (b) shows responses to the question: "Do you miss class more or less on the days surrounding basketball games that you *do* attend compared to the days surrounding games that you do not attend (so when you either watch the game on TV or not at all)?" Subfigure (c) shows responses to the question: "To what extent do you feel that attending basketball games has made you feel more or less connected to the University (for example, increased or decreased your "school spirit")?"

Table 1. Sample Means and Balance Test

	Mean	Std. Dev.	Win Coef.	Std. Err.
	(1)	(2)	(3)	(4)
Race				
White	0.703		0.001	(0.005)
Black	0.042		0.000	(0.002)
Hispanic	0.067		-0.003	(0.003)
Asian	0.091		-0.001	(0.003)
Missing	0.090		0.003	(0.002)
Female	0.495		-0.001	(0.004)
In-State	0.733		-0.001	(0.004)
Legacy	0.116		0.001	(0.003)
Cum. GPA, Prior Sem.	3.25	0.45	-0.006	(0.004)
Cum. Credits, Prior Sem.	70.9	29.3	0.129	(0.121)
Parent				
Donated Prior	0.299		-0.002	(0.004)
Total Donations	678	22,383	-10.7	(171.1)
Roommate				
Has At Least One	0.617		-0.003	(0.003)
Has Multiple	0.124		-0.002	(0.003)
Applied to Lottery	0.378		0.003	(0.004)
Won Lottery	0.135		0.006	(0.004)
Cum. GPA, Prior Sem.	3.20	0.51	0.001	(0.007)
Cum. Credits, Prior Sem.	50.7	27.6	-0.038	(0.205)
Sample Size	57,909			
Number of Students	30,299			

Notes: The sample is at the student-year level and contains all men's basketball student season ticket lottery applicants from 2009-2017. Columns 1 and 2 provide sample means and standard deviations. Columns 3 and 4 show the coeffcient and standard error on a dummy for winning the lottery from our preferred specification where the dependent variable is the characteristic in each row.

*** = 99% significance, ** = 95%, * = 90%

Table 2. Effects of Game Attendance on Academic Outcomes

	ITT	ITT	TOT	Control Mean
Dependent Variable:	(1)	(2)	(3)	(4)
Grade Point Average (GPA)				
Fall of Lottery	-0.005	-0.003	-0.014	3.248
	(0.003)	(0.004)	(0.017)	
Spring after Lottery	-0.012**	-0.010**	-0.048**	3.260
	(0.005)	(0.005)	(0.022)	
Average Fall and Spring	-0.008**	-0.007**	-0.031**	3.254
	(0.003)	(0.003)	(0.015)	
Final Cumulative	-0.007**	-0.005***	-0.023***	3.272
	(0.003)	(0.001)	(0.007)	
Credits Earned				
Fall of Lottery	-0.030*	-0.028	-0.134	14.44
	(0.017)	(0.017)	(0.082)	
Spring after Lottery	-0.053**	-0.052**	-0.249**	14.34
	(0.023)	(0.021)	(0.101)	
Total Fall Plus Spring	-0.083***	-0.080***	-0.383***	28.78
	(0.030)	(0.029)	(0.137)	
Final Credits Earned	-0.040	-0.054	-0.255	120.96
	(0.154)	(0.141)	(0.672)	
Earned Bachelors Degree	-0.004	-0.004	-0.017	0.924
	(0.002)	(0.002)	(0.011)	
Controls	N	Y	Y	

Notes: The sample is as in Table 1 (N=57,909 student-year observations), except for the bottom row (N=50,426) , which drops cohorts who were too recent for us to observe their on-time graduation status in our data, which ends in summer 2018 (e.g., freshmen applying to the lottery in fall 2017).

*** = 99% significance, ** = 95%, * = 90%

Table 3. Heterogeneity in the (ITT) Effects of Game Attendance on Academic Outcomes

	In-State Status		March Madness		Race			Sex	
	Yes	No	Yes	No	White	Asian	Black/Hisp	Female	Male
Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Grade Point Average (GPA)									
Spring after Lottery	-0.013**	-0.000	-0.010*	-0.011	-0.008	-0.040**	-0.001	-0.013*	-0.008
	(0.005)	(0.009)	(0.006)	(0.007)	(0.006)	(0.016)	(0.023)	(0.007)	(0.007)
Average Fall and Spring	-0.010**	0.004	-0.008*	-0.006	-0.004	-0.032**	-0.006	-0.007	-0.007
	(0.004)	(0.007)	(0.004)	(0.005)	(0.004)	(0.012)	(0.020)	(0.005)	(0.005)
Final Cumulative	-0.007***	0.002	-0.007***	-0.003*	-0.004	-0.013*	0.001	-0.007**	-0.003
	(0.002)	(0.006)	(0.002)	(0.002)	(0.003)	(0.007)	(0.014)	(0.003)	(0.003)
Credits Earned									
Spring after Lottery	-0.059**	-0.031	-0.079*	-0.029	-0.027	-0.172*	-0.051	-0.030	-0.072*
	(0.025)	(0.043)	(0.039)	(0.018)	(0.025)	(0.101)	(0.094)	(0.028)	(0.036)
Total Fall Plus Spring	-0.105***	-0.004	-0.118**	-0.048	-0.023	-0.242	-0.215	-0.045	-0.113**
	(0.035)	(0.070)	(0.048)	(0.032)	(0.040)	(0.168)	(0.159)	(0.048)	(0.046)
Final Credits Earned	-0.158	0.281	-0.099	-0.010	-0.107	-0.047	0.428	-0.127	0.040
	(0.169)	(0.218)	(0.242)	(0.162)	(0.182)	(0.631)	(0.674)	(0.207)	(0.230)
Earned Bachelors Degree	-0.006**	0.004	-0.007*	-0.000	-0.004	-0.006	0.002	0.001	-0.007**
	(0.003)	(0.004)	(0.004)	(0.003)	(0.002)	(0.008)	(0.011)	(0.003)	(0.003)
Sample Size	42,432	15,477	27,301	30,608	40,717	5,295	6,349	28,669	29,240

Notes: The sample is as in Table 1 (N=57,909 student-year observations), except for the bottom row (N=50,426) , which drops cohorts who were too recent to observe their on-time graduation status in our data, which ends in summer 2018 (e.g., freshmen applying to the lottery in fall 2017). The specification is as in column (2) from Table 2 (i.e., Intent-to-Treat with controls). In-state status refers to where a student was living when they applied to the University. March Madness refers to whether the basketball team earned a spot in the postseason. The sample sizes do not sum to 57,909 across the race subgroups, because 9% of the sample did not report their race.

*** = 99% significance, ** = 95%, * = 90%

Table 4. Robustness Checks for (ITT) Effects of Game Attendance on Academic Outcomes

	Baseline	Baseline, Robust SEs	Drop Grad. Students	Drop First-Years	Drop Recent Cohorts	Only First Application
Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)
Grade Point Average (GPA)						
Fall of Lottery	-0.003	-0.003	-0.002	-0.002	-0.004	-0.006
	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.006)
Spring after Lottery	-0.010**	-0.010**	-0.010**	-0.010*	-0.008*	-0.014**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.006)
Average Fall and Spring	-0.007**	-0.007	-0.006*	-0.006*	-0.006*	-0.010*
	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.006)
Final Cumulative	-0.005***	-0.005*	-0.005***	-0.004***	-0.006***	-0.006
	(0.001)	(0.003)	(0.001)	(0.001)	(0.001)	(0.003)
Credits Earned						
Fall of Lottery	-0.028	-0.028	-0.026	-0.031*	-0.037**	-0.051
	(0.017)	(0.022)	(0.017)	(0.016)	(0.018)	(0.031)
Spring after Lottery	-0.052**	-0.052**	-0.055**	-0.048*	-0.057**	-0.073***
	(0.021)	(0.025)	(0.021)	(0.025)	(0.024)	(0.027)
Total Fall Plus Spring	-0.080***	-0.080**	-0.081***	-0.079**	-0.094***	-0.125***
	(0.029)	(0.040)	(0.027)	(0.032)	(0.032)	(0.039)
Final Credits Earned	-0.054	-0.054	-0.076	-0.024	-0.032	0.056
	(0.141)	(0.151)	(0.142)	(0.151)	(0.153)	(0.235)
Earned Bachelors Degree	-0.004	-0.004	-0.004	-0.004	-0.004	-0.003
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.004)
Sample Size	57,909	57,909	56,484	46,316	50,426	30,297

Notes: Column (1) reports replicates column (2) from Table 2 (i.e., ITT with controls). Column (2) uses heteroskedasticity-robust standard errors instead of clustered standard errors. Column (3) drops graduate students from the sample. Column (4) drops first-years from the sample. Column (5) drops cohorts who were too recent for us to observe their on-time graduation status in our data, which ends in summer 2018 (e.g., first-years applying to the lottery in fall 2017). Column 6 keeps students' first lottery application year only, so includes one observation per student.

*** = 99% significance, ** = 95%, * = 90%

Table 5. Effects of Game Attendance on Donation Behavior

	ITT	ITT	TOT	Control Mean
Dependent Variable:	(1)	(2)	(3)	(4)
Student and Parent				
Ever Donated	-0.001	-0.000	-0.001	0.366
	(0.004)	(0.004)	(0.017)	
Total Donations	-0.91	-0.79	-3.76	91.94
	(4.08)	(3.76)	(17.89)	
Donated at 90th Percentile	-0.000	-0.000	-0.001	0.037
	(0.002)	(0.001)	(0.007)	
Student				
Ever Donated	-0.001	-0.000	-0.001	0.220
	(0.004)	(0.003)	(0.016)	
Total Donations	0.12	0.15	0.70	8.05
	(0.30)	(0.30)	(1.41)	
Donated at the 90th Percentile	0.001	0.001	0.003	0.021
	(0.001)	(0.001)	(0.006)	
Parent				
Ever Donated	-0.001	0.000	0.001	0.215
	(0.003)	(0.002)	(0.011)	
Total Donations	-1.78	-1.71	-8.12	76.67
	(3.75)	(3.45)	(16.41)	
Donated at the 90th Percentile	-0.000	-0.000	-0.002	0.021
	(0.002)	(0.001)	(0.007)	
Controls	N	Y	Y	

Notes. The sample is as in Table 1 (N=57,909 student-year observations). Total donations is the sum across all donations after the lottery through summer 2018, censored at the 99th percentile. Donated at 90th percentile is a dummy equal to one if the total donation amount is greater than the 90th percentile of total donations among donors.

*** = 99% significance, ** = 95%, * = 90%

Table 6. Heterogeneity in the (ITT) Effects of Game Attendance on Donation Behavior

	In-State Status		March Madness		Race			Sex	
	Yes	No	Yes	No	White	Asian	Black/Hisp	Female	Male
Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Parent and Student									
Ever Donated	0.003	-0.010	0.005	-0.005	0.002	-0.010	-0.012	0.004	-0.004
	(0.004)	(0.007)	(0.006)	(0.005)	(0.004)	(0.013)	(0.014)	(0.005)	(0.005)
Total Donations	-0.424	-0.905	-6.043	4.122	-2.125	-12.939**	0.143	-2.187	1.325
	(4.550)	(4.248)	(5.268)	(5.024)	(4.786)	(6.168)	(4.935)	(4.231)	(5.504)
Donated at 90th Percentile	0.001	-0.002	-0.001	0.001	-0.002	-0.005	0.000	-0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
Student									
Ever Donated	0.004	-0.010	0.004	-0.004	0.004	-0.006	-0.012	0.008	-0.007
	(0.004)	(0.006)	(0.005)	(0.005)	(0.005)	(0.014)	(0.011)	(0.005)	(0.005)
Total Donations	0.308	-0.309	0.062	0.205	0.217	-0.407	-0.642	0.152	0.183
	(0.418)	(0.476)	(0.547)	(0.299)	(0.371)	(0.845)	(0.703)	(0.391)	(0.396)
Donated at the 90th Percentile	0.001	-0.002	-0.001	0.002	0.001	-0.004	-0.002	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.004)	(0.004)	(0.002)	(0.002)
Parent									
Ever Donated	0.001	-0.000	-0.000	0.001	0.001	-0.017**	-0.005	-0.001	0.001
	(0.003)	(0.006)	(0.004)	(0.003)	(0.003)	(0.008)	(0.009)	(0.003)	(0.004)
Total Donations	-1.034	-2.673	-7.682*	3.843	-2.996	-11.908**	1.929	-3.146	0.357
	(4.167)	(3.939)	(4.336)	(4.775)	(4.536)	(5.609)	(4.221)	(3.950)	(4.817)
Donated at the 90th Percentile	0.000	-0.002	-0.003	0.002	-0.001	-0.004*	0.001	-0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Sample Size	42,432	15,477	27,301	30,608	40,717	5,295	6,349	28,669	29,240

Notes. The sample is as in Table 1 (N=57,909 student-year observations). Total donations is the sum across all donations after the lottery through summer 2018, censored at the 99th percentile among donors. Donated at 90th percentile is a dummy equal to one if the total donation amount is greater than the 90th percentile of total donations among donors. The specification is as in column (2) from Table 5 (i.e., Intent-to-Treat with controls). In-state status refers to where a student was living when they applied to the University. March Madness refers to whether the basketball team earned a spot in the postseason. The sample sizes do sum to 57,909 across the race subgroups, because 9% of the sample did not report their race.

*** = 99% significance, ** = 95%, * = 90%

Table 7. Effects of Game Attendance on Roommate's Academic Outcomes

	ITT	ITT	TOT	Control Mean
Dependent Variable:	(1)	(2)	(3)	(4)
Grade Point Average (GPA)				
Fall of Lottery	0.002	0.002	0.011	3.168
	(0.007)	(0.007)	(0.031)	
Spring after Lottery	-0.001	-0.001	-0.003	3.204
	(0.005)	(0.004)	(0.021)	
Average Fall and Spring	0.001	0.001	0.007	3.177
	(0.006)	(0.005)	(0.026)	
Final Cumulative	-0.002	-0.001	-0.006	3.229
	(0.006)	(0.005)	(0.023)	
Credits Earned				
Fall of Lottery	0.022	0.021	0.100	14.273
	(0.035)	(0.033)	(0.158)	
Spring after Lottery	0.031	0.031	0.149	14.483
	(0.031)	(0.031)	(0.148)	
Total Fall Plus Spring	0.054	0.054	0.256	28.785
	(0.042)	(0.040)	(0.189)	
Final Credits Earned	0.116	0.093	0.442	115.771
	(0.234)	(0.226)	(1.077)	
Earned Bachelors Degree	-0.001	-0.001	-0.005	0.872
	(0.004)	(0.004)	(0.021)	
Controls	N	Y	Y	

Notes: The sample is all lottery applicants with an on-campus housing roommate (N=35,624 student-year observations), except for the bottom row (N=29,545) , which drops cohorts who were too recent for us to observe their on-time graduation status in our data, which ends in summer 2018 (e.g., first-years applying to the lottery in fall 2017). Outcomes are averaged across roommates for applicants with multiple roommates.

*** = 99% significance, ** = 95%, * = 90%

Appendix Table 1. Number of Lottery Applicants and Fraction Winners by Grade and Year

Panel A: Applicants

Grade Level	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
First-Years	1,781	1,200	1,426	1,132	1,191	1,302	1,507	948	1,106	11,593
Sophomores	2,111	1,815	1,793	1,420	1,143	1,562	1,614	1,233	1,218	13,909
Juniors	2,137	2,293	2,144	1,471	1,358	1,494	2,001	1,550	1,471	15,919
Seniors	1,630	2,032	2,206	1,439	1,213	1,554	1,703	1,647	1,639	15,063
Grad. Students	95	178	241	181	37	141	206	153	193	1,425
Total	7,754	7,518	7,810	5,643	4,942	6,053	7,031	5,531	5,627	57,909

Panel B: Fraction Won

Grade Level	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
First-Years	0.177	0.227	0.183	0.239	0.293	0.241	0.200	0.251	0.250	0.224
Sophomores	0.259	0.299	0.247	0.357	0.434	0.340	0.292	0.377	0.357	0.319
Juniors	0.315	0.392	0.318	0.432	0.515	0.435	0.352	0.452	0.473	0.398
Seniors	0.385	0.449	0.380	0.525	0.604	0.499	0.442	0.531	0.516	0.472
Grad. Students	0.137	0.225	0.141	0.215	0.297	0.199	0.243	0.268	0.269	0.216
Total	0.281	0.354	0.289	0.391	0.463	0.380	0.324	0.419	0.410	0.359

Notes. The sample is at the student-year level and contains all men's basketball student season ticket lottery applicants from 2009-2017. The table shows the number of lottery applicants (Panel A) and fraction winners (Panel B) by grade and year from 2009-2017.

Appendix Table 2. Effect of Winning the Lottery on Games Attended

		In-State Status		March Madness		Race			Sex	
	All	Yes	No	Yes	No	White	Asian	Black/Hisp	Female	Male
Dep. Var.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Games Attended	0.603***	0.558***	0.635**	1.245**	0.435***	0.494**	0.609**	1.093***	0.663***	0.479
	(0.151)	(0.158)	(0.261)	(0.418)	(0.123)	(0.210)	(0.247)	(0.310)	(0.162)	(0.284)
Control Mean	2.912	2.978	2.749	3.264	2.795	3.238	1.778	2.128	2.112	4.256
Percent Effect	20.7	18.7	23.1	38.1	15.6	15.3	34.3	51.4	31.4	11.3
TOT Scale Factor	4.8	5.3	4.3	2.6	6.4	6.6	2.9	1.9	3.2	8.9
Sample Size	2,823	2,029	791	628	2,195	1,951	367	330	1,784	1,037

Notes: The sample is at the student-year level (N=2,823) and contains the 1,641 lottery applicants who responded to the survey asking about game attendance. Each column presents results from a separate regression of number of games attended in that season on whether the student won the lottery. The percent effect is the coefficient divided by the control mean. The TOT scale factor is 100 divided by the percent effect. In-state status refers to where a student was living when they applied to the University. March Madness refers to whether the basketball team earned a spot in the postseason. The sample sizes do not sum to 2,823 across the race subgroups, because 9% of the sample did not report their race.

*** = 99% significance, ** = 95%, * = 90%

Appendix Table 3. Heterogeneity in the (ITT) Effects of Game Attendance on Time-to-Degree

	All	In-State Status		March Madness		Race			Sex	
		Yes	No	Yes	No	White	Asian	Black/Hisp	Female	Male
Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ever Earned a Degree	-0.000	-0.003	0.007*	-0.003	0.003	-0.001	0.003	0.003	0.002	-0.003
	(0.002)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.008)	(0.013)	(0.003)	(0.003)
Earned Degree Within 4 Years	-0.005	-0.007	-0.000	-0.012*	0.003	-0.007	-0.006	-0.002	0.003	-0.012**
	(0.004)	(0.005)	(0.006)	(0.006)	(0.004)	(0.004)	(0.025)	(0.019)	(0.006)	(0.006)
Earned Degree In Exactly 5 Years	0.002	0.001	0.004	0.006	-0.003	0.003	0.010	0.001	-0.000	0.004
	(0.003)	(0.004)	(0.006)	(0.004)	(0.004)	(0.003)	(0.018)	(0.012)	(0.005)	(0.004)
Earned Degree in 6 or More Years	0.003*	0.003	0.004**	0.003**	0.003	0.003*	0.001	0.004	-0.000	0.006***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.003)	(0.002)	(0.009)	(0.007)	(0.002)	(0.002)
Earned Degree in 5 or More Years	0.005	0.004	0.008	0.009*	-0.000	0.006	0.011	0.005	-0.001	0.010*
	(0.003)	(0.004)	(0.006)	(0.005)	(0.004)	(0.004)	(0.024)	(0.013)	(0.005)	(0.005)
Sample Size	37,996	28,345	9,649	21,024	16,972	27,088	2,979	3,570	18,521	19,473

Notes: This sample includes the 37,996 student-lottery year observations for students who we can observe for at least 6 years after their freshman year. The control mean among this sample for ever earn a degree is 94.7%, for earn a degree within 4 years is 77%, for earn a degree in exactly 5 years is 15.4%, for earn a degree in 6 or more years is 2.3%, and for earn a degree in 5 or more years is 17.7%.

*** = 99% significance, ** = 95%, * = 90%

Appendix Table 4. Robustness Checks for (ITT) Effect of Game Attendance on Donations

	Student and Parent (1)	Student (2)	Parent (3)
Total Donations			
OLS, Censoring at:			
90th Percentile	0.108 (0.281)	0.025 (0.033)	0.075 (0.209)
95th Percentile	0.017 (0.679)	0.047 (0.080)	-0.055 (0.503)
99th Percentile	-0.790 (3.759)	0.147 (0.297)	-1.707 (3.447)
99.5th Percentile	-1.502 (7.322)	0.294 (0.473)	-2.877 (6.853)
99.9th Percentile	-21.394 (17.970)	1.208 (0.985)	-21.458 (17.095)
OLS, Not Censoring	-101.772* (57.759)	0.441 (2.271)	-102.214* (57.295)
Poisson	-0.010 (0.041)	0.020 (0.037)	-0.024 (0.046)
Zero-Inflated Poisson	-0.024 (0.040)	0.010 (0.032)	-0.032 (0.043)
Negative Binomial	0.002 (0.043)	0.014 (0.035)	-0.039 (0.062)
Quantile Treatment Effects at:			
80th Percentile	-0.025 (0.114)	0.000 (0.006)	0.000 (0.000)
90th Percentile	-0.377 (0.488)	-0.129 (0.193)	-0.000 (0.029)
95th Percentile	1.469 (1.982)	-0.409 (0.528)	-0.000 (0.136)
Total Donations Greater Than:			
80th Percentile	0.000 (0.002)	0.000 (0.002)	-0.000 (0.002)
90th Percentile	-0.000 (0.001)	0.001 (0.001)	-0.000 (0.001)
95th Percentile	-0.000 (0.001)	0.000 (0.001)	-0.001 (0.001)
Number of Donations	-0.008 (0.028)	0.014 (0.027)	-0.019 (0.037)

Notes: The sample is as in Table 1 (N=57,909 student-year observations). Total donations is the sum across all donations after the lottery through summer 2018, with censoring conducted at percentiles of the unconditional distribution. Quantile treatment effects are conducted following Firpo, Fortin, and Lemieux (2009) using re-centered influence functions (RIFs)-OLS at percentiles of the unconditional distribution. "Total dontions greater than" are dummies for donating greater than percentiles of the conditional distribution. Regression with number of donations as dependent variable conducted using Poisson.

*** = 99% significance, ** = 95%, * = 90%