Improving Academic Performance through Conditional Benefits: Open/Closed Campus Policies in High School and Student Outcomes

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Abstract

Open campus privileges in high schools can be conditional on students' academic (GPA, test scores, etc.) or behavioral (absences, probation, etc.) performance. I evaluate the effectiveness of this incentive scheme in improving student academic outcomes using a dataset covering over 460 California high schools over a 10-year period and their open/closed campus policies, while distinguishing between conditional and unconditional open campus policies. The results show an increase of roughly 0.1 of a standard deviation in student test scores when a conditional open campus policy is in place, in comparison to an unconditional open campus policy, thus suggesting that the incentive scheme intended by the conditional open campus policy is effective as a means for improving student test score outcomes. While the incentive scheme seems to improve test outcomes both for high and low-performing students, the magnitude of the effect is greater for lower-performing students, which is consistent with the fact that the academic thresholds under the conditional open campus policies are generally very minimal. The evidence also suggests that the incentive scheme is more effective for 9th and 10th grade students than it is for 11th grade students.

JEL Classifications: I21, I28. **Keywords:** Incentives, High School, Test Scores, Dropout

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1 Introduction

An important question in the economics of education is how to motivate students to put more effort into schooling and improve their academic performance. Children and teenagers may have higher discount rates than adults or inconsistent time-preferences.[1] If they do, they will make less than optimal investment decisions in education, compared to the expected gains from education. Incentive schemes can provide immediate returns and induce greater motivation to invest effort in schooling. Several papers have investigated programs which incentivise students through non-academically-oriented rewards for the purpose of improving student academic/schooling outcomes.[2] This paper evaluates the policy of granting high school students privileges to go off campus during the school day and its effect on students' academic performance. I distinguish between an unconditional open campus policy - in which the privilege to go off campus does not require students to meet any criteria - and a conditional open campus policy - which allows students to go off campus only if they fulfill certain minimal academic or behavioral criteria. This distinction allows me to evaluate the effectiveness of an incentive scheme which rewards students in exchange for certain investments in schooling. The comparison between student groups which are experiencing an open campus policy without having to meet any criteria and student groups which are experiencing an open campus policy with the requirement to meet specific criteria allows me to isolate the effect of the incentive scheme from the effect of the open campus privilege in my estimates.

The majority of student incentive schemes evaluated to date focus on financial or monetary rewards provided to students in exchange for meeting certain academic requirements. Some of these programs can be quite costly, with potential rewards to students who meet the required academic goals exceeding several thousands of dollars per student.[3] Thus, implementing these programs on a very large scale can entail substantial costs. While many of the financial incentive schemes evaluated have exhibited positive effects on students' academic outcomes, their costly nature has resulted in some debate as to whether their benefits justify the substantial costs associated with these programs (Gneezy et al. (2011)). Given this, student incentive schemes that are not monetary in their nature are important additions to the literature on student incentive schemes.

Only two other papers to date have examined non-financial student incentive schemes. Vidal-Fernández (2011) investigates the effect of a policy applied to U.S. high schools during the 1970's, which required student athletes to pass a certain number of subjects in order to be allowed to participate in school sports. The author finds that the policy had a positive effect on high school graduation rates. Barua and Vidal-

[1] Bettinger and Slonim (2007) and Lahav et al. (2010) present experimental evidence to support children's and adolescents' higher discount rates. Lee (2013) indirectly provides evidence of teenagers' relatively high discount rates by showing that repealing Sunday closing laws decreased adolescents' educational attainment and even their adult earnings, most probably through reallocating time away from schooling and toward employment or leisure activities. I characterize time-preferences as "inconsistent" based on Gruber (2000), where the discount rate is higher in the short run than it is in the long-run.

[2] See: Angrist and Lavy (2009); Angrist et al. (2009); Kremer et al. (2009); Jackson (2010); Fryer (2011); Vidal-Fernández (2011); Bettinger (2012); Barua and Vidal-Fernandez (2014)

[3] In Angrist and Lavy (2009), high school students in Israel were awarded a total of $650,000 for passing high school completion examinations, with each student potentially receiving as much as $2,400. Angrist et al. (2009) evaluated a program in a Canadian college which granted first-year students up to $5,000 in exchange for having "solid" grades at the end of their first year of college.

Fernandez (2014) evaluate state programs which condition teenagers' driving licenses on staying in school. Their findings show that this policy increased educational attainment and decreased high school dropout rates among the male black population.This paper also differs from most of the literature on student incentive schemes, as the policy evaluated involves no financial benefit to the students, but rather the provision of a privilege to which students attach a high value - going off campus during the school day and potentially the autonomy students associate with that benefit.

For the purpose of conducting the analysis, an independently-constructed dataset was used. Open/closed campus policies for eleven school-years between 2001 and 2011 were collected for more than 460 California high schools by surveying high school and school district administrators. This policy information was matched to student outcomes provided by the California Department of Education. The empirical approach exploits variation in the timing within specific school-grade units of different open/closed campus policies through the inclusion of fixed effects at the school-grade level in the regression specifications.

If the conditional open campus incentive scheme is effective in improving students' outcomes, we would expect the difference between the effect of a conditional open campus policy and the effect of an unconditional open campus policy, in comparison to a closed campus policy, to be statistically significant, with the conditional open campus policy resulting in improved outcomes. Such results would be even stronger if there were a qualitative difference between the two effects, in comparison to a closed campus regime. The results for test scores exhibit these patterns. The estimated response to a change from a closed campus policy to an unconditional open campus policy is negative, although usually not statistically significant. In contrast, the estimated response to a change from a closed campus policy to a conditional open campus is positive and statistically significant. Quantitatively, an unconditional open campus policy, in comparison to a closed campus policy, *decreases* students' test scores by 0.025 of a standard deviation, while a conditional open campus policy *increases* students' test scores by 0.077 of a standard deviation. Thus, the overall improvement from implementing the conditional open campus policy, while maintaining students' open campus policy privileges, exceeds 0.1 of a standard deviation. The statistically significant difference between the effect of an unconditional open campus and the effect of a conditional open campus policy, both in comparison to a closed campus policy, holds for all student population segments based on demographic characteristics. When evaluating the two open campus policies broken down by students' performance levels, there is evidence that the incentive scheme behind the conditional open campus policy is more effective (i.e. greater in magnitude) for the low performance levels. This is consistent with the fact that the minimal academic thresholds set under the conditional open campus policies are generally quite minimal. Despite this, there is still evidence of improvement in test scores even at the highest performance levels, thus suggesting that there may be spillover effects from the low-performing students to other students within the school. When evaluating the effect of the conditional open campus policy by grade-level, the results do not demonstrate a statistically significant effect for 11th grade students, and it may be that the effectiveness of the incentive scheme is confined to lower grade-levels - i.e. 9th and 10th grade.

The dropout rate analysis serves two purposes. First, an attempt is made to evaluate whether the incentive scheme behind the conditional open campus policy is also effective in decreasing dropout rates, as it is for increasing test score outcomes. Second, it is important to verify that the increase in test score outcomes in response to a conditional open campus policy is indeed being driven by the incentive scheme behind the policy and not by student compositional changes resulting from different dropout rates in response to the different policies. The former analysis produces only partially conclusive results: both the conditional and unconditional open campus policies reduce high school dropout rates, in comparison to a closed campus policy, and the difference between the two effects is not statistically significant. One potential explanation for this is that while the incentive scheme of the conditional open campus policy is working for the highest-risk students on the verge of dropping out, an unconditional open campus policy is also effective in reducing dropout rates, possibly through lowering high-risk students' psychological cost of attending school. Quantitatively, both the conditional and unconditional open campus policies decrease dropout rates by 0.6-0.7 percentage points, which is relatively large in magnitude, considering that the weighted means for dropout rates in the sample are 0.95%, 1%, 1.5% and 4.5% for ninth, tenth, eleventh, and twelfth grades, respectively.

The latter objective of the dropout analysis is achieved due to evidence that dropout rates decrease in similar magnitudes in response to both open campus policies. The decrease in dropouts should increase the share of students performing below average.[4] Thus, the compositional effect of *both* the conditional and unconditional open campus policies should be a decrease in test scores. Despite this, we see an increase in test scores under the conditional open campus policy, which rules out that the test improvements are being driven by compositional changes in the student population, rather than by the incentive scheme behind the conditional open campus policy.

To address concerns that schools' open/closed campus policies are correlated with school or student characteristics, I include in my regression specifications separate flexible time trends for grade-school units that changed their policies, as well as time trends interacted with grade-school units' demographic characteristics during a base year. Furthermore, the results are robust to several alternative specifications, including: the synthetic control method, which allows me to control more rigorously for differences between grade-school units experiencing different open/closed campus policies; regressions which limit the sample to schools which did not experience administrative changes, as these may have coincided with changes in schools' open/closed campus policies; regressions which limit the sample to school districts with a single high school, which decreases substantially students' ability to select into high schools in response to open/closed campus policies; and specifications with school-district-specific time trends.

The paper starts by providing background on open/closed campus policies in U.S. high schools, with some emphasis on California high schools. Section 3 discusses the data sources used for the analysis. Section 4 outlines the empirical strategy, including the identification assumptions and discusses any potential

[4]See Rumberger and Arellano (2007) for an overview of some literature showing that lower academic performance predicts dropping out of high school, as well as some general statistics from California.

challenges with the identification strategy. Results are presented in Section 5 for various test-score-related outcome variables, as well as high school dropout rates and student behavior. Section 6 checks whether the results from Section 5 are robust to several alternative specifications, and Section 7 concludes.

2 Open/Closed Campus Policies in U.S. High Schools

High school administrators and school boards face a dilemma whether or not to allow their students off campus during the school day. The adoption of an open/closed campus policy has the potential for both benefits and risks. While an open campus provides more autonomy and individual responsibility to students, abuse of this privilege may induce greater student truancy, tardiness to classes, and disciplinary issues. If a high school has an open campus policy, at least some of its students may leave the school grounds during at least part of the school day. High school open campus policies can be limited to only lunch or can allow students to leave campus during the entire school day, under the assumption that students leave when they have a free period and otherwise they stay on campus for their classes. In this paper, an open campus policy is defined as a policy allowing students to leave campus for at least part of the school day - even if it is limited to only the lunch period.

Open and closed campus policies can be set at the state level by a state board of education or by the state's education code, at the district level by the school board, or at the school level by high school principals. In California, there are no guidelines concerning open/closed campus policies at the state level. There are several school districts with official open/closed campus policies, and these range from very general guidelines to a ban on any open campus privileges to high school students within the school district.

It appears that U.S. high schools have experienced a decline in open campus privileges during the last few decades.[5] According to the School Health Policies and Programs Study from 2000, a survey covering a representative sample of U.S. high schools, 73.4% of high schools and 65.3% of school districts in the U.S. had a closed campus policy at the high school level (Small et al. (2001)). The 2006 School Health Policies and Programs Study shows the number of U.S. school districts with a closed campus policy for all high schools in the school district had gone up to 75.1% (O'Toole et al. (2007)), an increase of nearly 10 percentage points.[6]

Open campus policies can vary within a school by grade-level. In such situations, the strictest policies typically apply to the lower grades. As students progress through high school, greater open campus privileges tend to be permitted to higher grade levels.

When a high school applies an open campus policy, its administration can choose to either grant the privilege universally to all students (in the appropriate grade-level) or to condition the privilege on student grades, test scores, or behavioral conduct. While the data in this study shows that conditional open

[5] According to a newspaper article from 2001 in the Atlantic Monthly titled "The Organization Kid", written by the New York Times journalist David Brooks, open campus policies became more popular in U.S. high schools during the 1970's, as schools were "rebelling against the rigid desks-in-a-row pedagogy of the 1950's". However, by the 1980's, that trend had started reversing itself, as "the language of education reform has changed, and the emphasis is on testing, accountability, and order."

[6] O'Toole et al. (2007) does not provide figures for the percent of high schools in their sample with closed campus policies.

campus policies have become more prevalent in California high schools over the last decade, no additional background could be found on the origin of conditional open campus policies in U.S. high schools or their prevalence.[7] Generally, when open campus privileges are conditional, the threshold for eligibility is relatively low, and may include a minimum GPA ranging from 2.0 to 2.5, no unexcused absences, being in good standing, passing the high school exit exams by senior year, or scoring above a certain percentile in standardized tests. Thus, the privilege to go off campus under a conditional open campus policy regime is typically granted to the vast majority of the student population in the school, and the limitation applies primarily to the most problematic students.

The motivation behind a high school having either an open or closed campus policy and the type of open campus policy implemented can vary. Generally, the basic intention is related to providing alternative food sources for students during their lunch break. Opponents of open campus policies frequently turn to issues of student safety when arguing against the policy, and a large portion of media coverage on this subject focuses on incidents such as fighting, car accidents, mugging, substance abuse and arrest, and sexual assault occurring off campus during lunch periods.[8] Other driving forces behind decisions to open or close high school campuses could be related to the school environment, the location of the school, whether any food establishments are in close enough proximity, and whether the school cafeteria can adequately serve the entire student body in the school. Interestingly, budget considerations related to school lunches tend to play a major role in determining whether high schools will maintain open or closed campus policies. However, the impact of these budget considerations is not obvious. While budgetary struggles may reduce the likelihood of having a cafeteria that can adequately serve the entire student-body, they may also aggravate pressures to have students stay on campus during lunch time for the purpose of increasing the incoming revenues from sale of school meals and other foods from within the school.[9]

3 Data

For this study's main analysis, I use three main datasets. I also use a fourth dataset to analyze the effect of open/closed campus policies on student behavioral outcomes.

I collected data on over 460 California high schools' open/closed campus policies for the school years 2001-2002 through 2010-2011, primarily through surveying high school principals and school district administrators. This data was then matched at the school and grade-level to California Standards Test (CST)

[7] To date, this is the only known study documenting high school open campus policies, while distinguishing between a conditional and unconditional open campus policy.

[8] Stone and Runyan (2005) is a study from the public health literature on the impact of open campus lunch policies in high schools on car accidents. The study covered three North Carolina counties over four years, and found that there was a significantly higher rate of risk for car accidents involving teens during lunch periods in open campus counties, compared to any other time of the day, and compared to a county with a closed campus lunch policy for its high schools. There were also more passengers in the cars during lunch period accidents.

[9] For example, among the sample of school districts in this study, the Jefferson Union High School District (JUHSD) board voted in March 2004 to close all of its three open campus high schools during lunch, as part of its budget cuts for the 2004-2005 school year. It was estimated in the board meeting minutes that this would save the school district $35,000 annually due to higher sales during lunch under a closed campus regime.

scores, available from the California Department of Education (CDE), for every grade-level in a school for the period 2003-2011. Lastly, the open/closed campus policy data was matched to data on high school dropout rates, available at the grade-level for each school from the CDE for the period 2003-2011.

3.1 High Schools' Open/Closed Campus Policies

For the purpose of this study, I constructed a dataset which documents for over 460 California high schools their open/closed campus policies at each grade-level over a ten-year period. If an open campus policy was ever in place, this dataset also documents whether open campus privileges were unconditional or conditional on factors such as students' academic standing, behavior, or even parent permission or the payment of a fee to the school. For the forthcoming analysis, the conditions evaluated for student eligibility to open campus privileges are minimal thresholds for either GPA or CST exams, or behavior criteria, such as absences, tardiness, probation, etc. (or any combination of these three criteria).[10]

A brief online survey inquiring about schools' open/closed campus policy from the last 10 years was e-mailed to California high school principals during the Fall of 2011.[11] The information filled out in the survey was then cross-checked with any information found through Lexis-Nexis or other online sources which explicitly mention the school/school district and its open/closed campus policy. If the information provided in the survey did not correspond to information available online, or review of the survey brought up questions, e-mails were sent for the purpose of clarifying the survey response, followed by attempts to reach the principals or other school personnel via phone. In some cases, when a survey response or online resources indicated that the open/closed campus policy of certain schools is determined at the district level, school district representatives were contacted for the purpose of obtaining information on all high schools within the school district. The final sample resulted in grade-level open/closed campus policies from a 10-year period for 476 schools. Out of these, 11 schools had to be excluded due to moving to a new site during this period.[12] and one school district had all its 9th grade grade-school units excluded due to introducing a new academic support program simultaneously to transitioning to a closed campus policy. For a comparison between schools in the sample and schools which completed the survey, see the Online Appendix.[13]

Table 1 summarizes the survey results for the 465 schools for which responses were obtained, with the number of schools, broken down by the type of open/closed campus in place during the period 2003-2011 and whether a transition from one type of policy to another was implemented or not for each grade-level.

[10]Other possibilities for defining the conditions were also explored. The results were very similar to those presented when the conditions for open campus privileges were either only CST exams or only GPA thresholds. Another criterion documented for open campus eligibility was parent permission, but evaluating just the effect of parent permission or only behavior criteria did not produce statistically significant results, probably due to the fact that such definitions exclude the GPA and CST conditions, and those seem to be very dominant in driving the statistically significant results presented.

[11]Target high schools excluded schools with enrollment below 150 students or continuation schools.

[12]A new site is frequently associated with better facilities or a change in some of the demographic characteristics of the student-body population, which could have an impact on student outcomes, which is unrelated to the school's open/closed campus policy.

[13]See http://shirlees.weebly.com/uploads/2/3/6/1/23619094/oc_onlineappendix1607b.pdf for the Online Appendix.

Table 1: Open/Closed Campus Policies for 2003-2011 - Survey Results

Grade	Always Unconditional Open	Always Closed	Always Conditional Open	Unconditional Open to Closed	Unconditional Open to Conditional Open	Closed to Unconditional Open	Closed to Conditional Open	Total Schools
9	64	353	13	27	4	0	0	461
10	82	338	18	20	6	1	0	465
11	99	285	48	21	8	1	2	464
12	114	232	80	18	12	2	4	462

Notes:
The above are survey results for 465 California high schools in the sample, broken down by the open/closed campus policy in the each grade during the sample period. "Conditional" refers to having open campus privileges for students conditional on at least grades, test scores, or behavioral criteria. The results exclude seven schools which reported moving to a new site during the sample period, as well as the 9th grade classes in Visalia Unified School District (VUSD) high schools, due to implementation of a "Ninth-Grade Support Program" at the same time as open campus privileges were revoked to 9th graders in VUSD.

As can be seen, the majority of high schools in the sample have had closed campus policies for the entire sample period, with this number increasing as the grade-level is lower. These numbers are consistent with the 2003 California High Schools Fast Food Survey (CHSFFS) (Craypo et al. (2003)), a survey commissioned by the Public Health Institute.[14] This survey contacted nutrition services directors in California school districts to inquire about their high schools' food offerings, but also included a question regarding the high schools' open/closed campus policies during the survey period. According to the survey, in 2003, out of a sample of 320 California high schools which participated in the survey, 53% had closed campus policies. Because the results in the CHSFFS do not inquire about the open/closed campus policy at a specific grade-level, an open campus response is likely to be relevant for a high school allowing at least one grade-level to leave the campus during the school day. As open campus privileges expand as the grade-level increases, the open campus percent from the CHSFFS should correspond to the percent of open campus high schools among twelfth graders in the survey results presented in Table 1. This figure is 51.5%, thus exhibiting a high degree of consistency with the results in the CHSFFS.[15]

The schools in the sample are scattered throughout California roughly in proportion to the school-aged population. Thus, many of the schools are in the state's largest cities - Los Angeles, San Francisco, Sacramento, and San Diego. Figure 1 maps all schools in the sample, with the variation in color representing the type of open/closed campus policy during the sample period in the tenth grade for each school.[16]

3.2 California Standard Tests (CST)

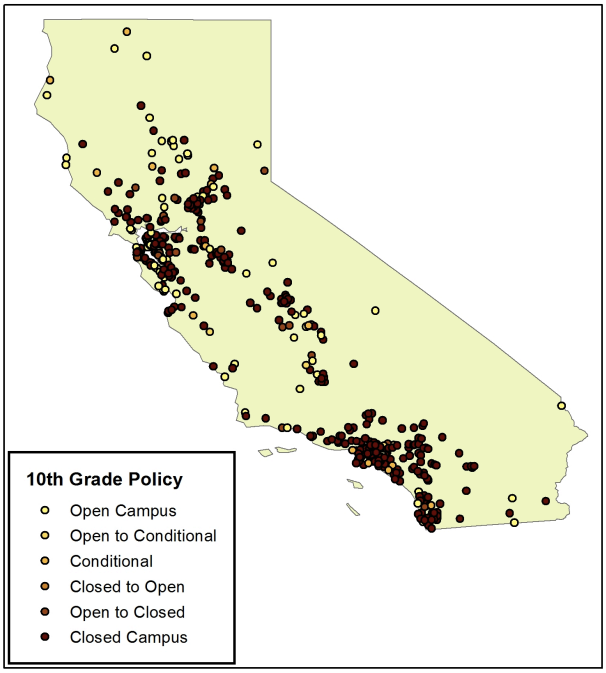
The California Department of Education (CDE) administers every Spring standardized tests for second through eleventh grade. I obtained from the CDE scores by test at the school-grade level for either the en-

[14]The Public Health Institute is a California-based independent, nonprofit organization dealing with health issues.

[15]The percent of closed campus policies in the sample as of 2003 was calculated by taking all high schools which had a closed campus policy all throughout the sample period (232 schools), with those that changed from a closed campus policy to some open campus policy (6 schools), and dividing by the total number of schools (462) for twelfth grade.

[16]The tenth grade was chosen just as a representative grade. Figure 1 most importantly highlights the geographic layout of the schools in the sample, which is almost identical across all grade-levels.

Figure 1: Geographic Distribution of Schools in Sample



Notes:
The above figure shows the geographic distribution of high schools in the sample. Each dot represents a high school with a sophomore grade-level. The various shades of the dots represent different open/closed campus policies during the sample period, as indicated by the legend. Source: CDE Directory (includes high schools' physical address).

tire student population or for groups of students based on demographic characteristics for 2003-2011.[17,18] For each observation in the CST data (i.e. a group of students tested exceeding 10 students within a grade at a school), several measures of performance are provided: mean scaled score, and percent at each of the five performance levels the CDE has set - advanced, proficient, basic, below basic, and far below basic. A breakdown by demographic groups is only available for the mean scaled scores, and therefore, performance-level percentages are only reported for grade-school observations containing all students. Mean scaled scores were standardized into Z-Scores based on means and standard deviations for each test and grade-level for a given school-year to control for any possible differences across years or grades in the tests. Changes in the percent of students obtaining performance levels are used for examining the effect of open/closed campus policies on the highest performers (percent advanced), higher performers (percent at the advanced and proficient levels together), lower performers (percent at the far below basic and below basic levels together), and lowest performers (percent far below basic).

The CST exams are in several subject areas. English Language Arts (ELA) is a grade-specific exam taken by all students at all tested grade-levels (i.e. second through eleventh) every year. Other exams which are mandatory for all high school students at specific grade-levels are: Science (10th grade), World History (10th grade), and U.S. History (11th grade). In Math, only second through seventh grade students are required to take a CST exam. After the seventh grade, all California students are required to pass an Algebra I exam, but students can decide whether to take it in the eighth or ninth grade.[19] The Algebra I exam completes all Math requirements for California students and all additional Math CST exams are optional. In all other subject areas (Biology, Earth Science, Chemistry, Physics), high school students take the CST exams based on course completion.

In order to determine which tests for specific grade-levels to include in the analysis, I initially chose all tests for specific grades, which satisfied the following: the average percent of test-takers out of total enrollment within California exceeded 30% for the period 2006-2011.[20] For these tests, I ran separate regressions at the grade-school-year level for the period 2003-2011 in order to determine whether there is concern for differential selection of students into test-taking based on different open/closed campus policies. The regression specified for this purpose had as its dependent variable the percent of students taking the exam at the grade-school level and the two independent variables of interest were indicator variables as to whether a conditional or unconditional open campus policy was in place that school-year. The regressions also controlled for school and grade-school level characteristics, school-year fixed effects and school fixed effects. The results of these regressions (for each relevant test in a relevant grade-level) are presented in the Online Appendix. The sample of tests for the analysis are those which do not exhibit a statistically significant change in the percent of test-takers when a specific open/closed campus policy is in place. It is assumed

[17] Due to changes in the format and grading of the exams beginning the 2002-2003 school year, the analysis presented in this paper makes use of data beginning in the 2002-2003 school year.

[18] If a reporting group has fewer than 10 students in it, CST scores for that group are censored.

[19] A minority of high-achieving students take the Algebra I exam already in the seventh grade.

[20] Data from the CDE on state-level percentages of test-takers at the test and grade-level is only available online beginning 2006.

that for these tests, we should be less concerned about student selection into tests in response to different open/closed campus policies. Based on this criterion, the final sample of tests is the following: ELA (grades 9-11), Science (10th grade), World History (10th grade), U.S. History (11th grade), Geometry (10th grade), and Biology (10th grade).

3.3 High School Dropout Rates

Annual school and grade-level data on the number of dropouts for seventh through twelfth grade for the school years 2002-2003 through 2010-2011 was obtained from the CDE. Each October, the CDE surveys all schools and requests from them information on the number of students enrolled in each grade and the number of students which dropped out of each grade-level over the past year. CDE uses this information to compute annual dropout figures for each grade.

The data can be imprecise, particularly for schools with very low enrollment and high dropout rates. Thus, there are several observations in the data with a dropout rate exceeding 100%. Following discussions regarding the accuracy of the dropout rates with CDE personnel, it was concluded that ninth grade observations with dropout rates above 20 percent and tenth through twelfth grade observations with dropout rates above 40 percent should be excluded. This resulted in just a few specific grade-school exclusions, but no entire school exclusions.

The distribution of dropout rates across schools is extremely skewed to the left, with most schools having a very low dropout rate. Figure 2 plots the distribution of dropout rates in the sample of high schools, by grade-level.

CDE also reports dropout rates at the grade-school level broken down by gender and ethnicity, thus allowing me to observe the effect of open campus policies by gender or ethnicity (white/black/Hispanic).

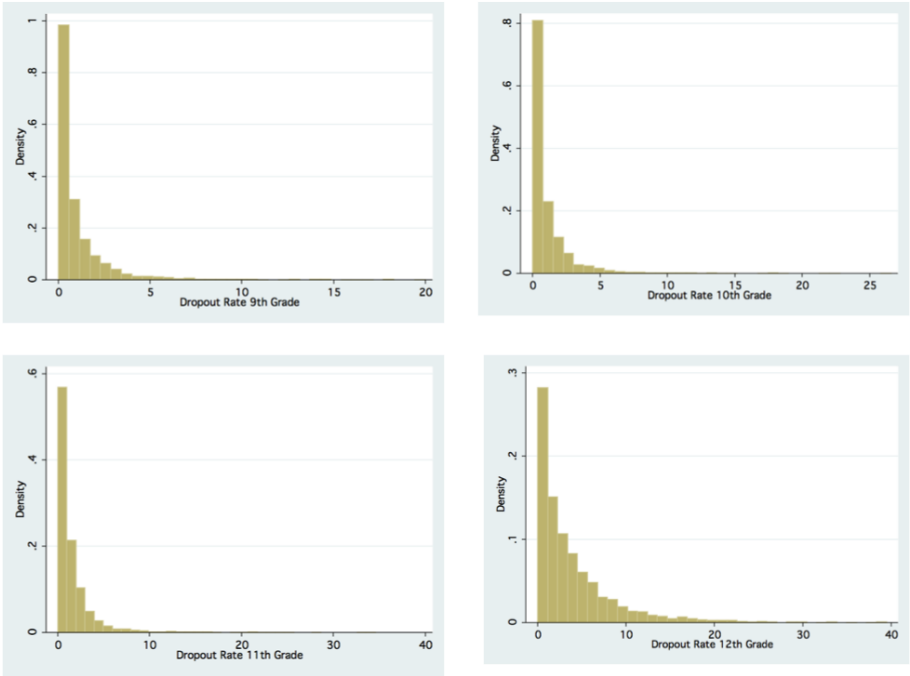
4 Empirical Strategy

4.1 Specification

The analysis for this paper utilizes a dataset which documents open/closed campus policies in high schools during the period 2003-2011 at the grade level and matches these to student outcomes. The final dataset is a panel dataset, with most grade-school combinations appearing for every school year.[21] The objective is to find the impact of an open campus policy on student outcomes, while distinguishing between conditional and unconditional open campus policies. Student outcomes are compared between grade-school observations with different open/closed campus policies, while some changed their policies during the sample period.

[21] The exception is schools that did not exist at the start of the sample period, or changed their grade composition over the sample period. There are 82 such schools out of the 465 high schools in our sample.

Figure 2: The Distribution of Dropout Rates Across Grade-Levels



Two sources of variation are exploited. The first source of variation is whether grade-school observations have an open or closed campus policy, and if open, whether conditional or unconditional. The second source of variation is with respect to the timing of the open/closed campus policies. This variation results from changes in grade-school observations' open/closed campus policies and differences in when these changes were implemented.

For the test score analysis, our unit of observation is at the year-school-grade level, and for each year-school-grade unit we may have multiple tests. The estimating equation is the following:

$$\begin{aligned} TestOutcome_{ysgt} &= \alpha_0 + \alpha_1 YrOpenNoCond_{ysg} + \alpha_2 YrOpenCond_{ysg} \\ &+ \gamma_1 X_{ysg} + \gamma_2 W_{ys} + \gamma_3 V_{ysgt} + test_t + yrgr_{gy} + grscl_{sg} + \varepsilon_{ysgt} \end{aligned} \tag{1}$$

In equation (1), the subscripts y, s, g, and t represent school-year, school, grade-level, and test respectively. $Outcome_{ysgt}$ is a measure of test scores, such as the Z-score or the percent at a specific or group of performance levels. The dummy variable $YrOpenNoCond_{ysg}$ ($YrOpenCond_{ysg}$) receives the value 1 if the grade-school observation is observed when an unconditional (conditional) open campus policy is in place. The coefficients of interest in equation (1) are α_1 and α_2. They measure how open campus policies with or without conditions differentially affect student outcomes, compared to a closed campus policy, the policy dummy variable excluded from the regression. These estimated effects are in excess of each grade-school's

average level of the outcome variable during the sample period, due to the inclusion of grade-school fixed effects, as represented by $grscl_{sg}$ in equation (1). The grade-school fixed effects control for both grade-school units' and schools' unobservable characteristics which are fixed over time and can potentially affect student outcomes. These can be characteristics of the student-body; characteristics of the staff and teachers at the school; the school's location; the school facilities; or the school environment. Estimates of α_1 and α_2 can be compared to each other - a statistically significant difference between α_1 and α_2 is evidence of the incentive scheme having a significant effect on student outcomes, beyond any potential effect of the open campus policy by itself (without conditioning it).

Joint year-grade fixed effects ($yrgr_{gy}$) control for annual unobservable characteristics specific to a grade-level. These fixed effects can potentially reduce noise resulting from policies implemented at certain years for just certain grades. This could be frequent within a state-wide education system, which implements various policies for specific grade-levels. Test fixed effects ($test_t$) control for inherent differences between the different subject areas in the sample of tests analyzed. X_{ysg} and W_{ys} represent time-varying characteristics at either the grade-school or just school level, respectively. These include: fraction Hispanic, fraction black, fraction white and enrollment at the grade level, and free and reduced price meal participation and total enrollment at the school level. V_{ysgt} is the percent of test-takers for each test in a given school-year at each grade-school unit out of total enrollment for that grade-school unit. Standard errors are clustered at the school level.

Because the data is not at the individual student level, but rather at the grade-school level, all regression results are calculated using the number of students in each grade-school unit as weights. Some outcomes are provided not only at the grade-school level, but are also broken down into subgroup based on ethnicity, gender or other demographic characteristics within a grade-school unit. Thus, equation (1) can also run separately for subgroups within the student population, with weights equaling the number of students within the subgroup.

For the dropout rates analysis, the specification is very similar to equation (1), and is the following:

$$\begin{aligned} DropoutRate_{ysg} &= \alpha_0 + \alpha_1 YrOpenNoCond_{ysg} + \alpha_2 YrOpenCond_{ysg} \\ &+ \gamma_1 X_{ysg} + \gamma_2 W_{ys} + yrgr_{gy} + grscl_{sg} + \varepsilon_{ysg} \end{aligned} \tag{2}$$

The main difference between equation (1) and equation (2) is that equation (2) does not include multiple observations for each grade-school-year observation (at the test level). All variables, clustering of standard errors, and weights for each grade-school unit are as in equation (1).

4.2 Identification

The main identification assumption is that absent the change in the policy for a grade-school observation, our outcome of interest would have equal time trends in *levels* as other grade-school observations which maintained the pre-change policy as constant during the entire sample period. One concern with this assumption is selection of schools or students into specific open/closed campus policies. If schools or students with specific characteristics that are correlated with our outcomes of interest are selecting into specific policies, then it can be argued that any statistically significant estimates for α_1 and/or α_2 in equation (1) are attributed to systematic differences in the characteristics between grade-school units or students in grade-school units with different open/closed campus policies, rather than the actual policies in place. To address this concern, I will first present several arguments against the possibility of selection of students at the grade-school level or grade-school units themselves into specific open/closed campus policies. I will then show results from placebo regressions which are consistent with ruling out the existence of systematic differences between grade-school units with different policies in place. Finally, I will also empirically address the concern with several robustness checks.

In many high schools, open/closed campus policies vary by grade-level. Furthermore, in some of the schools in the sample, the policies changed during the sample period for specific grade-levels. For these schools, self-selection of students into specific open/closed campus policies in response to policy changes at the grade-level would entail students switching schools after already starting at a specific high school. This is unlikely, given that the vast majority of high school students stay at the same school during their entire four years of high school. Besides students transferring between schools, an additional factor which may alter student characteristics for school-grade units with different open/closed campus policies is changes in dropout rates in response to the different policies. This concern is addressed in the dropout rate analysis (Section 5.2), and it is explained that given the decrease in dropout rates observed for both the conditional and unconditional open campus policies, it cannot be student compositional changes resulting from changes in dropout rates which are driving the test score results.

If schools with particular characteristics systematically select specific open/closed campus policies, then this means that changes in schools' open/closed campus policies are triggered by changes in these schools' characteristics. In practice, it seems that the determinants of high schools' open/closed campus policies are not linked to school characteristics for two reasons. First, some of these policies are historic, having been set as many as several decades ago. These historic policies determine the school's ability or lack of ability to change from one policy to another. In particular, in some cases, opening or closing a high school campus is not feasible due to the school's location (e.g. no lunch options sufficiently close to the school) or the school's infrastructure (e.g. no cafeteria in the school or a cafeteria unable to adequately serve the entire student body, unfenced school with many possible exits, or school being used for other community recreational activities during the school day). Second, changes in open/closed campus policies are frequently induced by exogenous events, not related to schools' characteristics - for example, fatal car

accidents while students were off campus or financial hardships, usually at the school district level.[22] Lastly, even if changes in open/closed campus policies are triggered by events which are related to characteristics of the student population - such as student fighting, substance abuse, student arrests off-campus, or the opening or closing of a shopping center by the school - the precise timing of such events and the school's response to change its policy are random in their nature. In particular, student characteristics which are correlated with these events are likely present within a given student population for some time until the school administration takes action to change its open/closed campus policy, following the particular events whose precise timing is random.

Table 2 presents summary statistics for the grade-school-year observations in the entire sample (column 1), as well as for those observations with a closed campus policy, unconditional open campus policy, or conditional open campus policy in place (columns 2, 3, and 4, respectively). Because the main analysis evaluates the effect of an unconditional/conditional open campus policy while it is in place, I run placebo tests in order to evaluate whether having a certain open/closed campus policy is correlated with certain characteristics at the grade-school level. These tests are regressions, as specified in equation (1), only the dependent variable is no longer a measure of academic achievement, but rather a characteristic at the grade-school/school level. In addition, the time-varying grade-school-level and school-level characteristics (X_{ysg} and W_{ys}, respectively) are omitted from the regression specification. The results of these placebo tests are presented in columns 5, 6, 7 and 8 of Table 2. Statistical significance of the coefficient estimates presented in Table 2 indicates that there is a statistically significant difference between grade-school observations which have an unconditional (column (5)) or conditional (column (6)) open campus policy, compared to grade school observations which have a closed campus policy, for the specific characteristic in that row. The p-values presented in column (7) indicate whether there is a statistically significant difference between grade-school observations with an unconditional open campus policy and grade-school observations with a conditional open campus policy for the specific characteristic in that row. Out of 27 (9*3) tests for statistically significant differences between school-grade observations experiencing different policies, only one test is statistically significant at the 10% level, which is evidence of no systematic differences in observed characteristics between grade-school observations experiencing different open/closed campus policies.

To further address concerns for differences in the time path of the dependent variables between grade-school units experiencing a change in policy and grade-school units with a constant policy during the sample period, I will add to my baseline estimating equation, specified in (1), a separate fourth-order polynomial in time for grade-school units which changed their open/closed campus policy during the sample

[22] To illustrate these arguments, I present anecdotal evidence from two school districts: In Novato Unified School district, a fatal car accident involving four high school students took place around noon on a school day in September 2010. In response to this, the school district's high school open campus policies came under attack. While the school board determined later that school year that closing campuses is preferable, the existence of no cafeteria in one of the two high schools posed a logistic constraint. The result was that open campus privileges were revoked in Fall 2011 from ninth grade students, although only at the school that had a cafeteria. In Jefferson Union High School District (JUHSD), as noted already in footnote 9, three high schools closed their campuses in 2004 in response to financial hardships the school district experienced, as the school board estimated this would increase revenues through higher participation in the National School Lunch Program. The fourth high school in JUHSD had a closed campus policy in place already in 2004, following a fatal car accident involving one of its students during lunch approximately five years earlier.

Table 2: Summary Statistics and Placebo Tests for Differences in Characteristics between Grade-School Observations when Experiencing different Open/Closed Campus Policies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Characteristic	**All Observations**	**Closed Campus**	**Unconditional Open Campus Policy**	**Conditional Open Campus Policy**	**Coefficient Estimate - Unconditional**	**Coefficient Estimate - Conditional**	**P-Value for Difference between (5) and (6)**	**N**
Number of Observations	15,206	10,191	3,740	1,275				
Fraction Hispanic	0.352	0.369	0.286	0.362	-0.008	0.004	0.297	15,206
	(0.250)	(0.248)	(0.252)	(0.232)	(0.007)	(0.012)		
Fraction Black	0.064	0.069	0.051	0.051	-0.001	-0.004*	0.221	15,206
	(0.083)	(0.084)	(0.087)	(0.063)	(0.002)	(0.003)		
Fraction White	0.401	0.383	0.436	0.470	0.005	0.015	0.350	15,206
	(0.253)	(0.253)	(0.245)	(0.255)	(0.006)	(0.012)		
Total Grade Enrollment	562.71	586.68	474.34	570.16	26.103	-7.977	0.215	15,206
	(227.30)	(236.14)	(178.47)	(201.44)	(19.650)	(30.166)		
Total School Enrollment	2,192.85	2,248.77	1,903.09	2,411.62	91.409	-7.750	0.208	15,206
	(804.31)	(807.70)	(716.16)	(804.35)	(75.793)	(102.798)		
Free and Reduced Price Meal	0.352	0.367	0.301	0.353	-0.016	-0.001	0.530	15,181
Population	(0.245)	(0.247)	(0.237)	(0.236)	(0.015)	(0.025)		
Percent with English as	0.119	0.126	0.108	0.096	-0.000	0.005	0.481	14,669
Second Language	(0.107)	(0.107)	(0.106)	(0.109)	(0.007)	(0.010)		
Number of Full-Time Equivalent	4.255	4.229	4.369	4.194	0.001	-0.096	0.267	11,572
Teachers per Student	(0.480)	(0.461)	(0.542)	(0.429)	(0.091)	(0.101)		
Average Years of Experience	13.619	13.379	14.081	14.531	0.199	0.581	0.533	11,572
Per Teacher	(2.785)	(2.799)	(2.556)	(2.889)	(0.268)	(0.633)		

Notes:
"Conditional" refers to having open campus privileges for students conditional on at least grades, test scores, or behavioral criteria. The results exclude seven schools which reported moving to a new site during the sample period, as well as the 9th grade classes in Visalia Unified School District (VUSD) high schools, due to implementation of a "Ninth-Grade Support Program" at the same time as open campus privileges were revoked to 9th graders in VUSD.
In columns (1)-(4): means are weighted by the number of students in each grade-school level and numbers in brackets are standard deviations.
In columns (5)-(8): each line presents the coefficient estimates of a single regression, as specified in equation (1), with the dependent variable being the grade-school characteristic listed, and the time-varying grade-school level and school-level characteristics omitted. Grade-school and grade-year fixed-effects are included. Data on full-time equivalent teachers per student and average years of experience per teacher was only available for 2007 through 2009. Numbers in parenthesis are standard errors clustered at the school level.
*** p<0.01, ** p<0.05, * p<0.1

period. To address concerns for differences in the time path of the dependent variables, whose correlation with the actual open/closed campus policy may be driven by a non-random pattern of the specific policies in place, I will add to my baseline specifications interactions between a fourth-order polynomial in time and key school/school-grade-level observables in a base year.[23] Including these separate flexible time paths based on school-grade units' characteristics and policies during the sample period allows me to reduce substantially concerns that systematic differences in grade-school units experiencing the different policies are driving the results.

Because the regression specification for the analysis compares grade-school units which switched their policy during the sample period to grade-school units which maintained a steady policy throughout the sample period, an additional approach which addresses concern for differences between observations experiencing different policies is to refine the comparison group of each grade-school unit which changed its policy during the sample period. This can be done through use of the synthetic control method developed in Abadie and Gardeazabal (2003) and Abadie et al. (2010). Because the synthetic control method is defined based on one outcome of interest for each unit for which a synthetic control group is constructed, the synthetic control method analysis will be confined to just one exam out of all exams included in the test score analysis - the ELA exam, which is the only exam mutual to all three grade-levels. See the Online Appendix for a discussion concerning the synthetic control method and how it is applied to this analysis.

If students with particular characteristics select into schools with specific open/closed campus policies, then students' mobility between schools with different policies should be very high. Because interdistrict transfers in California are not common,[24] then students' mobility between schools with different policies would potentially be high only in school districts with more than one high school (and these high schools would need to have different open/closed campus policies in place). However, in California, there is actually a large number of school districts with a single high school.[25] Out of 259 school districts in my sample, 91 have only one high school - i.e. over 35% of the school districts in my sample have a single high school. As a robustness check, I limit my sample of high schools to those that have single high schools within a school district and the results continue to hold for the most part - see Section 6 for further details.

An additional identification concern is that changes in open/closed campus policies occur in proximity to administrative changes in the high school, which can also have an effect on student outcomes. To address this concern, regressions are run, while limiting the sample of high schools to those which are not recorded to have experienced administrative changes during the sample period. Despite the drastic decrease in

[23] The observables chosen were: percent white, to represent the racial composition of the school-grade unit; total school enrollment to represent the school/grade size; and free or reduced price meal eligibility. The base year is for the most part 2003, the start of the sample period, with the exception of instances that the school did not exist at 2003, in which case the earliest year for which data on the school is available is the base year.

[24] According to the CDE, interdistrict transfers require the approval of an interdistrict transfer/reciprocal agreement by both sides. According to the CDE, "it is within the authority of either the home district or the receiving district to revoke an interdistrict transfer/reciprocal agreement at any time for any reason the local board or district superintendent deems appropriate." (source: http://www.cde.ca.gov/re/di/fq/districttransfers.asp#Interdistrict).

[25] For the purpose of defining single-high-school school districts, continuation schools or schools with alternative teaching methods (e.g. independent high schools, as defined by the CDE in http://www.cde.ca.gov/sp/eo/is/) were not considered valid alternatives for students within the school district.

the number of observations, the results still hold and exhibit that the conditional open campus policy is effective in improving students' test scores outcomes.

5 Results

5.1 Test Score Results

The specification described in equation (1) was run for test scores at the grade-school level for grades 9 through 11.

As a first step, I evaluate potential differences between the estimates for our coefficients of interest in equation (1) for various specifications. Table 3 presents the estimates for α_1 and α_2 in equation (1): the effect of having an unconditional and conditional open campus policy, respectively, in comparison to a closed campus policy. As can be seen, in all specifications, the effect of the conditional open campus on students' Z-Scores, relative to a closed campus policy, is positive and statistically significant. Furthermore and quite importantly, this effect is statistically significantly different from the effect of an unconditional open campus policy on students' Z-Scores, to which all coefficient estimates are negative. Thus, not only does Table 3 present evidence of the positive effect of the conditional open campus policy on students' test scores, but we can also attribute this effect to the incentive scheme behind the conditional open campus policy, due to the fact that this effect is statistically significantly different from the effect of an open campus policy without an incentive scheme. The results show that the positive effect of the conditional open campus policy, in comparison to a closed campus policy, as well as the statistically significant difference between the effect of the conditional and unconditional open campus policy, are robust to the inclusion of controls, including demographic characteristics and separate time polynomials interacted with a dummy for experiencing a change in policy or base-year demographics. Due to the identification concerns discussed in Section 4.2, the remaining results presented will include the controls specified in the last column of Table 3.

Table 4 presents results for the estimated effect of an unconditional/conditional open campus policy on students' Z-scores, broken down by demographic subgroups based on socioeconomic status[26], race, gender, and parents' educational attainment. All estimates of the effect of a conditional open campus policy, in comparison to a closed campus policy, are positive and for the most part statistically significant. The effect of a conditional open campus policy, in comparison to an unconditional open campus - which represents the effect of the incentive scheme on students' test scores - is statistically significant for all subgroups.[27] Quantitatively, when looking at the entire student population, a conditional open campus policy increases student test scores, in comparison to an unconditional open campus policy, by roughly one standard deviation ($0.077 + 0.025$). The magnitude of the incentive scheme embedded within the conditional open campus policy stays in the range of 0.71 to 1.38 of a standard deviation for all demographic subgroups examined,

[26]The CDE uses the term "economically disadvantaged" for students on free or reduced price meals, as part of the National School Lunch Program.

[27]For Blacks, it is only marginally statistically significant with a p-value of 10.8%.

Table 3: The Effect of an Unconditional/Conditional Open Campus Policy on Students' Mean Scaled Scores (Z-Scores) - All Students

	(1)	(2)	(3)	(4)	(5)	(6)
Unconditional Open Campus Policy	-0.002	-0.024	-0.026	-0.001	-0.012	-0.025
	(0.019)	(0.031)	(0.028)	(0.020)	(0.019)	(0.027)
Conditional Open Campus Policy	0.084**	0.091**	0.084**	0.077**	0.073**	0.077**
	(0.042)	(0.040)	(0.036)	(0.038)	(0.033)	(0.032)
P-Value for Difference between Coefficient Estimates	0.027	0.021	0.014	0.018	0.003	0.010
N	29,149	29,149	29,065	28,080	28,022	28,022
R^2	0.87	0.87	0.88	0.88	0.88	0.88
School-Grade Demographics			X		X	X
Time Polynomial Interacted with Change in Policy		X	X			X
Time Polynomial Interacted with Base-Year Demographics				X	X	X
School-Grade, Year-Grade, Exam Fixed Effects	X	X	X	X	X	X

Notes:
Dependent variable is the average Z-Score for students at the school-grade-year-test level. Regressions are weighted by the number of students in every school-grade-year level. Demographics are the following: percent black, percent Hispanic, percent white, total grade enrollment, and percent eligible for free or reduced price meals at the grade level; and total school enrollment at the school level. All regressions include fixed effects at the grade-school, year-grade, and exam level. Time polynomial interactions are a fourth-order polynomial in time interacted with a dummy for a change in policy (second row), or with percent white, total school enrollment and free or reduced meal eligibility in the earliest year the school-grade is observed (third row). The number of schools in all regressions is 465. Standard errors clustered at the school level are in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

and does not seem to vary systematically based on student demographic characteristics, which are either more or less associated with lower socioeconomic status.

Given the relatively low thresholds for academic achievement set in most schools as part of the conditional open campus policy, one would expect that the improvement in academic outcomes resulting from the conditional open campus policy would be driven primarily by low-performing students, who are incentivised through the conditional open campus policy to meet the minimal threshold. However, if one considers the possibility of spillovers from low-performing students to other students, then the improvement in academic outcomes could also be seen among students who are not near the low threshold set by the conditional open campus policy. In order to test these hypotheses, we turn to investigate the effect of the unconditional and conditional open campus policies on students' performance levels. Table 5 presents the results of equation (1), with four different dependent variables, measuring the percent of students within the grade-school unit achieving low (first two columns) or high (last two columns) performance levels. The results show that the improvement in test scores under the conditional open campus policy exists at both the low performance and high performance levels, although it grows stronger as the performance level gets lower. In particular, the conditional open campus policy lowers the percent at the far below basic level by 3.1 percentage points, which represents a 25.7 percent decrease in the average attaining the far below basic level. When looking at the combined percent for the far below basic and below basic performance levels,

Table 4: The Effect of an Unconditional/Conditional Open Campus Policy on Students' Mean Scaled Scores (Z-Scores) - by Demographic Subgroup

Subgroup	Unconditional Open Campus Policy	Conditional Open Campus Policy	Weighted Mean of Dependent Variable	N	P-Value for Difference between Coefficient Estimates
All Students	-0.025	0.077**	0.140	28,022	0.010
	(0.027)	(0.032)			
Economically Disadvantaged	-0.018	0.106***	-0.265	25,585	0.007
	(0.028)	(0.035)			
Not Economically Disadvantaged	-0.035	0.103***	0.391	26,890	0.000
	(0.035)	(0.033)			
Black	0.032	0.139**	-0.314	13,030	0.108
	(0.040)	(0.061)			
Hispanic	-0.006	0.084**	-0.246	25,848	0.075
	(0.027)	(0.042)			
White	-0.035	0.055	0.410	25,197	0.068
	(0.034)	(0.047)			
Male	-0.032	0.077**	0.113	27,685	0.019
	(0.033)	(0.037)			
Female	-0.020	0.078**	0.168	27,739	0.007
	(0.024)	(0.032)			
Parents w/o High School	-0.015	0.076*	-0.376	19,122	0.059
	(0.028)	(0.046)			
Parents w/ High School	-0.041	0.057	-0.144	23,518	0.044
	(0.032)	(0.044)			
Parents w/ Some College	-0.034	0.037	0.127	24,453	0.020
	(0.027)	(0.028)			
Parents College Graduates	0.011	0.097**	0.431	23,107	0.052
	(0.031)	(0.048)			
Parents Post-Graduates	-0.071*	0.062	0.847	18,550	0.006
	(0.039)	(0.045)			

Notes:
Dependent variable is the average Z-Score for students at the school-grade-year level. Each row represents a single regression for a specific subgroup. Regressions are weighted by the number of students in every school-grade-year-subgroup level. The mean of the dependent variable provided is weighted by the number of students tested at each school-grade-year-subgroup observation. Time-varying school and school-grade characteristics are controlled for: percent black, percent Hispanic, percent white, total grade enrollment, and percent eligible for free or reduced price meals at the grade level; and total school enrollment at the school level. Additional controls include four fourth-order polynomials in time interacted with: a dummy for a change in policy, with percent white, with total school enrollment and with free or reduced meal eligibility in the earliest year the school-grade is observed. All regressions include fixed effects at the school-grade, year-grade, and exam level. The number of schools in regressions is 465. Standard errors clustered at the school level are in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

Table 5: The Effect of an Unconditional/Conditional Open Campus Policy on Percent of Test Takers at Low/High Performance Levels

Dependent Variable	Percent Far Below Basic	Percent Far Below Basic or Below Basic	Percent at or Above Proficient	Percent Advanced
Unconditional Open Campus	0.279	1.022	-0.841	-0.319
	(0.829)	(1.192)	(1.042)	(0.645)
Conditional Open Campus	-2.859**	-4.120**	3.185***	1.196
	(1.189)	(1.594)	(1.204)	(0.725)
P-Value for Difference between Coefficient Estimates	0.011	0.004	0.012	0.097
Weighted Mean of Dependent Variable	12.19	27.68	44.29	19.68
Observations	28,022	28,022	28,022	28,022
R^2	0.76	0.84	0.89	0.88

Notes:
Dependent variable is the percent of students at the school-grade-year-test level at the defined performance levels. The mean of the dependent variables provided is weighted by the number of students tested at each school-grade-year-test observation. Regression specifications are as in Table 4. *** p<0.01, ** p<0.05, * p<0.1

the decrease resulting from the conditional open campus policy is 5.1 percentage points, which is 18.6 percent of the baseline. For the percent who are at the proficient or advanced levels, the increase measured is 4 percentage points, and this represents less than 10 percent of the baseline. Thus, Table 5 shows us that the conditional open campus policy is more effective in improving test scores among low-performing students. Nevertheless, this increase in the percent of students attaining higher performing levels is still substantial and likely to be evidence of spillovers occurring from the low-performing students to the high-performing students. Interestingly, even the increase in the percent attaining the advanced level - which is the highest performance level - is statistically significant at the 10% level, even though no conditional open campus policy sets its threshold at such a high performance level.

The next Table - Table 6 - evaluates equation (1) for each grade-test combination separately. This allows us to determine whether the improvement observed as a result of the conditional open campus policy is specific to certain grade-levels or tests. The results show that the conditional open campus policy is much more effective in improving test scores for 9th and 10th grade students, in comparison to 11th grade students, as can be seen even when comparing the results for separate grade-levels within the same exam - ELA. The magnitude of the effect of the conditional open campus policy decreases by more than half for 11th grade and is no longer statistically significant at conventional levels. For US History in the 11th grade no improvement in test scores is observed as a result of the conditional open campus policy. For 10th grade, ELA, Geometry and Biology, have a much larger and statistically significant effect than World History and Science.

Table 6: Does the Effect of an Unconditional/Conditional Open Campus Policy Vary by Subject or Grade?

Dependent Variable: Z-Score	ELA 9th Grade	ELA 10th Grade	ELA 11th Grade	Geometry 10th Grade	World History 10th Grade	US History 11th Grade	Biology 10th Grade	Science 10th Grade
Unconditional Open Campus	-0.080**	-0.075*	-0.010	-0.023	0.034	0.017	-0.001	-0.022
	(0.035)	(0.041)	(0.034)	(0.047)	(0.055)	(0.037)	(0.065)	(0.045)
Conditional Open Campus	0.063	0.067*	0.047	0.305***	0.162**	0.041	0.153**	0.063
	(0.063)	(0.039)	(0.045)	(0.063)	(0.080)	(0.049)	(0.073)	(0.044)
P-Value for Difference between Coefficient Estimates	0.029	0.003	0.112	0.000	0.149	0.588	0.042	0.173
Weighted Mean of Dependent Variable	0.203	0.169	0.148	-0.143	0.168	0.188	-0.037	0.164
Observations	3,823	3,730	3,517	3,602	3,716	3,517	3,584	2,533
R^2	0.96	0.95	0.94	0.87	0.91	0.91	0.85	0.95

Notes:
Dependent variable is the Z-score for each grade-school unit in a given school year. Each regression limits the sample only to the subject area and grade-level indicated at the top of the column. The mean of the dependent variables provided is weighted by the number of students tested at each school-grade-year-test observation. Regression specifications are as in Table 4. *** p<0.01, ** p<0.05, * p<0.1

5.2 High School Dropout Rates Results

The specification presented in equation (2) was run with the dependent variable being the dropout rate (in percent) for a grade-school-year observation and while controlling for grade-school-level demographic characteristics and the four fourth-order polynomials in time interactions, as specified in Sections 4.2 and 5.1.[28] Table 7 presents results for regressions with dropout rate as the dependent variable which were run for the entire student population (column 1), as well as for specific student populations, based on grade-level (columns 2-5), gender (columns 6-7), or ethnicity (columns 8-10). The results suggest that an open campus policy decreases dropout rates, in comparison to a closed campus policy, regardless of whether it is conditional or not. While the estimated negative effects of a conditional open campus policy or an unconditional open campus policy are not always statistically significant, the point estimates are always negative. In each regression, the magnitude of the conditional and unconditional coefficient estimates are fairly close to each other. For the full-sample specification, the magnitude estimated is 0.5-0.7 percentage points. This is large, compared to the weighted mean of the dropout rate across all grades and years, 2.1%. When breaking down the effect of an unconditional or conditional open campus policy by grade-level, the magnitude of the effect is increasing as the grade-level increases, which is consistent with the higher average dropout rates for the higher grade-levels. When evaluating males and females separately, we see a larger negative effect for the male population, and when evaluating dropout rates based on ethnicity, we see a substantially larger negative effect for the Black student population.

One potential explanation for a decrease in dropout rates in response to an unconditional open campus policy is that the freedom provided through an unconditional open campus policy is reducing the psychological cost of staying in school for the highest-risk students on the verge of dropping out. This line of argument cannot hold for explaining the decrease in dropout rates in response to a conditional open

[28] In regressions that explored variations of equation (2), as presented for Z-Scores and equation (1) in Table 3, the coefficient estimates when dropout rate was the dependent variable were found to be quite stable in terms of magnitude and statistically significant across the various specifications.

Table 7: The Effect of an Unconditional/Conditional Open Campus Policy on High School Dropout Rates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All Students	**9th Grade**	**10th Grade**	**11th Grade**	**12th Grade**	**Male**	**Female**	**White**	**Black**	**Hispanic**
Unconditional Open Campus	-0.685**	-0.128	-0.475*	-0.654	-1.624*	-0.802***	-0.505*	-0.216*	-2.659***	-0.654
	(0.274)	(0.151)	-0.244	(0.399)	(0.954)	(0.289)	(0.261)	(0.123)	(0.774)	(0.447)
Conditional Open Campus	-0.587*	-0.345	-0.281	-0.529	-1.146	-0.827*	-0.261	-0.143	-1.399	-0.248
	(0.337)	(0.337)	(0.281)	(0.534)	(0.916)	(0.428)	(0.301)	(0.216)	(1.557)	(0.433)
Weighted Mean of Dependent Variable	1.675	0.991	0.991	1.293	3.792	1.859	1.478	0.977	3.126	2.477
Observations	15,153	3,817	3,845	3,784	3,707	15,133	15,146	14,784	13,719	15,077
R^2	0.70	0.53	0.60	0.61	0.67	0.68	0.64	0.44	0.52	0.67

Notes:
Dependent variable is the dropout rate (in percent) for a year-school-grade observation. Columns (2)-(10) restrict the sample to only year-school-grade observations based on the columns title. Regression specifications are as in Table 4 (with the exception of exam fixed effects). Standard errors clustered at the school level
are in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

campus policy, due to the need to exert effort in order to be eligible for the open campus privilege under this policy regime. Thus, this logic could be evidence that the conditional open campus policy's incentive scheme is effective in reducing high schools students' dropout rates.

Changes in dropout rates are likely to affect the composition of students within a school, as it is almost entirely the lower-performing students who are on the verge of dropping out (see evidence for this from Rumberger and Arellano (2007) and Allensworth and Easton (2005)). This, in turn, can affect various student outcomes, when examining them at aggregate levels. Table 7 presents evidence of a decrease in dropout rates in response to both unconditional and conditional open campus policies, in comparison to a closed campus regime. Thus, a decrease in dropout rates should decrease aggregate test score outcomes through changes in the student composition. Despite this, the results in Tables 3-5 show that a conditional open campus policy actually *increases* test score outcomes, even among the higher-performing students (Table 5), in comparison to a closed campus policy. For unconditional open campus policies, we observe a decrease in test score outcomes - although in most specifications this is not statistically significant - and it is not possible to determine whether this decrease results from the open campus policy itself or from compositional changes in the student body (or both). Nevertheless, the increase in test score outcomes in response to a conditional open campus policy, in comparison to the unconditional open campus policy, is evidence that the incentive scheme behind the conditional open campus policy is effective in improving students' academic performance. A positive and statistically significant difference between the conditional open campus policy coefficient estimate and the unconditional open campus policy coefficient estimate can only be attributed to compositional changes in the student body if the decrease in dropout rates as a result of the conditional open campus policy is increasing the prevalence of students who were on the verge of dropping out but with average or above performance, while the decrease in dropout rates as a result of the unconditional open campus policy is increasing the prevalence of students with poor performance. While this is a theoretical possibility, which cannot be ruled out empirically, it seems highly unlikely, in particular

given the statistics that the vast majority of students who drop out of high school perform below average.

5.3 Discussion

The analysis above has shown that the effect of an open campus policy on student test scores, in comparison to a closed campus policy, depends on whether the open campus policy is unconditional or conditional. Not only is the difference between the effect of the two policies statistically significant, but there is also evidence of a qualitative difference between the two policies' effects, in comparison to a closed campus policy. These differences present direct evidence that the incentive scheme behind the conditional open campus is indeed effective in improving student academic outcomes.

Quantitatively, the results suggest an increase in test scores greater than 0.1 of a standard deviation in response to the incentive scheme behind a conditional open campus policy. This increase in test scores is considered modest but substantial in magnitude, when compared to other policy measures or school environments evaluated in recent literature. Rockoff (2004) observed a 0.15 standard deviation increase in response to a one standard deviation increase in teacher quality in elementary schools. Abdulkadiroğlu et al. (2011) report that one extra year of attending an over-subscribed charter school in Boston increases high school students' ELA results by 0.27 of a standard deviation. In Zimmer et al. (2010), after-school tutoring for elementary and middle-school low-income students in Pittsburgh increased their math test score performance by 0.14-0.26 of a standard deviation.[29] While these reported effects are greater in magnitude, in comparison to the estimated effect of a conditional open campus policy, it should be emphasized that a conditional open campus policy is virtually costless, in comparison to investments in teacher quality, opening more high-demand charter schools, or providing after-school tutoring. Furthermore, the magnitude of the effect is comparable to that of more costly student incentive schemes. Bettinger (2012) finds that a financial incentive scheme for Ohio elementary school students, which paid each student up to $100 in cash rewards, increased students' math test score outcomes by 0.15 of a standard deviation, an increase very close in magnitude to the results above, although the cost of a conditional open campus policy should be substantially less than $100 per student.[30]

In terms of the performance levels of students, Table 5 shows that the incentive scheme is most effective among the students who should be most responsive to the incentive scheme: low-performing students, who need to reach the minimal academic threshold in order to be eligible for the open campus privilege. Nevertheless, we still see a significant and even substantial improvement among high-performing students

[29] In Zimmer et al. (2010) the results are strictly for low-income students, while in Abdulkadiroğlu et al. (2011) the results are primarily for low-income students, as the Boston Public School system serves a disproportionately black and Hispanic student population and Boston's charter schools serve an even higher proportion of black students. Thus, when comparing these estimated effects to those of the conditional open campus policy for economically disadvantaged students - at least 0.13 of a standard deviation - the comparison is even closer.

[30] In Bettinger (2012) only math scores were affected by the financial incentive scheme and students were paid $15-20 for various achievement rates on 5 separate exams, with math being only one of them. Thus, given that the incentive scheme was only effective for math scores, the cost of the incentive scheme could have potentially gone down to up to $20 per student. On the other hand, the incentive scheme in Bettinger (2012) was for elementary school students in grades 3-6, and it seems plausible that high school students' financial incentive schemes would involve higher costs.

as well, thus indicating that the improved academic performance among low-performers may be spilling over to other students as well.

In the analysis for dropout rates, open campus policies are decreasing dropout rates, irrespective of whether they are conditional or not. However, the mechanism behind each of the open campus policies which is driving these outcomes may be different - while an unconditional open campus policy could decrease the psychological cost of attending school, this cannot be claimed for the conditional open campus policy, and it therefore appears that under the conditional open campus policy, the incentive scheme does work for at least some of the high-risk students on the verge of dropping out. Furthermore, and quite importantly, the dropout rate results support the notion that the test score outcomes regarding the effectiveness of the conditional open campus incentive scheme are not being driven by student compositional changes resulting from differential changes in dropout rates in response to the two distinct open campus policies.

Given the evidence that a conditional open campus policy improves test scores and possibly dropout rates, the question arises as to whether high school students' behavior - in particular behavior which may be directly linked to academic performance - varies under different open/closed campus policy regimes. This was examined using data from the California Health Kids Survey (CHKS), a state-wide bi-annual anonymous student survey, inquiring about student risky behavior. While the results of this analysis exhibited some behavioral changes in response to open campus policies, they were not conclusive in the comparison of the effects of conditional versus unconditional open campus policies on student behavioral outcomes. Additional details concerning this data and analysis are available in the Online Appendix.

6 Robustness Checks

The main identification assumption of the regression results presented in Section 5 is that students in the treated grade-school units are not experiencing any other changes at the same time that their open/closed campus policy is changing, which may affect their academic performance. The following addresses potential threats to this assumption through variations of equations (1) and (2) - either by changing the sample of grade-school observations, or changing the actual specification, in four separate robustness checks. Table 8 below presents the results.

6.1 Accounting for Administrative Changes Coinciding with Changes in Open/Closed Campus Policies

One potential cause for concern is that changes in open/closed campus policies are occurring shortly after or simultaneous to a change in the schools' administration. A change in a school principal may result in a change in the quality or effectiveness of the school administration, thus affecting student academic outcomes (Coelli and Green (2012)). To address this concern, I collected data from the CDE on all school

Table 8: The Effect of a Conditional/Unconditional Open Campus Policy on Test Scores and Dropout Rates - Robustness Checks

	Schools without Administrative Changes				School Districts with One High School			
	Z-Score	**Percent Below Basic and Far Below Basic**	**Percent at or Above Proficient**	**Dropout Rate**	**Z-Score**	**Percent Below Basic and Far Below Basic**	**Percent at or Above Proficient**	**Dropout Rate**
Unconditional Open Campus	0.081	-5.387	1.321	-3.931	-0.030	-0.193	-1.885	-0.056
	(0.078)	(3.364)	(3.390)	(2.468)	(0.027)	(1.705)	(1.288)	(0.268)
Conditional Open Campus	0.234**	-12.753***	8.806***	-4.848*	0.125	-8.303*	4.337	-0.611
	(0.089)	(3.757)	(3.108)	(2.477)	(0.077)	(4.328)	(2.659)	(0.552)
P-Value for Difference between Coefficient Estimates	0.010	0.030	0.003	0.001	0.041	0.040	0.038	0.272
Weighted Mean of Dependent Variable	0.0295	29.49	42.58	2.579	0.170	25.97	45.32	1.163
Observations	2,269	2,269	2,269	1,168	5,872	5,872	5,872	3,194
R^2	0.91	0.89	0.92	0.83	0.83	0.77	0.86	0.58
	Synthetic Control Method - ELA for Test Outcomes				**District-Specific Linear Time Trends**			
	Z-Score	**Percent Below Basic and Far Below Basic**	**Percent at or Above Proficient**	**Dropout Rate**	**Z-Score**	**Percent Below Basic and Far Below Basic**	**Percent at or Above Proficient**	**Dropout Rate**
Unconditional Open Campus	-0.066***	2.366**	-2.662**	-0.563**	-0.019	1.050	-0.694	-0.510
	(0.024)	(1.090)	(1.031)	(0.273)	(0.027)	(1.245)	(0.999)	(0.313)
Conditional Open Campus	0.044	-2.460	1.083	-0.619	0.045	-1.530	1.825	-0.394
	(0.034)	(1.829)	(1.226)	(0.391)	(0.033)	(1.455)	(1.396)	(0.404)
P-Value for Difference between Coefficient Estimates	0.002	0.007	0.003	0.846	0.079	0.099	0.111	0.704
Weighted Mean of Dependent Variable	0.127	26.36	46.03	2.063	0.140	27.68	44.29	1.675
Observations	2,013	2,015	2,040	2,793	28,022	28,022	28,022	15,153
R^2	0.96	0.93	0.97	0.67	0.89	0.85	0.90	0.72

Notes:
Dependent variables are as stated at the top of each column for each panel. Specifications are as described in equations (1) and (2) for test scores and dropout rates, respectively. The mean of the dependent variable provided is weighted by the number of students tested at each school-grade-year-subgroup observation. Time-varying school and school-grade characteristics are controlled for: percent black, percent Hispanic, percent white, total grade enrollment, and percent eligible for free or reduced price meals at the grade level; and total school enrollment at the school level. Additional controls include four fourth-order polynomials in time interacted with: a dummy for a change in policy, with percent white, with total school enrollment and with free or reduced meal eligibility in the earliest year the school-grade is observed. All regressions include fixed effects at the school-grade and year-grade level. Standard errors clustered at the school level are in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

principal changes for the high schools in the sample for the period 2006 through 2011. Prior to the 2006-2007 school year, CDE has very partial data on school administration changes.

As a first step, separate regressions were run to evaluate whether changes in open/closed campus policies are correlated with administrative changes in high schools. The results show a positive and statistically significant correlation between changes in the open/closed campus policy and an administrative change occurring in that high school during the preceding year. For the results concerning this correlation and further details on these regressions, see the Online Appendix. Due to the positive findings concerning the effect of administrative change on changes in the open/closed campus policy the following school-year, the regressions presented in Section 5 were run for the sample of school districts which did not experience administration changes between the school years 2006-2007 and 2010-2011. This resulted in a much smaller sample of school-grade observations - both because of data availability only beginning in the 2006-2007 school year and because of the sample limitation. Despite this smaller sample size - a reduction in the number of observations from over 28,000 to under 2,300 for the test score outcomes - the results presented in Section 5.1 still qualitatively hold. As shown in the top left panel of Table 8, the effect of a conditional open campus policy, in comparison to a closed campus policy, is statistically significant, and the difference between the coefficient estimate of the conditional and unconditional open campus policy is also statistically significant and in the right direction. However, the two coefficient estimates are also in the same qualitative direction, which varies from the contrasting coefficient estimates when the entire sample was used. Dropout rates are shown to decreases in response to both a conditional and unconditional open campus policy, in comparison to a closed campus policy, but more so under the conditional open campus policy.

6.2 School Districts with a Single High School

As discussed in Section 4.2, a concern with the identification in this study is that students with certain characteristics that are correlated with academic performance select into high schools with specific policies. Section 4.2 argues that including school-grade fixed effects in the regression specifications alleviates this concern. Results reported in Section 5 further address the concern for selection of schools into different policies through controlling for separate flexible time trends based on school and grade-school level demographic characteristics. Nevertheless, an additional approach to address this concern is to limit the sample used for the analysis to represent students who have very limited choice (if any) in terms of their high school. These are students who are in school districts which have one single high school. Out of 259 school districts in the sample, 91 were identified as school districts with a single high school.

The top right panel of Table 8 presents results for the effect of a conditional/unconditional open campus policy on Z-Scores, percent of high and low performers in test scores, and dropout rates, while limiting the sample to schools that are single high schools within their school district. The results exhibit a large and statistically significant effect of conditional open campus policies on test scores, in comparison to unconditionally open campus regimes. This is although the sample size has decreased substantially. For dropout

rates, the coefficient estimate for the unconditional open campus is much smaller in magnitude, while for the conditional open campus policy the coefficient estimate is negative, but not statistically distinct from the effect of either the closed campus regime or the unconditional open campus regime.

6.3 Synthetic Control Method

The synthetic control method enables me to address concern that the control units within the regression analysis are not comparable to the treated units. I define treatment as having experienced a change in the open/closed campus policy during the sample period at the grade-school unit, and find a comparable control unit for each such treated unit, which is constructed as a weighted set of control units, such that the distance of the outcome variable and characteristics between the treated unit and the control set is minimized (Abadie and Gardeazabal (2003) and Abadie et al. (2010)). The construction of the synthetic control units is limited to a single outcome variable. Thus, the synthetic control method results are presented for a single exam: ELA, the only exam in the analysis conducted at all grade-levels (9-11). The bottom left panel of Table 8 present the ELA results when equation (1) is run (with the exclusion of exam fixed effects), and the sample is defined using the synthetic control method. The results are consistent with an improvement in test score outcomes resulting from the conditional open campus policy, in comparison to the unconditional open campus. The magnitude of the effect is also similar to the magnitude presented in Tables 3 and 5. For dropout rates, we also see coefficient estimates which are very comparable to those in Table 7, only here they are only statistically significant for the unconditional open campus policy.

6.4 District-Specific Linear Time Trends

An additional specification presented in the bottom right panel of Table 8 takes equation (1) and adds to it school-district-specific linear time trends. The results of this specification show that a conditional open campus increases student test scores in comparison to an unconditional open campus on orders of magnitude which are slightly smaller than those presented in Section 5. For dropout rates, we still see decreases in response to both open campus policies, but these are not statistically significant when school-district-specific linear time trends are included. While school-district-specific linear time trends are important to address concerns that the variable of interest is correlated with trends over time in the dependent variable, these trends may also decrease the ability to exploit variation arising from policy changes over time, if the trends are representative of only a single (or very few) units of observation. In our sample, there are 259 school districts; however, 165 of these school districts have only one high school - either due to the school district being a single-high-school district or due to limitations in policy information collected for other high schools in the school district. Therefore, in a specification with school-district-specific linear time trends, for many schools experiencing a transition from one policy to another, the time trend will capture this transition and leave significantly less variation in the policy variables of interest to exploit in the estimation procedure. It is likely that this is the reason behind the reduction in the magnitude of the effect of

the conditional open campus policy, in comparison to the unconditional open campus policy, as well as the decrease in precision in the coefficient estimates, as presented in Table 8. Nevertheless, it is informative to see that the results are still robust - at least to some extent - to the inclusion of school-district-specific time trends, despite this loss of variation in the estimation procedure.

7 Concluding Remarks

Economists and policy makers have devoted considerable efforts toward understanding how to improve children's school performance. A large part of the existing economics literature has focused on students' school environment and less so on intrinsically motivating students to invest more effort in schooling.[31] In more recent years, economists have also been examining the effectiveness of student incentive schemes, where students are rewarded in exchange for academic outcomes. This paper contributes to the existing literature on the determinants of school performance by evaluating the effect of open/closed campus policies in high schools on student outcomes. Furthermore, because many open campus policies are conditional on students attaining certain academic or behavioral requirements, this paper also contributes to the more recent investigation in the economics of education literature on student incentive schemes and how students can be motivated to invest optimally in their schooling.

The results show that the effect of an open campus policy depends on whether the policy is conditional on students meeting academic or behavior requirements or unconditional. The evidence concerning the effectiveness of conditional open campus policies in incentivising students to improve academic performance supports past findings that students respond to incentives. This paper provides further evidence that incentivising students through short-term rewards, not related to their prospects in life or their personal sense of achievement, but rather just to being eligible to eat off-campus for lunch, may be effective in improving student academic outcomes. This paper may also provide evidence on the high value teenagers attribute to their individual autonomy, as going off campus can be seen as a realization of that value.

The main difference between this paper and most of the past literature on incentivising students is that the incentive scheme analyzed here is virtually costless.[32] This is particularly in contrast to other incentive schemes evaluated in past literature, which provide monetary rewards to students (Angrist and Lavy (2009); Fryer (2011); Bettinger (2012)), and are therefore quite costly.[33,34] Thus, conditional open campus policies can serve as a cost-effective means to improving student academic outcomes. Future research can investigate the effects of other policies, which provide incentives, though not through monetary or financial

[31] See Angrist and Lavy (1999) and Hoxby (2000) regarding class size, Angrist and Lang (2004) regarding peer effects, Rockoff (2004) regarding teacher quality, and Lavy (2009) on teacher performance-related pay.

[32] There are some minimal costs associated with monitoring conditional open campus policies, to make sure those who are not eligible to leave campus are not able to leave.

[33] Two exception to this are Barua and Vidal-Fernandez (2014) on the effects of conditioning teen driving privileges on staying in school and Vidal-Fernández (2011) on the effect of requiring student athletes to pass a certain number of subjects in order to be allowed to participate in school sports on high school graduation rates.

[34] Gneezy et al. (2011) review past literature on incentives for academic outcomes, and conclude that the small size of the effects do not justify the costs associated with most of the incentive schemes.

means, in improving student outcomes.

With the increase in child and adolescent obesity rates, there has been growing concern on the impact of open campus policies, which may increase student access to fast food establishments, on student nutrition and health outcomes.[35] A full evaluation of a conditional open campus policy should also take into account the potential negative effect of this policy through exposing high school students to unregulated foods outside of school (e.g. fast food establishments).[36]

[35]See Neumark-Sztainer et al. (2005) for an example of a paper from the public health literature showing that open campus policies in high schools result in students eating more frequently at fast food establishments.

[36]See Currie et al. (2010) for an analysis on the impact of high school proximity to fast food establishments on California ninth graders' BMI outcomes.

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