Running Head: Financial Aid and Course Repetition

Second Try's a Charm: The Impact of Financial Aid Policy on Course Retaking Behavior for Low Income Students

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Abstract:

In this paper, we examine the impact of a change to federal financial aid policy that gave aided students increased access to course retaking. Prior to Fall 2011, students receiving federal financial aid could not count repeated coursework towards their full-time enrollment count, despite many universities rolling out course retaking and grade forgiveness policies for their students. We use administrative records from San Francisco State University (SFSU) to examine how the 2011 federal financial aid policy change affected student outcomes for Pell grant recipients. We find that the policy change led Pell-eligible students to be 3 percentage points more likely to repeat a course in which they earned a D grade on the initial attempt (approximately a 14% increase). We also find evidence that Pell-eligible students were more likely to attempt and earn higher credit hours after the policy change. However, despite this finding, there is no accompanying improvement in academic standing or increase in continued enrollment after the policy change. Results suggest that the policy may have influenced Pell-eligible students to take "riskier" classes with higher failure rates in STEM and Business.

I. Introduction

Over the last decade, many colleges and universities have rolled out more generous course repetition policies, in most cases allowing students with low but passing grades in a class to retake the course. Critics suggest that this is another way that colleges respond to pressure from their students to inflate grades (See for example Selingo, 2018). Proponents suggest that grade forgiveness gives students a second chance to succeed, often allowing them to graduate and earn higher wages in the labor market (See for example Reed, 2019). It is possible that a low grade could be the result of an idiosyncratic negative shock, unanticipated to the student and not reflective of their future ability to succeed in the course or subject. Students in their first year may especially be sensitive to these types of shocks, particularly those who are unfamiliar with the college process and atmosphere. Separately from these shocks, low-income students may be more likely to face external constraints that could affect success inside of the classroom. In these cases, students may non-optimally sort away from degree completion, as often low grades in early courses are a roadblock to continuing.

Prior to Fall 2011, students receiving federal financial aid at any U.S. institution could not count repeated coursework towards their full-time enrollment count if they had passed the class during a previous attempt[1]. This restriction on financial aid meant that lower income students receiving federal financial aid could repeat previously passed coursework only if they paid for the credit hours themselves or had other forms of financial aid that could bridge the gap.[2] Starting with the Fall 2011 semester, students were eligible to receive federal financial aid when retaking a previously passed course in which they initially received a passing grade,

[1] To be more specific, if a student received any grade above an F (failing), they were not eligible to apply federal financial aid funding towards the repeated class.

[2] The California Student Aid Commission follows federal guidelines for course repetition policy, so state aid cannot replace lost federal aid.

subject to the course repetition policy of the institution they attended. This change allowed lower-income students to access university level course repetition policies at the same cost as their higher-income and unaided peers.

Allowing students to retake coursework for which they received a low grade could impact a student's trajectory in various ways. Students may feel safer in their enrollment, knowing they have a type of insurance against low grades on first attempts, which may improve their probability of continuing their studies. We also expect that if students do take advantage of the policy change by repeating more courses, this would allow students, particularly those who are more likely to receive a low grade on the first attempt, to improve their grade point averages and therefore their academic standing. Despite these potential advantages, retaking a course is not without costs. If students are constrained to a certain number of courses or credit hours per semester, the repeated coursework can crowd out new course-taking and delay time to degree. This also bears a financial cost, which for low-income students may be substantial.

We evaluate the impacts of the federal financial aid policy change using administrative data from San Francisco State University (SFSU). SFSU is part of the California State University System and has historically enrolled a large number of underrepresented minorities and first-generation students. San Francisco State is an ideal setting to evaluate this policy because a large fraction of the student population receives some form of financial aid. While we do not have access to detailed financial aid records across our full sample period, we can identify whether a student was eligible for a Pell grant when they first enrolled at SFSU. In our estimation sample, approximately 41% of the undergraduates were eligible for a Pell grant. We choose this group as our focus, as Pell-eligible students represent the lowest income bracket, a group of students who we would expect to find the increased cost of retaking a course before the policy change to be the

most burdensome.[3] The policy at SFSU is representative of the other Cal State University System campuses at the time, which is the largest public university system in the United States. More broadly, this is also in line with course repetition and grade forgiveness policies at many other institutions in the U.S, and public institutions in particular. In 2022, approximately 90% of public universities allowed for course repetition for non-failing grades.[4]

We estimate a difference-in-differences model comparing Pell grant eligible students to a comparison group composed of either the rest of the student body, all other aided students, or all non-aided students, to examine how the change in federal financial aid policy impacted student outcomes. For students that receive a D grade on their first attempt at a course, the policy change now allowed for repeated coursework to be eligible for federal financial aid. This should increase the probability of repeating coursework relative to students that receive an F grade (for whom repeating was always eligible under federal financial aid policy).

Our findings indicate that Pell-eligible students that originally received a passing grade of a D+ or below (D- to D+)[5] were significantly more likely to repeat a course following the change in financial aid policy. For these students, they were roughly 3 percentage points more likely to repeat a course after the change in federal financial aid policy, using our preferred specification, which corresponds to a roughly 14 percent increase in course repetition for this group. We also find evidence that the numbers and types of courses taken were impacted by the policy, increasing the probability that Pell-eligible students took courses with traditionally high-failure rates, and increasing the number of attempted and earned credit hours. However, this did

[3] Although this is meant to capture the group of students with the lowest income levels, we may miss some students who were unable to file the FAFSA due to its complexity or for other reasons but are also low-income. However, this is likely a very small portion of our sample, given that almost 80% of the student population at SFSU receives some form of aid.

[4] This is based on data collected by the authors on course repetition and grade forgiveness policies at four-year non-profit institutions in the U.S. Data are collected from individual institutional records and policies.

[5] Henceforth we will refer to "D" grades as any in the D range (D-, D, D+).

not translate to an improvement in academic standing or an increase in continuous enrollment. These results suggest that the financial aid policy change in 2011 led to substantial behavioral changes for Pell-eligible students, but little improvement in Pell-eligible student's longer-term enrollment outcomes.

This paper contributes to the literature in several ways. First, we add to the scant literature on course repetition by examining how increased access to repeated coursework can impact educational trajectories. Typically, changes in grade forgiveness policies impact the entire student population at an institution once they go into effect. This makes a causal analysis difficult as no clear comparison group exists. A working paper by Jiang et al. examining a university wide course forgiveness policy found that following the policy change allowing courses to be repeated and grades forgiven, students were significantly more likely to repeat, particularly in typically low-grading fields (Jiang et al., 2021). The policy change studied in this paper allows us to compare within one institution how improving access to course repetition to a subset of students by reducing costs impacts course-taking behavior and academic success.

Second, we add to the literature on impacts of access to need-based financial aid by examining impacts on the intensive margin of a small policy change. This literature has shown us that financial aid availability can have strong impacts on college outcomes (see Nguyen et al., 2019 for a meta-analysis of the literature). Availability of Pell grants for low-income students improves graduation outcomes and future labor market earnings (Denning et al., 2019). An increase in need-based financial aid has been shown to increase persistence of students into their second year of college and has been associated with earlier graduation for low-income students (Singell, 2004; Denning, 2019). Similarly, merit-based aid has been shown to increase graduation outcomes by decreasing time to degree (Scott-Clayton, 2012).

Although our results are from one institution alone, our results also help us speak to the ways in which the federal financial aid policy change may have altered the educational trajectories of academically marginal students. Increasing college degree completion for marginal students, such as those that may be more likely to receive a low-grade in a college course and then retake the course as we study here, can have important consequences for labor market outcomes (Ost, Pan, & Webber, 2018). Past research has also shown that grades earned early in the college career can impact students' probability of continuing in college, both through grade minimums and as signals of potential to succeed (Stinebrickner & Stinebrickner, 2014 & 2012). Additionally, early grades in college signal to students their abilities in certain subjects, steering them towards or away from certain majors, and these effects can differ by gender (Stinebrickner & Stinebrickner, 2014; Rask & Tiefenthaler, 2009; Rask, 2010). Together, this body of work suggests that grades received in courses taken in the first couple of years of college can have very important consequences for future college attendance and major choice. Therefore, if a change in financial aid policy impacted the ability to improve grades through repeating a course, we might expect longer term effects as well.

This paper proceeds with a description of our data and methods, a discussion of the results, and finally the conclusion.

III. Background

The California State University system introduced a system-wide minimum standard for grade forgiveness and course repetition with an executive order (EO-1037), effective with the Fall 2009 academic term. Under the executive order, undergraduates were allowed to repeat a course if they earned a C- grade or lower. An overall limit of 40 units could be repeated, where

up to 16 units could be repeated with grade forgiveness, and up to an additional 24 units could be repeated with grade averaging. Universities in the CSU system were given the discretion to choose more restrictive policies but could not be less restrictive than the policies outlined in the executive order.

The Academic Senate at San Francisco State University chose to adopt a more restrictive course repetition policy, as did many of the other CSU campuses. Students could repeat up to 28 units of coursework if they earned a grade of C- or lower for courses taken at SFSU in Fall 2008 or later. All grade attempts would be used in GPA calculations (SFSU F08-248). The repeat policy was amended to allow for 16 units of grade forgiveness for coursework completed in Fall 2017 or later, in which the lower of the two grades would be forgiven (SFSU F16-248).

Prior to the 2011-2012 academic year, students were not eligible to receive federal financial aid for retaking coursework to replace any credits earned previously in a course. Additionally, any repeated coursework would not be included when determining enrollment status and satisfactory progress (U.S. Department of Education 2010). Under these restrictions, students who repeated coursework would have to pay for the credit hours associated with the repeated coursework, as well as ensure that they were taking enough additional credit hours to ensure satisfactory progress. On the other hand, there were no restrictions on repeating coursework if the student did not pass the course (had not earned credits). Starting in Fall 2011, the federal aid handbook was changed with respect to course retaking. Students were now allowed one repetition for courses which they had previously passed. There was no restriction placed on the number of courses that could be repeated (U.S Department of Education 2011).

IV. Data

To examine how the federal financial aid policy change in Fall 2011 impacted students' educational trajectories, we use administrative data from San Francisco State University. Our sample begins with undergraduates who started in the fall semester of 2008 and extends through spring of 2016. This sample restriction allows us to focus on the time period when the course repetition policy was constant at SFSU, while the federal financial aid policy changed in 2011. We restrict our sample to freshman admits observed over their first five years in school and transfer students observed over their first three years at SFSU. The data include student characteristics such as gender, race/ethnicity, SAT scores, high school GPA, and Pell eligibility at matriculation. This is then linked to transcript files on each course taken by the students in the sample and the grade received. The SFSU student population is of particular relevance for this question as the student body has a very high representation of low-income and minority students. Our descriptive statistics at the student-term level are shown in Table 1 for the full sample as well as for sub-samples by aid status. We also display summary statistics at the student course level (our main level of analysis) in Table 2.

As can be seen from column (1) of Table 1, roughly 41% of the sample are Pell Grant eligible students, and 30% are first-generation students. We define students as Pell Grant eligible if they were eligible to receive a Pell Grant, based on family income requirements, in their first semester at SFSU. Although some students on the margin lose their eligibility for the Pell grant while enrolled and others gain it, most do not experience changes in Pell eligibility. The majority of Pell-eligible students (79%) remain Pell-eligible while enrolled. Similarly, only 15% of non-Pell eligible students become Pell-eligible. Therefore, this distinction allows us to focus

on the lowest-income subset of our sample.[6] Descriptive statistics for the Pell eligible and non-Pell eligible are shown in columns (2) and (3) respectively. We are also able to break our non-Pell eligible sub-sample into two groups: those that receive financial aid but are non-Pell eligible (column 4), and those who do not receive any aid at all (column 5).[7] The difference in family income across our sub-samples is obvious from the statistics on expected family contribution, showing a close to $2000 difference in EFC between the Pell-eligible (column 2) and non-Pell eligible (column 3). Of the non-Pell eligible, the non-aided students (column 5) have the highest EFC, as would be expected, roughly $2500 more than the average for the Pell-eligible sample. Additionally, in the non-Pell sample (column 3), the average Pell grant received is only $583 as most students in this group are not receiving any Pell amount, despite a few becoming Pell-eligible for a term or more after matriculation. In contrast, the students Pell-eligible at matriculation receive an average Pell grant of $3520. Within the Pell-eligible sample, 47% of the students are first-generation, while only 18% of the non-Pell sample is first-generation (and only 15% of those not receiving aid). The whole sample is slightly more female than male at 58% as we see at many colleges and universities.

Additionally, SFSU has a high representation of racial and ethnic minorities. Our sample is only 26% White. As we saw with first-generation status, the Pell eligible sample is less White with only 17% of this sub-sample identifying as White. SFSU is not a highly selective institution in terms of test scores and this is reflected in the SAT verbal and math scores as well as the high

[6] In what follows we define students as Pell Grant eligible using their status at matriculation because we do not have access to their term level eligibility for the entire sample period.

[7] More detailed financial aid data was available starting in 2010, whereas the enrollment data was available starting in 2008. Students who did not apply for aid during the years where we have the more detailed data are assumed to be unaided. International students are assumed to be unaided (ineligible). In the years where the detailed financial aid data is unavailable, we match students to their future aid data. They are considered aided if they ever received financial aid. Most students do not switch in and out of aided status (a student who ever received aid will be aided for an average of 88% of the time they are enrolled. We do not include students who cannot be matched to the more detailed aid data (those who enrolled between 2008 and 2010 and left the university before 2010).

school GPA averages. The average SAT scores are both roughly 500, and the high school GPA average is around a B average. Although both SAT score averages are lower in the Pell-eligible sample than the non-Pell sample, the high school GPA average is slightly higher for the Pell-eligible sample.[8] We can also see that of the non-Pell eligible students, the aided sub-sample in column (4) is more similar on demographics and test scores to the Pell-eligible sub-sample than is the non-aided sub-sample in column (5).

The statistics in Table 1 also illustrate the salience of a course repetition policy at SFSU. On average, 13% of the students in our sample receive a D grade in at least one course and an additional 12% receive an F in a given term, with both numbers slightly higher for the Pell-eligible sample. In fact, almost half of the students (47%) at SFSU accumulate at least one D or F grade over the course of their undergraduate career. There is also a high rate of course repetition, with on average roughly 8.2% of students in a given term retaking a course they have already attempted at least once. The retake rate is higher for Pell-eligible students at 9.1%. The D grade threshold is important, as many entry courses to majors have a C- minimum grade for the course to count towards the major and for the student to continue to higher-level courses. We also show below that despite being eligible for course repetition, very few C- recipients retake a course and most repetition occurs for students receiving Ds and Fs on their first attempt.

The majority of students in our sample that receive a D+ or lower do so in the first 4 semesters of their time. This is due to a combination of reasons. First, the types of courses in which students most often receive a low grade are the "gateway" courses to fields, which are mostly taken by students in their first two years of college. Second, students that receive a low grade in many courses in a given term tend not to progress and may dropout before their third or fourth year of enrollment. As a result, we see that 24% of all courses in the D/F range in our

[8] Note: all means in Table 1 are significantly different between the Pell and non-Pell eligible samples.

sample are for the first term, 23% in the second term, 17% in the third and 15% in the fourth term for a cumulative total of 79% in the first 4 semesters[9]. The high levels of attrition also likely contribute to the low four-year graduation rate in our sample. For first time freshmen, the graduation rate within 4 years at SFSU is 15%. These statistics highlight the importance of understanding whether course repetition policies can increase degree attainment by improving student retention and academic progress.

In Figure 1 we first display average course repetition trends by term separately for all students receiving a C-, D or F grade on the first attempt, including a vertical line indicating the timing of the policy change in Fall 2011. As we see in Figure 1, course repetition rates are relatively constant and close to 0 across the sample period for students earning a C- in a course on their initial enrollment. For students receiving a D or F grade, there is an upwards trend in the pre-period, followed by a general downward trend in the post-period. However, this downward trend appears to be less steep for those receiving a D than those receiving an F, suggesting that the financial aid policy change in 2011 may have dampened this downward trend for these students. Importantly, it is clear from this figure that almost all the movement in course repetition is occurring within the sub-sample of students receiving a D or F grade. For this reason, and due to the importance of the D/F threshold for required courses, we will focus our analysis on this sub-group.

We show course repetition rates over time by Pell Grant eligibility (our treated group for our analysis) for students initially receiving a D or F grade separately in panels A and B of Figure 2. For students initially receiving a D grade, we see a gap appear between repeat rates for Pell and non-Pell students at the time of the policy change although repeat rates again converge two years after the policy change, whereas in panel B we see no evidence of trends separating for

[9] Results available on request.

students initially receiving an F grade, or if anything lower retake rates for Pell grant students receiving an F. This is what we might expect, as the F grades were always repeatable with full financial aid coverage, but D grades while repeatable were not eligible for financial aid coverage until fall of 2011.

In Figure 3 we show term level outcomes over time by Pell-eligible status. In panel A we show an indicator of course repetition. In the pre-policy change period, we see very similar rates of course repetition for Pell and non-Pell eligible students. However, a gap appears in the policy year and this gap between repetition rates for Pell and non-Pell students remains over the study period. In panel B we show the proportion of Pell and non-Pell students in good academic standing (GPA 2.0 or higher and not on academic probation in a given term) over the study period. Here we see a large gap in the pre-period that begins to narrow and is almost eliminated by the end of the data period. However, despite an increase in the academic standing of Pell-eligible students after the policy change, in panel C we do not see strong evidence that the proportion of Pell-eligible students continuing their enrollment into the following term increased following Fall 2011.

As could be seen in the term-level descriptive statistics and figure, there is a high prevalence of lower grades and repeated coursework in our sample. In Table 2 we report summary statistics at the student course level to further illustrate these patterns. In Column (1) the statistics for the full sample indicate that roughly 2.6% of the student-course observations in our sample result in the course being repeated. However, when the sample is restricted to those receiving a D+ or below on the first attempt, this jumps to over 22%. In columns (3) and (4) we further subsample the group of students that received a D or F on the first attempt by whether the student repeated the course or not. While repeaters are slightly more likely to have received an F

than a D the first time around, this split is very similar for the non-repeaters as well. We also see some difference in student characteristics across these sub-samples. Although Pell-eligible students are more likely to receive a lower grade on the first attempt, they are similarly likely to repeat the course or not over the entire sample period. However, female students are a smaller percentage of the D/F sub-sample than overall and make up a larger percentage of the non-repeating sub-sample than the repeaters. Minority students are a larger percentage of the D or below recipients, and more likely to retake a course once receiving a grade in this range. Not surprisingly, students who receive a D+ or below are more likely to be on academic probation two semesters later than the full sample. However, we also see that although students in this grade range are less likely to still be enrolled two semesters after receiving the low grade (Column 2), the repeaters (Column 3) are significantly more likely than the non-repeating sample (Column 4) to still be enrolled. This suggests that the ability to retake a course in which one originally earned a low grade could be beneficial for keeping students enrolled.

Also, it is important to consider that lower than expected grades in a given semester in one course may not happen in isolation and we are likely to see multiple low grades in one term, which could compound effects. Among the students with at least one D or F grade, roughly 30% have more than one class with a D+ or below. Many of these students receiving at least one D or F grade then go on to a second attempt of these courses. When they do, the next attempt is often successful at improving their grade. On average, the second attempt grade increases by roughly 1.5 grade points. Important for many gateway courses in which there is a minimum grade requirement in order to continue, 73% of the students who originally receive a D or F grade and retake the course get a C- or better on their second attempt. These statistics suggest that for many students, the grade of D+ or below on the first attempt was not necessarily a signal of their

ability to succeed in the class but might instead reflect an idiosyncratic negative shock. Particularly so for those students who receive more than one D or F in a given term. Further evidence of this is provided in Appendix Table A1, where we separate the sample by SAT tercile. Although students in the bottom tercile are more likely to earn a D or F grade in a given term, there is still a very high percentage of the students in the top SAT tercile that earn grades in this range (12% earn at least one D and similarly 12% earn at least one F). As the ability to retake a course appears to have positive effects on grades for students of all ability levels experiencing a low grade in a course initially, it may improve students' chances of remaining in good academic standing.

VI. Estimation Strategy

The descriptive evidence presented above suggests that the federal financial aid policy change in fall of 2011 could have led to a change in course-retaking behavior of Pell-eligible students in line with the predictions of our conceptual model. To examine the impact of the policy more rigorously, we estimate a series of difference-in-difference models. Although the policy affected all students eligible for federal financial aid, we focus on Pell-eligible students for two reasons. First, the group of students receiving any type of federal financial aid is quite broad at SFSU (over 80% of the student body). Second, we suspect that Pell-eligible students would be the most impacted by this policy change. These students have the highest level of financial need and therefore likely face the highest constraints on their time and finances. Therefore, the ability to count a repeated course towards their financial aid covered enrollment would constitute a meaningful change for these students.

We first test the hypothesis that the policy change should have increased course repetition for Pell-eligible students using Equation (1). We estimate Equation (1) with student-course level data, where Y is an indicator for whether student *i* retakes course *c*, taken during term *t* of year *y,* within 2 semesters of the original attempt. We restrict the retake window for a few reasons. First, in our sample, over 87% of students that earn a D+ or lower in a course and go on to repeat it do so within 2 semesters of the first time taking it. Secondly, retaking a course within a shorter time frame is more likely to contribute to timely academic progress.

$$(1) Y_{icty} = \beta_0 + \gamma_1 Pell \times Post_{ity} + \gamma_2 (C-) \times Pell \times Post_{icty} + \gamma_3 D \times Pell \times Post_{icty} + X_{icty}\pi + \delta_c + \theta_y + \lambda_t + \eta_i + \varepsilon_{icty}$$

In our course repetition model, we include student fixed effects (η_i), course fixed effects (δ_c), year fixed effects (θ_y), and a fixed effect for term (fall or spring) (λ_t). To examine the impact of the policy change we include an interaction between an indicator for whether student i is Pell eligible in the first term we see them in our data and an indicator for the post policy period (Fall 2011 and afterwards). We then add an additional set of interactions of the Post and Pell-eligible indicators with indicators for whether the student initially received a C- or D grade in the course.

We first estimate this model of course repetition on the subset of students that received a C- or below on their original attempt. The change in federal aid policy should have had no impact on those originally receiving a C or better, as they were not eligible to retake the course under university policy in either the pre or post periods of our data. In this specification our comparison for our third-order interaction terms are those students who received an F grade on their initial attempt, as the change in federal financial aid policy had no impact on these students, who were always eligible to retake the course with financial aid coverage. We also include

controls for the initial grade received in the course (indicators for C- or D grades respectively) and pairwise interactions of these with both our Pell-eligible indicator and an indicator for the Post policy change period in X_{icty}. Our coefficient of interest is γ_3, which captures the causal impact of the change in federal financial aid policy on the probability of repeating a course for the treated Pell-eligible students who receive a D grade on their initial try.

We next further select our sample to those who received a D or F grade on the first attempt, as we have shown above that this is the grade range where the majority of course repetition occurs. This is still a very significant group of students, as almost half of this population earned at least one D or F grade. For all models, the standard errors are clustered at the student level.

We include student fixed effects to capture any factors that do not vary within a student over time that might influence their probability of repeating a course. As was seen in our descriptive results, students that repeat courses are observably different from those who do not, and therefore are likely different in unobservable ways as well. If these differences are correlated with Pell-eligible status, that would bias our estimates. Student fixed effects allow us to control for these characteristics and isolate the impact of the policy. Therefore, our main source of identifying variation is from observing students receiving repeatable grades of C- or below both before and after the policy change. Within our sample we have 12,893 student-course observations that meet this criterion, 20% of which are transfer students. For the students who met this criterion, we see the bulk of observations are in a plus/minus three-year window around the cutoff. This is by design because we only look at initial course attempts in the first five years of enrollment. More specifically, students in our student-course level analysis sample receive 3.6 Ds or Fs on average (over the sample period) and average a total of 1.6 Ds. These statistics also

further illustrate that receiving a low grade is a common outcome at SFSU, and in fact many students are receiving multiple D or F grades, either in the same semester or in multiple semesters.

Next, we examine the behavioral responses of students to the financial aid policy change. We must consider that there may be a certain degree of moral hazard generated by this policy, which can lead to ambiguous predictions for longer run academic outcomes. The ability to repeat coursework provides a form of insurance against low grade point averages (GPA), which may lead to a decrease in effort on the original attempt, resulting in lower grades on the first attempt and more "D" grades in particular. We first examine how effort, and resulting grade received on the first attempt, was impacted by the policy change. We accomplish this by estimating Equation (2) using student-course level data:

$$(2) Y_{icty} = \beta_0 + \gamma Pell \times Post_{icty} + \delta_c + \theta_y + \lambda_t + \eta_i + \varepsilon_{icty}$$

where Y_{ict} is either the course grade received on the initial attempt, or an indicator of whether the grade received as a C- or below, a D or F grade, or a D grade respectively. As with equation (1) we include course, year, term, and student fixed effects and cluster our standard errors at the student level. If there is evidence of moral hazard, we would expect γ to be negative when examining overall course grade, as students may reduce effort, knowing that they are able to retake the course. More specifically, we might expect this type of moral hazard to increase the proportion of students that receive a grade between C- and D- (the range that is now covered by the grade repetition policy but was not previously).

Next, we explore the impact of the policy change on longer-term outcomes to investigate other behavioral responses to the policy. We estimate Equation (3) below using term-level data to examine whether the policy change had any impact on broader measures of student success.

(3) $Y_{ity} = \beta_0 + \gamma Pell \times Post_{ity} + \theta_y + \lambda_t + \eta_i + \varepsilon_{ity}$

where Y_{ity} is an indicator for one of the following: whether the student *i* is currently repeating any courses in term *t* and year *y*, whether student *i* is on academic probation in term *t* and year *y*, or if student *i* who is currently enrolled in term *t* and year *y* continues to be enrolled at the university in the following term. We include year, term, and student fixed effects and cluster standard errors at the student level. Additionally, we use equation (3) to test whether the policy change affected course-taking behavior. For these estimations we include as the Y variable credit units attempted, credit units earned, and the GPA for student *i* in term *t* and year *y*. One might expect that if the course repetition covered by financial aid works as an insurance against bad outcomes, we might see that students of all ability levels may attempt more classes, taking a chance that they do not complete these extra units.

We also estimate a set of term-level models to examine whether students shifted their behavior by taking courses in different fields after the policy, focusing on fields with traditionally high-failure rate courses and high payoffs in terms of expected future salaries. Students may be incentivized to take more risks with respect to their course enrollment choices, knowing that the financial cost of retaking has been lowered. In particular, we estimate equation (3) where Y is an indicator for whether the student *i* is taking any STEM, Business, or "roadblock" course in term *t* and year *y*. We define a "roadblock" course as one in which the rate of D or F grades awarded is above the median for courses in our sample period. Many of these courses are in STEM and Business fields, but there are also other, mostly introductory level "weed-out" courses with high failure rates in the arts and sciences as well. Pell-eligible students might be more likely to take courses where the risk of a lower grade is high after the policy change, as the cost of retaking coursework has decreased.

We investigate heterogeneity by student ability by estimating equation (3) including additional interactions of the Post, Pell-eligible, and PostXPell indicators with student ability, as measured by tercile of SAT score at matriculation. Ex ante it is unclear which group responds more to the increased availability of course repetition. Compared to low ability students, high ability students are more likely to successfully retake a course if needed but are less likely to find themselves in a position where they need to retake a course.

Our base models include all Pell-eligible and non-Pell eligible students in our sample, therefore setting non-Pell eligible students as the comparison group in our difference-in-differences framework. However, more than 50% of these students also receive other forms of federal financial aid, despite not being eligible for Pell Grants. Therefore, the policy change may have influenced their course repetition behavior as well. Ideally, we would want a comparison group that is entirely unimpacted by the policy change. However, this group, the unaided sample, is a smaller group of students at SFSU, limiting our sample size if used as the comparison group. It could also be argued that these students are not as similar to Pell-eligible students as other aided students might be given the statistics shown in Table 1, and therefore would not provide the appropriate comparison.

To address these questions, we estimate equation (1) on 3 separate samples, effectively using 3 different comparison groups. The first comparison group is all non-Pell eligible students in the sample. The second restricts to only students who receive some type of financial aid, resulting in a comparison group of aided but non-Pell eligible students. Finally, our third comparison group consists of students who are not eligible for financial aid, therefore excluding aided but non-Pell eligible students from our estimation sample. We might expect that if the policy does have an impact, we may find more muted effects when we use only other aided

students as the comparison group, due to spillover effects. However, the largest impact should still be felt by the lowest income students, for whom the reduction in the price of retaking a course with the new financial aid coverage would be a significant amount. In contrast, we expect that effects may be the largest when compared to the non-aided group. We report results of all 3 groups to show consistency and sensitivity of our results to the comparison group used.

An important assumption of the difference-in-differences model in this setting is that there are parallel trends for the treated and comparison groups in the pre-period. We estimate event-study versions of equation (1) and equation (3) with included lags and leads for each time period prior to and post to the Fall 2011 policy change, interacted with the Pell-eligibility indicator as well as the higher-level interactions of Pell and grade received initially for equation (1). Our results are shown in Appendix Tables A2 and A3 for all three comparison groups described above. We also display the results for the all non-Pell comparison group (column (1)) in Figures 4 and 5. There are no significant pre-trends in either of the samples used (C- and below or D+ and below) to estimate course repetition using equation (1) with course-level data.

As a preview of our main results, we do see that course repetition jumps up in the first post-policy change period, although this jump starts to shrink slightly 4 terms after the policy change. In Figure 5 we have mixed results regarding the presence of pre-trends. When examining course repetition at the term level and academic probation, we see no evidence of pre-trends. However, in the third panel of Figure 5, the pre-policy year coefficients for continuous enrollment follow an irregular pattern (sometimes negative and sometimes positive). Therefore, although we will show results for whether the policy impacted continuous enrollment, it does not appear that they will represent causal impacts. In contrast, the remaining results, paired with the

evidence provided above regarding other threats to the validity of the difference-in-differences estimates assure us that all assumptions are met for the other outcomes of interest.

An additional concern with the use of the difference-in-differences model is that there may be other changes occurring at the same time, that could impact student's course repetition behavior. However, during the period under study there are no other major policy changes at the institution level that could impact course repetition, outside of the federal financial aid policy change. Additionally, we do not see any changes in student demographics around the policy change timing. Figures plotting term-level student demographics for our study period are shown in Figure A1. These figures indicate that the student population was very similar before and after the policy change in the fall of 2011, therefore any changes that we see in course repetition should be a function of the policy rather than of differences in the types of students enrolled over the study period. Importantly, any other large institutional or national changes that might affect course repetition would affect both the treated and comparison groups, as there were no other targeted policy changes during this time period. A threat to identification of the difference-in-differences estimates would be another change that differentially impacted the Pell-eligible sample. However, there are no other changes the authors are aware of occurring at this time that would have this effect.

VII. Results

Our first set of results, shown in Table 3, investigate whether the availability of federal financial aid for repeated coursework beginning in fall of 2011 led to an increase in course repetition for Pell-eligible students[10]. In the first three columns we limit our sample to all

[10] As mentioned above, we define students as Pell Eligible if they are eligible for a Pell grant upon initial enrollment at SFSU. We also estimate the model using current Pell eligibility in a given term, but the sample available for this

students eligible to retake a course, that is all students that received a C- or below on their initial try. We show the results of estimating equation (1) with our three separate comparison groups. In column (1) we include all non-Pell students, in column (2) we include only aided students, and finally in column (3) we use the non-aided students as our comparison group. Students receiving an F were always eligible to retake the course with financial aid coverage throughout the sample period, so we expect if there was any impact it would be found for the Pell-eligible students who received a C- or a D grade.

In columns (1) – (3) the impact of the policy change for students receiving a C- grade is small in magnitude and not significantly different from zero. For Pell-eligible students who received a D grade on the first attempt, there is no statistically significant effect of the policy change when using the non-Pell sample (column 1) or the aided sample (column 2). Both comparison groups contain students who are affected by the policy to a certain degree, so there may be spillover effects. In contrast, when non-aided students are used as a comparison (column 3), the effect is a 3 percentage point increase in the probability of repeating and is significant at the 10% significance level.

We restrict the sample further to students who received a D or F grade on the initial attempt in columns (4)-(6), as we saw in the figures above, students receiving a C- initially are very unlikely to repeat a course throughout the sample period. The estimated effects for students earning a D grade range from 2.8 percentage points using non-Pell students as the comparison group to 3.1 percentage points using non-aided students as the comparison group. The estimated effect using aided students as the comparison remains statistically insignificant. As a further robustness check, we estimate equation (1) without student fixed effects in Appendix Table A4

is much smaller due to data constraints. Our results suggest a smaller, insignificant coefficient in this specification, but the coefficient on the interaction term remains positive.

and confirm the absence of pre-trends for this version of the model in Appendix Table A5. The estimated effects for students earning a D grade are significant when using the non-aided comparison group and are similar in magnitude to our results with student fixed effects.

Our results thus far have indicated that the small change in financial aid eligibility as applied to repeated coursework significantly increased course repetition for Pell-eligible students by an economically meaningful amount. In Table 4 we investigate whether this policy change impacted the effort level of students on the first course attempt, using course-level data.[11] Our conceptual theory suggests that students that may have originally received a low C grade may decrease effort when the policy is in place, earning a D grade instead which is now repeatable with financial aid. Additionally, if students are taking more risks in their course choices (by enrolling in lower-grading classes), we may also see lower grades earned after the policy change. In column (1) of Table 4 we see that in the post period, Pell-eligible students earn significantly lower grades, although this impact is quite small and not enough to move a student across a grade threshold on average. In columns (2) and (3) we focus on the probability of earning a C- or below, or a D or F grade, finding a very small, but statistically significant increase in the probability of earning either outcome.

In Column (4) we restrict the sample to those who received a D or F and estimate the probability of receiving a D grade. When we focus on the D grades in column (4), the grades that are newly eligible for repetition for students on financial aid, we see no significant impact, and a negative coefficient, indicating that although grades are decreasing, there is not a specific increase in D grades, which are now repeatable. Instead, these results are more consistent with the idea that in the post-period Pell-eligible students took more risks in their course-taking

[11] We find similar results when we estimate these models using the other two comparison groups (aided, non-aided).

choices, with a result of slightly lower grades overall. This finding also confirms that focusing on the group of students receiving a D grade on the first attempt is not a problem for our models above, as there does not appear to be policy-induced selection into this group.

Theory suggests that making students eligible to cover repeated courses in which they received a passing grade initially with federal financial aid will allow students to improve their educational outcomes and standing, and to persist in college. We test this implication using term-level data and display our results in Table 5, displaying results for each of the 3 comparison groups in Panels A, B, and C respectively. In the first column of Table 5 we replicate our findings regarding the impact of the policy change on course repetition for Pell-eligible students at the term level. We see a positive and significant impact in all 3 panels, with the probability of a Pell-eligible student repeating a course in a given term increasing by roughly 1.6 percentage points in the post-period. Note, this model asks a different question than those estimated previously, as we are no longer examining the question at the course level where we examined the probability of repetition of a given course in a subsequent semester. Here we are merely examining whether a student is retaking any coursework in which the initial grade was a D or below, in a given semester.

In columns (2) and (3) we repeat this analysis focusing on whether a student is on academic probation in a given term or continuously enrolled in the following term. Despite our finding from Table 4 that course grades are significantly lower in the post-policy period for Pell-eligible students, we see little to no impact on the probability that a student is on academic probation in the post-period, save a small negative impact when we use the Aided comparison group in Panel B. This result indicates that although one argument in favor of course repetition policies is to help students experiencing low grading outcomes to return to good academic

standing, it appears that net effects are very small or zero. In the final column we see mixed evidence on the impact of the policy on continuous enrollment for Pell-eligible students. The coefficients are not consistent across the 3 specifications. Combined with the evidence of pre-trends for this outcome, we do not place much weight on these results. Overall, we do not have strong evidence that this policy change allowing increased access to course repetition for lower-income students has any impact on whether students stay in school longer, and perhaps to complete their degree.

We examine the behavioral effects more directly in Tables 6 and 7, first focusing on the policy impact on units attempted, units earned, and cumulative GPA with results shown in Table 6, again with the results using the 3 comparison groups as separate panels. In Column (1) we see that in the post period Pell-eligible students attempted roughly $1/6^{th}$ more academic units. This effect goes to zero with the all-aided comparison group but grows in Panel C to $1/3^{rd}$ of an academic unit when the non-aided comparison group is used. We see a similar, but slightly smaller impact on earned units in column (2). This suggests that as a result of the increased access to course repetition, lower-income students are taking more courses, although potentially not all of these new credits are earned, consistent with our findings in Table 4 regarding grades earned, as well as total GPA earned, as shown in column (3). Pell-eligible students earn GPAs roughly 0.05-0.08 grade points lower in the post period. This suggests students may be making more risky choices by taking courses with a higher probability of failure or a low grade, knowing that they can now repeat the course.

This shift in course-taking behavior in response to the policy change may also change the patterns of types of courses taken. Some fields, such as STEM and business, are known for their low-grading outcomes in introductory courses, primarily used as a weed-out mechanism. In our

sample, 10-11% of students in a STEM or business class receive a D or F grade. In contrast, only 7% of students in non-STEM, non-business classes receive a D or F grade. We might expect that with the repetition policy now available to Pell-eligible students, we might see an increase in course-taking in these fields in which grading outcomes are riskier, especially given the potential payoff to a degree in STEM or business (Webber, 2016). We examine this possibility in Table 7. In the first column we examine the probability that a student is enrolled in a STEM class of any kind or level in a given term. Similarly, in columns (2) and (3) we look at enrollment in Business classes and "roadblock" classes respectively. We see a significant increase in the probability of taking each of these 3 categories of classes as a result of the policy change. Pell-eligible students are between 3 and 7 percentage points more likely to enroll in a STEM class in a given semester following the policy change. The impact on Business classes is much smaller, but still significant at a 1 percentage point increase. Both STEM and Business classes have low average grades (and high failure rates), it is unsurprising to see a similar positive impact in the last column for "roadblock" classes.

Our results show evidence that the financial aid policy reducing the cost of repeating coursework shifted initial course-taking behavior of Pell-eligible students as well. We next examine whether there is any heterogeneity in these term-level impacts by student ability level, displaying our results in Appendix Tables A6, A7, and A8. If the change in course types taken by students after the policy change is primarily due to the increased availability of the insurance provided by the course repetition policy, we might expect the higher-ability students (proxied by top SAT tercile) who a priori are least likely to receive a low grade to respond the most by taking more courses with potentially risky grading outcomes. We find evidence in support of this hypothesis; students in the top SAT tercile are significantly likely to repeat a course in which

they received a D/F grade, attempt significantly more units, but do not earn significantly more units. This results in a significant drop in their cumulative GPA, as shown in Column (6) of Table A7. This is likely due to an increase in the probability of ever taking a STEM, Business, or "Roadblock" course with high failure rates, as seen in Table A8.

Although lower-ability students (bottom SAT tercile) may be more likely to experience low, repeatable initial grades, we see a smaller and insignificant increase in course repetition for students in the bottom two terciles following the policy change. Similar to the students in the top tercile, students in the middle SAT tercile also increase their attempted units without a corresponding increase in earned units. However, students in the bottom tercile do not experience a significant increase in attempted or earned units. Again, similar to students in the top two terciles, we see in Table A8 that students in the bottom tercile are significantly more likely to ever take a STEM or "roadblock" course. For the latter set of courses, this effect is larger for the students in the bottom tercile than for those in either of the top two terciles, which may be why we see a significant drop in GPA for these students following the policy, despite there being no significant change in attempted hours. Altogether, these results suggest that the policy change allowed for riskier course choices, although the way this manifested in course types differed across the student ability distribution.

VIII. Discussion

In this paper we investigate the impacts of a fall 2011 federal financial aid policy change that allowed students to count repeat courses in which the students first received a passing grade towards their full enrollment count. We use data from San Francisco State University, which had a course repetition policy for C- and below grades on the first attempt for all students throughout

our sample period of 2008-2016. Our analysis focuses on Pell-eligible students, as they are the most likely to be constrained by the federal financial aid policy before 2011, and therefore most likely to be able to take advantage of the opportunity to retake courses after 2011. Our findings indicate that these students do increase their course repetition by between 1.5 and 3 percentage points as a result of the policy, and although significance can vary across estimations, these magnitudes are robust to the use of different comparison groups. The availability of this policy also appears to affect course-taking behavior overall. These changes result in higher attempted and earned hours, but lower average grades and GPA. This appears to be due to an increase in the probability of students enrolling in high failure rate courses and lower-grading courses overall in STEM and business.

We also find some evidence of heterogeneity by student ability in their response to the policy. Pell-eligible students in the lowest SAT tercile repeat more courses after the policy change and shift their course-taking towards high-failure rate classes, which often serve as a roadblock to entry into majors. This includes an increase in enrollment in STEM courses, which are often low grading, but have potentially high payoffs in the labor market. In contrast, the middle and top SAT tercile students show a response that indicates that the policy change functioned as an insurance policy, allowing them to explore more courses and riskier courses in terms of potential grading outcomes. This resulted in a higher number of hours attempted, although not necessarily earned, as well as an increase in the probability of enrolling in STEM, Business, and roadblock courses.

The implications for policy are therefore nuanced. For lower-ability Pell-eligible students, the increased availability of course repetition potentially opened new academic routes with potentially higher labor market returns. These results support the claims of those in favor of

course repetition and grade forgiveness type policies, indicating that the ability to retake a class can have positive impacts on the educational trajectories of some students. However, for middle to higher-ability students, we saw that the increase in availability of course repetition came with it an increase in enrollment in courses that on average award low grades, resulting in lower GPAs overall and little suggestion of positive impacts on longer-term outcomes like academic standing and enrollment.

With these findings we conclude that course repetition policies may not have clear-cut positive or negative impacts on students. However, as with most policies that change costs and benefits, we see that the shifting incentives for students with the policy change result in secondary effects beyond simply increasing course repetition itself. Institutions with or considering a course repetition policy, as well as policymakers that can impact the cost of course repetition (as with this financial aid policy) should think carefully about the student population affected, the goal of the policy, and the policy design when considering the outcomes.

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Figure 1: Course Repetition Trends

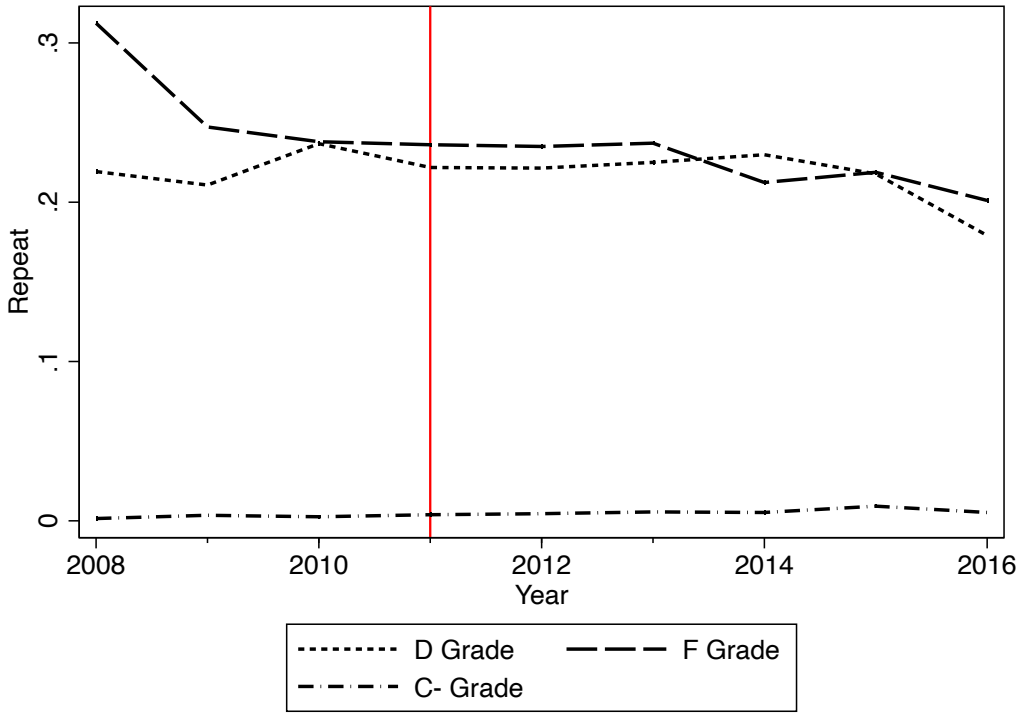

Figure 2: Course Repetition Trends by Pell Grant Status and Initial Grade

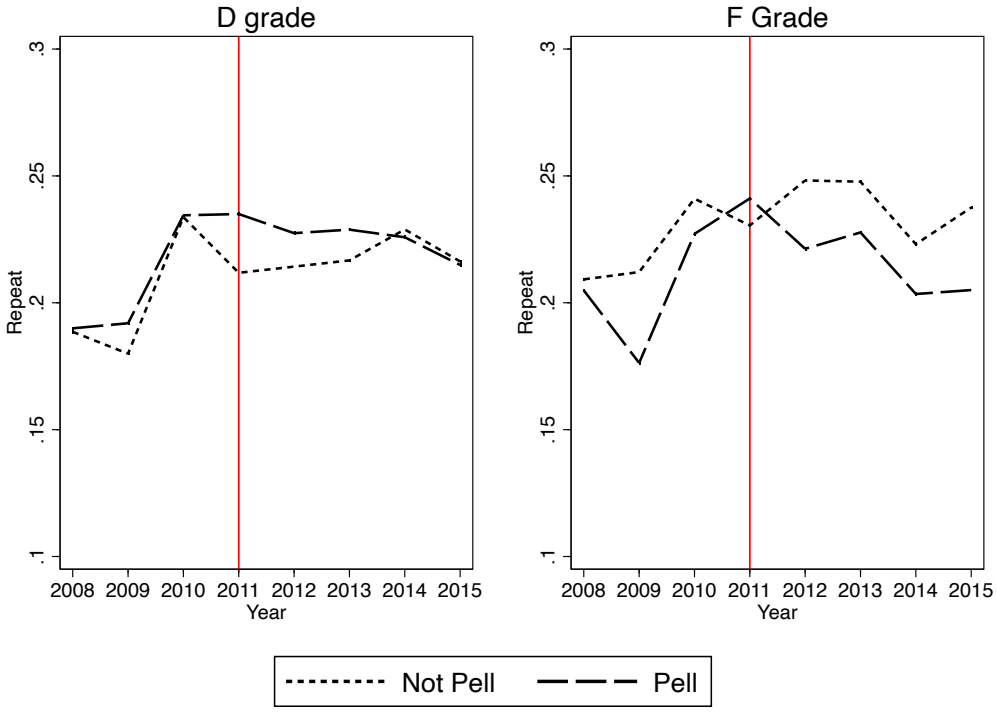

Figure 3: Term Level Outcomes by Pell Grant Status

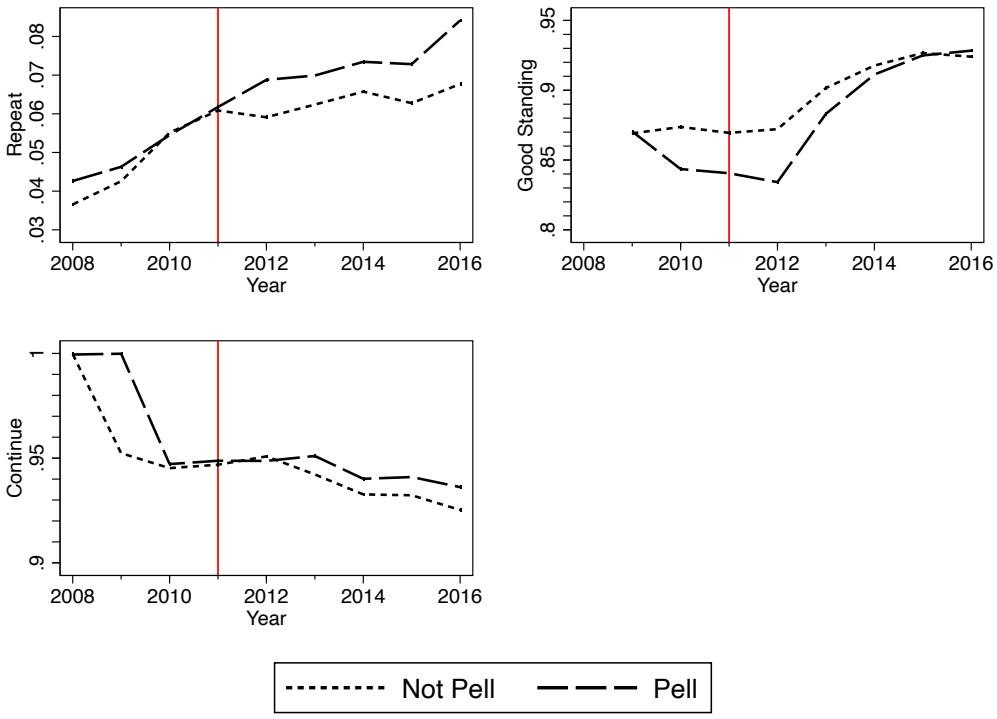

Figure 4: Course Level Event Study (Coefficients From Regressions in Appendix Table A2)

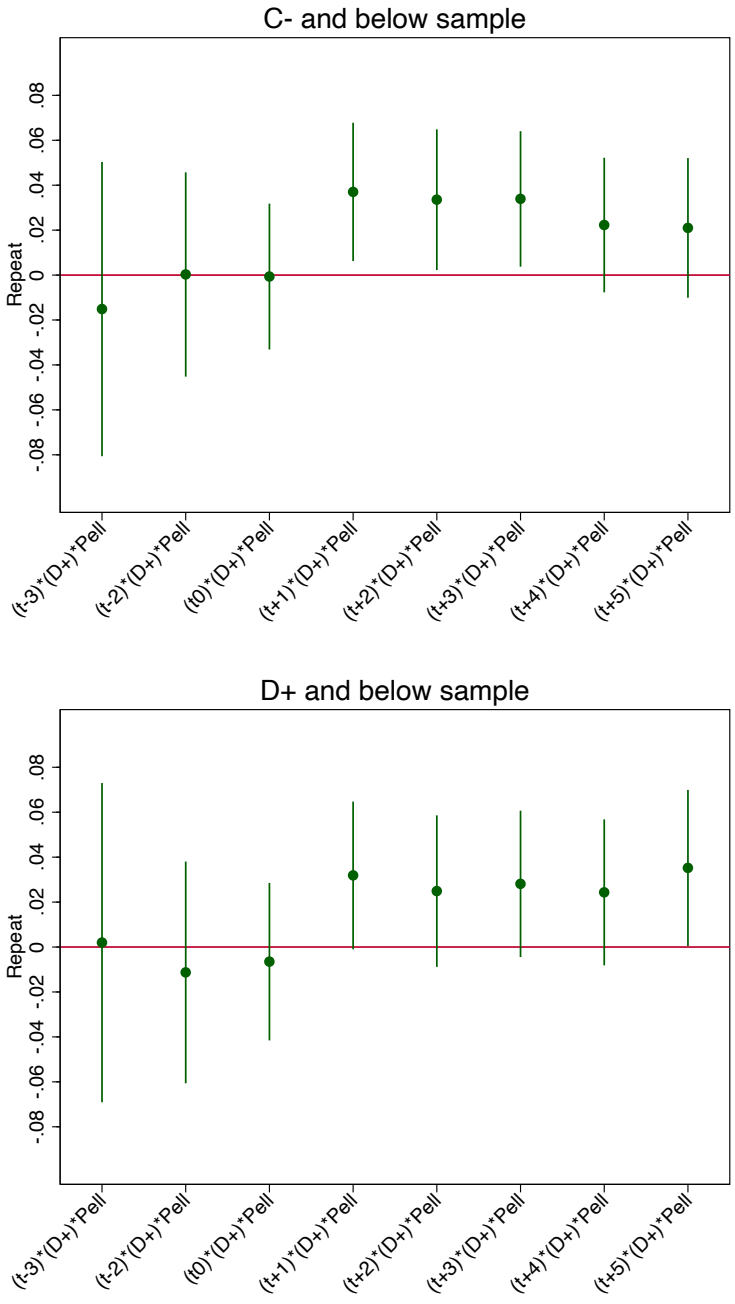

Figure 5: Term Level Event Study (Coefficients From Regressions in Appendix Table A3)

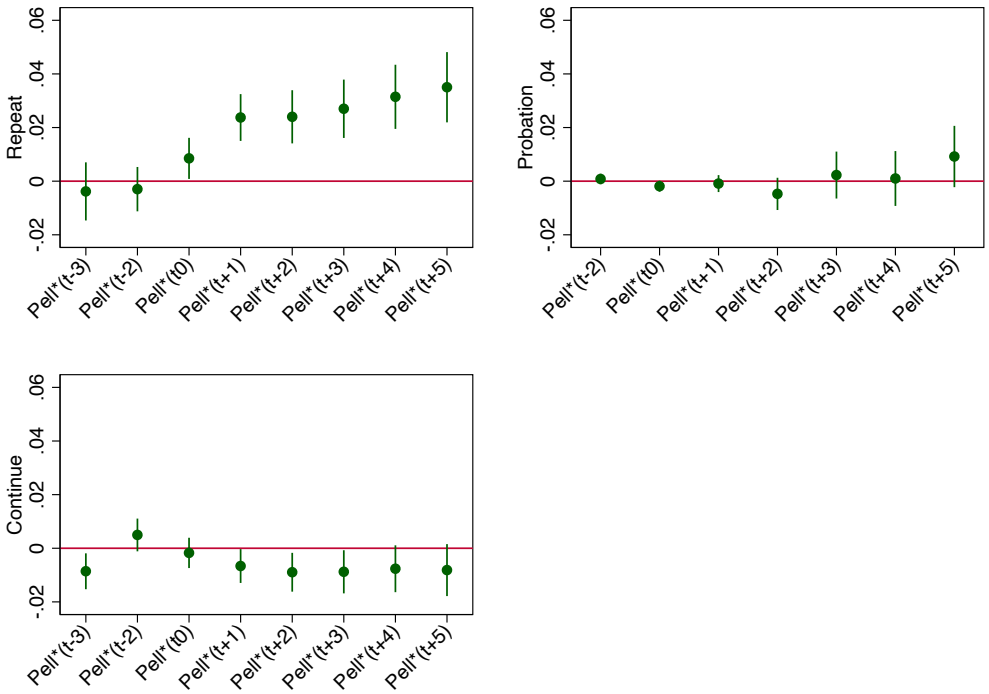

Table 1: Student-Term Level Summary Statistics

	(1) Total	(2) Pell	(3) Not Pell	(4) Aided	(5) No Aid
Pell Eligible at Admission	0.408	1	0	0	0
	(0.492)	(0)	(0)	(0)	(0)
Pell Eligible in Current AY	0.511	0.787	0.156	0.183	0
	(0.500)	(0.410)	(0.363)	(0.386)	(0)
Stafford Loan Amount in Current AY	3044.9	2800.0	3361.0	3939.2	0
	(4095.5)	(3828.1)	(4396.7)	(4514.3)	(0)
Pell Aid Amount in Current AY	2238.3	3520.4	583.0	683.3	0
	(2462.4)	(2278.0)	(1526.2)	(1631.4)	(0)
Expected Family Contribution	1125.8	284.7	2211.7	2122.5	2729.6
	(5757.2)	(1747.1)	(8361.0)	(7810.9)	(11013.9)
First Generation College Student	0.302	0.474	0.183	0.216	0.148
	(0.459)	(0.499)	(0.387)	(0.411)	(0.355)
Female	0.577	0.602	0.559	0.588	0.527
	(0.494)	(0.489)	(0.497)	(0.492)	(0.499)
White	0.257	0.165	0.321	0.290	0.354
	(0.437)	(0.372)	(0.467)	(0.454)	(0.478)
Transfer Student	0.419	0.425	0.415	0.405	0.425
	(0.493)	(0.494)	(0.493)	(0.491)	(0.494)
SAT Verbal Score	492.8	466.0	511.5	506.5	517.4
	(88.95)	(88.57)	(84.32)	(83.17)	(85.27)
SAT Math Score	503.2	483.0	517.2	509.1	526.9
	(85.85)	(85.24)	(83.42)	(83.12)	(82.75)
High School GPA	3.021	3.063	2.992	3.045	2.935
	(0.593)	(0.459)	(0.669)	(0.545)	(0.777)
On academic probation in current term	0.110	0.115	0.106	0.0982	0.114
	(0.312)	(0.319)	(0.307)	(0.298)	(0.318)
Continued enrollment (t+1)	0.946	0.949	0.944	0.958	0.928
	(0.226)	(0.220)	(0.231)	(0.201)	(0.258)
GPA in current term	2.896	2.850	2.929	2.924	2.934
	(0.892)	(0.903)	(0.882)	(0.866)	(0.900)
Earned D grade in current term	0.132	0.142	0.125	0.132	0.118
	(0.339)	(0.349)	(0.331)	(0.338)	(0.323)
Earned F grade in current term	0.118	0.130	0.110	0.114	0.106
	(0.323)	(0.336)	(0.313)	(0.318)	(0.307)
Repeating a course in current term	0.0816	0.0905	0.0754	0.0807	0.0696
	(0.274)	(0.287)	(0.264)	(0.272)	(0.254)
Observations	341590	139491	202099	105497	96602

Note: Means by student-term reported; standard deviations in parentheses.

Table 2: Summary Statistics by Student-Course

	(1) All Grades	(2) DF grade	(3) DF (repeat)	(4) DF (no repeat)
Course Grade	3.022	0.497	0.482	0.501
	(1.002)	(0.539)	(0.535)	(0.540)
D Grade	0.0363	0.479	0.466	0.482
	(0.187)	(0.500)	(0.499)	(0.500)
F Grade	0.0396	0.521	0.534	0.518
	(0.195)	(0.500)	(0.499)	(0.500)
Repeated Course	0.0255	0.224	1	0
	(0.158)	(0.417)	(0)	(0)
Pell	0.405	0.446	0.442	0.447
	(0.491)	(0.497)	(0.497)	(0.497)
First Generation College Student	0.294	0.322	0.337	0.318
	(0.455)	(0.467)	(0.473)	(0.466)
Female	0.584	0.524	0.490	0.533
	(0.493)	(0.499)	(0.500)	(0.499)
White	0.263	0.206	0.182	0.213
	(0.440)	(0.404)	(0.386)	(0.409)
SAT Verbal Score	494.7	484.9	479.5	486.2
	(87.85)	(88.97)	(88.45)	(89.06)
SAT Math Score	505.0	495.2	502.2	493.4
	(85.01)	(85.91)	(86.06)	(85.79)
High School GPA	1.974	1.986	1.769	2.048
	(1.557)	(1.468)	(1.533)	(1.442)
Continued Enrollment(t+1)	0.961	0.848	1	0.805
	(0.193)	(0.359)	(0)	(0.396)
Academic Probation(t+1)	0.0775	0.346	0.308	0.360
	(0.267)	(0.476)	(0.462)	(0.480)
Continued Enrollment(t+2)	0.902	0.699	0.888	0.645
	(0.297)	(0.459)	(0.316)	(0.479)
Academic Probation(t+2)	0.0669	0.264	0.255	0.268
	(0.250)	(0.441)	(0.436)	(0.443)
Observations	1336554	101463	22700	78763

Note: Means by student-course reported; standard deviations in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Regressions of Course retaking on Pell Eligibility

	(1) Repeat	(2) Repeat	(3) Repeat	(4) Repeat	(5) Repeat	(6) Repeat
Post*Pell*(D)	0.0220	0.0152	0.0303*	0.0280*	0.0289	0.0306*
	[0.0142]	[0.0167]	[0.0165]	[0.0154]	[0.0183]	[0.0180]
Post*Pell*(C-)	0.0099	-0.0035	0.0256			
	[0.0138]	[0.0162]	[0.0162]			
Post*(D)	-0.0009	0.0062	-0.0099	-0.0068	-0.0075	-0.0110
	[0.0085]	[0.0122]	[0.0120]	[0.0093]	[0.0134]	[0.0131]
Post*(C-)	0.0162*	0.0294**	0.0004			
	[0.0083]	[0.0119]	[0.0119]			
Pell*Post	-0.0227	-0.0154	-0.0309*	-0.0267	-0.0330*	-0.0237
	[0.0141]	[0.0165]	[0.0168]	[0.0169]	[0.0196]	[0.0204]
C- Grade	-0.2596***	-0.2689***	-0.2497***			
	[0.0071]	[0.0105]	[0.0097]			
D Grade	-0.0702***	-0.0759***	-0.0637***	-0.0724***	-0.0726***	-0.0690***
	[0.0072]	[0.0107]	[0.0098]	[0.0079]	[0.0118]	[0.0107]
Grade Range	C- or below	C- or below	C- or below	D+ or below	D+ or below	D+ or below
Comparison group	non-Pell	aided	not aided	non-Pell	aided	not aided
Mean of Dep. Var.	0.17	0.17	0.17	0.22	0.22	0.22
R-squared	0.460	0.461	0.462	0.508	0.509	0.512
N	134,291	100,084	93,863	88,714	66,307	62,145

Robust standard errors clustered at the student level. Includes course, student, semester, and year fixed effects.

Grades are measured with respect to the first enrollment attempt.

* $p < .1$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Regressions of Course Grade Outcomes on Pell Eligibility

	(1) Grade	(2) Below C	(3) D or F grade	(4) D grade
Pell*Post	-0.0316***	0.0077***	0.0073***	-0.0087
	[0.0088]	[0.0028]	[0.0024]	[0.0171]
Grade Range	All	All	All	D or F
Mean of Dep. Var.	3.02	0.11	0.08	0.46
R-squared	0.465	0.282	0.269	0.440
N	1,335,402	1,335,402	1,335,402	88,714

Robust standard errors clustered at the student level. Includes course, student, semester and year fixed effects. Explanatory variables are measured with respect to the first enrollment attempt.

* $p < .1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Term level Outcomes (Course Retaking and Continued Enrollment)

	(1) Repeat	(2) Probation	(3) Continue
Panel A. Non-Pell Comparison Group			
Post*Pell	0.0163***	-0.0020	-0.0046*
	[0.0034]	[0.0013]	[0.0025]
Mean of Dep. Var.	0.06	0.11	0.95
R-squared	0.022	0.017	0.048
N	341,590	325,917	341,590
Panel B. Aided Comparison Group			
Post*Pell	0.0165***	-0.0029**	-0.0100***
	[0.0040]	[0.0014]	[0.0028]
Mean of Dep. Var.	0.07	0.11	0.95
R-squared	0.023	0.017	0.046
N	244,988	236,231	244,988
Panel C. Non-aided Comparison Group			
Post*Pell	0.0161***	-0.0011	0.0011
	[0.0040]	[0.0014]	[0.0030]
Mean of Dep. Var.	0.06	0.11	0.94
R-squared	0.022	0.017	0.051
N	236,093	225,018	236,093

Robust standard errors clustered at the student level. Observations are at the student-term level. All models include student, year, and semester fixed effects.

* $p < .1$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Term level Outcomes (Attempted and Earned Units)

	(1) Attempted	(2) Earned	(3) GPA
Panel A. Non-Pell Comparison Group			
Post*Pell	0.1610***	0.1364**	-0.0650***
	[0.0403]	[0.0553]	[0.0114]
Mean of Dep. Var.	12.99	11.60	2.90
R-squared	0.009	0.002	0.001
N	337,104	337,378	325,917
Panel B. Aided Comparison Group			
Post*Pell	-0.0247	-0.0118	-0.0505***
	[0.0467]	[0.0638]	[0.0132]
Mean of Dep. Var.	13.09	11.64	2.88
R-squared	0.007	0.001	0.001
N	243,067	243,280	236,231
Panel C. Non-aided Comparison Group			
Post*Pell	0.3489***	0.2851***	-0.0803***
	[0.0493]	[0.0651]	[0.0131]
Mean of Dep. Var.	12.95	11.53	2.88
R-squared	0.010	0.002	0.001
N	232,563	232,751	225,018

Robust standard errors clustered at the student level. Observations are at the student-term level. All models include student, year, and semester fixed effects.

* $p < .1$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Term level Regressions (Course Selection)

	(1) Any STEM	(2) Any Bus.	(3) Roadblock
Panel A. Non-Pell Comparison Group			
Post*Pell	0.0525***	0.0107**	0.0561***
	[0.0066]	[0.0047]	[0.0070]
Mean of Dep. Var.	0.32	0.23	0.63
R-squared	0.021	0.012	0.042
N	341,590	341,590	341,590
Panel B. Aided Comparison Group			
Post*Pell	0.0363***	0.0107**	0.0352***
	[0.0077]	[0.0054]	[0.0081]
Mean of Dep. Var.	0.33	0.22	0.64
R-squared	0.018	0.013	0.036
N	244,988	244,988	244,988
Panel C. Non-aided Comparison Group			
Post*Pell	0.0691***	0.0106*	0.0777***
	[0.0076]	[0.0056]	[0.0081]
Mean of Dep. Var.	0.32	0.24	0.63
R-squared	0.020	0.013	0.041
N	236,093	236,093	236,093

Robust standard errors clustered at the student level. Observations are at the student-term level. All models include student, year, and semester fixed effects.

* $p < .1$, ** $p < 0.05$, *** $p < 0.01$

Appendix

Appendix Material

The following are excerpts from the Federal Student Aid Handbooks (relevant changes underlined).

2010-2011 Federal Student Aid Handbook, Volume 3, chapter 1

In general, students at term-based credit-hour schools may receive FSA funds for retaking coursework. The credits must be in addition to, not as a replacement for any credits earned previously for the course. In addition, the credits must be included in the total number of credits that the student is taking when determining enrollment status and satisfactory academic progress, as long as you allow the student to receive credit for the repeated course. You will generally not give a student credit for repeating a course to earn a better grade unless the student failed the course the first time and received no credit. If a student who received an incomplete in a course in the prior term is completing the coursework in the subsequent term to erase the incomplete in the prior term, the student is not considered to be enrolled in the course for the subsequent term. Therefore, the hours in the course do not count toward the student's enrollment status for the subsequent term, and the student may not receive FSA funds for retaking the course. However, if a student who received an incomplete in a course in the prior term is retaking the entire course for credit in the subsequent term, the hours in the course count toward the student's enrollment status and the student may receive FSA funds for retaking the course.

2011-2012 Federal Student Aid Handbook, Volume 3, Chapter 1

Beginning in the 2011-12 award year, you may count towards enrollment status and award Title IV funds to a student who is repeating, for the first time only (i.e. one repetition per class), a previously passed course in a term-based program. Conversely, you may not pay a student for retaking previously passed courses if the student is required to retake those courses because they failed a different course. For example, a student enrolls in four classes in the fall semester, passes three of them, and fails one. The school requires the student to retake the three classes because they failed the one class. The student retakes all four classes in the spring semester. The failed class would be counted towards the student's enrollment status (and could have Title IV aid awarded for it), but the three classes previously passed in the fall would not be counted towards the student's enrollment status and would not be eligible for aid. In any case, remember that retaken classes may count against satisfactory academic progress, and the student's eligibility is still constrained by all the requirements of satisfactory academic progress, as discussed in Volume 1 of the FSA Handbook. Also, the one-year academic limitation on noncredit and reduced credit remedial coursework still applies, so, for example, a student repeating a remedial course that exceeds the one-year limitation could not have the class included in his or her enrollment status. If a student who received an incomplete in a course in the prior term is completing the coursework in the subsequent term to erase the incomplete in the prior term, the student is not considered to be enrolled in the course for the subsequent term. Therefore, the hours in the course do not count toward the student's enrollment status for the subsequent term, and the student may not receive FSA funds for retaking the course. However, if

a student who received an incomplete in a course in the prior term is retaking the entire course for credit in the subsequent term, the hours in the course count toward the student's enrollment status and the student may receive FSA funds for retaking the course. Students enrolled in non-term-based programs may not receive credit for retaking coursework.

Figure A.1: Demographic Trends by Pell Grant Status

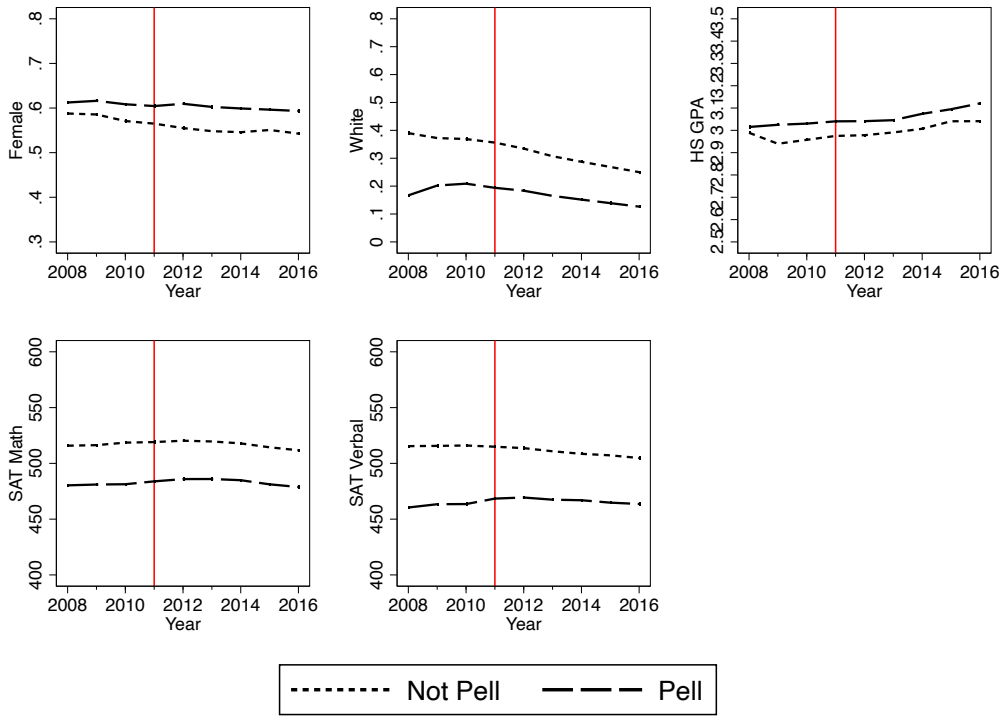

Table A.1: Student-Term Level Summary Statistics

	(1) Total	(2) Low SAT	(3) Med SAT	(4) High SAT
Pell Eligible at Admission	0.411	0.553	0.395	0.275
	(0.492)	(0.497)	(0.489)	(0.447)
First Generation College Student	0.303	0.458	0.280	0.162
	(0.460)	(0.498)	(0.449)	(0.369)
Female	0.610	0.685	0.612	0.527
	(0.488)	(0.464)	(0.487)	(0.499)
White	0.235	0.103	0.230	0.381
	(0.424)	(0.305)	(0.421)	(0.486)
Transfer Student	0.103	0.124	0.0898	0.0939
	(0.304)	(0.330)	(0.286)	(0.292)
SAT Verbal Score	492.8	409.6	493.6	580.2
	(88.95)	(57.68)	(45.51)	(59.75)
SAT Math Score	503.2	422.5	505.9	586.0
	(85.85)	(57.54)	(45.46)	(56.24)
High School GPA	3.090	3.024	3.089	3.161
	(0.486)	(0.485)	(0.456)	(0.505)
On academic probation in current term	0.109	0.132	0.104	0.0887
	(0.311)	(0.339)	(0.305)	(0.284)
Continued enrollment (t+1)	0.943	0.941	0.944	0.943
	(0.233)	(0.236)	(0.229)	(0.233)
GPA in current term	2.861	2.726	2.869	3.000
	(0.887)	(0.879)	(0.865)	(0.894)
Earned D grade in current term	0.146	0.173	0.148	0.115
	(0.353)	(0.378)	(0.355)	(0.319)
Earned F grade in current term	0.129	0.142	0.127	0.118
	(0.335)	(0.349)	(0.333)	(0.322)
Repeating a course in current term	0.0848	0.0943	0.0860	0.0734
	(0.279)	(0.292)	(0.280)	(0.261)
Observations	194659	67688	63166	63805

Note: Means by student-term reported; standard deviations in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.2: Course level Regressions checking for Pre-trends

	(1) Repeat	(2) Repeat	(3) Repeat	(4) Repeat	(5) Repeat	(6) Repeat
(t-3)*(D+)*Pell	-0.0151	-0.0006	-0.0306	0.0020	0.0215	-0.0081
	[0.0334]	[0.0389]	[0.0380]	[0.0362]	[0.0424]	[0.0415]
(t-2)*(D+)*Pell	0.0003	0.0199	-0.0154	-0.0113	-0.0006	-0.0250
	[0.0232]	[0.0276]	[0.0254]	[0.0252]	[0.0302]	[0.0276]
(t0)*(D+)*Pell	-0.0007	0.0025	0.0023	-0.0065	0.0010	-0.0053
	[0.0166]	[0.0192]	[0.0201]	[0.0179]	[0.0208]	[0.0218]
(t+1)*(D+)*Pell	0.0370**	0.0426**	0.0275	0.0319*	0.0376*	0.0230
	[0.0157]	[0.0184]	[0.0206]	[0.0168]	[0.0196]	[0.0223]
(t+2)*(D+)*Pell	0.0335**	0.0369*	0.0269	0.0249	0.0298	0.0128
	[0.0160]	[0.0189]	[0.0203]	[0.0172]	[0.0203]	[0.0220]
(t+3)*(D+)*Pell	0.0339**	0.0229	0.0523**	0.0281*	0.0181	0.0473**
	[0.0154]	[0.0176]	[0.0208]	[0.0166]	[0.0190]	[0.0227]
(t+4)*(D+)*Pell	0.0223	0.0096	0.0393*	0.0243	0.0176	0.0347
	[0.0153]	[0.0180]	[0.0206]	[0.0166]	[0.0195]	[0.0226]
(t+5)*(D+)*Pell	0.0210	0.0242	0.0173	0.0352**	0.0398**	0.0320
	[0.0159]	[0.0181]	[0.0217]	[0.0177]	[0.0203]	[0.0243]
(t-3)*(C-)*Pell	-0.0065	0.0053	-0.0192			
	[0.0307]	[0.0361]	[0.0346]			
(t-2)*(C-)*Pell	-0.0017	0.0304	-0.0297			
	[0.0217]	[0.0258]	[0.0239]			
(t0)*(C-)*Pell	-0.0118	-0.0086	-0.0108			
	[0.0154]	[0.0180]	[0.0188]			
(t+1)*(C-)*Pell	0.0478***	0.0505***	0.0446**			
	[0.0151]	[0.0179]	[0.0195]			
(t+2)*(C-)*Pell	0.0187	0.0218	0.0116			
	[0.0151]	[0.0180]	[0.0193]			
(t+3)*(C-)*Pell	0.0344**	0.0148	0.0631***			
	[0.0145]	[0.0166]	[0.0199]			
(t+4)*(C-)*Pell	0.0194	0.0150	0.0230			
	[0.0151]	[0.0179]	[0.0203]			
(t+5)*(C-)*Pell	0.0154	0.0072	0.0272			
	[0.0155]	[0.0179]	[0.0213]			
Grade Range	< C-	< C-	< C-	< D+	< D+	< D+
Comparison group	non-Pell	aided	no aid	non-Pell	aided	no aid
Mean of Dep. Var.	0.17	0.17	0.17	0.22	0.22	0.22
R-squared	0.461	0.462	0.462	0.508	0.509	0.512
N	134,291	100,084	93,863	88,714	66,307	62,145

Standard errors in brackets

* $p < .1$, ** $p < 0.05$, *** $p < 0.01$

Table A.3: Term level Regressions checking for Pre-trends

	(1) Repeat	(2) Repeat	(3) Repeat	(4) Probation	(5) Probation	(6) Probation	(7) Continue	(8) Continue	(9) Continue
Pell*(t-3)	-0.0038	0.0014	-0.0087				-0.0086**	0.0059	-0.0218***
	[0.0055]	[0.0064]	[0.0062]				[0.0034]	[0.0037]	[0.0041]
Pell*(t-2)	-0.0030	0.0006	-0.0064	0.0008	0.0011	0.0006	0.0050	0.0083**	0.0016
	[0.0042]	[0.0049]	[0.0047]	[0.0010]	[0.0011]	[0.0010]	[0.0031]	[0.0034]	[0.0037]
Pell*(t0)	0.0085**	0.0106**	0.0064	-0.0019*	-0.0023*	-0.0015	-0.0017	-0.0044	0.0011
	[0.0039]	[0.0046]	[0.0045]	[0.0010]	[0.0012]	[0.0012]	[0.0029]	[0.0032]	[0.0035]
Pell*(t+1)	0.0237***	0.0256***	0.0219***	-0.0009	-0.0015	-0.0003	-0.0066**	-0.0099***	-0.0029
	[0.0045]	[0.0052]	[0.0052]	[0.0016]	[0.0019]	[0.0018]	[0.0032]	[0.0036]	[0.0039]
Pell*(t+2)	0.0240***	0.0231***	0.0254***	-0.0047	-0.0075**	-0.0016	-0.0089**	-0.0125***	-0.0049
	[0.0051]	[0.0059]	[0.0059]	[0.0031]	[0.0035]	[0.0037]	[0.0037]	[0.0042]	[0.0045]
Pell*(t+3)	0.0270***	0.0249***	0.0300***	0.0023	-0.0001	0.0051	-0.0088**	-0.0146***	-0.0018
	[0.0056]	[0.0064]	[0.0067]	[0.0045]	[0.0052]	[0.0056]	[0.0041]	[0.0047]	[0.0051]
Pell*(t+4)	0.0315***	0.0271***	0.0378***	0.0010	-0.0011	0.0034	-0.0076*	-0.0180***	0.0064
	[0.0061]	[0.0071]	[0.0074]	[0.0052]	[0.0060]	[0.0066]	[0.0045]	[0.0050]	[0.0057]
Pell*(t+5)	0.0350***	0.0297***	0.0431***	0.0092	0.0075	0.0110	-0.0081*	-0.0247***	0.0152**
	[0.0067]	[0.0078]	[0.0082]	[0.0058]	[0.0067]	[0.0074]	[0.0049]	[0.0055]	[0.0064]
Comparison Group	non-pell	aided	no aid	non-pell	aided	no aid	non-pell	aided	no aid
Mean of Dep. Var.									
R-squared	0.022	0.023	0.022	0.018	0.017	0.017	0.048	0.047	0.052
N	341,590	244,988	236,093	325,917	236,231	225,018	341,590	244,988	236,093

Robust standard errors clustered at the student level. Observations are at the student-term level. All models include student, year, and semester fixed effects. Sample size is smaller for probation outcome due to term level data being available starting in AY 2009.

* $p < .1$, ** $p < 0.05$, *** $p < 0.01$

Table A.4: Regressions of Course retaking on Student Characteristics (No student fixed effects)

	(1) Repeat	(2) Repeat	(3) Repeat	(4) Repeat	(5) Repeat	(6) Repeat
Post*Pell*(D)	0.0148	-0.0029	0.0272*	0.0170	-0.0000	0.0283*
	[0.0134]	[0.0149]	[0.0148]	[0.0135]	[0.0154]	[0.0151]
Post*Pell*(C-)	0.0132	-0.0093	0.0301**			
	[0.0104]	[0.0133]	[0.0130]			
Post*(D)	0.0027	0.0203*	-0.0100	-0.0042	0.0127	-0.0163
	[0.0089]	[0.0108]	[0.0106]	[0.0088]	[0.0119]	[0.0105]
Post*(C-)	0.0145	0.0369***	-0.0026			
	[0.0113]	[0.0097]	[0.0136]			
Pell*Post	-0.0125	0.0115	-0.0282**	-0.0112	0.0109	-0.0245**
	[0.0094]	[0.0119]	[0.0119]	[0.0096]	[0.0102]	[0.0120]
C- Grade	-0.2163***	-0.2410***	-0.1976***			
	[0.0178]	[0.0086]	[0.0185]			
D Grade	-0.0416***	-0.0606***	-0.0279***	-0.0418***	-0.0607***	-0.0281***
	[0.0102]	[0.0095]	[0.0106]	[0.0101]	[0.0128]	[0.0105]
Grade Range	< C-	< C-	< C-	< D+	< D+	< D+
Comparison group	non-Pell	aided	not aided	non-Pell	aided	not aided
Mean of Dep. Var.	0.17	0.17	0.16	0.22	0.23	0.22
R-squared	0.233	0.237	0.232	0.234	0.241	0.234
N	146,150	108,389	102,092	100,948	75,020	70,677

Robust standard errors clustered at the course level. Includes course, student, semester, and year fixed effects. Grades are measured with respect to the first enrollment attempt.

* $p < .1$, ** $p < 0.05$, *** $p < 0.01$

Table A.5: Course level Regressions checking for Pre-trends (no student fixed effects)

	(1) Repeat	(2) Repeat	(3) Repeat	(4) Repeat	(5) Repeat	(6) Repeat
(t-3)*(D+)*Pell	0.0080	0.0286	-0.0122	0.0107	0.0332	-0.0091
	[0.0303]	[0.0372]	[0.0312]	[0.0305]	[0.0377]	[0.0313]
(t-2)*(D+)*Pell	-0.0086	0.0322	-0.0275	-0.0120	0.0287	-0.0307
	[0.0215]	[0.0236]	[0.0238]	[0.0213]	[0.0234]	[0.0234]
(t0)*(D+)*Pell	0.0061	0.0086	0.0034	0.0046	0.0094	-0.0009
	[0.0132]	[0.0164]	[0.0159]	[0.0130]	[0.0160]	[0.0158]
(t+1)*(D+)*Pell	0.0400***	0.0502***	0.0261	0.0391***	0.0492***	0.0251
	[0.0137]	[0.0164]	[0.0181]	[0.0139]	[0.0163]	[0.0186]
(t+2)*(D+)*Pell	0.0246**	0.0349**	0.0132	0.0244**	0.0319**	0.0152
	[0.0120]	[0.0145]	[0.0161]	[0.0118]	[0.0145]	[0.0154]
(t+3)*(D+)*Pell	0.0159	0.0052	0.0334**	0.0164	0.0052	0.0362**
	[0.0117]	[0.0140]	[0.0149]	[0.0116]	[0.0136]	[0.0153]
(t+4)*(D+)*Pell	0.0255*	0.0229	0.0300*	0.0260*	0.0261	0.0266
	[0.0142]	[0.0159]	[0.0180]	[0.0141]	[0.0159]	[0.0180]
(t+5)*(D+)*Pell	0.0137	0.0120	0.0170	0.0138	0.0127	0.0163
	[0.0152]	[0.0152]	[0.0214]	[0.0153]	[0.0158]	[0.0207]
(t-3)*(C-)*Pell	0.0022	0.0128	-0.0090			
	[0.0296]	[0.0351]	[0.0304]			
(t-2)*(C-)*Pell	-0.0388**	0.0242	-0.0755***			
	[0.0184]	[0.0203]	[0.0210]			
(t0)*(C-)*Pell	-0.0127	-0.0094	-0.0155			
	[0.0117]	[0.0133]	[0.0144]			
(t+1)*(C-)*Pell	0.0437***	0.0477***	0.0391***			
	[0.0111]	[0.0127]	[0.0145]			
(t+2)*(C-)*Pell	0.0139	0.0253*	0.0014			
	[0.0108]	[0.0133]	[0.0133]			
(t+3)*(C-)*Pell	0.0160	0.0099	0.0242*			
	[0.0104]	[0.0115]	[0.0144]			
(t+4)*(C-)*Pell	0.0234**	0.0292**	0.0164			
	[0.0107]	[0.0135]	[0.0144]			
(t+5)*(C-)*Pell	-0.0023	-0.0061	0.0021			
	[0.0135]	[0.0142]	[0.0173]			
Grade Range	< C-	< C-	< C-	< D+	< D+	< D+
Comparison group	non-Pell	aided	no aid	non-Pell	aided	no aid
Mean of Dep. Var.	0.17	0.17	0.16	0.22	0.23	0.22
R-squared	0.232	0.237	0.232	0.233	0.240	0.234
N	146,150	108,389	102,092	100,948	75,020	70,677

Standard errors in brackets

* $p < .1$, ** $p < 0.05$, *** $p < 0.01$

Table A.6: Term level Outcomes by SAT Terciles

	(1) Repeat	(2) Repeat	(3) Probation	(4) Probation	(5) Continue	(6) Continue
Post*Pell	0.0182***		-0.0026		-0.0039	
	[0.0044]		[0.0017]		[0.0032]	
High SAT: Post*Pell		0.0210***		0.0017		-0.0068
		[0.0078]		[0.0023]		[0.0062]
Med SAT: Post*Pell		0.0144		-0.0043		-0.0039
		[0.0081]		[0.0032]		[0.0056]
Low SAT: Post*Pell		0.0127		-0.0032		-0.0066
		[0.0078]		[0.0030]		[0.0053]
Mean of Dep. Var.	0.06	0.06	0.11	0.11	0.94	0.94
R-squared	0.026	0.026	0.015	0.015	0.051	0.051
N	194,659	194,659	186,401	186,401	194,659	194,659

Robust standard errors clustered at the student level. Observations are at the student-term level. All models include student, year, and semester fixed effects.

* $p < .1$, ** $p < 0.05$, *** $p < 0.01$

Table A.7: Term level Outcomes (Attempted and Earned Units) by SAT Tercile

	(1) Attempted	(2) Attempted	(3) Earned	(4) Earned	(5) GPA	(6) GPA
Post*Pell	0.2498***		0.3073***		-0.0525***	
	[0.0501]		[0.0707]		[0.0149]	
High SAT: Post*Pell		0.3946***		0.1927		-0.0570**
		[0.0923]		[0.1327]		[0.0290]
Med SAT: Post*Pell		0.3065***		0.1653		-0.0511**
		[0.0866]		[0.1257]		[0.0258]
Low SAT: Post*Pell		0.0633		-0.0407		-0.0866***
		[0.0908]		[0.1182]		[0.0246]
Mean of Dep. Var.	13.40	13.40	11.89	11.89	2.86	2.86
R-squared	0.014	0.014	0.004	0.005	0.002	0.002
N	192,418	192,418	192,565	192,565	186,401	186,401

Robust standard errors clustered at the student level. Observations are at the student-term level. All models include student, year, and semester fixed effects. The dependent variable in Columns 1 and 2 is a student's attempted number of units in the current semester. The dependent variable in Columns 3 and 4 is the number of completed units in the current semester. The dependent variable in Columns 5 and 6 is the term GPA.

* $p < .1$, ** $p < 0.05$, *** $p < 0.01$

Table A.8: Course-taking at the Term level by SAT Terciles

	(1) STEM	(2) STEM	(3) Bus.	(4) Bus.	(5) Roadblock	(6) Roadblock
Post*Pell	0.0771***		0.0239***		0.0899***	
	[0.0092]		[0.0066]		[0.0091]	
High SAT: Post*Pell		0.0621**		0.0233**		0.0602***
		[0.0179]		[0.0114]		[0.0161]
Med SAT: Post*Pell		0.0767***		0.0207*		0.0455***
		[0.0167]		[0.0122]		[0.0157]
Low SAT: Post*Pell		0.0609***		0.0132		0.0848***
		[0.0150]		[0.0111]		[0.0159]
Mean of Dep. Var.	0.40	0.40	0.19	0.19	0.69	0.69
R-squared	0.029	0.029	0.019	0.020	0.041	0.042
N	194,659	194,659	194,659	194,659	194,659	194,659

Robust standard errors. Obervations are at the student-term level.

* $p < .1$, ** $p < 0.05$, *** $p < 0.01$