Impacts of state aid for non-traditional students on educational and labor market outcomes

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Abstract: Up to three-fourths of college students can be classified as "non-traditional", yet whether typical policy interventions improves their education and labor market outcomes is understudied. I use a regression discontinuity design to estimate the impacts of a state financial aid program aimed towards non-traditional students. Eligibility has no impacts on degree completion for students intending to enroll in community colleges or four-year colleges but increases bachelor's degrees for students interested in large, for-profit colleges by four percentage points. I find no impacts on employment or earnings for all applicants. This research highlights challenges in promoting human capital investment for adults.

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Introduction

College enrollment rose almost 40% in the 2000s, with the largest increase among students in their late 20s (U.S. Department of Education, 2018). Many factors contributed to the rise in older students, including delayed enrollment, lengthening time to degree, newly developed online opportunities, and a desire to return to school for students facing limited job prospects during a recession. Yet many studies of the postsecondary experience fail to take these students into account, as most research – or newsworthy discussions about college admissions scandals or affirmative action cases – typically focus on the stereotypical student transitioning directly from high school into college. Although defining a "non-traditional" student is challenging, an expansive definition identifies 74% of current students as having significant levels of personal responsibility (e.g., financial independence, significant employment considerations) or taking increasingly varied postsecondary pathways (e.g., delaying enrollment, attending part-time, without a high school diploma) (U.S. Department of Education, 2015).

This paper examines whether financial aid impacts educational investment or labor market outcomes for "non-traditional" students. Rapid technological advancements have renewed the emphasis on lifelong learning to ensure employability in an ever-shifting workplace (National Academies of Sciences & Medicine, 2017). Improving educational outcomes for individuals with weaker academic credentials is a key component of workforce development, as fewer than half of all adults have earned a postsecondary degree (Ryan & Bauman, 2016). Increasing human capital development among working adults could help to address many issues confronting the economy as a whole: increasing income inequality between educated and non-educated workers; technological shifts that are pushing older, unprepared workers into low-skilled jobs; and rising levels of postsecondary debt, driven particularly by college dropouts with poor job prospects

(Autor, Katz, & Kearney, 2008; Autor, Levy, & Murnane, 2003; Goldin & Katz, 2007; Looney & Yannelis, 2015).

I test whether tuition vouchers and cash payments alters non-traditional students' outcomes using application data from the California Student Aid Commission's (CSAC) Competitive Cal Grant program. Eligibility is determined by student GPA and a number of common measures of disadvantage, such as family income, with extra points assigned to students who are older and have fewer years of postsecondary schooling. As a result of these requirements, the average award winner is almost 30 years old and has Free Application for Federal Student Aid (FAFSA) reported family income of about $15,000, with only one-third still registering as a dependent.[1] Thus the type of "non-traditional" student in this paper is typically a young adult in their late 20s or early 30s, though as described below some traditionally-aged, undergraduate students do ultimately earn awards.

Understanding whether financial aid has meaningful impacts on educational or labor force outcomes requires us to produce evidence that is both causal and generalizable to other settings. There are two aspects of the program that make it an ideal site for producing such evidence. First, this paper uses data from an entire state, with over 900,000 unique applicants over a ten year period. Applicants in my study can be enrolled or not enrolled in college, and are weighing enrollment decisions across all postsecondary sectors. This is in contrast to recent studies of non-traditional students that mostly focus on students already enrolled in public colleges (Barrow, Richburg-Hayes, Rouse, & Brock, 2014; Denning, forthcoming). Although some studies have used national-level data to study financial aid for non-traditional students, these papers have focused on

[1] Some FASFA submissions indicate zero income due to auto-zero EFC calculations but Unemployment Insurance estimates used below suggest my impact estimates are for students in families with about $29,000 annual income (conditional on having reported income).

Pell grant recipients in the 1970s or military veterans (Barr, 2015, forthcoming; Seftor & Turner, 2002), and results may not be as generally applicable to the current population of non-traditional students. Second, I can credibly estimate causal effects using a regression discontinuity design that compares identical students on the margins of award eligibility. As the program rank orders applicants through a formula driven largely by measures of student disadvantage, the eligibility threshold compares the lowest income applicants, producing a treatment effect among students with the fewest resources.

I find that Competitive award eligibility increases degree completion by one percentage point, with no impacts on in-state employment or earnings, as measured by California's unemployment insurance (UI) data. Using students' interest in specific postsecondary sectors, I divide applicants into separate groups depending on whether they intend to enroll in community colleges, four-year colleges (throughout this paper this includes both public and non-profit institutions), or for-profit colleges. For students interested in community colleges, who constitute the majority of applicants, or those intending to enroll in four-year colleges, long-term estimates on degree completion and total quarterly earnings are essentially zero. The only evidence of positive impacts is found among students interested for-profit colleges; although all Title IV institutions are eligible for the aid program, students almost exclusively apply to large chains such the University of Phoenix, Heald, and ITT. In addition, the educational outcome data can only measure impacts in a small set of five reporting institutions, though UI labor force outcomes include the full sample. For these students, bachelor's degree completion increases by four percentage points, a 17% increase over baseline, and instrumental variable estimates based on award utilization are roughly twice as large. Yet I find no long-term employment or earnings impacts for all students. Among for-profit students, long-term quarterly earnings increase only $120 (1.3%), which is statistically indistinguishable

from zero, and impacts for other groups are even smaller in magnitude. I also find no impacts on short-term employment rates or earnings for all students, implying that non-traditional students either do not or cannot meaningfully shift labor force participation while in school as a result of financial aid.

To understand these results, it is useful to compare the structure of the Competitive award program to other financial aid programs studied in the literature. The Competitive award has some similarity to the Pell Grant (it allows enrollment in most institutions, and uses a complex and opaque formula that only provides guidance on the aid award after the application process) but also contains a merit-component common to many state aid programs. One substantive difference to both is that the Competitive award does not guarantee aid to all who meet a transparent set of criteria, thus limiting awards to a small subset of total applicants. Financial transparency seems to be a hallmark of successful aid and outreach programs (Bartik, Hershbein, & Lachowska, forthcoming; Dynarski, Libassi, Michelmore, & Owen, 2018; Gurantz, Hurwitz, & Smith, 2017). Students who receive the aid are not just older and low-income, but most are already enrolled in college with relatively high GPAs. The design of the award then likely pushes aid towards students who may be less likely to benefit. The GPA submission form favors those who are already committed to college and have been successful; Ost, Pan, and Webber (forthcoming) show large earnings gains from students with weaker academic credentials who are successful in college. Although CSAC has made efforts to minimize this administrative barrier (described below), it might still serve as an impediment, with low-GPA students correctly assuming they have little opportunity to win an award. The Competitive award also gives larger aid packages to for-profit students through the tuition subsidies, and rescaling degree completion impacts by the amount of aid received shrinks much of the differences in outcomes between groups. These design features then attempt to

allocate aid towards students with high needs and high tuition expenses, but who have shown some level of prior commitment. Unfortunately, the program does not produce its intended effects, raising questions about how to structure programs so that aid is received among those most likely to benefit (Finkelstein & Notowidigdo, forthcoming).

This paper makes a number of contributions to our understanding of how governments can support human capital investment for working adults. Although financial aid is generally found to have positive impacts on postsecondary attendance or completion, there are relatively few studies of financial aid based on non-traditional students. I find no impacts of aid on student outcomes, adding to the literature which suggests that non-traditional students may be less responsive to aid than high school graduates.[2] Work on the early version of the Pell Grant found relatively small impacts on college attendance (Seftor & Turner, 2002), and a study of direct application assistance on the FAFSA found large attendance impacts for dependent students, but small to no impacts for independents (Bettinger, Long, Oreopoulos, & Sanbonmatsu, 2012).[3] Randomized control trials of short-term performance-based scholarships for non-traditional students attending community colleges documented small impacts on measures such as full-time enrollment but no statistically significant changes to long-term degree completion or earnings four years out (Barrow et al., 2014; Mayer, Patel, & Gutierrez, 2016; Patel & Valenzuela, 2013; Richburg-Hayes et al., 2009; Richburg-Hayes, Sommo, & Welbeck, 2011). Denning (forthcoming) and Barr (forthcoming) show that financial aid to independent students and military veterans, respectively, improve degree outcomes. Although neither of the groups in those papers mirror the types of students examined

[2] For brevity I do not discuss the full literature on financial aid, which relies heavily on state-based merit- or need-based programs (Angrist, Autor, Hudson, & Pallais, 2014; Bettinger, Gurantz, Kawano, Sacerdote, & Stevens, 2019; Castleman & Long, 2016; Dynarski, 2000, 2004, 2008; Fitzpatrick & Jones, 2016; Scott-Clayton, 2011; Scott-Clayton & Zafar, forthcoming).

[3] Most studies of Pell Grant impacts are conducted on traditional-aged students (Carruthers & Welch, 2016; Denning, Marx, & Turner, forthcoming).

here, they do support the idea that some groups of non-traditional students can indeed benefit from appropriately targeted financial support. I also add to a literature that examines whether changes to aid while students are in school changes persistence and completion rates; I find no impacts for students in public colleges, in contrast to other recent work on more traditionally-aged populations (Denning, forthcoming; Scott-Clayton & Schudde, forthcoming).

I also contribute to the broad literature on government intervention in educational and workforce development (Barnow & Smith, 2015; McCall, Smith, & Wunsch, 2016). Given the relatively small effects of workforce training on employment outcomes (e.g., Schochet, Burghardt, and McConnell (2008)), more attention is needed in assessing the relative merits of various program formats. Financial aid can serve as a workforce training tool, allowing students to select the timing at which they improve their skills in order to improve their labor market outcomes. Educational vouchers may be a more effective approach than traditional government-created programs if individuals are better able than government to make decisions regarding their labor market opportunities and the strength of available educational options. Previous studies find that offering tuition vouchers or allowing consumers more discretion in program selection can increase training, but has little impact on employment outcomes (Perez-Johnson, Moore, & Santillano, 2011; Schwerdt, Messer, Woessmann, & Wolter, 2012). I find most program applicants exhibit no employment-related benefits in the first seven years after application, suggesting that many older students continue to need additional support in order to improve their labor force prospects.

Background

The Competitive Cal Grant program began in 2001 and requires California residents to: (1) be two or more years removed from earning their high school degree; (2) complete the FAFSA, and; (3)

complete a GPA verification form, submitted directly by the administration of the corresponding high school or college. CSAC has entered into GPA data-sharing with most public two- and four-year institutions, so many students who submit the FAFSA are not required to submit the GPA verification form (Appendix B).[4] The Competitive Cal Grant program assigns students a score between 60 and 200. Students can earn up to 70 points through a higher GPA, with the remaining points derived from multi-faceted measures of need: lower income, lower parental education, larger family size, being older, having less postsecondary experience, earning a GED, or graduating from a disadvantaged high school. Appendix B provides a detailed map of the scoring process along with substantial details that are too involved to be included below.

The state allocates award in two "cycles" depending on whether the application is completed by March 2nd or September 2nd. Eligible students are rank ordered by their point totals, from highest to lowest, with awards offered to the top 11,250 students in each cycle. Whereas March applicants can take their award to any in-state institution, September cycle winners can only use the award at a community college.[5] The key takeaway is that changing applicant pools produced a year-varying eligibility cutoff score that I can identify but is ex ante unknown to CSAC or any applicants. Cutoff values between 2002 and 2011 range from 153 to 166, and are shown in Appendix Table 1.

Award winners are provided four years of a cash "subsistence" award to be used for "living expenses and expenses related to transportation, supplies, and books," equal to $1,551 per year. Students attending any in-state public four-year institution also receive three years of full tuition and fees, whereas those attending accredited private institutions – either non-profits or Title IV

[4] Appendix A shows the GPA verification form. CSAC only uses a college GPA after a student has attempted at least 24 semester units. College GPAs are given priority over high school GPA, but if a student has both a community college and four-year college GPA, preference is given to the higher value.

[5] September winners must be enrolled at a community college in the Fall quarter or semester to receive their payment, but can later transfer and receive tuition at a four-year or private institution.

eligible for-profits – can receive tuition subsidies up to $9,708 per year.[6] Students who use an award are automatically renewed each year for up to four years, as long as they compete their FAFSA and meet Satisfactory Academic Progress; there is no continued scoring process. Although the Competitive award does not offer community college tuition, a separate state program essentially provides free community college tuition for low-income applicants, and all Competitive award applicants near the eligibility threshold would likely qualify.[7] Cal Grant tuition payments are "first-dollar" scholarships, meaning that aid is paid to institutions before other forms of financial aid are considered.[8] Although the only aid I can observe are payments made directly by CSAC, previous work on the Cal Grant found that receiving the grant did not change participation in other federal programs such as the Pell Grant or federal tax credits (Bettinger et al., 2019).[9]

Data

CSAC Administrative Data

[6] Tuition for California's four-year public colleges is listed in Appendix Table 1. In practice over 95% of eligible Competitive award students elect to use the payment plan known as Cal Grant B, described in the text. A description of the alternate Cal Grant A payment plan, which provides one extra year of tuition payments but eliminates the subsistence award, is described in Appendix B, but has little bearing on this analysis.

[7] California offers free tuition to low-income students through the Board of Governor (BOG) fee waiver program. In the rare case that students are unaware of the well-advertised program, California offers the lowest community college tuition in the nation. At $1,104 for a year of full-time enrollment in 2011-12, the subsistence award is then more than equal to the equivalent of free college enrollment.

[8] It is unlikely that four-year colleges shift institutional aid awards as these are generally offered significantly before the Cal Grant results are provided to students. Aid programs for community college students are predominately the Pell grant and the BOG fee waiver discussed in footnote 6, which would not be impacted by the Competitive award. It also seems unlikely that for-profit colleges would adjust tuition based on a student's Cal Grant receipt.

[9] The Competitive award is primarily used as a means to support students re-entering the postsecondary sector or persisting within their current institution, rather than as a means to encourage two-year to four-year transfer. An alternate CSAC award, known as the Transfer Entitlement award, assists students actively transferring from two-year to four-year institutions. The requirements for the Transfer Entitlement grant are substantially easier to meet than the Competitive award, though is reserved for students prior to turning 28 years old. The Transfer Entitlement program granted less than 5,000 awards per year during the time period studied, which is significantly fewer than the Competitive program.

I use administrative records for ten years of Competitive grant applicants applying for aid for the 2002-03 through 2011-12 academic school years (I refer to these as the 2002 through 2011 cohorts).[10] In all cases I only utilize the first application for each individual, as roughly 40% of first-time applicants who did not earn an award re-apply in a later year. The data elements consist of many variables collected on the FAFSA (e.g., income, age, educational level, list of colleges to which financial aid information should be sent), along with student GPA. I also track aid utilization through payments made by CSAC to participating institutions on behalf of individual students.

Table 1 provides descriptive statistics of the total applicant sample in the first column, with over 900,000 unique applicants. About 40% of students have at least one college-educated parent, 58% are female, average income is $20,900, and the average submitted GPA used in the eligibility calculations is 2.8. The average age is 27, though this differs greatly for dependent and independent students, who average 21 and 31, respectively. Additional descriptive statistics for students close to the eligibility threshold or separately by year are provided in Appendix Tables 2 and 3.

Approximately 85% of all students list only one college on their FAFSA (Table 1, column 1), and the few students who list more than one college almost always list two or more distinct community colleges. Thus non-traditional students are rarely weighing enrollment choices across postsecondary sectors, but simply engaging in a binary decision to enroll or not, or persist in their current institution versus drop out. Given that students are focused on specific postsecondary sectors, I use students' choices determined exogenously prior to award eligibility to divide the

[10] I do not use the first year of the program (2001) as CSAC used an alternate scoring system of 100 points before converting to the current 200 point system. I eliminate all students who applied for a Cal Grant from 1998 through 2001 to ensure that the analysis uses only the first application for each student. I also eliminate students from 2002 to 2005 who applied in the March cycle but listed a community college on their FAFSA, for whom I could not recover their data. March applicants below the threshold are rescored into the September cycle but for these years I was unable to recover their initial March score, as their GPA and income were updated and overwrote the initial value, producing endogenous point values that would lead to biased estimates of program impacts.

sample into five groups: four-year students, which includes students who list California State University, University of California, or in-state, non-profit four-year institutions; for-profit students, which includes students who list both Title IV eligible for-profit colleges; community college students, who list public two-year schools; and mixed students, which includes the relatively few students who list schools across postsecondary sectors.[11] Community college students are divided into two groups – March and September – based on the cycle when they first applied for the program. Table 1, columns two through six, provides descriptive statistics for these applicant groups.[12]

Outcome Data

Applicant data are linked at the individual-level to National Student Clearinghouse (NSC) data, which are used for the primary academic outcomes measures of college enrollment and completion. NSC data follow all cohorts for at least five years post application. Due to the financial cost of NSC linking, I match all March cycle applicants within a 15 point bandwidth of the eligibility cutoff and September applicants within a 10 point bandwidth, still resulting in over 200,000 unique students across years. As many for-profits do not report to the NSC, I note that my NSC match identifies five large for-profit colleges (University of Phoenix, Heald, ITT, DeVry, and Academy of Art University), though in practice the first three colleges listed are also the most

[11] I include private, non-profit colleges with public four-year colleges as the most commonly attended institutions generally offer liberal arts curriculum that most commonly align with these schools, rather the most occupationally driven for-profit colleges. The most popular non-profits include: Humprey's College, University of Southern California, Chapman University, University of LaVerne, Art Center College of Design, Fresno Pacific University, California Baptist University, Azusa Pacific, and Loyola Marymount.

[12] One contrast across groups is that almost all students who intend to enroll in four-year colleges are entering their third or fourth year of college, whereas the most common response for for-profit and community college students is their second year. This is likely as some students were not eligible for state aid immediately after high school, enrolled in a four-year college and persisted for at least two years, but then re-applied for Competitive award aid.

popular colleges in the Cal Grant applicant pool. As I show later, NSC missingness appears to have no meaningful impacts on my results (Appendix D).

Employment and earnings outcomes come from a match to California's Employment Development Department (EDD) Unemployment Insurance (UI) data.[13] I create variables for each quarter that identify whether an individual had any in-state employment, defined as having earnings greater than zero (the extensive margin). I define earnings as the sum of total earnings conditional on having employment, thus dropping observations with zero earnings (the intensive margin). As shown below I find no discernable employment effects, such that assigning zero earnings, rather than dropping observations in these regressions, produces results that can be interpreted identically. At the time of match EDD data extended through the first quarter of 2019; this allows me to follow all applicants for seven and three-quarter years (i.e., 31 total quarters) after they would have learned their award status.[14] In contrast to the NSC outcomes, the UI data cover all applicants.

Methodology

The existence of a sharp cutoff for Competitive award eligibility allows me to estimate treatment effects using a regression discontinuity design. The changing applicant pool and rank-order sorting resulted in a time-varying eligibility threshold that is unknowable prior to application, preventing

[13] Any employee whose employer pays into the state UI program is included within these records. Individuals that are unobserved or may have incomplete records primarily include those who work or live out of state, independent contractors, or the self-employed. Internal calculations by EDD estimate that approximately 92% of all employed Californians are included in the files in any given quarter. Matching is done at the individual-level through social security numbers. EDD does not return individual-level data, but provides descriptive statistics provided the match meets minimum cell size requirements, or allows the researcher to provide SAS code that can be run by the EDD, who then return statistical output.

[14] Earnings are top coded at $25,000 per quarter. The primary concern as noted by the EDD is that some SSNs are either erroneously or illegally used by multiple individuals within the same quarter, thus leading to large outliers. Top coded results are essentially similar to unadjusted results. Only 0.36% of earnings values were topcoded down to $25,000 and there is no discontinuous jump in likelihood of topcoding at the eligibility threshold.

students from sorting endogenously across the threshold. Conversations with CSAC officials indicated that though the scoring information was publicly available, few students were aware of how scoring occurred or where to find this information, and GPA data-sharing agreements result in many students who submitted or renewed the FAFSA being entered into the applicant pool without their knowledge (Appendix B). Finally, students are unlikely to report false information as the FAFSA is routinely subject to verification by the federal government, and GPA data come directly from the institution rather than the student. Although providing false information would not necessarily invalidate the identification strategy given the unpredictable cutoff, it does suggest that I can interpret these values as accurate representations of the type of student affected by the award.

Throughout the paper I provide heterogeneous impacts for students based on the colleges they list on the FAFSA. I focus on this categorization for three reasons. First, the Competitive award implicitly highlights this distinction by offering differing financial aid packages depending on whether a student attends community college (cash only), four-year public college (cash plus full tuition), or a private college (cash plus subsidized tuition). Given that the responsiveness to aid is likely a function of the award size, this is a natural area of concern. Second, variation in the types of postsecondary offerings between sectors is likely to attract students who differ on unobservable characteristics, even in the absence of observable differences. As there are few applicants who select private, non-profit colleges – only 4% of the sample, compared to 10% and 16% who choose for-profit or four-year publics, respectively – I merge private, non-profit and four-year publics together given the closer relationship in curriculum between these sectors (see footnote 12). Finally, as noted above, almost all students in the data appear to choose one sector, allowing for an easy distinction between these groups of students.

On the full sample I estimate treatment effects using the following equation:

$$Y_{igt} = \beta_0 + \beta_1 * f(score_{ig}) + \beta_2 * CG_{igt} + \beta_3 * CG_{igt} * f(score_{ig}) + \theta_{gt} + X_{igt} + \varepsilon_{igt} \quad (1)$$

In equation (1), Y_{igt} is the outcome of interest (e.g., degree completion) for student *i* in group *g* in year *t*. I include five distinct groups (*g*), based on the FAFSA decisions described in the Data section above: four-year, for-profit, March community college, September community college, and mixed students. CG_{igt} is a dummy variable that equals one if student *i* is above the Cal Grant eligibility threshold, which is centered at zero and allowed to vary by group *g* and year *t* (given the year- and cycle-specific cutoffs). I estimate the jump at the eligibility threshold CG_{igt} by allowing $f(score_{ig})$ to be a flexible function that indicates an individual's distance from the centered year- and group-specific threshold, and is allowed to vary on either side of the cutoff. In practice I use local linear regressions over the IK optimal bandwidth, which was calculated as eight points (Imbens & Kalyanaram, 2012), though the results are generally invariant to bandwidth or functional form. For labor market outcomes I use the full bandwidth of 15 points for March applicants and 10 points for September applicants in order to maximize power, though estimates are similar in magnitude. θ_{gt} are year- and group-specific fixed effects, which are necessary to account for the year- and cycle-specific eligibility thresholds. X_{igt} is a vector of baseline observable characteristics, such as student's background and demographic characteristics, though I only include them as a robustness check for my main results. I present robust standard errors as they were more conservative than the common practice of clustering on discrete running variables (Lee and Card, 2008) ineligible.

The main focus is the intent-to-treat parameter, β_2, which identifies the causal effect of the Competitive award eligibility on later outcomes. It is common practice in these settings to

supplement the reduced form analysis with an instrumental variable (IV) estimate that assumes changes in outcomes only occur through actual award utilization. In these cases my instrument is whether an individual ever received a Cal Grant payment by 2016, though later results also scale degree impacts by the amount of aid received. Students below the threshold can also earn an award by reapplying in a later year; through rescoring in a given year (those who apply in March have some ability to be entered into the September cycle, see Appendix B), or; re-applying in the same year for Cal Grant C, an smaller, alternate award with a separate scoring mechanism described in Appendix B. (Receipt of Cal Grant C slightly changes the treatment-control contrast in dollars received, as a few initially ineligible students – mostly those in for-profit colleges – later earn this award, but does not substantively change the analysis and is discussed in Appendix B). Students above the threshold might not use the award if they choose not to attend an eligible postsecondary institution or if FAFSA verification later identifies them as ineligible.

To provide evidence that this design produces unbiased estimates, I test a number of assumptions that indicate no sorting of students in the area surrounding the eligibility threshold. Appendix Figure 1 shows no evidence of bunching that would indicate students have the ability to manipulate their scores above the cutoff, both for the full sample and all separate FAFSA subgroups. A test of continuity in the running variable finds no evidence of a discrete jump in observations, with a p-value of 0.55 (Cattaneo, Jansson, & Ma, 2018).[15] Covariates are smooth in the vicinity surrounding the eligibility threshold, whether observed graphically (Appendix Figure 2) or when placing individual-level covariates on the left-hand side of equation (1) (Appendix Table 4).[16] Smoothness

[15] Cattaneo et al. (2018) offers a manipulation test for discrete running variables. Results are estimated over a bandwidth of 8 points but are similar when varying the bandwidth or estimating results for specific FAFSA subgroups.
[16] These graphs use the full sample of eligible students, rather than just the NSC sample that restricts to 10 point bandwidths for the September cohort.

also holds within FASFA subsamples or when estimating linear or quadratic functions forms over various alternate bandwidths.

Results

First-stage Impacts of Competitive Award Eligibility

To understand the size of the treatment effect, I first show graphically how Competitive award eligibility impacts aid utilization in Figure 1, with corresponding regression estimates presented in Table 2. (Regression tables include baseline estimates based on control group means for students one and two points below the threshold). Although the threshold defines a sharp cutoff in initial award eligibility, the cutoff produces a 64 percentage point difference in award utilization in the first year, with a $1,710 difference in CSAC-provided grant aid. The difference in overall award utilization shrinks to 46 percentage points as control group students re-apply in subsequent years, though the dollar contrast increases to $3,060 over students' lifetimes.[17] The amount that award eligibility changes total grant aid received varies significantly across FAFSA groups, ranging from a low of $1,470 for March community college students to a high of $7,280 for March for-profit students.

Although eligible Competitive award students could potentially receive tens of thousands of dollars in tuition payments, along with over $6,000 in cash "subsistence" payments, there are a few reasons we observe much smaller dollar award contrasts at the threshold. Some eligible students choose not to use the award and some ineligible students earn the award in later years; also, students who applied in the March cycle and were interested in attending a community college

[17] Lifetime aid is measured for at least five years in each cohort but include all payments from 2002 through 2016.

could be rescored and entered into the September cycle, potentially earning an award within the same academic year. In addition, eligible students do not utilize the full award amount if they drop out or do not require four years to graduate. As many students are continuing their studies or have previous college experience, it is expected that many will require fewer than four years. Finally, as most students intend to attend a community college and are only eligible for the subsistence payments, the maximum benefit is much smaller than the potential benefits offered towards four-year and for-profit institutions.

Educational Outcomes

I examine college attendance outcomes, including immediately or ever enrolling at an in-state community college, an in-state four-year college (including public and private, non-profit institutions), any for-profit college, or any other institution. I also examine whether a student earned a college degree, which I divide into three categories: (1) associate degree or certificate; (2) bachelor degree; or (3) any degree. Generally, I show only a limited set of outcomes for brevity, though provide more complete results in appendices.[18]

Table 3 shows that Competitive award eligibility has virtually no impacts on college attendance. Enrollment results are precisely estimated, and allow me to reject the likelihood that Competitive award eligibility increases attendance by even one percentage point. The lack of changes in attendance may be due in part to the high enrollment rate of these students; the baseline enrollment rate for students who are initially ineligible is 72%. There is suggestive evidence that the award increases transfer to a four-year public or non-profit college by 0.9 percentage points. Graphical

[18] Less than one percent of students attended an out-of-state institution the year after applying for the award. I use any for-profit, rather than just in-state, as the IPEDS OPEID for some for-profit branches do not differentiate between local branches or the residence state of the corporate headquarters. Few students earned a certificate, so I combine both certificates and associate degrees into one category for simplicity.

depictions of these attendance results are shown in the top panel of Figure 2, and support the regression findings. The first column of Appendix Table 5 provides a more complete set of enrollment estimates, with only a few marginally significant results.[19]

The bottom panel of Table 3 shows that Competitive award eligibility increases the probability of earning a bachelor's degree by 0.9 percentage points (5 percent), with a statistically insignificant increase of 0.2 percentage points on associate degree completion. Graphical results for degree completion are shown in the bottom left panel of Figure 2. IV results are presented separately in column 2, and are generally a little over twice as large as the reduced form estimates; IV baseline rates use only students just below the threshold who never utilized a Cal Grant payment.[20] Thus the IV results indicate that bachelor's degree completion among students who used the award increased roughly two percentage points, which translates to an eleven percent increase in bachelor's degrees.

As applicants for the Competitive award aspire to enroll in specific institutions, Table 4 splits the sample into four separate groups based on their listed FAFSA colleges.[21] Students who list for-profits as their preferred institution experience the greatest gains from the program. Bachelor degree completion rates for for-profit applicants increases 3.9 percentage points in the reduced form estimates, which represents a 17% increase over a baseline completion rate of 23%.[22] IV

[19] Standard error adjustments using Stata's 'wyoung' command estimate a statistically significant p-value of 0.02 for the for-profit bachelor's degree completion effect (discussed below), but render the few weak effects on attendance statistically insignificant (Jones, Molitor, & Reif, 2018).

[20] I instrument using a dummy for ever receiving a Cal Grant payment to capture reapplication rates. An alternate specification using a dummy for receiving aid in that specific cycle increases the first-stage from 46% to 64%, reducing IV estimates from roughly 2.2 times the reduced form to only 1.6 times the reduced form.

[21] As noted above, there are few students who list multiple schools across postsecondary sectors, and I do not focus on them throughout the paper. Using students within the optimal bandwidth, removing the "mixed" students eliminates only 2.8% of the analytic sample.

[22] As stated above, only five for-profits are well covered by NSC data (see discussion of Appendix Table D1). An additional robustness check deals with a potential source of bias by eliminating students whose FAFSA college list identifies schools that do not report data to the NSC or those with high FERPA blockage rates that render students

estimates show an increase of 8.6 percentage points, or a corresponding 36% increase. For four-year college or community college students, award eligibility appears to have no meaningful impacts. All results are robust to common validity checks for regression discontinuity designs, including a scatterplot of for-profit degree completion outcomes (bottom right panel of Figure 2).[23]

Appendix Table 6 examines degree completion using a different but complementary instrument of $10,000 of aid received, rather than a binary indicator of using Cal Grant aid. (I show two versions, one based on aid received in the first year post-application (top panel) or all aid received over time (bottom panel)). Although for-profit students are the only group that continues to show statistically significant results, accounting for aid substantially diminishes the differences between groups. For example, each $10,000 of total aid increases for-profit bachelor's degree completion by 5.3 percentage points, but the statistically insignificant results for four-year and community colleges groups vary from 2.5 to 3.8 percentage points. This results suggest that one primary driver of the difference between groups may be the amount of aid received, rather than just differences in aid's effectiveness; community college students receive roughly one-quarter the amount of aid as for-profit students in the regression discontinuity analysis (Table 2).

Pathways to Degree Completion

invisible to the researcher. See Dynarski, Hemelt, and Hyman (2015) for a lengthier discussion of the student blockage issue. Removing these students suggests bachelor's degree completion results are closer to five percentage points for for-profit students, but unchanged for students in the community college or four-year sectors (Appendix Table 7). Estimating results for each college individually points to large bachelor's degree impacts for Phoenix students (the most commonly listed college) as driving the results, though estimates for individual colleges are noisy at this level. There is also some evidence for large associate's degree completion results for Academy or Art students, though this is the least listed college and the optimal bandwidth regression has 339 observations. More generally,

[23] Robustness checks include: (i) varying the bandwidth and functional form (Appendix Figure 3); (ii) using triangular kernels (Appendix Figure 4), or; (iii) using covariates or combinations of covariates and triangular kernels (results omitted for brevity). Bandwidth results for the other three FAFSA groups do not indicate any evidence of positive impacts. Appendix C describes an alternate difference-in-difference strategy that leverages cross year changes to the eligibility thresholds, with results presented in Appendix Table 8 similar to the RD estimates.

To understand the process by which aid increases degree completion, Figure 3 shows changes in overall attendance, full-time attendance, or persistence for just the for-profit sample for the first five years after the initial application.[24] As before I find no impacts on attendance in the first year, yet in the second year after application eligible students are roughly three percentage points more likely to be enrolled, and bachelor degree completion rates have risen by a marginally significant 1.5 percentage points. These results indicate that the award promotes degree completion through substantial persistence effects on enrolled students. By three years after application both the persistence and degree completion effects become stable, with few students remaining enrolled; following students over a longer time-frame is then unlikely to reveal additional impacts on degree completion. Similar figures for community college and four-year applicants are shown in Appendix Figure 5 and show essentially no changes to degree completion at any point in the first five years. These results indicate that the aid does not induce a time-to-degree effect for community college or four-year students.

As the Competitive award explicitly favors older, non-traditional students, I test whether the award is particularly beneficial for older applicants. I create three equally sized age groups, which translates to 22 and younger, 23 to 31, and 32 and older. Figure 4 shows treatment effects on bachelor degree completion based on the interaction of age categories and the intended sector of college attendance. I find that the award increases the likelihood that for-profit students earn a bachelor degree in both the middle and upper age terciles but has no effect for all other groups

[24] Full-time attendance is taken from NSC data, although some schools do not report these data to the NSC and I am not aware of any reports that verify the accuracy of these data.

(Regression results are provided in Appendix Table 9). Additional results suggest little substantial heterogeneity in treatment effects based on other background characteristics.[25]

Labor Force Outcomes

In the aggregate, estimates from UI data show that Competitive award eligibility does not change either in-state employment or total earnings over roughly eight years after initial application. Figures 5 and 6 show results for employment and earnings using the full sample, for the time period including one year prior to application (e.g., for those who submitted in March 2011 this includes 2010 Q3 through 2011 Q2) through seven and three-quarter years (31 quarters) post-application (e.g., 2011 Q3 through 2019 Q1 for March 2011 applicants). Figure 5 shows no evidence that employment between treatment and control students differs from zero in any quarter post-application, with standard errors rejecting differences larger than roughly one percentage point. I also find no statistically significant differences in quarterly earnings (Figure 6), with 95% confidence intervals rejecting estimates larger than $100 (over the first three years post-application) to $200 (over the last three years). Appendix Table 12 provides regression results for the full sample and FAFSA subgroups.[26]

[25] I further examine other potential forms of student heterogeneity on college outcomes based on for-profit students (Appendix Table 10) and all other students (Appendix Table 11). I fit separate models based on student sex, dependency status, whether a student was already enrolled in college at the time of application, GPA, and educational level. In the for-profit sample the observed results are stronger for females, those with higher GPA, and those with some college experience, where in the alternate groups there are almost no impacts on any attendance or completion measures, regardless of subgroup studied. For the for-profit students in particular, the aid may be then helping them "cross the finish line". First-stage impacts are relatively similar across groups, indicating that differences in estimates arise from variation in the impact of the award on student behaviors, rather than the inability to get different groups to participate in the program.

[26] In robustness tests I aggregate all UI-reported income in the year (four quarters) prior to the initial application and include as covariates a cubic of income and a dummy for individuals with no reported UI income data. These regressions produce essentially identical results, and only decrease standard errors on long-term earnings in Table 5 by about 6%; the small reduction in standard errors is likely as the Competitive award scoring process incorporates FAFSA reported income. Covariate adjustment in Appendix Table 12 results in fairly large decreases in standard errors of approximately 10-20% over the first two years after initial application, but diminishes rapidly and only reduces standard errors by about 3% after seven years. All point estimates on long-term earnings (the intensive margin)

I find no changes to employment or earnings for any of the individual FAFSA groups. Figures 7 and 8 provide quarter by quarter estimates on employment and earnings, respectively, for each of the four FAFSA groups. Among the September community college applicants, the largest and most precise subsample, increases in average earnings were essentially zero, with point estimates exceeding $50 only three times in the subsequent 31 quarters. Results for the March community college, four-year, and for-profit applicants are similar in content though statistically noisier.[27]

To address a concern that each individual quarter provides a noisy estimate of employment and earnings, Table 5 provides estimates from a stacked regression that includes all quarters beginning four years after initially applying, clustering standard errors by individual to account for within-student correlations in earnings. (I chose this timeframe to allow students a sufficient opportunity to enroll and graduate, particularly as Figure 3 shows that at this point any impacts on for-profit degree completion have essentially finished). No results are statistically significant, and in the full sample we find that quarterly earnings increase $46 per quarter (0.6%). The largest impacts on earnings, though still statistically insignificant, comes from for-profit students, for whom quarterly earnings increases $120 (1.3%). Under two strong assumptions – using the point estimate as the precise treatment effect and assuming all earnings increases derive solely from increases in degree completion, the numbers suggest a 32% return from earning a for-profit bachelor's degree. This return is much higher than suggested by Cellini and Turner (2019), though more similar to estimates from associate degrees and certificates in the for-profit and community college sector

continue to be null. There is one small change, as award receipt appears to encourage September community college students to reduce employment (the extensive margin) by roughly one-half to one and a half percentage points in the two years after receiving the grant; in unadjusted regressions these point estimates are similar or slightly smaller in magnitude, but the reduced standard errors push them into conventional levels of statistical significant ($p<0.05$). There are no changes to employment regressions for all other groups.

[27] One possibility is that students are earning higher hourly wages but working fewer hours, resulting in no overall changes to total earnings, though overall earnings in this group are sufficiently low that one would expect individuals to prefer increasing their total earnings.

(Carruthers & Sanford, 2018; Jepsen, Mueser, & Jeon, 2016; Jepsen, Troske, & Coomes, 2014; Stevens, Kurlaender, & Grosz, forthcoming). Overall my results are too noisy to estimate returns to these for-profit bachelor's degrees, though reduced form impacts from award eligibility offer scant evidence that the program provides meaningful improvements to labor force outcomes.[28]

Discussion

This paper investigates the effect of cash and tuition subsidies on stimulating human capital investment among adults with less formal education. Offering financial aid is shown to have virtually no effect on college attendance, degree completion, employment, or earnings. I find that aid did increase bachelor's degree completion among the subset of applicants interested in attending large, for-profit colleges, but estimates on employment and earnings are statistically indistinguishable from zero. Even barring precision issues, there are strong reasons for being skeptical of the utility of these for-profit increases. First, I am unable to observe other outcomes, such as changes in student loans or default rates, which are necessary for understanding the net benefits of earning these for-profit degrees. Even small increases in earnings might not pay off in the long-run if they were simply offset by larger loan amounts, higher payments, and increased risk of default, which are endemic to the for-profit sector (Cellini & Turner, 2019; Looney & Yannelis, 2015). Second, state expenditures in the Competitive award program are roughly four times larger per for-profit student than those in community colleges. Even taking the for-profit earnings' point estimates at face value, the results suggest the program is a poor investment when

[28] It bears repeating that the for-profit colleges in my sample are exclusively large, Title IV eligible branches, and not the many thousands of smaller for-profits that exist and are often the target of study in other research (e.g., Jepsen et al. (2016)). Appendix Figure 6 present scatterplots of earnings around the threshold, and provide suggestive evidence of a meaningful shift in total earnings for the for-profit sample that begins just at the eligibility threshold, with no observed differences for either community college or four-year applicants. Appendix Figure 7 provides a scatterplot showing null results on the extensive margin of employment. None of the results change our interpretation of null effects.

comparing discounted earnings against the sizeable government expenditures per for-profit student.[29]

These results suggest that non-traditional students may be less sensitive to aid as a policy intervention than their traditional counterparts. Although reducing labor force participation while in school might improve students' ability to study or participate in other educationally beneficial activities, there is no evidence that non-traditional students receiving aid are able to or willing to make this tradeoff. Increased commitments to work and family might limit their ability to invest necessary effort in their education (Kazis et al., 2007). Non-traditional students may also face less uncertainty about the costs and benefits of schooling – due to previous poor experiences within the postsecondary sector or personal observations of workplace stratification in earnings based on educational attainment – making aid a less salient feature of the college-going decision at that point in time.

Why does the Competitive award program do little to change outcomes? The program allocates aid towards those with the highest need but who have generally exhibited some prior postsecondary success, thus eliminating academically weaker students who might benefit from the additional support. The lack of transparency on who will receive aid also likely works against the program, particularly in the California context. California already provides free community college to very low-income students through an alternate state program (footnote 7). Aid boosts postsecondary attendance not just through lowering price, but also minimizes uncertainty by

[29] The cost-benefit impacts on degree completion observed in this study are significantly lower than observed in other studies of financial aid. Focusing just on for-profit students, scaling the impact estimates shows that the state purchased each additional degree for roughly $185,000. Estimates across other studies estimate associate or bachelor degree completion from $30,000 to (at the upper end) $200,000, with some showing sizeable earnings increases or other ancillary benefits, as well as including a significantly longer time period in the workforce by which the state could recoup its investment (Barr, forthcoming; Bettinger et al., 2019; Denning et al., forthcoming; Fack & Grenet, 2015; Goldrick-Rab, Kelchen, Harris, & Benson, 2016; Mayer et al., 2016).

providing students an early signal of expected costs (Dynarski et al., 2018). As the Pell Grant is often criticized for its lack of transparency (e.g., Dynarski and Scott-Clayton (2006)), most states attempt to simplify the messaging and eligibility requirements of their aid programs. Thus the Competitive award exists in a state that already provides a clear message of affordability through free tuition (at least, for the low-income students likely to benefit from the Competitive award), but then directs extra funds through an opaque formula that provides students no early indication of whether they will benefit or not. This context is substantially different than the evaluation of aid for non-traditional students in other research, such as veterans who are more likely to know the amount of aid for which they are eligible (Barr, 2015, forthcoming). The high college attendance rate of my untreated sample suggests that perhaps most students interested in attending college would do so regardless.[30]

Improving award effectiveness then requires shifting the structure of the program by increasing expenditures to better support students, or improving information so that dollars are targeted towards those whose marginal benefit is higher. As it stands, for-profit students receive roughly four times the aid as community college students; one possibility is to offset this difference by increasing the size of the cash payments to community college students. An alternate issue is that individuals most in need of the financial support may be unaware of the program, and complementary programs that offer students guidance could induce them to apply or select schools of higher quality (Barr & Turner, 2018; Corcoran, Jennings, Cohodes, & Sattin-Bajaj, 2018). Evidence is mixed on whether this type of informational assistance matters, though again much of

[30] The Competitive award "control" group just below the threshold attended college at a 72% rate. Studies that focus on continuing students can have higher rates (e.g., (Denning, forthcoming)); Mayer et al. (2016), whose population is most similar the Competitive award, randomize among already enrolled community college students, with enrollment dropping to 67%, 50%, and 33% over the subsequent three years, roughly in line with my attendance rates. Barr's studies of military veterans often have lower rates, from 25 – 45%.

our information derives from studies of traditional-aged students (Carrell & Sacerdote, 2017; Hurwitz & Smith, 2016). The FAFSA data in my study indicate that most non-traditional students are only focused on one specific school, even among those who are not currently enrolled in college. This suggests that applicants are so constrained in their choice set that they are considering few alternative options, and that aid without guidance is unlikely to shift students into higher quality institutions or across postsecondary sectors. Supplementing educational vouchers with some type of student-focused supports has the potential to help students make better decisions.

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Table 1. Descriptive Statistics, First-time Competitive award applicants, 2002-2011

	(1)		(2)		(3)		(4)		(5)		(6)	
Application cycle	All		March		March		March		September		March	
FAFSA type	All		Four-year		For-profit		Community college		Community college		Mixed	
Years	2002-2011		2002-2011		2002-2011		2006-2011		2002-2011		2002-2011	
N	911492		143329		87132		106991		545576		28464	
	Estimate	St.Dev.	Estimate	St.Dev.	Estimate	St.Dev.	Estimate	St.Dev.	Estimate	St.Dev.	Estimate	St.Dev.
Family Size	2.9	1.7	2.7	1.7	2.7	1.6	2.9	1.7	3.0	1.7	2.7	1.7
College Educated Parent	40%	49%	55%	50%	38%	49%	36%	48%	37%	48%	46%	50%
Female	58%	49%	54%	50%	56%	50%	60%	49%	59%	49%	58%	49%
Dependent Student	39%	49%	44%	50%	18%	39%	33%	47%	43%	49%	36%	48%
Age	27.3	8.8	25.9	6.6	29.9	8.6	29.1	10.0	26.9	9.0	27.5	8.2
Age: dependent	21.0	1.5	21.7	1.2	21.8	1.3	21.4	1.3	20.7	1.5	21.6	1.3
Age: independent	31.4	9.2	29.2	7.2	31.8	8.5	32.9	10.2	31.5	9.5	30.7	8.6
Application GPA	2.8	0.8	3.1	0.5	3.0	0.7	2.9	0.7	2.7	0.8	3.0	0.6
Income	$20,923	$18,372	$24,765	$21,980	$19,330	$16,855	$18,110	$17,475	$20,696	$17,506	$21,375	$19,203
FAFSA educational background												
No college experience	9%	28%	1%	9%	9%	28%	4%	20%	12%	33%	4%	20%
Freshman	22%	42%	3%	16%	30%	46%	26%	44%	26%	44%	13%	34%
Sophomore	38%	48%	10%	30%	36%	48%	50%	50%	44%	50%	28%	45%
Junior	21%	41%	50%	50%	18%	38%	17%	37%	14%	35%	43%	49%
Senior	9%	28%	35%	48%	7%	25%	3%	18%	3%	17%	11%	32%
FAFSA school listings												
Number of Schools	1.3	0.8	1.2	0.9	1.0	0.2	1.1	0.5	1.2	0.6	3.2	1.9
Only one school listed	85%	36%	90%	30%	96%	20%	90%	29%	85%	36%	3%	17%
Community college	74%	44%	0%	0%	0%	0%	100%	0%	100%	2%	78%	41%
For-profit	10%	30%	0%	0%	100%	0%	0%	0%	0%	1%	21%	40%
UC	11%	31%	60%	49%	0%	0%	0%	0%	0%	1%	56%	50%
CSU	5%	21%	27%	44%	0%	0%	0%	0%	0%	0%	20%	40%
Private, non-profit	4%	19%	19%	39%	0%	0%	0%	0%	0%	1%	24%	43%
Cal Grant award outcomes												
Offered A or B	18%	39%	8%	26%	37%	48%	27%	44%	16%	37%	17%	37%
Offered C	1%	12%	0%	5%	8%	27%	5%	22%	0%	1%	2%	13%
Received payment in first year	13%	34%	6%	24%	28%	45%	20%	40%	12%	32%	10%	30%
Reapplied in later year	47%	50%	37%	48%	22%	42%	49%	50%	54%	50%	43%	50%
Ever received payment	26%	44%	13%	34%	32%	47%	36%	48%	26%	44%	24%	43%
Total payments, conditional on immediate award usage	$6,850	$7,638	$11,362	$8,289	$13,054	$9,140	$5,344	$6,595	$4,880	$5,947	$11,746	$9,515

Notes. 'Mixed' FAFSA applicants in column 6 restricts to students who listed more than one type of postsecondary sector (i.e., public or non-profit four-year, for-profit, community college) on their application. 'Total payments, conditional on immediate award usage' sums all Cal Grant payments for students who above the eligiblity cutoff on their first application and received a Cal Grant award in the subsequent year.

Table 2. First-Stage impacts of Competitive award eligibility on program take-up

	(1)	(2)	(3)	(4)	(5)
Application cycle	All	March	March	March	September
FAFSA type	All	Four-year	For-profit	CC	CC
Years	2002-2011	2002-2011	2002-2011	2006-2011	2002-2011
N	185915	17639	23772	25182	114136
Offered Cal Grant A or B	0.933**	0.931**	0.843**	0.750**	0.995**
	(0.002)	(0.005)	(0.007)	(0.008)	(0.001)
	4.2%	1.3%	14.1%	15.5%	0.1%
Received Cal Grant payment in first year	0.637**	0.759**	0.506**	0.453**	0.695**
	(0.003)	(0.009)	(0.010)	(0.010)	(0.004)
	3.7%	1.1%	13.7%	13.2%	0.0%
Total grant aid: first year	1713.822**	4483.763**	4715.767**	641.442**	879.794**
	(15.938)	(78.260)	(91.122)	(15.690)	(6.592)
	$64	$31	$336	$120	$1
Ever received Cal Grant payment	0.462**	0.631**	0.450**	0.319**	0.474**
	(0.004)	(0.011)	(0.011)	(0.012)	(0.005)
	27.0%	16.7%	22.5%	36.1%	27.6%
Total grant aid: all years	3059.741**	7276.920**	7222.708**	1473.027**	1835.426**
	(54.745)	(187.039)	(176.900)	(153.425)	(64.160)
	$1,793	$1,230	$1,211	$2,323	$1,866
Offered Cal Grant C	-0.025**	-0.009**	-0.114**	-0.062**	--
	(0.001)	(0.002)	(0.007)	(0.005)	
	2.7%	0.8%	12.4%	6.9%	

Notes. + p<0.1, * p<0.05, ** p<0.01. Coefficients are treatment effects at the eligibility threshold pooled across years, as estimated by equation (1). All results use local linear regressions that include all observations within the optimal bandwidth of eight points of the eligiblity threshold. Robust standard errors in parentheses. Baseline rates are presented under the regression estimates and include mean values for all observations one or two points below the eligiblity threshold. Cal Grant C is a separate program that is fairly small and pays significantly less than the Competitive award, and works to slightly narrow the treatment-control contrast is aid received; this is discussed in Appendix B.

Table 3. Impacts of Competitive award on attendance and degree completion

	(1)	(2)
Application cycle	All	All
FAFSA type	All	All
N	185915	185915
Regression estimates	Reduced Form	IV
Attendance		
Immediately attend	0.001	0.001
	(0.004)	(0.009)
(Baseline rate below estimates)	71.8%	71.3%
Ever attend	0.004	0.009
	(0.003)	(0.007)
	82.3%	80.9%
Ever attend four-year	0.009*	0.020*
	(0.004)	(0.009)
	30.1%	25.4%
Five-Year Degree Completion		
Associate degree	0.002	0.005
	(0.004)	(0.008)
	19.6%	15.6%
Bachelor degree	0.009**	0.020**
	(0.003)	(0.008)
	19.9%	18.6%
Any degree	0.010*	0.022*
	(0.004)	(0.009)
	35.6%	31.3%

Notes. + p<0.1, * p<0.05, ** p<0.01. Coefficients are treatment effects at the eligibility threshold pooled across years, as estimated by equation (1) in column (1) and by equation (2) in column (2). All results use local linear regressions that include all observations within the optimal bandwidth of eight points of the eligiblity threshold. The instrument used in column (2) is whether an individual ever received any Cal Grant payment through 2016. Robust standard errors in parentheses. Baseline rates are presented under the regression estimates and include mean values for all observations one or two points below the eligiblity threshold. Baseline rates are presented under the regression estimates and include mean values for all observations one or two points below the eligiblity threshold; IV rates only include observations who never recevied a Cal Grant payment.

Table 4. Impacts of Competitive award on attendance and degree completion, by FAFSA preferences

	(1)	(2)	(3)	(4)
Application cycle	March	March	March	September
FAFSA type	Four-year	For-profit	CC	CC
N	17639	23772	25182	114136
Reduced Form				
Ever attend four-year	0.011	0.009+	0.008	0.011*
	(0.012)	(0.006)	(0.011)	(0.005)
	78.6%	4.0%	27.1%	28.1%
Associate degree in five years	-0.001	-0.003	0.012	0.001
	(0.005)	(0.009)	(0.011)	(0.005)
	2.7%	14.1%	24.0%	22.7%
Bachelor degree in five years	0.018	0.039**	0.006	0.005
	(0.015)	(0.011)	(0.009)	(0.004)
	63.4%	22.6%	13.4%	13.4%
Instrumental Variable				
Ever attend four-year	0.017	0.021+	0.026	0.023*
	(0.019)	(0.012)	(0.035)	(0.011)
	77.5%	3.5%	20.4%	21.3%
Associate degree in five years	-0.002	-0.008	0.039	0.003
	(0.008)	(0.020)	(0.034)	(0.011)
	2.7%	10.5%	19.1%	18.5%
Bachelor degree in five years	0.028	0.086**	0.018	0.010
	(0.023)	(0.025)	(0.027)	(0.009)
	62.8%	24.2%	10.7%	10.3%

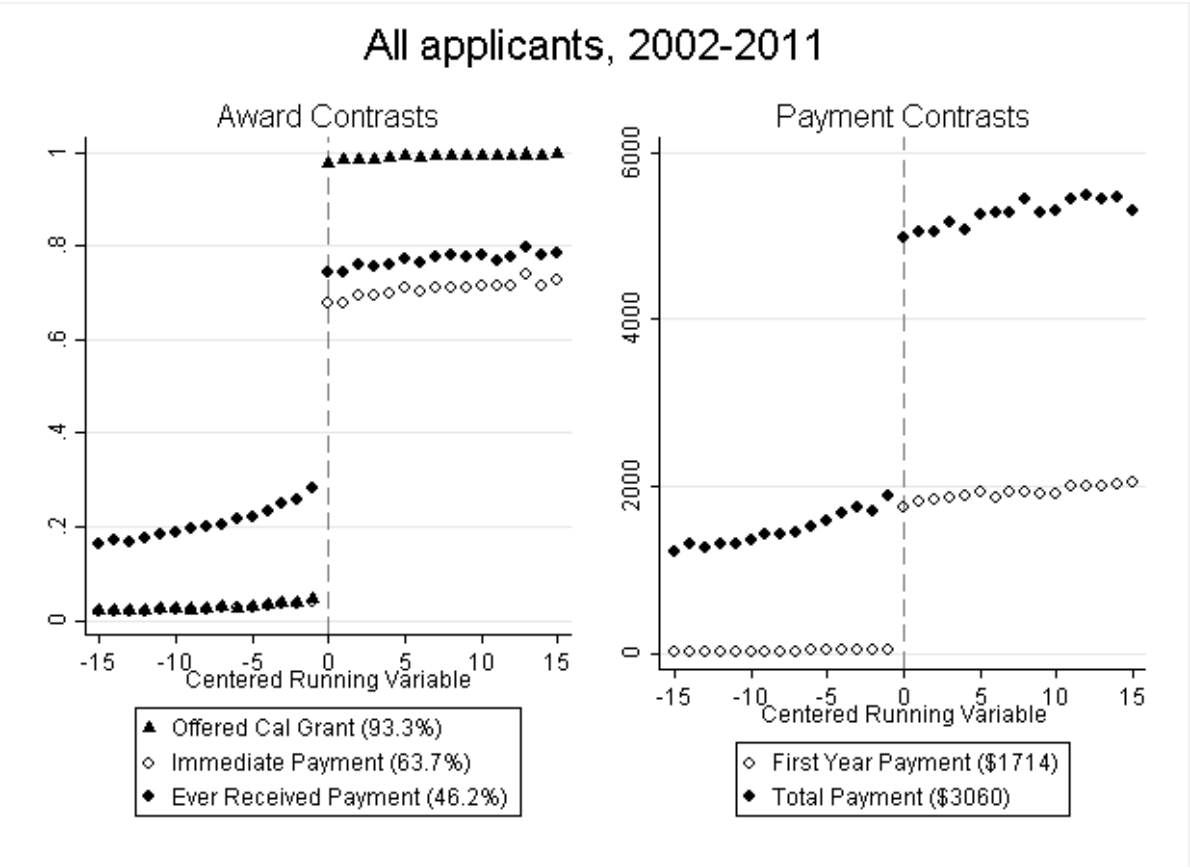
Notes. + p<0.1, * p<0.05, ** p<0.01. Coefficients are treatment effects at the eligibility threshold pooled across years, as estimated by equation (1) in column (1) and by equation (2) in column (2). All results use local linear regressions that include all observations within the optimal bandwidth of eight points of the eligiblity threshold. The instrument used in column (2) is whether an individual ever received any Cal Grant payment through 2016. Robust standard errors in parentheses. Baseline rates are presented under the regression estimates and include mean values for all observations one or two points below the eligiblity threshold; IV rates only include observations who never recevied a Cal Grant payment.

Table 5. Reduced form impacts on labor force outcomes stacking data between 12 to 30 quarters after initial application, by FAFSA preferences

Group	Employment	Wages
All	0.0	46
	(0.3)	(51)
(Baseline rate below estimates)	60.5%	$8,115
Four-year	-0.4	16
	(1.1)	(178)
	64.4%	$10,319
For-profit	-0.7	120
	(1.0)	(141)
	65.0%	$9,318
Community College: March	0.1	82
	(0.9)	(143)
	57.6%	$7,950
Community College: Sept.	0.0	14
	(0.4)	(63)
	59.6%	$7,524

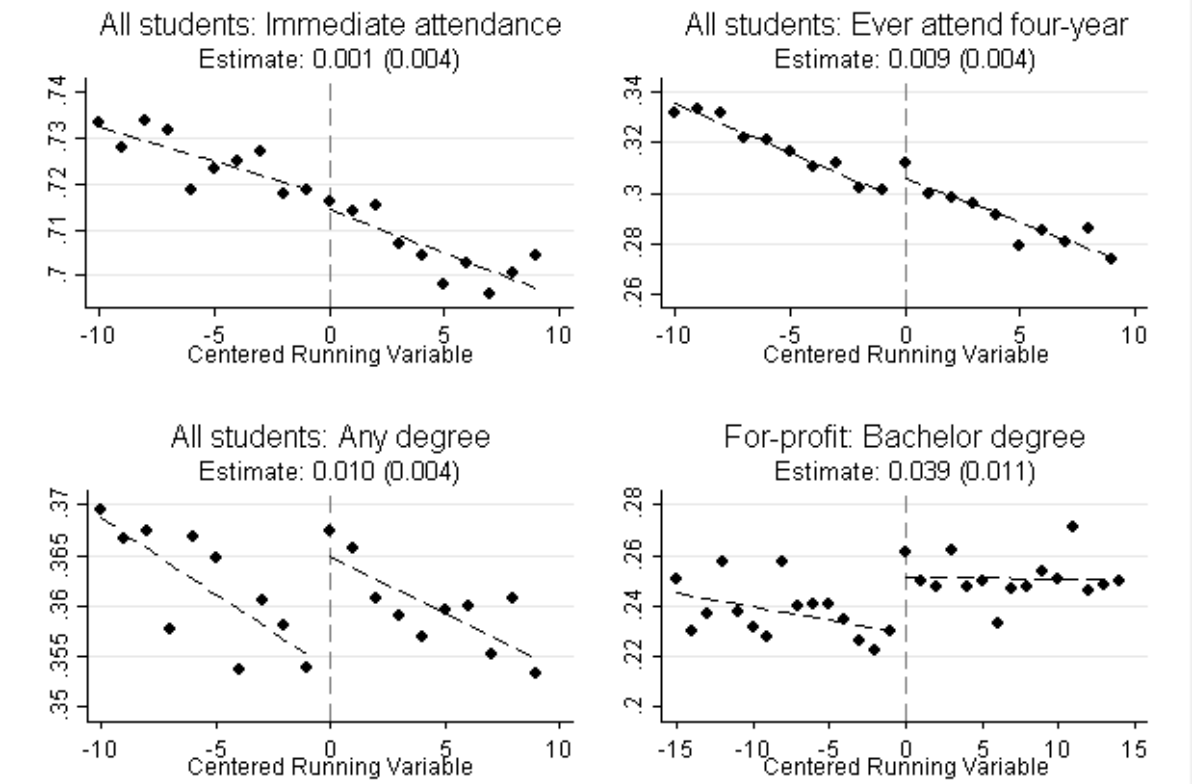
Notes. + p<0.1, * p<0.05, ** p<0.01. Coefficients are treatment effects at the eligibility threshold pooled across years, as estimated by equation (1). Employment results scaled by 100 (e.g., 0.5 implies a 0.005 regression estimate or 0.5% treatment estimate). All results use local linear regressions that include all observations within 8 points of the eligibilty threshold for March and September cycle applicents, respectively. The full sample uses 2,376,021 student-by-wage quarter observations, with the subsequent four rows using 245,013, 318,755, 305,086, and 1,442,630 observations, respectively. Quarter equals zero for the first full quarter after a students' initial aid application. Standard errors clustered by individual.

Figure 1. First-stage impacts at Competitive award eligibility threshold, All applicants



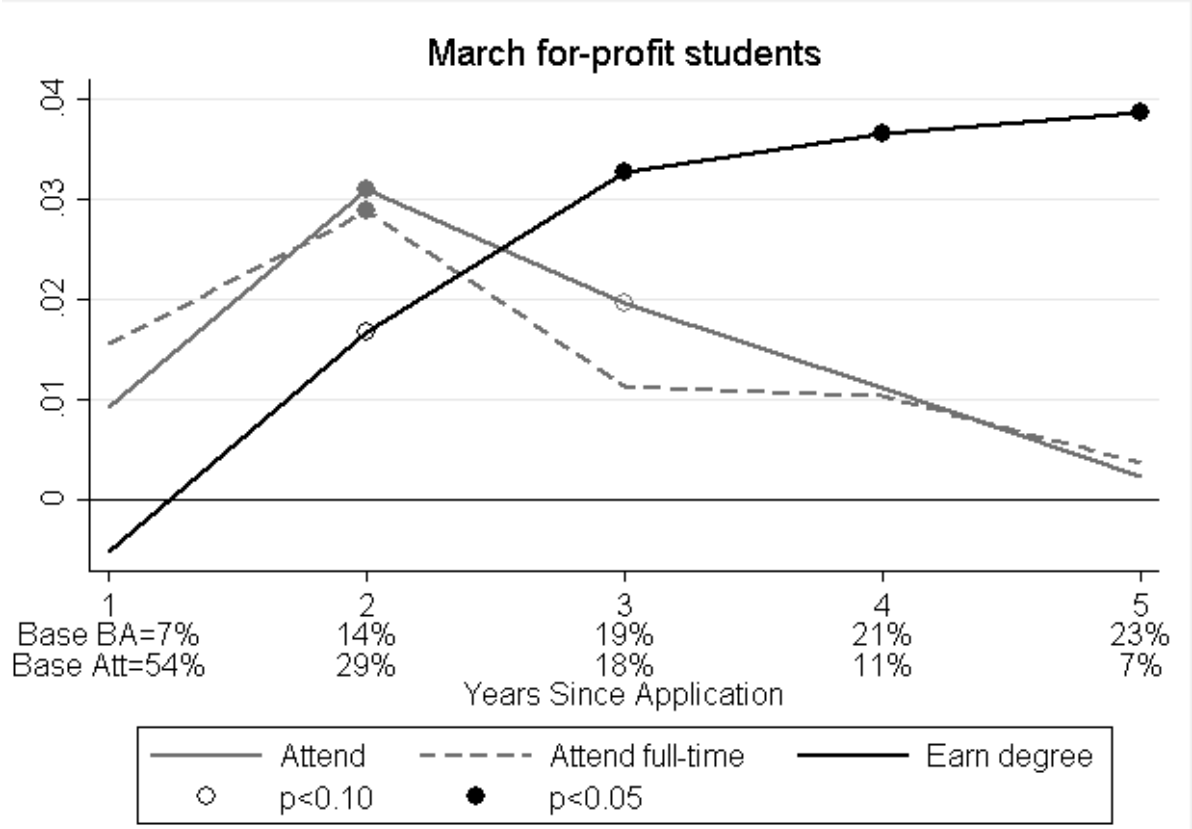
Notes: The x-axis indicates the distance from the year- and group-specific Competitive award eligibility threshold, centered at zero, with each bin equal to one point on the 200 point eligibility scale. The left panel indicates whether students were offered a Cal Grant payment in the first academic year that they applied, received a Cal Grant payment the subsequent year after their initial application, or ever received a Cal Grant payment. The right panel shows differences in financial aid received in dollar amounts in the subsequent year after initial application and total aid received over all years in the data. Treatment effects from regression discontinuity results are provided in parentheses to the right of each outcome measure and in Table 2; all effects are significant at $p<0.001$.

Figure 2. Treatment impacts at Competitive award eligibility threshold



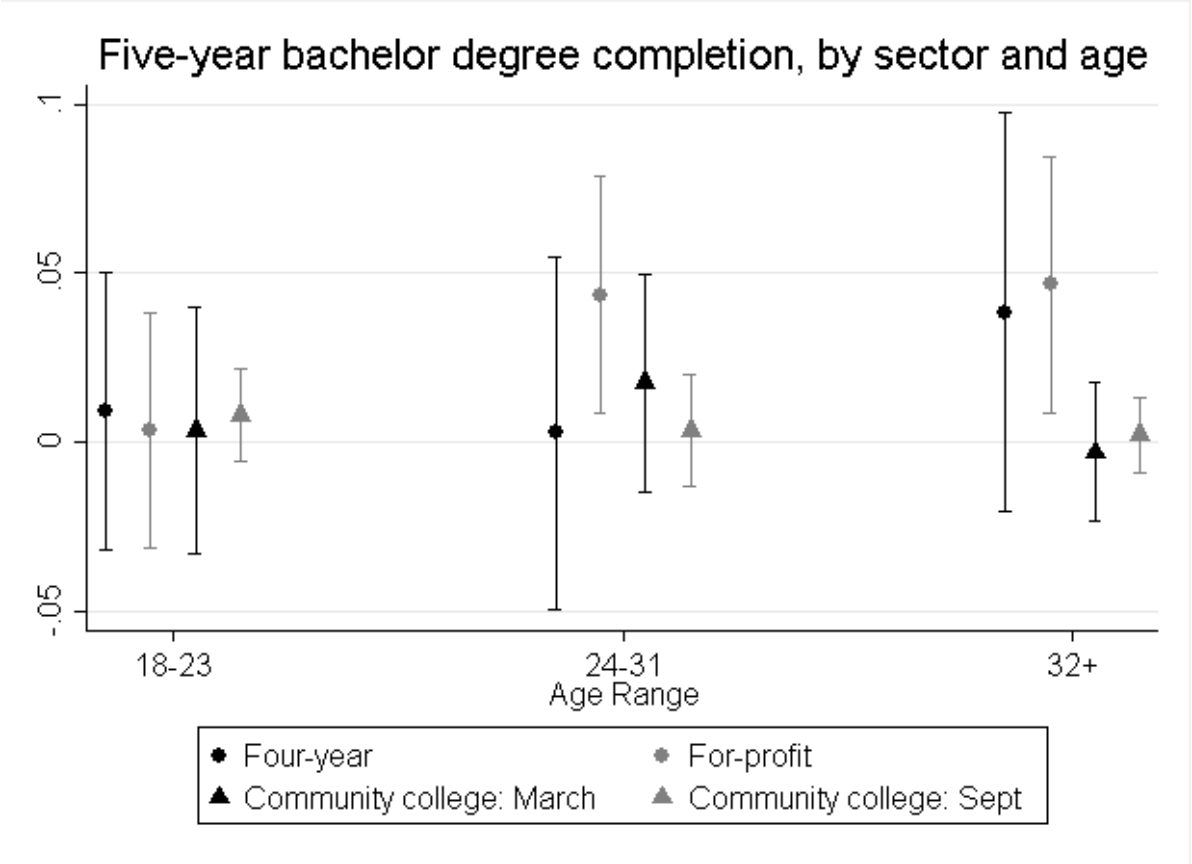
Notes: The x-axis indicates the distance from the year- and group-specific Competitive award eligibility threshold, centered at zero, with each bin equal to one point on the 200 point eligibility scale. Point estimates and standard errors of treatment effects are provided under the title for each graph, and derive from regression discontinuity results on an optimal bandwidth of eight points as in equation (1) and provided in Tables 3 and 4.

Figure 3. Competitive award impacts on attendance, full-time attendance, and degree completion by year, For-profit students only



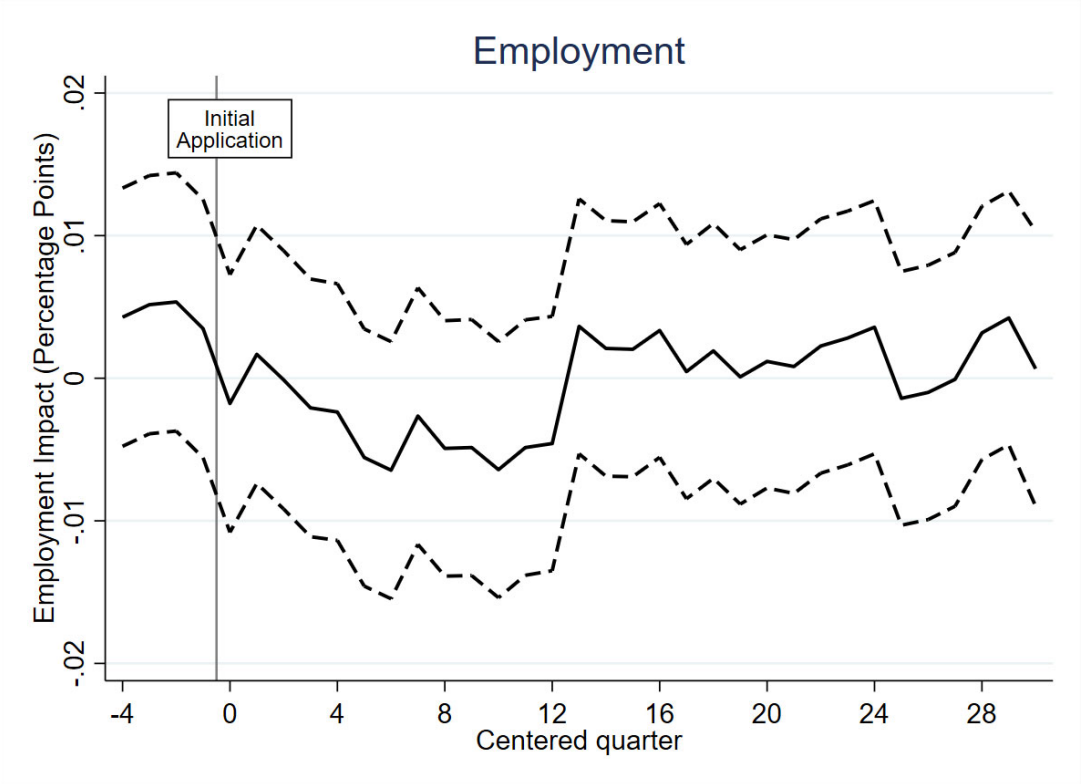
Notes: The x-axis indicates the years since initial application. For each year I estimate the treatment effect of state aid eligibility using a regression discontinuity design on an optimal bandwidth of eight points as in equation (1). Results include three outcomes using National Student Clearinghouse data: earning a bachelor's degree, having any attendance, or having full-time attendance. Statistical significance is indicated by either a hollow circle ($p<0.10$) or a solid circle ($p<0.05$). Base rates on bachelor's degree completion (Base BA) and college attendance (Base Att) vary by year and include all students one or two points below the eligibility threshold.

Figure 4. Treatment impacts at Competitive award eligibility threshold, by age and college sector



Notes: Each line indicates a treatment effect and 95% confidence interval from a separate regression as detailed in equation (1), which estimates the impact of state aid eligibility using a regression discontinuity design on an optimal bandwidth of eight points. Each regression includes a subset of the full sample that is disaggregated by age terciles (18-23, 24-31, and 32 and older) and the application cycle and college listed on the FAFSA. Corresponding regression results are provided in Appendix Tables 9.

Figure 5. Treatment impacts on any employment by quarter

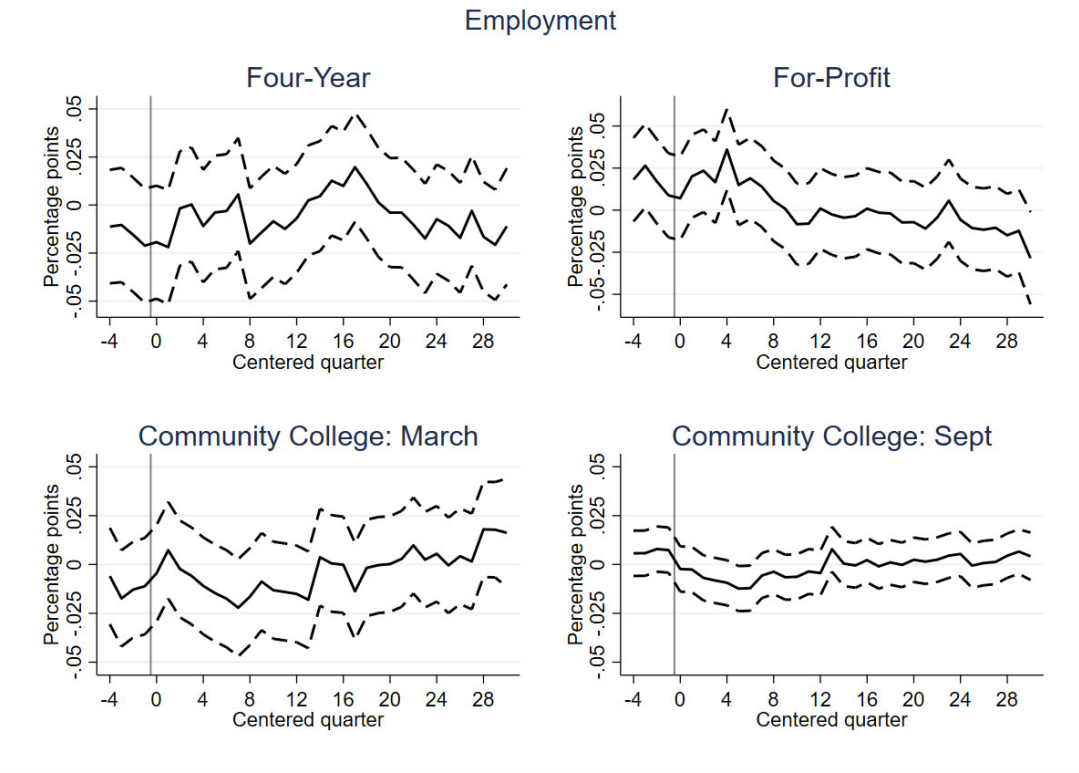


Notes: The solid and dashed lines provide treatment estimates and 95% confidence intervals at each time interval from 4 quarters prior to each student's initial Competitive award application to 24 quarters after application, where quarter 0 is the third quarter of the calendar year in which the individual applied. For each quarter I estimate the treatment effect of state aid eligibility using a regression discontinuity design on an optimal bandwidth of eight points as in equation (1). Employment is a dummy that indicates an individual received positive earnings within that quarter, as based on California Unemployment Insurance records. Corresponding regression results are provided in Appendix Table 12.

Figure 6. Treatment impacts on total earnings conditional on employment by quarter

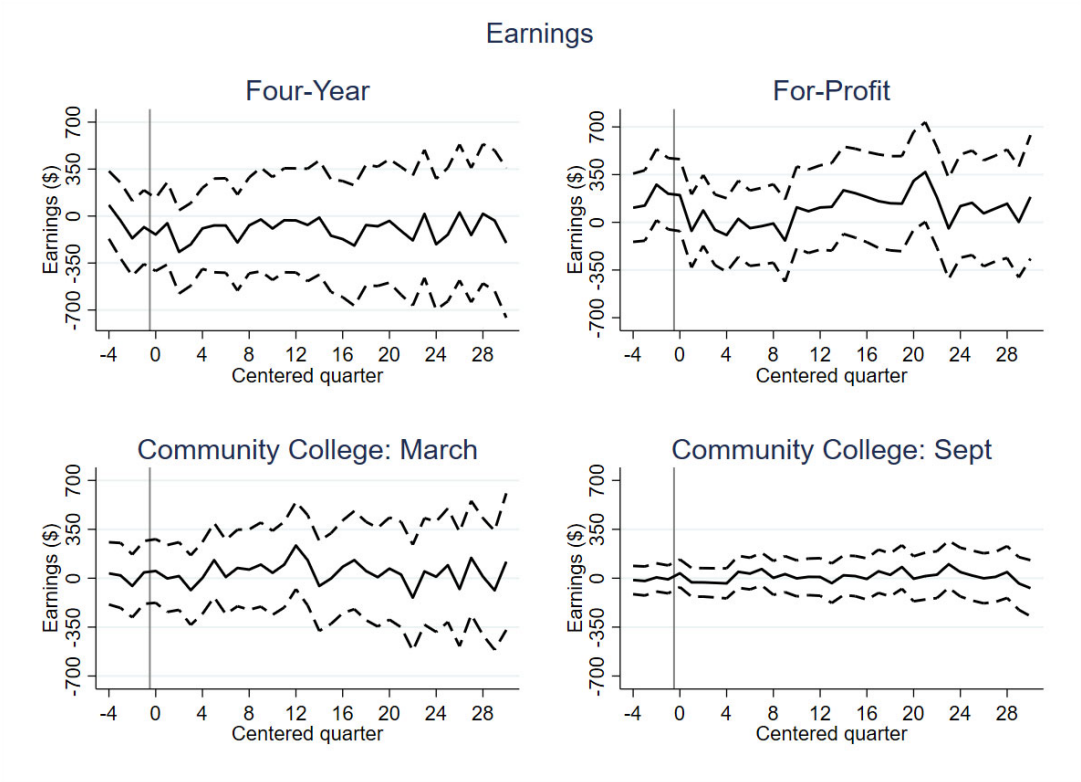
Notes: The solid and dashed lines provide treatment estimates and 95% confidence intervals at each time interval from 4 quarters prior to each student's initial Competitive award application to 24 quarters after application, where quarter 0 is the third quarter of the calendar year in which the individual applied. For each quarter I estimate the treatment effect of state aid eligibility using a regression discontinuity design on an optimal bandwidth of eight points as in equation (1). Earnings derive from California's Unemployment Insurance records and are topcoded at $25,000 per quarter. Corresponding regression results are provided in Appendix Table 12.

Figure 7. Treatment impacts on employment, by quarter and FAFSA group



Notes: The solid and dashed lines provide treatment estimates and 95% confidence intervals at each time interval from 4 quarters prior to each student's initial Competitive award application to 24 quarters after application, where quarter 0 is the third quarter of the calendar year in which the individual applied. For each quarter I estimate the treatment effect of state aid eligibility using a regression discontinuity design on an optimal bandwidth of eight points. Employment is a dummy that indicates an individual received positive earnings within that quarter, as based on California Unemployment Insurance records. Each graph corresponds to students who listed on their FAFSA (starting in the top-left corner and continuing clockwise): four-year colleges; for-profit colleges; community colleges during the March application cycle; community college during the September application cycle. Corresponding regression results are provided in Appendix Table 12.

Figure 8. Treatment impacts on total earnings conditional on employment, by quarter and FAFSA group



Notes: The solid and dashed lines provide treatment estimates and 95% confidence intervals at each time interval from 4 quarters prior to each student's initial Competitive award application to 24 quarters after application, where quarter 0 is the third quarter of the calendar year in which the individual applied. For each quarter I estimate the treatment effect of state aid eligibility using a regression discontinuity design on an optimal bandwidth of eight points. Earnings derive from California's Unemployment Insurance records and are topcoded at $25,000 per quarter. Each graph corresponds to students who listed on their FAFSA (starting in the top-left corner and continuing clockwise): four-year colleges; for-profit colleges; community colleges during the March application cycle; community college during the September application cycle. Corresponding regression results are provided in Appendix Table 12.

Appendix Table 1. Competitive Award

Application Year	Cycle eligibility threshold		Income Limits				In-State Resident Undergraduate Tuition	
				Independent				
	March	September	Dependent	With Dependents	Single, No Dependent	Married, No Dependent	California State University (CSU)	University of California (UC)
2002	156	158	$76,500	$76,500	$27,800	$24,700	$1,428	$3,429
2003	156	159	$77,100	$77,100	$28,180	$24,680	$2,046	$4,984
2004	157	159	$78,100	$78,100	$28,300	$24,800	$2,334	$5,684
2005	155	158	$80,400	$80,400	$29,200	$26,070	$2,520	$6,141
2006	154	157	$83,600	$83,600	$30,385	$26,605	$2,520	$6,141
2007	153	158	$85,100	$85,400	$31,150	$26,830	$2,772	$6,636
2008	155	159	$89,500	$88,970	$32,205	$28,215	$3,048	$7,126
2009	161	164	$92,100	$92,125	$33,665	$29,675	$4,026	$7,788
2010	163	165	$93,350	$93,500	$33,990	$29,430	$4,230	$10,302
2011	165	166	$91,575	$91,185	$33,245	$29,085	$5,472	$12,192

Notes. Income limits for dependents and independents with dependents refers to families with six or more students. Income limits generally decline by about $5,000 per family member, and income limits for families of two individuals are generally $20,000 lower. Undergraduate tuition does not include system and campus fees, which are also covered by the Cal Grant.

Appendix Table 2. Descriptive Statistics, First-time Competitive award applicants, 2002-2011; Only within 8 points of eligiblity threshold

	(1)		(2)		(3)		(4)		(5)		(6)	
Application cycle	All		March		March		March		September		March	
FAFSA type	All		Four-year		For-profit		Community college		Community college		Mixed	
Years	2002-2011		2002-2011		2002-2011		2006-2011		2002-2011		2002-2011	
N	185915		17627		23772		25182		114148		5186	
	Estimate	St.Dev.	Estimate	St.Dev.	Estimate	St.Dev.	Estimate	St.Dev.	Estimate	St.Dev.	Estimate	St.Dev.
Family Size	3.0	1.6	2.9	1.5	2.9	1.5	3.0	1.6	3.1	1.6	2.8	1.5
College Educated Parent	26%	44%	33%	47%	29%	45%	25%	43%	24%	43%	32%	46%
Female	65%	48%	62%	49%	62%	48%	66%	47%	65%	48%	63%	48%
Dependent Student	34%	47%	45%	50%	18%	39%	26%	44%	37%	48%	34%	48%
Age	29.1	9.8	27.5	8.5	30.4	8.8	30.9	10.6	28.6	10.0	28.7	9.1
Age: dependent	21.0	1.6	21.8	1.3	21.9	1.3	21.4	1.3	20.7	1.6	21.6	1.4
Age: independent	33.1	9.8	32.2	9.0	32.3	8.6	34.2	10.5	33.2	10.0	32.4	9.2
Application GPA	3.0	0.8	3.3	0.5	3.1	0.6	3.1	0.5	2.9	0.9	3.2	0.6
Income	$15,686	$13,075	$16,386	$13,815	$17,209	$14,251	$13,608	$13,016	$15,713	$12,611	$15,822	$13,844
FAFSA educational background												
No college experience	11%	31%	2%	14%	10%	30%	5%	21%	14%	35%	6%	23%
Freshman	29%	46%	6%	23%	32%	47%	31%	46%	32%	47%	19%	39%
Sophomore	40%	49%	15%	35%	37%	48%	51%	50%	43%	49%	33%	47%
Junior	14%	35%	49%	50%	15%	36%	11%	31%	8%	27%	34%	47%
Senior	4%	21%	27%	44%	5%	22%	2%	13%	1%	11%	7%	26%
FAFSA school listings												
Number of Schools	1.2	0.7	1.3	1.0	1.0	0.2	1.1	0.5	1.2	0.6	3.2	2.0
Only one school listed	86%	35%	87%	33%	97%	16%	91%	28%	85%	35%	4%	20%
Community college	77%	42%	0%	0%	0%	0%	100%	0%	100%	2%	76%	43%
For-profit	14%	34%	0%	0%	100%	0%	0%	0%	0%	2%	25%	43%
UC	6%	25%	54%	50%	0%	0%	0%	0%	0%	1%	47%	50%
CSU	3%	17%	27%	44%	0%	0%	0%	0%	8.76E-06	0%	21%	40%
Private, non-profit	3%	18%	26%	44%	0%	0%	0%	0%	0%	1%	27%	44%
Cal Grant award outcomes												
Offered A or B	43%	49%	36%	48%	53%	50%	48%	50%	40%	49%	44%	50%
Offered C	1%	12%	0%	7%	6%	24%	4%	19%	0%	0%	2%	14%
Received payment in first year	30%	46%	30%	46%	37%	48%	34%	47%	29%	45%	24%	43%
Reapplied in later year	42%	49%	34%	47%	20%	40%	43%	50%	49%	50%	38%	48%
Ever received payment	45%	50%	39%	49%	43%	50%	49%	50%	45%	50%	39%	49%
Total payments, conditional on immediate award usage	$6,712	$7,538	$11,013	$7,955	$12,726	$9,105	$5,366	$6,739	$4,824	$5,963	$11,918	$9,572

Notes. 'Mixed' FAFSA applicants in column 6 restricts to students who listed more than one type of postsecondary sector (i.e., public or non-profit four-year, for-profit, community college) on their application. 'Total payments, conditional on immediate award usage' sums all Cal Grant payments for students who above the eligiblity cutoff on their first application and received a Cal Grant award in the subsequent year.

Appendix Table 3. Descriptive Statistics, First-time Competitive award applicants, 2002-2011; by year and within 8 points of eligibility threshold

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Application year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
N	11764	12449	13892	14194	18840	18861	20555	24227	24799	26334
Family Size	3.0	3.0	3.0	3.0	3.0	3.0	2.9	3.0	3.1	3.0
College Educated Parent	26%	25%	26%	28%	30%	28%	28%	25%	22%	22%
Female	66%	66%	66%	65%	66%	64%	65%	65%	64%	64%
Dependent Student	30%	30%	33%	34%	35%	38%	37%	34%	31%	32%
Age	29.3	29.6	29.3	29.0	28.8	28.2	28.1	28.7	29.8	29.8
Age: dependent	21.0	21.0	20.9	21.1	21.0	21.0	21.0	21.0	21.1	21.2
Age: independent	32.8	33.2	33.4	33.0	33.0	32.6	32.4	32.6	33.7	33.8
Application GPA	2.7	2.7	2.6	2.6	3.1	3.1	3.1	3.1	3.2	3.2
Income	$15,922	$15,955	$16,295	$16,540	$17,498	$16,715	$16,717	$14,589	$14,427	$14,027
FAFSA educational background										
No college experience	11%	10%	12%	11%	11%	12%	12%	12%	10%	10%
Freshman	26%	27%	28%	28%	27%	26%	27%	31%	33%	34%
Sophomore	37%	39%	38%	41%	41%	40%	41%	40%	42%	41%
Junior	17%	15%	14%	14%	16%	17%	15%	13%	11%	12%
Senior	4%	5%	4%	5%	5%	6%	5%	4%	4%	3%
FAFSA school listings										
Number of Schools	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.3
Only one school listed	87%	86%	88%	87%	86%	85%	86%	86%	85%	83%
Community college	76%	74%	74%	75%	78%	77%	78%	80%	78%	77%
For-profit	10%	13%	13%	14%	12%	12%	12%	12%	16%	18%
UC	8%	7%	6%	6%	7%	8%	8%	6%	5%	4%
CSU	3%	4%	3%	3%	4%	4%	4%	3%	2%	2%
Private, non-profit	4%	4%	4%	4%	4%	4%	3%	2%	2%	2%
Cal Grant award outcomes										
Offered A or B	44%	43%	43%	44%	45%	45%	44%	41%	41%	39%
Offered C	1%	1%	1%	1%	2%	2%	1%	2%	1%	1%
Received payment in first year	34%	34%	33%	28%	32%	33%	30%	29%	29%	27%
Reapplied in later year	44%	43%	43%	43%	43%	44%	45%	44%	41%	37%
Ever received payment	47%	48%	48%	44%	46%	47%	43%	44%	44%	42%
Total payments, conditional on immediate award usage	$6,340	$6,617	$6,409	$4,460	$6,617	$6,947	$7,013	$7,207	$7,372	$6,949

Notes. 'Mixed' FAFSA applicants in column 6 restricts to students who listed more than one type of postsecondary sector (i.e., public or non-profit four-year, for-profit, community college) on their application. 'Total payments, conditional on immediate award usage' sums all Cal Grant payments for students who above the eligiblity cutoff on their first application and received a Cal Grant award in the subsequent year.

Appendix Table 4. Covariate Balance at Competitive award eligibility threshold

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Application cycle	All	March	March	All	September			All			
FAFSA type	All	Four-year	For-profit	CC	CC			All			
Years	2002-2011	2002-2011	2002-2011	2006-2011	2002-2011	2002-2011					
N	185915	17639	23772	25182	114136	116708	116708	231002	231002	272728	272728
Bandwidth	8	8	8	8	8	5	5	10	10	15	15
Functional Form	Linear	Linear	Linear	Linear	Linear	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic
Joint test of differences (p-value)	0.559	0.745	0.432	0.787	0.255	0.940	0.810	0.111	0.892	0.232	0.837
Family Size	0.018	0.034	0.036	0.004	0.013	0.011	-0.031	0.024+	0.013	0.013	0.023
	(0.014)	(0.045)	(0.040)	(0.040)	(0.018)	(0.019)	(0.033)	(0.013)	(0.020)	(0.012)	(0.018)
College educated parent	-0.001	0.026+	0.018	-0.009	-0.007	-0.003	-0.006	-0.001	-0.002	-0.003	-0.002
	(0.004)	(0.014)	(0.012)	(0.011)	(0.005)	(0.005)	(0.009)	(0.004)	(0.006)	(0.003)	(0.005)
Female	0.006	0.006	0.014	0.004	0.004	0.002	0.006	0.006	0.003	0.007+	0.001
	(0.004)	(0.015)	(0.013)	(0.012)	(0.006)	(0.006)	(0.010)	(0.004)	(0.006)	(0.004)	(0.006)
Age	-0.107	-0.432+	0.441+	-0.026	-0.167	-0.178	-0.406+	-0.119	-0.154	-0.094	-0.183
	(0.091)	(0.260)	(0.227)	(0.268)	(0.119)	(0.117)	(0.209)	(0.081)	(0.126)	(0.074)	(0.113)
Dependent	0.002	0.024	-0.006	0.013	-0.001	0.004	0.006	0.004	-0.000	0.004	0.002
	(0.004)	(0.015)	(0.010)	(0.011)	(0.006)	(0.006)	(0.010)	(0.004)	(0.006)	(0.004)	(0.005)
Student GPA	-0.002	-0.015	-0.012	-0.010	0.004	0.003	0.016	0.001	-0.001	-0.002	-0.001
	(0.007)	(0.016)	(0.015)	(0.013)	(0.010)	(0.009)	(0.016)	(0.006)	(0.010)	(0.006)	(0.009)
Total Income	189.123	-259.731	248.045	296.199	223.256	106.511	-32.382	287.309**	42.296	258.604**	134.596
	(120.069)	(410.315)	(367.200)	(324.268)	(148.423)	(153.846)	(273.990)	(107.470)	(166.873)	(99.627)	(152.584)
FAFSA values											
0th year undergraduate	-0.002	0.002	0.006	-0.006	-0.003	-0.000	0.003	-0.001	-0.002	-0.000	-0.003
	(0.003)	(0.004)	(0.008)	(0.005)	(0.004)	(0.004)	(0.007)	(0.003)	(0.004)	(0.002)	(0.003)
1st year undergraduate	-0.003	0.001	-0.019	0.017	-0.003	-0.004	-0.001	-0.001	-0.006	0.001	-0.002
	(0.004)	(0.007)	(0.012)	(0.012)	(0.006)	(0.005)	(0.010)	(0.004)	(0.006)	(0.003)	(0.005)
2nd year undergraduate	0.007	0.003	0.010	-0.002	0.007	0.010+	0.007	0.005	0.011+	0.001	0.009
	(0.004)	(0.011)	(0.012)	(0.013)	(0.006)	(0.006)	(0.010)	(0.004)	(0.006)	(0.004)	(0.006)
3rd year undergraduate	-0.001	0.001	0.007	-0.009	-0.001	-0.004	-0.007	-0.002	-0.002	-0.001	-0.003
	(0.003)	(0.015)	(0.009)	(0.008)	(0.003)	(0.004)	(0.007)	(0.003)	(0.004)	(0.003)	(0.004)
4th year undergraduate	0.000	-0.007	-0.002	0.001	0.001	-0.000	-0.001	0.001	-0.001	0.000	-0.001
	(0.002)	(0.013)	(0.006)	(0.003)	(0.001)	(0.002)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
Total FAFSA schools listed	0.007	-0.004	-0.002	0.006	0.012+	0.000	-0.004	0.009+	0.000	0.008	0.006
	(0.006)	(0.031)	(0.005)	(0.012)	(0.007)	(0.008)	(0.014)	(0.005)	(0.008)	(0.005)	(0.008)
FAFSA listed a four-year college	-0.001					-0.001	-0.001	-0.000	-0.001	-0.000	-0.000
	(0.001)					(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
FAFSA listed a for-profit	-0.000					-0.000	0.002	-0.000	0.000	0.000	-0.000
	(0.001)					(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
FAFSA listed a community college	-0.000					0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.001)					(0.001)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)

Notes. + p<0.1, * p<0.05, ** p<0.01. Coefficients are treatment effects at the eligibility threshold pooled across the years listed in the column heading, as estimated by equation (1).

Appendix Table 5. Impacts of Competitive award on attendance and degree completion

	(1)	(2)	(3)	(4)	(5)
Application cycle	All	March	March	March	September
FASFA type	All	Four-year	For-profit	CC	CC
N	185915	17639	23772	25182	114136
Immediate attendance					
Attend	0.001	0.008	0.010	0.009	-0.004
	(0.004)	(0.013)	(0.013)	(0.012)	(0.005)
Community College	-0.001	0.000	-0.004	0.013	-0.003
	(0.004)	(0.010)	(0.006)	(0.012)	(0.005)
Four-year	0.000	0.011	0.002	-0.003	0.000
	(0.002)	(0.013)	(0.002)	(0.004)	(0.002)
For-profit	0.003	0.000	0.009	0.000	0.001
	(0.002)	(0.002)	(0.013)	(0.002)	(0.001)
All other schools	0.001	0.003	0.002	-0.001	0.001
	(0.001)	(0.003)	(0.002)	(0.002)	(0.001)
Ever attend					
Attend	0.004	0.001	0.001	0.022*	0.002
	(0.003)	(0.010)	(0.013)	(0.010)	(0.004)
Community College	-0.001	0.004	-0.022*	0.017	0.001
	(0.004)	(0.014)	(0.010)	(0.011)	(0.005)
Four-year	0.009*	0.011	0.009+	0.008	0.011*
	(0.004)	(0.012)	(0.006)	(0.011)	(0.005)
For-profit	0.002	-0.004	0.016	-0.001	-0.000
	(0.003)	(0.006)	(0.013)	(0.005)	(0.003)
All other schools	-0.000	0.005	-0.002	-0.005	0.001
	(0.002)	(0.008)	(0.005)	(0.006)	(0.003)

Notes. + p<0.1, * p<0.05, ** p<0.01. Coefficients are treatment effects at the eligibility threshold pooled across years, as estimated by equation (1). All results use local linear regressions that include all observations within the optimal bandwidth of eight points of the eligiblity threshold. Robust standard errors in parentheses.

Appendix Table 6. Impacts of Competitive award on attendance and degree completion, IV estimates (IV = $10,000 of grant aid received)

	(1)	(2)	(3)	(4)	(5)
Application cycle	All	March	March	March	September
FAFSA type	All	Four-year	For-profit	CC	CC
N	185915	17639	23772	25182	114136
IV = Per $1000 received in first year					
Ever attend four-year	0.003	0.019	0.021	0.140	-0.040
	(0.024)	(0.028)	(0.027)	(0.180)	(0.058)
Ever attend four-year	0.025	0.002	0.002	0.350*	0.027
	(0.020)	(0.023)	(0.027)	(0.150)	(0.047)
Associate degree	0.013	-0.002	-0.007	0.194	0.017
	(0.021)	(0.011)	(0.019)	(0.170)	(0.057)
Bachelor degree	0.055**	0.040	0.082**	0.088	0.056
	(0.020)	(0.032)	(0.023)	(0.136)	(0.046)
IV = Per $10,000 ever received					
Ever attend four-year	0.002	0.012	0.014	0.061	-0.019
	(0.013)	(0.017)	(0.018)	(0.079)	(0.028)
Ever attend four-year	0.014	0.001	0.002	0.153*	0.013
	(0.011)	(0.014)	(0.017)	(0.065)	(0.022)
Associate degree	0.007	-0.001	-0.005	0.085	0.008
	(0.012)	(0.007)	(0.013)	(0.074)	(0.027)
Bachelor degree	0.031**	0.025	0.053**	0.038	0.027
	(0.011)	(0.020)	(0.015)	(0.058)	(0.022)

Notes. + p<0.1, * p<0.05, ** p<0.01. Coefficients are treatment effects at the eligibility threshold pooled across years, as estimated by equation (1) in column (1) and by equation (2) in column (2). All results use local linear regressions that include all observations within the optimal bandwidth of eight points of the eligiblity threshold. The instrument used in $10,000 of Cal Grant aid received through 2016. Robust standard errors in parentheses. Baseline rates are presented under the regression estimates and include mean values for all observations one or two points below the eligiblity threshold.

Appendix Table 7. Reduced form mpacts of Competitive award eligibility on attendance and degree completion, NSC reporting robustness checks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Restriction	FAFSA only lists schools with strong NSC reporting rates					FAFSA contains schools with weak NSC reporting rates				
Application cycle	Both	March	March	March	September	Both	March	March	March	September
FAFSA type	All	Four-year	For-profit	CC	CC	All	Four-year	For-profit	CC	CC
N	151111	15806	15417	20628	95033	34804	1833	8355	4554	19103
<u>Attendance</u>										
Immediately	0.001	0.005	0.011	0.014	-0.003	-0.004	-0.011	0.002	-0.018	-0.003
	(0.004)	(0.012)	(0.014)	(0.012)	(0.005)	(0.010)	(0.045)	(0.011)	(0.030)	(0.014)
Ever	0.004	-0.004	0.001	0.024*	0.002	0.006	0.015	-0.001	0.013	0.007
	(0.003)	(0.009)	(0.013)	(0.010)	(0.004)	(0.010)	(0.047)	(0.020)	(0.028)	(0.013)
Ever attend four-year	0.007	0.006	0.012	0.003	0.008	0.015+	-0.001	0.004	0.031	0.023+
	(0.004)	(0.012)	(0.008)	(0.012)	(0.006)	(0.009)	(0.045)	(0.007)	(0.027)	(0.013)
<u>Degree Completion</u>										
Associate	0.001	-0.003	-0.001	0.017	-0.001	0.007	0.012	-0.010	-0.009	0.016*
	(0.004)	(0.005)	(0.013)	(0.013)	(0.006)	(0.005)	(0.010)	(0.007)	(0.018)	(0.008)
Bachelor	0.010**	0.018	0.050**	0.007	0.004	0.004	-0.028	0.012+	-0.002	0.009
	(0.004)	(0.015)	(0.015)	(0.010)	(0.004)	(0.007)	(0.041)	(0.007)	(0.021)	(0.010)
Any degree	0.009+	0.018	0.044**	0.009	0.003	0.012	-0.021	-0.000	-0.004	0.025*
	(0.005)	(0.015)	(0.016)	(0.013)	(0.006)	(0.008)	(0.041)	(0.010)	(0.025)	(0.012)

Notes. + p<0.1, * p<0.05, ** p<0.01. Coefficients are treatment effects at the eligibility threshold pooled across years, as estimated by equation (1). All results use local linear regressions that include all observations within the optimal bandwidth of eight points of the eligiblity threshold. Robust standard errors in parentheses. Strong NSC reporting schools are those where less than half of students identified as receiving financial aid also appear in the NSC data; weak NSC reporting schools are those where more than half of aid receipients do not appear in the NSC, including all schools that do not report to the NSC.

Appendix Table 8. Difference-in-difference impacts of Competitive award on attendance and degree completion

	(1)	(2)	(3)	(4)	(5)
Application cycle	All	March	March	March	September
FAFSA type	All	Four-year	For-profit	CC	CC
Competitive point range	149-170	149-170	149-171	149-172	156-166
N	176673	21968	31416	34751	78565
Ever received payment	0.473**	0.658**	0.464**	0.347**	0.478**
	(0.004)	(0.010)	(0.009)	(0.009)	(0.006)
Total payment	3423.919**	7640.088**	7211.962**	1668.554**	1904.125**
	(53.373)	(149.681)	(145.959)	(122.748)	(73.013)
Associate degree: Reduced form	0.002	-0.005	-0.007	0.011	-0.005
	(0.003)	(0.004)	(0.007)	(0.009)	(0.006)
Associate degree: IV	0.005	-0.007	-0.014	0.031	-0.010
	(0.007)	(0.006)	(0.016)	(0.025)	(0.012)
Bachelor degree: Reduced form	0.013**	0.008	0.023*	0.006	0.006
	(0.003)	(0.012)	(0.009)	(0.007)	(0.004)
Bachelor degree: IV	0.028**	0.013	0.049**	0.017	0.013
	(0.007)	(0.018)	(0.019)	(0.020)	(0.009)

Notes. + p<0.1, * p<0.05, ** p<0.01. Coefficients are estimated via a difference-in-difference approach as described in Appendix 3 and using equation (2).

Appendix Table 9. Impacts of Competitive award on degree completion, by age terciles

	(1)	(2)	(3)	(4)	(5)
Application cycle	All	March	March	March	September
FAFSA type	All	Four-year	For-profit	CC	CC
<u>Associate degree</u>					
Age: 18-23	0.004	0.003	-0.006	0.017	0.003
	(0.006)	(0.007)	(0.019)	(0.020)	(0.008)
Age: 24-31	0.007	-0.003	-0.000	0.042*	0.002
	(0.007)	(0.009)	(0.015)	(0.020)	(0.010)
Age: 32+	-0.003	-0.004	-0.004	-0.012	-0.001
	(0.006)	(0.011)	(0.014)	(0.017)	(0.009)
<u>Bachelor degree</u>					
Age: 18-23	0.005	0.009	0.003	0.004	0.008
	(0.006)	(0.021)	(0.018)	(0.019)	(0.007)
Age: 24-31	0.012+	0.003	0.044*	0.018	0.003
	(0.007)	(0.027)	(0.018)	(0.016)	(0.008)
Age: 32+	0.010+	0.038	0.047*	-0.003	0.002
	(0.005)	(0.030)	(0.019)	(0.010)	(0.006)

Notes. + p<0.1, * p<0.05, ** p<0.01. Coefficients are treatment effects at the eligibility threshold pooled across years, as estimated by equation (1). All results use local linear regressions that include all observations within the optimal bandwidth of eight points of the eligiblity threshold. Robust standard errors in parentheses. Samples sizes across regressions for March applicants range from 4,042 to 9,234, September applicants range from 30,535 to 49,391, and for the full sample 54,443 to 74,016.

Appendix Table 10. Heterogeneous reduced form impacts of Competitive award on attendance and completion outcomes, For-profit students

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Female	Male	Dependent	Independent w/ dependents	Independent w/ no dependents	Currently enrolled in college	Not enrolled in college	GPA >= 3.0	GPA < 3.0	Educational Level: First-year	Educational Level: Second year	Educational Level: Third year or more	Years: 2002 to 2007	Years: 2008 to 2012
Ever received payment	0.443**	0.459**	0.397**	0.464**	0.454**	0.514**	0.369**	0.516**	0.352**	0.323**	0.476**	0.689**	0.458**	0.443**
	(0.015)	(0.018)	(0.027)	(0.014)	(0.026)	(0.015)	(0.017)	(0.014)	(0.019)	(0.018)	(0.018)	(0.021)	(0.017)	(0.015)
Immediate attendance	0.018	-0.002	0.003	-0.003	0.044	0.010	-0.001	0.028+	-0.010	0.011	-0.000	0.007	0.015	0.007
	(0.016)	(0.021)	(0.029)	(0.016)	(0.029)	(0.013)	(0.010)	(0.017)	(0.020)	(0.019)	(0.021)	(0.027)	(0.019)	(0.017)
Ever attended	0.006	-0.007	-0.007	-0.014	0.045	0.012	-0.021	0.019	-0.021	-0.011	0.008	-0.001	-0.002	0.004
	(0.016)	(0.021)	(0.030)	(0.015)	(0.030)	(0.011)	(0.017)	(0.016)	(0.020)	(0.020)	(0.021)	(0.025)	(0.019)	(0.017)
Associate degree	-0.016	0.014	-0.012	-0.005	0.006	-0.006	-0.003	-0.001	-0.010	0.005	-0.020	0.010	-0.001	-0.005
	(0.012)	(0.013)	(0.021)	(0.012)	(0.020)	(0.015)	(0.008)	(0.011)	(0.015)	(0.015)	(0.016)	(0.011)	(0.011)	(0.013)
Bachelor degree	0.054**	0.016	0.013	0.038*	0.055*	0.050**	0.018*	0.059**	0.020	0.013	0.047**	0.057*	0.021	0.053**
	(0.014)	(0.018)	(0.021)	(0.015)	(0.024)	(0.017)	(0.008)	(0.016)	(0.014)	(0.012)	(0.018)	(0.029)	(0.017)	(0.015)
N	14784	8988	4329	14784	4672	13002	10770	14331	9441	9928	8815	4829	10571	13201

Notes. + p<0.1, * p<0.05, ** p<0.01. Coefficients are treatment effects at the eligibility threshold pooled across years, as estimated by equation (1). All results use local linear regressions that include all observations within the optimal bandwidth of eight points of the eligiblity threshold. Robust standard errors in parentheses. Baseline rates are presented under the regression estimates and include mean values for all observations one or two points below the eligiblity threshold.

Appendix Table 11. Heterogeneous reduced form impacts of Competitive award on attendance and completion outcomes, Students who do not list for-profits

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Female	Male	Dependent	Independent w/ dependents	Independent w/ no dependents	Currently enrolled in college	Not enrolled in college	GPA >= 3.0	GPA < 3.0	Educational Level: First-year	Educational Level: Second year	Educational Level: Third year or more	Years: 2002 to 2007	Years: 2008 to 2012
Ever received payment	0.453**	0.483**	0.484**	0.422**	0.536**	0.468**	0.455**	0.481**	0.438**	0.452**	0.451**	0.509**	0.473**	0.453**
	(0.005)	(0.007)	(0.007)	(0.006)	(0.010)	(0.005)	(0.008)	(0.006)	(0.007)	(0.007)	(0.007)	(0.010)	(0.006)	(0.006)
Immediate attendance	0.003	-0.008	-0.011	0.011+	-0.011	0.003	-0.008	-0.010+	0.011	-0.009	0.008	-0.002	-0.002	0.001
	(0.005)	(0.007)	(0.007)	(0.006)	(0.010)	(0.002)	(0.008)	(0.005)	(0.007)	(0.007)	(0.007)	(0.010)	(0.006)	(0.006)
Ever attended	0.007	0.001	-0.004	0.014*	-0.000	0.003	0.009	-0.003	0.016**	-0.005	0.015**	0.003	0.001	0.008+
	(0.004)	(0.006)	(0.005)	(0.005)	(0.009)	(0.002)	(0.008)	(0.004)	(0.006)	(0.006)	(0.005)	(0.008)	(0.005)	(0.005)
Associate degree	0.005	0.000	0.011+	0.000	-0.005	0.002	0.005	0.008	-0.004	-0.001	0.004	0.003	0.003	0.004
	(0.005)	(0.007)	(0.007)	(0.006)	(0.010)	(0.005)	(0.004)	(0.005)	(0.006)	(0.006)	(0.007)	(0.008)	(0.006)	(0.006)
Bachelor degree	0.008+	-0.000	0.006	0.006	-0.002	0.003	0.010+	-0.001	0.014**	0.002	0.010	0.003	0.006	0.005
	(0.004)	(0.006)	(0.007)	(0.005)	(0.009)	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.006)	(0.011)	(0.005)	(0.005)
N	105613	56530	58046	75229	28954	108520	53623	95835	66308	65091	65842	29651	79429	82714

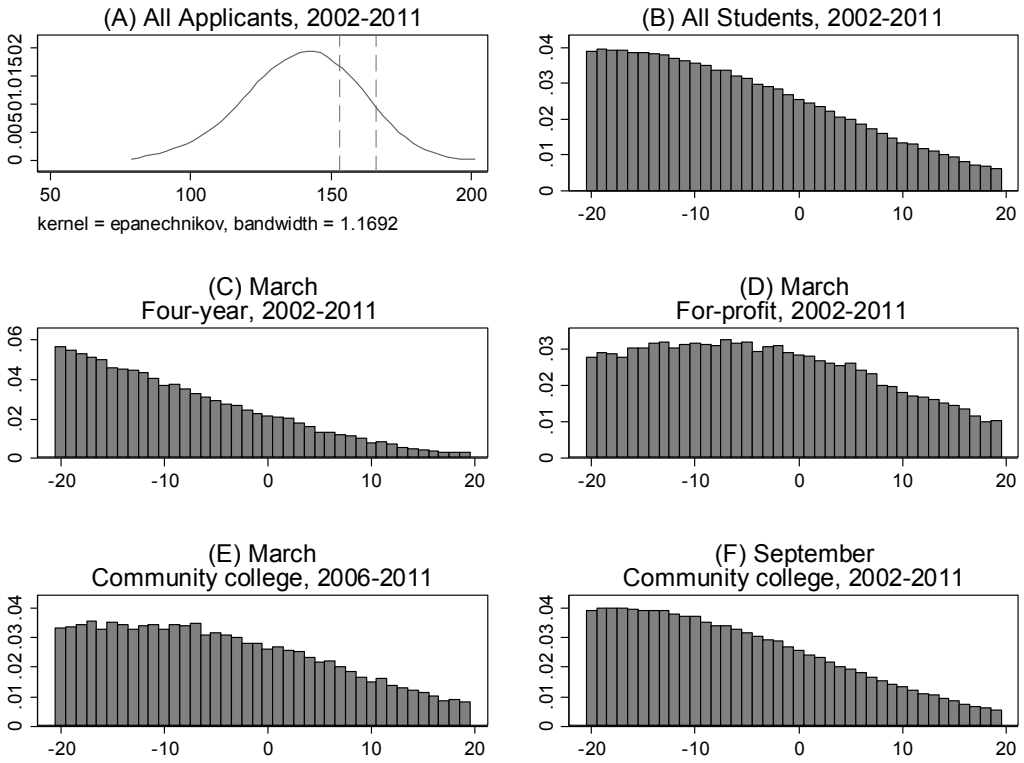
Notes. + p<0.1, * p<0.05, ** p<0.01. Coefficients are treatment effects at the eligibility threshold pooled across years, as estimated by equation (1). All results use local linear regressions that include all observations within the optimal bandwidth of eight points of the eligiblity threshold. Robust standard errors in parentheses. Baseline rates are presented under the regression estimates and include mean values for all observations one or two points below the eligiblity threshold.

Appendix Table 12. Reduced form impacts on labor force outcomes, by wage quarter

Application cycle	All		March	March	March	September	March	March	March	September
FAFSA type	All		Four-year	For-profit	CC	CC	Four-year	For-profit	CC	CC
Quarter	Employment	Earnings	Employment				Earnings			
-4	0.4	23	-1.1	1.8	-0.6	0.6	83	107	35	-13
	(0.5)	(42)	(1.5)	(1.3)	(1.3)	(0.6)	(129)	(128)	(114)	(52)
-3	0.5	10	-1.0	2.6*	-1.7	0.6	-34	123	20	-20
	(0.5)	(43)	(1.5)	(1.3)	(1.3)	(0.6)	(144)	(132)	(119)	(53)
-2	0.5	28	-1.6	1.7	-1.3	0.8	-166	276*	-55	6
	(0.5)	(42)	(1.5)	(1.3)	(1.3)	(0.6)	(142)	(133)	(115)	(51)
-1	0.3	24	-2.1	0.9	-1.1	0.7	-82	210	42	-8
	(0.5)	(42)	(1.5)	(1.3)	(1.3)	(0.6)	(140)	(133)	(115)	(51)
0	-0.2	48	-1.9	0.7	-0.5	-0.2	-137	199	52	36
	(0.5)	(42)	(1.5)	(1.3)	(1.3)	(0.6)	(139)	(135)	(116)	(50)
1	0.2	-23	-2.2	2.0	0.7	-0.3	-53	-63	-2	-30
	(0.5)	(44)	(1.5)	(1.3)	(1.3)	(0.6)	(157)	(137)	(122)	(52)
2	0.0	-19	-0.2	2.3	-0.2	-0.7	-267	88	15	-30
	(0.5)	(44)	(1.5)	(1.3)	(1.3)	(0.6)	(158)	(132)	(124)	(52)
3	-0.2	-47	0.0	1.7	-0.6	-0.8	-211	-55	-85	-33
	(0.5)	(44)	(1.5)	(1.2)	(1.3)	(0.6)	(157)	(132)	(127)	(53)
4	-0.2	-36	-1.1	3.6*	-1.1	-0.9	-92	-93	1	-37
	(0.5)	(45)	(1.5)	(1.2)	(1.3)	(0.6)	(154)	(138)	(131)	(55)
5	-0.6	38	-0.4	1.5	-1.5	-1.2	-70	26	130	46
	(0.5)	(48)	(1.5)	(1.2)	(1.3)	(0.6)	(178)	(143)	(136)	(58)
6	-0.6	5	-0.3	1.9	-1.8	-1.2	-70	-43	8	33
	(0.5)	(48)	(1.5)	(1.2)	(1.3)	(0.6)	(180)	(141)	(135)	(58)
7	-0.3	26	0.6	1.4	-2.2	-0.6	-197	-28	73	66
	(0.5)	(49)	(1.5)	(1.2)	(1.3)	(0.6)	(182)	(143)	(140)	(60)
8	-0.5	8	-2.0	0.6	-1.6	-0.4	-70	-8	62	2
	(0.5)	(51)	(1.5)	(1.2)	(1.3)	(0.6)	(182)	(147)	(147)	(62)
9	-0.5	-1	-1.4	0.1	-0.9	-0.7	-25	-134	98	29
	(0.5)	(54)	(1.5)	(1.2)	(1.3)	(0.6)	(197)	(154)	(154)	(66)
10	-0.6	3	-0.8	-0.8	-1.3	-0.6	-93	110	39	-1
	(0.5)	(54)	(1.5)	(1.2)	(1.3)	(0.6)	(196)	(153)	(153)	(66)
11	-0.5	20	-1.2	-0.8	-1.4	-0.4	-31	81	97	10
	(0.5)	(55)	(1.5)	(1.2)	(1.3)	(0.6)	(198)	(156)	(157)	(67)
12	-0.5	53	-0.7	0.1	-1.5	-0.4	-32	109	234	9
	(0.5)	(56)	(1.4)	(1.2)	(1.3)	(0.6)	(198)	(158)	(159)	(68)
13	0.4	5	0.2	-0.3	-1.8	0.8	-66	113	130	-36
	(0.5)	(59)	(1.5)	(1.2)	(1.3)	(0.6)	(214)	(164)	(165)	(72)
14	0.2	38	0.5	-0.5	0.4	0.0	-11	235	-56	21
	(0.5)	(59)	(1.5)	(1.2)	(1.3)	(0.6)	(217)	(163)	(164)	(72)
15	0.2	30	1.3	-0.4	0.1	0.0	-146	214	-2	15
	(0.5)	(60)	(1.5)	(1.2)	(1.3)	(0.6)	(214)	(166)	(166)	(73)
16	0.3	17	1.0	0.1	0.0	0.2	-171	186	82	-5
	(0.5)	(61)	(1.4)	(1.2)	(1.3)	(0.6)	(221)	(169)	(169)	(75)
17	0.0	45	2.0	-0.2	-1.4	-0.1	-220	155	130	50
	(0.5)	(64)	(1.5)	(1.2)	(1.3)	(0.6)	(229)	(175)	(179)	(79)
18	0.2	41	1.1	-0.2	-0.2	0.1	-67	140	52	24
	(0.5)	(64)	(1.5)	(1.2)	(1.3)	(0.6)	(230)	(176)	(180)	(79)
19	0.0	69	0.1	-0.7	0.0	0.0	-76	137	7	80
	(0.5)	(64)	(1.5)	(1.2)	(1.3)	(0.6)	(227)	(178)	(180)	(80)
20	0.1	50	-0.4	-0.7	0.0	0.2	-36	304	69	-4
	(0.5)	(66)	(1.4)	(1.2)	(1.3)	(0.6)	(235)	(183)	(186)	(82)
21	0.1	50	-0.4	-1.1	0.3	0.1	-110	369*	27	15
	(0.5)	(69)	(1.5)	(1.2)	(1.3)	(0.6)	(243)	(187)	(193)	(86)
22	0.2	6	-1.0	-0.5	1.0	0.2	-181	183	-139	25
	(0.5)	(69)	(1.5)	(1.2)	(1.3)	(0.6)	(247)	(188)	(194)	(85)
23	0.3	67	-1.7	0.6	0.2	0.5	17	-45	49	100
	(0.5)	(69)	(1.5)	(1.2)	(1.2)	(0.6)	(244)	(189)	(195)	(86)
24	0.4	29	-0.7	-0.6	0.5	0.5	-210	119	10	44
	(0.5)	(71)	(1.5)	(1.2)	(1.2)	(0.6)	(249)	(193)	(202)	(89)
25	-0.1	33	-1.1	-1.1	0.0	-0.1	-138	143	93	19
	(0.5)	(73)	(1.5)	(1.2)	(1.2)	(0.6)	(253)	(196)	(207)	(91)
26	-0.1	13	-1.7	-1.2	0.4	0.1	27	66	-78	-1
	(0.5)	(73)	(1.5)	(1.3)	(1.3)	(0.6)	(258)	(198)	(209)	(91)
27	0.0	38	-0.3	-1.0	0.2	0.1	-141	101	146	10
	(0.5)	(73)	(1.5)	(1.3)	(1.2)	(0.6)	(255)	(198)	(208)	(91)
28	0.3	58	-1.6	-1.5	1.8	0.4	18	136	11	44
	(0.5)	(76)	(1.5)	(1.3)	(1.2)	(0.6)	(265)	(203)	(213)	(95)
29	0.4	-24	-2.1	-1.2	1.8	0.7	-33	3	-87	-37
	(0.5)	(77)	(1.5)	(1.3)	(1.2)	(0.6)	(267)	(208)	(217)	(96)
30	0.1	-9	-1.1	-2.9	1.6	0.4	-200	187	119	-71
	(0.5)	(83)	(1.5)	(1.4)	(1.4)	(0.6)	(284)	(231)	(250)	(102)

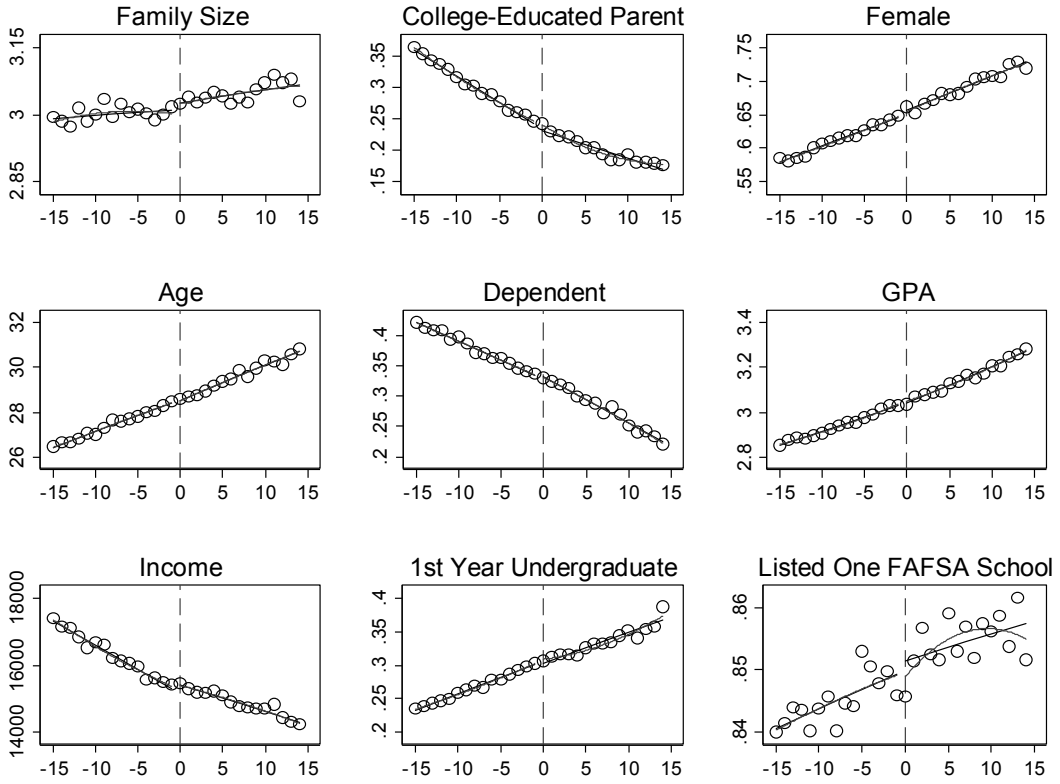
Notes. * p<0.05, ** p<0.01. Coefficients are treatment effects at the eligibility threshold pooled across all students, as estimated by equation (1). Employment results scaled by 100 (e.g., 0.5 implies a 0.005 regression estimate or 0.5% treatment estimate). Results use local linear regressions that include all observations within 8 points of the eligibilty threshold. Employment regressions utilize 185,915 observations per quarter and wage regressions vary from 89,930 to 114,087 observations per quarter. Employment regressions for subgroups vary by quarter and generally increase in size over time; the final quarter contains 11,287, 14,870, 15,059, and 69,266 observations for the last four columns, respectively. Quarter equals zero for the first full quarter after a students' initial aid application. Robust standard errors in parentheses. Estimates from quarters prior to treatment removed for brevity but are not statistically significant from zero.

Appendix Figure 1. Distribution of Competitive Cal Grant scores



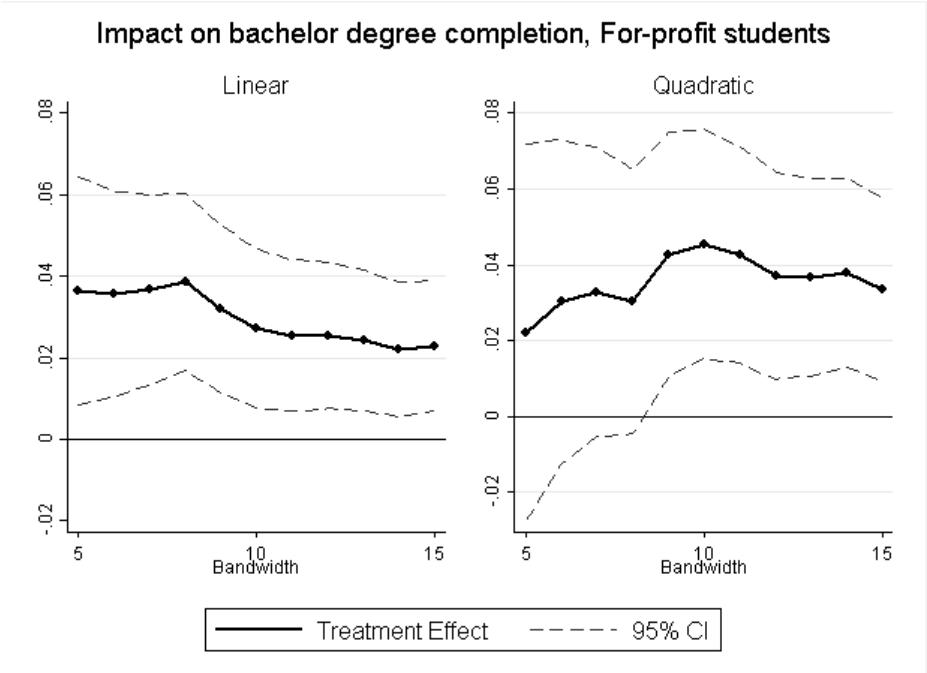
Notes. Panel A shows the distribution of students' initial scores for 2002 to 2011, using the same sample shown in the first column of Table 1. The scores are normally distributed, with two lines indicating the lowest threshold (153 points in 2007) and highest threshold (165 points in 2011) over time. Panel B shows the distribution of student scores near the cutoff for all applicants, with panels C, D, E, and F showing results separately for four-year, for-profit, March community college, and September community college students respectively.

Appendix Figure 2. Covariate Balance at Eligibility Threshold, All applicants



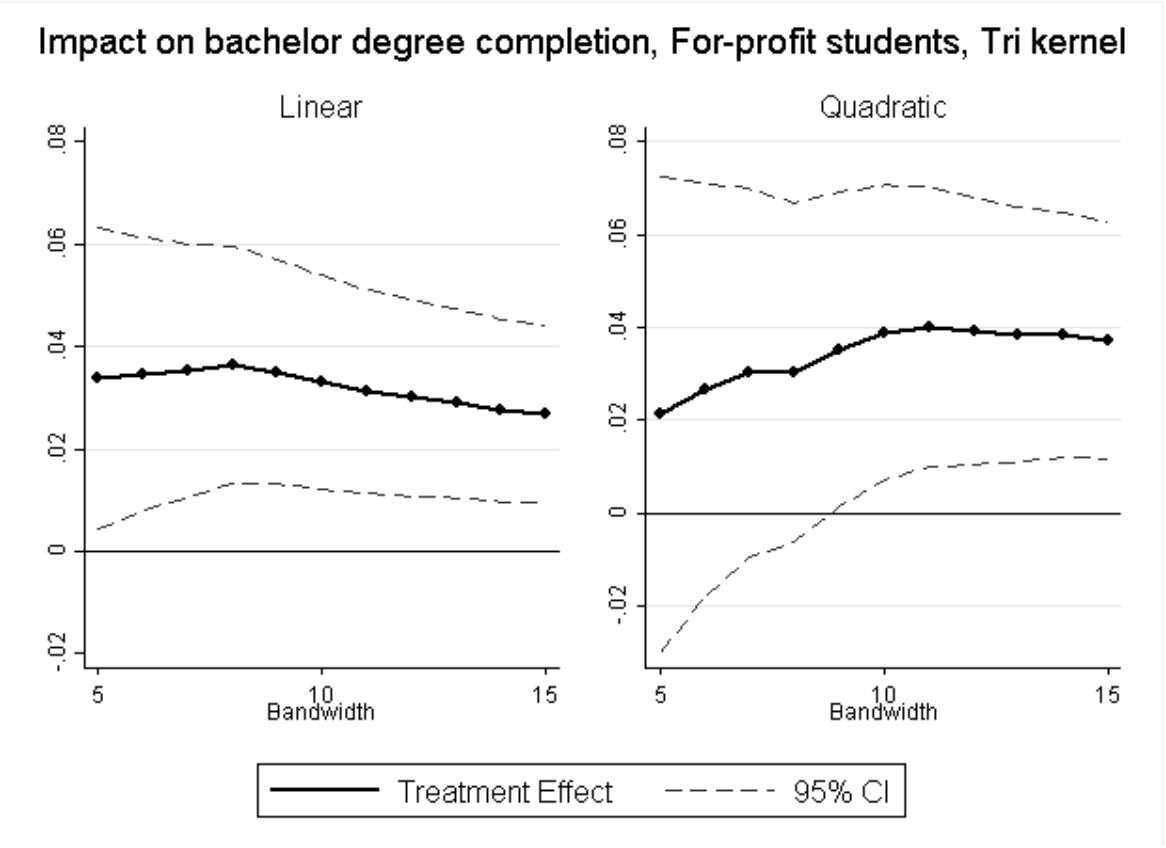
Notes: The x-axis in all figures is the year- and group-specific Competitive award eligibility threshold, centered at zero, with each bin equal to one point on the 200 point eligibility scale. Corresponding regression results are provided in Appendix Table 4.

Appendix Figure 3. Treatment impacts at Competitive award eligibility threshold, by bandwidth and functional form



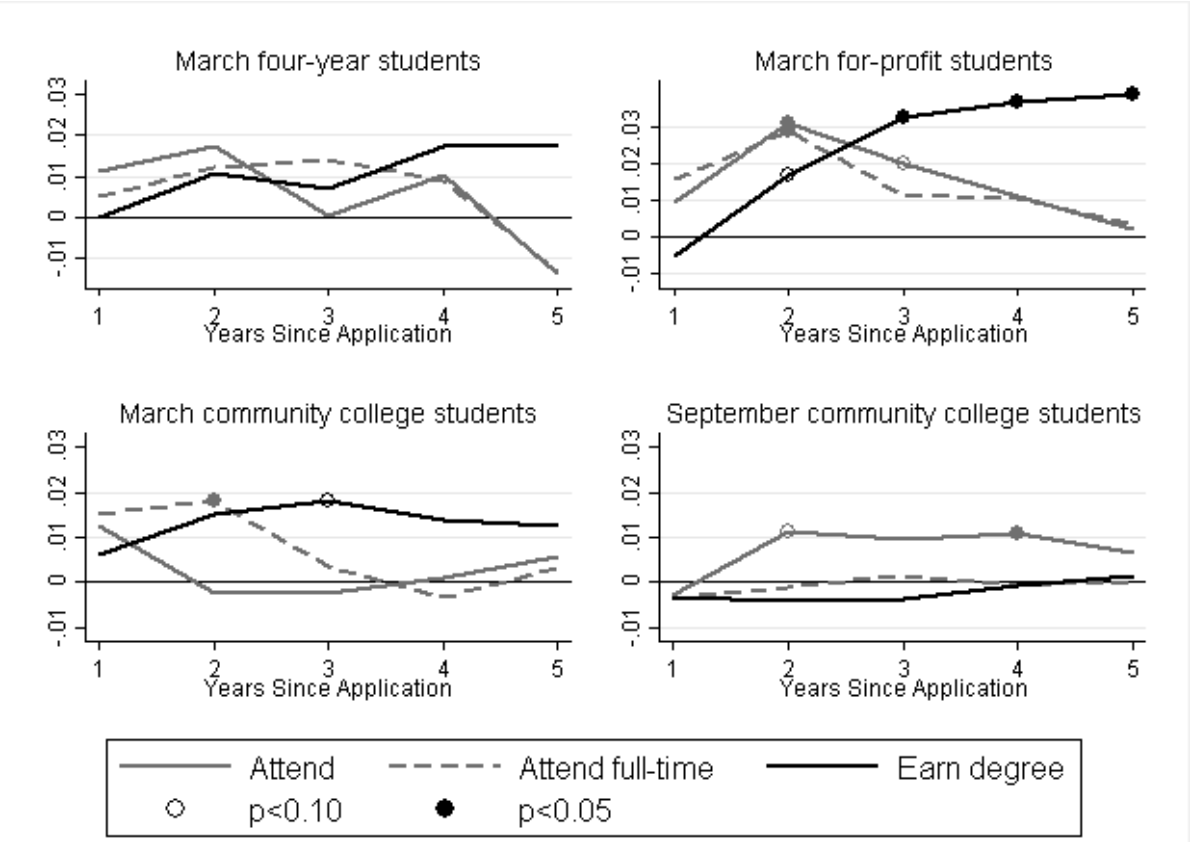
Notes: Each dot indicates an estimate of treatment impacts along with dotted 95% confidence intervals based on equation (1), which measures the impacts of state aid eligibility using a regression discontinuity design. Each estimate is based on a bandwidth that varies from 5 to 15 points, as specified on the x-axis. Results in the left and right panels use linear and quadratic functional forms, respectively, in the estimating equation.

Appendix Figure 4. Treatment impacts at Competitive award eligibility threshold, by bandwidth and functional form, Triangular kernels



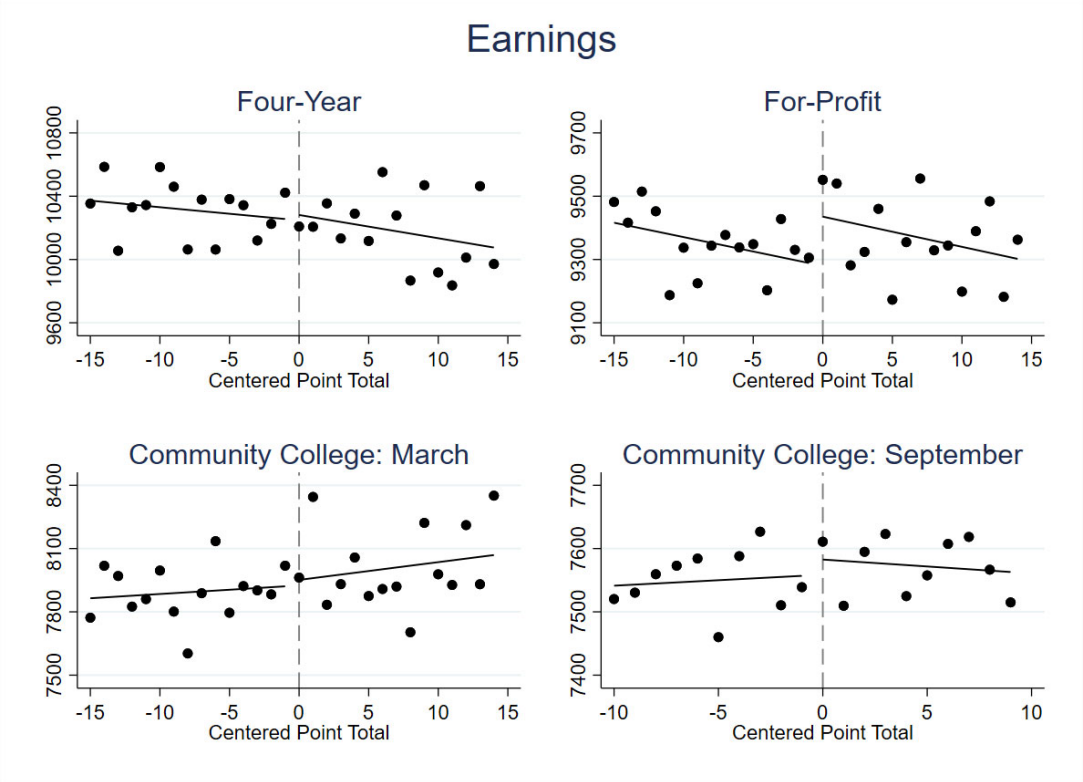
Notes: Each dot indicates an estimate of treatment impacts along with dotted 95% confidence intervals based on equation (1), which measures the impacts of state aid eligibility using a regression discontinuity design. Each estimate is based on a bandwidth that varies from 5 to 15 points, as specified on the x-axis. Results in the left and right panels use linear and quadratic functional forms, respectively, in the estimating equation.

Appendix Figure 5. Competitive award impacts on attendance, full-time attendance, and degree completion by year and FAFSA group



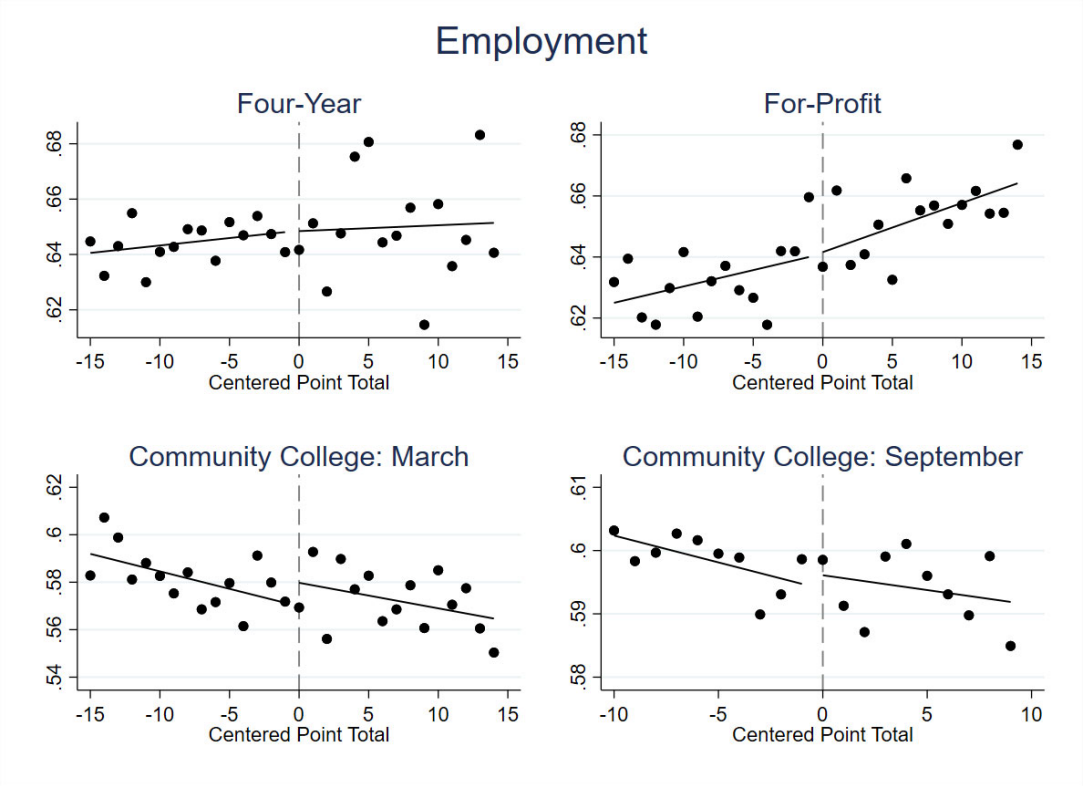
Notes: The x-axis indicates the years since initial application. For each year I estimate the treatment effect of state aid eligibility using a regression discontinuity design on an optimal bandwidth of eight points. Results include three outcomes using National Student Clearinghouse data: earning a bachelor's degree, having any attendance, or having full-time attendance. Statistical significance is indicated by either a hollow circle ($p<0.10$) or a solid circle ($p<0.05$). Each graph corresponds to students who listed on their FAFSA (starting in the top-left corner and continuing clockwise): four-year colleges; for-profit colleges; community colleges during the March application cycle; community college during the September application cycle.

Appendix Figure 6. Average quarterly earnings from quarters 12 through 31 after initial application, by FAFSA group



Notes: The x-axis indicates the distance from the year- and group-specific Competitive award eligibility threshold, centered at zero, with each bin equal to one point on the 200 point eligibility scale. Results average earnings from the time period from 12 and 31 quarters after initial application. Earnings derive from California's Unemployment Insurance records and are topcoded at $25,000 per quarter. Each graph corresponds to students who listed on their FAFSA (starting in the top-left corner and continuing clockwise): four-year colleges; for-profit colleges; community colleges during the March application cycle; community college during the September application cycle.

Appendix Figure 7. Average employment levels from quarters 12 through 31 after initial application, by FAFSA group



Notes: The x-axis indicates the distance from the year- and group-specific Competitive award eligibility threshold, centered at zero, with each bin equal to one point on the 200 point eligibility scale. Results average employment from the time period from 12 and 31 quarters after initial application. Employment is a dummy that indicates an individual received positive earnings within that quarter, as based on California Unemployment Insurance records. Each graph corresponds to students who listed on their FAFSA (starting in the top-left corner and continuing clockwise): four-year colleges; for-profit colleges; community colleges during the March application cycle; community college during the September application cycle.